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Phd Thesis

**Development and Psychometric Evaluation of the Paternal
Pregnancy-Related Anxiety Scale (PPrAS)**

Dabb, Carol

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**Development and Psychometric Evaluation of the
Paternal Pregnancy-Related Anxiety Scale (PPrAS)**

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BPharm, DipHosPharm, BPsychSc(Hons)

A thesis submitted in total fulfilment of the requirements for the degree of

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Statement of Authorship and Sources

This thesis contains no material that has been extracted in whole or in part from a thesis that I have submitted towards the award of any other degree or diploma in any other tertiary institution. No other person's work has been used without due acknowledgment in the main text of the thesis. All research procedures reported in the thesis received the approval of the relevant Ethics/Safety Committees (where required). Chapters 3, 6, and 7 were written as manuscripts for journal submission. Refer to the Research Portfolio Appendix for details of the author contributions for these chapters.

.....

Carol Dabb

December 2023

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List of Publications

Chapter 3: Publication resulting from this research

Dabb, C., Dyer, R., Brunton, R. J., Yap, K., & Roach, V. J. (2023). Paternal pregnancy-related anxiety: Systematic review of men's concerns and experiences during their partners' pregnancies. *Journal of Affective Disorders*, 323, 640-658.

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Chapter 7: Manuscript in preparation

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Abstract

Approximately 10% of expectant fathers experience anxiety during their partner's pregnancy, with anxiety being linked to adverse outcomes for themselves and their families. The diagnosis and treatment of anxiety in expectant fathers is often overlooked in clinical practice, however researchers are increasingly recognising that men may experience pregnancy-related anxiety, characterised by pregnancy-specific concerns, worries, and fears. To address the current absence of a psychometrically sound measure of pregnancy-related anxiety which has been developed specifically for expectant fathers, the present research aimed to develop and evaluate a new measure, the Paternal Pregnancy-related Anxiety Scale (PPrAS).

Before generating potential items for the new scale, a comprehensive systematic review of qualitative and quantitative literature was conducted to examine men's experiences during their partner's pregnancy and identify the nature and breadth of their pregnancy-related concerns, worries, and fears. The systematic review identified 75 distinct concerns experienced by fathers during pregnancy, encompassed by 10 categories of concern, including: childbirth concerns, attitudes towards childbirth, baby concerns, acceptance of pregnancy, partner concerns, relationship concerns, worry about self, transition to parenthood, attitudes towards medical staff, and practical and financial concerns.

An initial item pool including 113 items was generated on the basis of the systematic review findings. The item pool was then modified after being evaluated by members ($N = 12$) of an expert review panel, resulting in a final item pool of 95 items.

Refinement of the item pool and subsequent psychometric evaluation of the newly developed scale was then conducted in several stages, using data collected from expectant fathers during two phases of data collection, using identical recruitment strategies. During Phase 1 of data collection (August 2022 to November 2022), 292 expectant fathers ($M_{\text{age}} =$

29.9 years, $SD = 5.55$) from Australia ($N = 146$) and the USA ($N = 146$) completed online questionnaires comprised of the revised item pool of 95 items and two additional measures, including an adapted maternal measure of pregnancy-related anxiety and a generic measure of anxiety. During Phase 2 of data collection (February 2023 to May 2023), 282 expectant fathers ($M_{age} = 28.50$, $SD = 4.60$), from Australia ($N = 149$), the USA ($N = 116$), and additional countries ($N = 17$), completed online questionnaires comprised of the newly developed PPrAS, two adapted maternal measures of pregnancy-related anxiety, two generic measures of anxiety, a measure of depression, and a measure of neuroticism.

Refinement of the item pool was conducted with the data collected during Phase 1 ($N = 292$). The revised item pool of 95 items was evaluated within the framework of the Rasch measurement model, to identify items for retention in the final scale. The resultant 33-item unidimensional scale demonstrated good fit, no evidence for differential item functioning, sound levels of targeting, and excellent internal consistency reliability.

Additional psychometric evaluation of the 33-item PPrAS was then conducted with the data collected during Phase 2 ($N = 282$), using methodology consistent with Classical Test Theory (CTT) approaches. Findings indicated excellent internal consistency reliability ($\alpha = .96$) and some evidence for construct validity. The PPrAS demonstrated significantly stronger correlations with the two convergent measures (general anxiety and an adapted maternal measure of pregnancy-related anxiety) than with the divergent measure of neuroticism. However, the size of the correlations between the PPrAS and the two convergent measures were not significantly different to the size of correlation with the divergent measure of depression, suggesting that the construct of pregnancy-related anxiety may not be as distinct from general anxiety or depression for expectant fathers as has been found previously in research with expectant mothers.

Further psychometric evaluation assessed concurrent validity by examining the ability of the PPrAS to identify fathers classified as anxious versus non-anxious, using a subsample of expectant fathers ($N = 152$), drawn from all participants from Phase 1 and Phase 2 of data collection. Using binary logistic regression and a Receiver Operating Characteristic (ROC) curve, it was found that the PPrAS significantly predicted whether fathers were classified as anxious or non-anxious, displaying high sensitivity (96.0%) and specificity (97.4%).

Overall, the research findings indicate that the PPrAS would be useful in clinical contexts, for identifying expectant fathers with high levels of pregnancy-related anxiety. While pregnancy-related anxiety in expectant fathers may not be as distinct from general anxiety or depression as seen in women; men are still likely to benefit from a paternal measure of pregnancy-related anxiety, given that expectant fathers may initially be reluctant to seek help specifically for anxiety or depression, but are instead more likely to engage in services that target practical skills (e.g., baby care classes). The PPrAS addresses this barrier to receiving support by providing a context for exploring men's pregnancy-related concerns while assessing their levels of anxiety. With sound psychometric properties, the newly developed PPrAS provides researchers and clinicians an opportunity to extend the current understanding of paternal pregnancy-related anxiety and provide better support to fathers during pregnancy.

Chapter 1: Introduction and Overview

Pregnancy is recognised to be a time of significant transition for fathers (Åsenhed et al., 2013; Kowlessar et al., 2015). Many men experience a range of emotions during pregnancy, including happiness, excitement, apprehension, and fear (Åsenhed et al., 2013; Baldwin et al., 2019). Compared with men in the general population, expectant fathers are at increased risk of experiencing anxiety symptoms (Leiferman et al., 2021). Moreover, research comparing expectant mothers with fathers has found that men with high anxiety levels are more likely to experience increased symptom scores than women with high anxiety levels, suggesting that anxiety during pregnancy may be particularly problematic for fathers (Korja et al., 2018). Two factors found to increase the risk of anxiety symptoms in expectant fathers are increased pregnancy-related worries (Biehle & Mickelson, 2011; Göbel et al., 2020) and low perceived social support (Dixson et al., 2023; Koh et al., 2015). Systematic reviews have reported prevalence rates of anxiety in expectant fathers as high as 16% (Leach et al., 2016) and 25% (Philpott et al., 2019). A recent meta-analysis found that approximately 10% of expectant fathers experience anxiety symptoms during pregnancy, with the reported prevalence of anxiety ranging from 2.4% to 42% across 23 studies (Leiferman et al., 2021).

Anxiety in fathers during pregnancy is linked to multiple adverse outcomes for themselves, their infants, and relationships (Philpott et al., 2019). Expectant fathers with anxiety are more likely to experience sleeping difficulties (Dixson et al., 2023; Finnbogadóttir & Persson, 2019; 2022) and depressive symptoms (Durkin et al., 2001; Finnbogadóttir & Persson, 2019) during their partner's pregnancy. Moreover, paternal prenatal anxiety is a predictor of paternal postnatal depression (Howarth & Swain, 2020; Ramchandani et al., 2008), which in turn predicts the later development of psychiatric disorders and social difficulties in their children at seven years of age (Ramchandani et al.,

2008). Paternal prenatal anxiety is also associated with adverse parenting outcomes, including poorer paternal prenatal attachment to their unborn child (Vreeswijk et al., 2014) and poorer bonding with their infants, three months after the birth (Trautmann-Villalba et al., 2023). At three months post-birth, these fathers are also more likely to exhibit lower responsiveness to their infants (Parfitt et al., 2013) and experience increased parenting stress, which in turn is associated with increased infant negative reactivity (Prino et al., 2016). At six months post-birth, their risk of experiencing parenting stress remains high (Skjothaug et al., 2018) and their development of parental self-efficacy is reduced (Pinto et al., 2016).

Paternal prenatal anxiety is also associated with adverse maternal outcomes, including maternal prenatal anxiety and depression (Brandão et al., 2019; Canário & Figueiredo, 2017; Koh et al., 2015). Moreover, anxiety in expectant fathers may undermine the crucial support they provide their pregnant partners, in that paternal prenatal anxiety has been associated with paternal gender role stress and symptoms of anger (Durkin et al., 2001), hostility (Göbel et al., 2020), and reduced relationship satisfaction (Brandão et al., 2019; Cameron et al., 2021). With low perceived partner support, pregnant women risk experiencing prenatal (Cheng et al., 2016; Hyer et al., 2022) and postnatal (Parfitt & Ayers, 2014; Pilkington et al., 2015) mental health difficulties and are at increased risk of preterm birth (Ghosh et al., 2010) and having low birth-weight babies (Lee et al., 2018).

Considering the aforementioned adverse outcomes for fathers and their families, addressing anxiety in expectant fathers is likely to improve the wellbeing of fathers as well as the whole family unit (Fisher et al., 2021). However, fathers often report feeling excluded by health care professionals during pregnancy (Rominov et al., 2018; Steen et al., 2012). To complicate matters, research indicates that fathers are often reluctant to seek help for their emotional wellbeing during pregnancy and are more comfortable seeking help for practical or parenting challenges (Matthey et al., 2009; Rominov et al., 2018). These barriers highlight

that without proactive steps taken by clinicians, the diagnosis and treatment of anxiety in expectant fathers may be overlooked (Koh et al., 2015). Clinical practice guidelines, within Australia (Highet et al., 2023) and internationally (Fisher et al., 2021), are therefore increasingly placing importance on addressing men's perinatal mental health and are recommending that partners of pregnant women be included in routine mental health screening (Darwin et al., 2021). Including expectant fathers in antenatal care and proactively assessing them for anxiety by exploring their pregnancy-related concerns, may address some of their barriers to receiving help, by creating a pregnancy-specific context for their assessment and support. Furthermore, this approach may improve men's sense of perceived support (Dixson et al., 2023; Koh et al., 2015) and address their pregnancy-related worries (Biehle & Mickelson, 2011; Göbel et al., 2020), thereby targeting the two previously mentioned risk factors found to be associated with paternal prenatal anxiety.

Defining Pregnancy-Related Anxiety

Pregnancy-related anxiety was first identified as a distinct type of anxiety, in research with women (Huizink et al., 2004). Research indicates that mothers may not only experience specific and generalised anxiety disorders during pregnancy (Blair et al., 2011; Leach et al., 2017), but they are also susceptible to pregnancy-related anxiety (Huizink et al., 2004), also known as pregnancy anxiety or pregnancy-specific anxiety (Dunkel Schetter, & Ponting, 2022). Pregnancy-related anxiety has been defined by Bayrampour et al. (2016), as “nervousness and fear about the baby's health, the mother's health and appearance, experience with the health care system, social and financial issues in the context of pregnancy, childbirth, and parenting that are accompanied by excessive worry and somatic symptoms” (p. 121). According to this definition, pregnancy-related anxiety arises from the pregnancy-specific concerns, worries, and fears experienced by parents. Therefore, measures of pregnancy-related anxiety are distinguishable from generic measures of anxiety or distress,

since the nature and content of the items included in pregnancy-related anxiety scales are specifically related to pregnancy. Although the bulk of pregnancy-related anxiety research has been conducted with women, men are also likely to experience pregnancy-related anxiety, arising from worries that are specific to their partner's pregnancy (Cameron et al., 2021).

Research provides strong evidence that pregnancy-related anxiety is a different entity to general anxiety or depression in expectant mothers (Anderson et al., 2018; Brunton et al., 2019; Huizink et al., 2004) and expectant fathers (Cameron et al., 2021). Huizink et al. (2004) identified three broad areas of concern for women with pregnancy-related anxiety, including: fear of giving birth, fear of bearing a handicapped child, and concern about one's appearance. Using multiple regression analyses, they found that general anxiety and depression did not account for a large proportion of variance in these three pregnancy-related factors. This finding provided evidence for differentiating pregnancy-related anxiety from general anxiety and depression. Recent studies have replicated these findings (Anderson et al., 2018; Brunton et al., 2019).

Further evidence for pregnancy-related anxiety is found in research which has demonstrated that measures of pregnancy-related anxiety uniquely predict adverse outcomes, not predicted by generic measures of anxiety. For example, in longitudinal research with men, pregnancy-related anxiety was a better predictor of paternal postnatal depression and anxiety, than prenatal general anxiety (Cameron et al., 2021). In women, measures of pregnancy-related anxiety have uniquely predicted preterm delivery (Lobel et al., 2008), negative emotional reactivity in infants at 6 months of age (Nolvi et al., 2016), and negative affectivity in children at 2 years of age (Blair et al., 2011).

Given the distinct nature of pregnancy-related anxiety, it is unlikely that generic measures of anxiety or distress would adequately identify individuals with elevated levels of

pregnancy-related anxiety. This is because generic measures of anxiety do not address any of the specific concerns parents experience in relation to pregnancy (Anderson et al., 2018; Brunton et al., 2019; Cameron et al., 2021). Accordingly, to avoid missed diagnosis and misdiagnosis, researchers have directed increased attention to developing psychometrically sound measures of pregnancy-related anxiety in women (e.g., Brunton et al., 2021; Dryer et al., 2022). However, research with expectant fathers is still emerging, and currently there is no well-established pregnancy-related anxiety measure available, that has been specifically developed for men.

Research Aims and Outline of Chapters

Considering the high prevalence of paternal anxiety during pregnancy and the risk of associated adverse outcomes for fathers and their families, the main goal of this research was to improve the screening and support provided to expectant fathers, by developing and evaluating a new measure of pregnancy-related anxiety, that has been specifically developed for men. This is not to say that fathers may not also be affected by general anxiety, however, the rationale for developing a paternal pregnancy-related anxiety scale was on the basis of the aforementioned research on maternal pregnancy-related anxiety, indicating that pregnancy-related anxiety is distinct from general anxiety (e.g., Brunton et al., 2019). Therefore, a similar research approach was used for examining the construct of pregnancy-related anxiety in fathers and for the subsequent development of the scale.

The new measure, the Paternal Pregnancy-related Anxiety Scale (PPrAS), aims to improve the diagnosis and treatment of anxiety in expectant fathers, which has often been overlooked during the delivery of antenatal care (Koh et al., 2015). Moreover, it is anticipated that the PPrAS would be a useful tool for improving the perceived support received by fathers during pregnancy, by addressing their sense of exclusion and creating a non-threatening context for evaluating anxiety by exploring men's pregnancy-related concerns,

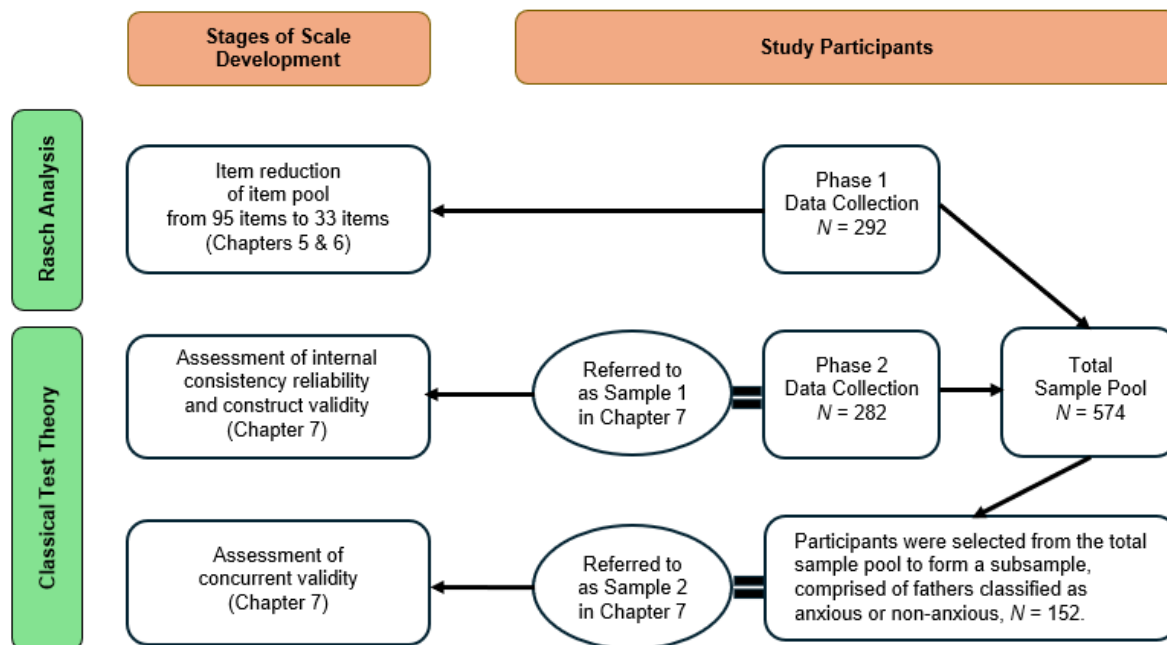
worries, and fears. A more specific pregnancy-related measure for anxiety in expectant fathers will be able to identify whether or not the worries, concerns, or fears of fathers are related to pregnancy, so that specific support can be implemented in order to prevent perinatal mood disorders (Biehle & Mickelson, 2011; Göbel et al., 2020).

The following chapters outline the systematic research undertaken to develop and evaluate the new measure. Chapter 2 provides context for the current need for a new scale for expectant fathers by comprehensively reviewing the scales currently used to measure general anxiety, pregnancy-related anxiety, and closely related constructs in research with expectant fathers. Following this, Chapter 3 presents a published systematic review of qualitative and quantitative literature, which was conducted to explore the experiences of fathers during their partner's pregnancy and to identify the nature of their pregnancy-specific concerns, worries, and fears. Chapter 4 then outlines the steps taken to generate an initial item pool of potential items for the new scale on the basis of the systematic review findings, presented in Chapter 3. Evaluation and revision of the initial item pool through the use of an Expert Review Panel (ERP) is also reported in Chapter 4.

The research described in Chapters 5, 6, and 7 is depicted in Figure 1.1. This research was conducted in stages to refine the item pool using Rasch Analysis (Chapters 5 and 6) and conduct additional psychometric evaluation of the refined scale using methodology consistent with Classical Test Theory (CTT) approaches (Chapter 7). Data for these chapters was collected from online questionnaires, completed by expectant fathers during two phases of data collection, using identical recruitment strategies.

Figure 1.1

Stages of Scale Development Outlined in Chapters 5, 6, and 7



Chapter 5 first provides a detailed overview of the analytical methods used to apply the Rasch measurement model to scale development of the PPrAS. Chapter 6 then describes the development and psychometric evaluation of the PPrAS in a research report, written as a manuscript for journal publication. The research report outlines the stages of scale development, including generation of the initial item pool, evaluation by the ERP, administration of the revised item pool to a sample of expectant fathers (Phase 1 data collection), and the Rasch methodology used to select the items retained in the final 33-item scale.

Following from the research presented in Chapter 6, Chapter 7 addresses the need for further psychometric evaluation of the newly developed PPrAS using a new sample and different methods than those used during initial scale development. Therefore, Chapter 7 extends on the research in Chapter 6, by evaluating the psychometric properties of the PPrAS

using Classical Test Theory (CTT) approaches with a new sample of expectant fathers and with a second subsample of participants. Internal consistency reliability and construct validity were examined using the new sample (“Sample 1”), which was the data collected during Phase 2 of the current thesis. Chapter 7 then presents an assessment of concurrent validity, by examining the ability of the PPrAS to identify fathers classified as anxious versus non-anxious, using “Sample 2,” which is a subsample of expectant fathers, drawn from all participants from Phase 1 and Phase 2 of data collection. Finally, Chapter 8 provides an overall discussion and conclusion to the research conducted for this thesis.

Chapter 2: Literature Review of Scales used to Measure Anxiety and Related Constructs in Expectant Fathers

Clinical practice guidelines within Australia (Highet et al., 2023) and internationally (Fisher et al., 2021) are increasingly highlighting the need to address men's perinatal mental health, particularly in regard to the need for routine mental health assessment of partners during the perinatal period (Darwin et al., 2021). A father inclusive model of perinatal mental health services proposed by Fletcher et al. (2015) involves screening for depression, anxiety, and psychosocial risk factors alongside the mother. However, current clinical practice guidelines provide limited recommendations for the assessment and treatment of fathers experiencing prenatal anxiety (Leach et al., 2016). Antenatal mental health screening of fathers is largely seen as optional in the USA (Fisher et al., 2021). Contrastingly, in the UK, the National Health Service good practice guide (Darwin et al., 2020) recommends that clinicians routinely ask about the mental health of fathers. However, no specific assessment tools are recommended.

Similarly, in Australia, despite recommending routine perinatal mental health screening of fathers, the Centre of Perinatal Excellence (COPE; Highet et al., 2023), does not currently recommend any specific screening tools due to an absence of male-specific measures of distress. Therefore, the current consensus-based recommendation is for clinicians to select a screening tool in accordance with which tools are available, and their professional competencies (Highet et al., 2023). Within perinatal health settings, the Edinburgh Postnatal Depression Scale (EPDS; Cox et al., 1987) is readily available and has been validated for fathers with a lower cut-off score of 5/6 (Matthey et al., 2001). When administering the EPDS to men, the Australian guidelines recommend that practitioners examine responses to individual items rather than solely relying on total scores (Highet et al., 2023). Responses to

EPDS items 3, 4, and 5 would provide clinicians with some information about men's anxiety symptoms. Otherwise, clinicians may choose to administer a generic measure of anxiety, such as the anxiety subscale of the Depression Anxiety and Stress Scale (DASS-21; Lovibond & Lovibond, 1995).

Within the extant literature, research examining anxiety in expectant fathers has predominantly relied on generic measures of anxiety. The present scoping review was conducted to gain a comprehensive understanding of the breadth of measurement instruments used in research examining anxiety, or closely related constructs, in expectant fathers. The review aimed to identify the most suitable measures currently available for assessing pregnancy-related anxiety in expectant fathers. Any studies which examined pregnancy-related and general anxiety, or which assessed expectant fathers for closely related constructs, such as worry, stress, fear, and psychosocial adjustment were included. Studies were included regardless of whether the measures they used were well-established measures, or they had been created by the researchers for immediate use within a specific study (i.e., self-constructed scale).

The following electronic databases of peer-reviewed journal articles and dissertations were searched on 30 July 2023, with no date limits: CINAHL Complete, Medline Complete, APA PsycArticles, APA PsycInfo, psycEXTRA, and OpenDissertations. The search strategy included the Boolean terms "OR" and "AND" and used truncation "*". Keywords and their synonyms were combined as follows to search titles (pregnan* OR expectant OR expecting OR prenatal OR prepartum OR antenatal OR antepartum OR perinatal OR peripartum) AND to search titles OR abstracts (Partner* OR Father* OR paternal OR dad* OR male* OR men) AND to search titles OR abstracts (anxiety OR anxi* OR distress OR stress OR cop* OR adjust* OR worr* OR fear* OR concern).

A large proportion of research with expectant fathers was originally conducted with couples, to examine the psychosocial functioning of both expectant parents. The most commonly used approach to assess anxiety in expectant parents has been to administer a well-established generic measure of anxiety, such as the State-Trait Anxiety Inventory (STAI; Spielberger et al., 1970) or the DASS-21. Researchers have examined related constructs, such as psychological stress or distress in expectant couples, using scales such as the Kessler 6-item Psychological Distress scale (K6; Kessler et al., 2002) or more frequently, the Perceived Stress Scale (PSS; Cohen et al., 1983).

Table 2.1 presents details of the measurement instruments used by 90 studies, which examined anxiety and related constructs in expectant couples. Each study is listed according to the primary measure used, grouped into seven categories based on the psychological construct examined. Apart from the use of generic measures of anxiety or stress/distress, the five remaining categories of measures shown in Table 2.1 are all pregnancy-specific approaches to measuring psychosocial functioning in expectant parents. The seven categories of measures are: (a) generic measures of anxiety; (b) psychological stress/distress; (c) antenatal psychosocial assessment tools; (d) fear of childbirth; (e) pregnancy concerns, worries, or fears; (f) pregnancy stress/distress; and (g) maternal measures of pregnancy-related anxiety, used with couples. Depending on their original aims, a number of the included studies may have examined multiple anxiety-related psychological constructs. For example, Lindgren et al. (2017) operationalised psychological distress during pregnancy as a combination of pregnancy worries and non-specific anxiety. Therefore, both the Cambridge Worry Scale (CWS; Green et al., 2003) and the anxiety subscale of the Hospital Anxiety & Depression Scale (HADS-A; Zigmond & Snaith, 1983) were used. Studies using multiple measurement instruments are listed in Table 2.1 according to the primary anxiety(-related) measure used, with any additional measures shown as secondary measures.

Table 2.1*Measures of Anxiety and Related Constructs in Research with Expectant Couples*

Studies grouped by primary measures	Language	Sample size	Secondary measures
Generic Measures of Anxiety			
State-Trait Anxiety Inventory (STAI; Spielberger et al., 1970)			
Arnal-Remón et al. (2015)	Spanish	50 couples	
Braren et al. (2020)	English & Dutch	385 couples	GHQ-12
Canário & Figueiredo (2017), State	Portuguese	129 couples	
Conde et al. (2021), State	Portuguese	66 women, 65 men	
Durkin et al. (2001), 10-item version State	English	327 couples	
Ekelin et al. (2009), 20-item Trait, 6-item State	Swedish	1,258 women, 925 men	
Field et al. (2006)	English	156 couples	
Figueiredo & Conde (2011a; 2011b), State	Portuguese	260 couples	
Formica et al. (2018), Trait	Italian	40 couples	
Han et al. (2023), State	Chinese	306 couples	
Juulia Paavonen et al. (2017), 6-item State	Finnish	1,667 women, 1,598 men	PSS-5
Kiepura & Kmita (2020)	Polish	250 couples	
McMahon et al. (1997)	English	133 couples	
McMahon et al. (2007), State	English	66 couples	
Prino et al. (2016)	Italian	29 couples	
Tambelli et al. (2019), Trait	Italian	146 women, 105 men	
Teixeira et al. (2009), State	Portuguese	270 women, 213 men	
Tendais & Figueiredo (2016), State	Portuguese	231 couples	
Terzioglu et al. (2016), State	Turkish	217 couples	
Thome & Arnardottir (2013)	Icelandic	39 couples	
Trautmann-Villalba et al. (2023), Trait	German	63 couples	
Turton et al. (2006)	English	76 couples	
Wang et al. (2020), State (Secondary: Hjelmstedt, Widström, Wramsby, Matthiesen, & Collins, 2003; Kannenberg et al., 2016. State: Tolvanen et al., 2013. Trait: Theut et al., 1988)	Chinese	440 couples	
Depression Anxiety and Stress Scale (DASS; Lovibond & Lovibond, 1995)			
Camarneiro & Justo (2022), DASS-42	Portuguese	67 couples	BSI
Baldwin et al. (2022), DASS-21	English	299 women, 241 partners	
Clifton et al. (2022), DASS-21	English	454 women, 454 partners	
Dixson et al. (2023), DASS-21	English	180 couples	
Nasreen et al. (2018), 7-item anxiety subscale	Malay	911 women, 587 men	
Van der Meulen et al. (2023), DASS-21	Dutch	141 women, 120 partners	PSS-10
Hospital Anxiety & Depression Scale, anxiety subscale (HADS-A; Zigmond & Snaith, 1983)			
Brandão et al., 2019	Portuguese	320 couples	
Luz et al. (2017)	French	40 couples	
Missler et al. (2020) (Secondary: Lindgren et al., 2017)	Dutch	138 women, 96 men	

Table 2.1 (continued)

Studies grouped by primary measures	Language	Sample size	Secondary measures
Generalized Anxiety Disorder scale (GAD-7; Spitzer et al., 2006)			
Göbel et al. (2019)	German	93 couples	
Qin et al. (2022) (Secondary: Warriner et al., 2018)	Chinese	171 couples	
EPDS, 3-item anxiety subscale (EPDS-3A; Matthey, 2008)			
Zhu et al. (2018)	English	362 women, 248 partners	
Matthey Generic Mood Question (Matthey et al., 2013)			
Della Vedova et al. (2019)	Italian	93 couples	
Taylor Manifest Anxiety Scale (MAS; Taylor, 1953)			
Feinberg et al. (2013), 20-item short form	English	128 couples	
General Health Questionnaire (GHQ; Goldberg & Hillier; 1979)			
Sälevaara et al. (2018), 36-item version	Finnish	130 couples	
Spry et al. (2020), 12-item version	English	398 women, 267 men	
Summerscales (2003), 12-item version (Secondary: Braren et al., 2020, 12-item)	English	38 women, 29 men	PSS-14
Hopkins Symptom Checklist, 90-item scale (HSC; Lipman et al., 1979)			
Bekkhus et al. (2022), 4 anxiety items	Norwegian	Parents of 8,771 sibling pairs	
Oftedal et al. (2023), 8 anxiety items (Secondary: Lucero et al., 2013, 10-item ANX)	Norwegian	286 women, 211 men	
Crown-Crisp Experiential Index (CCEI; Birtchnell et al., 1988)			
Ben-Shlomo et al. (2016)	English	Parents of 6,090 children	
Capron et al. (2015)	English	Parents of 4,303 children	
Van Batenburg-Eddes et al. (2013) ^a	English	Parents of 3,442 children	
Brief symptom inventory (BSI; Derogatis & Spencer, 1982)			
Guxens et al. (2013)	Dutch	Parents of 5,283 children	
Guxens et al. (2014)	Dutch	Parents of 4,848 children	
Taal et al. (2013)	Dutch	Parents of 4,831 children	
van Batenburg-Eddes et al. (2013), ^a 6-item ANX	Dutch	Parents of 2,280 children	
van Meel et al. (2020), 6-item ANX (Secondary: Camarneiro & Justo, 2022)	Dutch	Parents of 4,231 children	
Brief symptom inventory-18 (BSI-18; Derogatis, 2000)			
Guedes & Canavarro (2014)	Portuguese	95 couples	
Psychiatric Symptom Index, 7-item ANX (Ilfeld, 1976)			
Lachance-Grzela & Bouchard (2009)	French	154 couples	
Profile of Mood States, 9-item tension subscale (McNair et al., 1981)			
Condon & Esuvaranathan (1990)	English	52 couples	

Table 2.1 (continued)

Studies grouped by primary measures	Language	Sample size	Secondary measures
Symptom Checklist-90 (SCL-90; Derogatis et al., 1973)			
Korja et al. (2018), 10-item ANX	Finnish	3,202 women, 2,076 men	
Lahti et al. (2020), 10-item ANX	Finnish	3,808 women, 2,623 men	
Symptom Checklist-90, Revised (SCL-90-R; Derogatis, 1984)			
Terrone et al. (2020) (Secondary: Biehle & Mickelson, 2011, 10-item ANX)	Italian	137 couples	
Symptom Checklist-5 (SCL-5; Tambs & Moum, 1993)			
Kvalevaag et al. (2014) ^b	Norwegian	19,580 father-child dyads	
Kvalevaag et al. (2015)	Norwegian	28,695 couples	
Single item anxiety symptom question (Condon, 1987)			
Condon (1987)	English	165 couples	
Measures of Psychological Stress/Distress			
Kessler 6-item Psychological Distress scale (K6; Kessler et al., 2002)			
Yoshimasu et al. (2017)	Japanese	9,103 women, 5,476 men	
Perceived Stress Scale (PSS; Cohen et al., 1983)			
Baldoni et al. (2020), 10-item	Italian	114 couples	
Castelar-Ríos et al. (2022), 14-item	Spanish	130 Women, 106 men	
Gugliandolo et al. (2021), 10-item	Italian	246 couples	
Han et al. (2022), 14-item	Chinese	314 couples	
Kumar et al. (2022), 4 items selected from PSS	English	154 couples	
Mangialavori et al. (2021), 10-item	Italian	138 couples	
Martin & Brock (2023), 14-item	English	157 couples	
Penner et al. (2022), 14-item (Secondary: 14-item: Summerscales, 2003; Warriner et al., 2018 10-item: Van der Meulen et al., 2023 5-item: Juulia Paavonen et al., 2017)	English	52 women, 31 men	
Antenatal Psychosocial Assessment Tools			
Emotional Responses to Pregnancy Scale (ERPS; Hjelmstedt, Widström, Wramsby, Matthiesen, & Collins, 2003)			
Hjelmstedt, Widström, Wramsby, Matthiesen, & Collins (2003)	Swedish	100 women, 94 men	STAI
Hjelmstedt, Widström, Wramsby, & Collins (2003)	Swedish	same sample as above	
Prenatal Psychosocial Profile (PPP; Curry, 1994)			
Yu et al. (2011)	English	66 couples	
Fear of Childbirth Measures			
Ringler childbirth-related fear scale (Szeverényi et al., 1998)			
Szeverényi et al. (1998)	Hungarian	216 couples	
Childbirth Attitudes Questionnaire (Areskog et al., 1982)			
Biehle & Mickelson (2011)	English	104 couples	SCL-90R-ANX10

Table 2.1 (continued)

Studies grouped by primary measures	Language	Sample size	Secondary measures
Wijma Delivery Expectancy Questionnaire (W-DEQ-A; Wijma et al., 1998) Mäkelä et al. (2023)	Finnish & Swedish	3,853 women, 3,020 men	FOC-VAS
Fear of Childbirth Visual Analogue Scale (FOC-VAS; Rouhe et al., 2009) (Secondary measure used by Mäkelä et al., 2023)			
Fear of Birth Scale, 2-item VAS (FOBS; Haines et al., 2011) Sercekus, Vardar, & Ozkan, (2020)	Turkish	282 couples	
Fear of childbirth 4-point rating scale (Waldenström et al., 2006) Hildingsson et al. (2010)	Swedish	1,212 women, 1,105 men	
Measures of Pregnancy Concerns, Worries, or Fears			
Cambridge Worry Scale (CWS; Green et al., 2003) Lindgren et al. (2017)	Swedish	194 women, 186 men	HADS-A
25-item Pregnancy-fears (Kannenberg et al., 2016) Kannenberg et al. (2016)	German	259 women, 183 men	STAI
Measures of Pregnancy Stress/Distress			
Stress Amount Checklist (SAC; Barnett et al., 1983) Brown (1986)	English	313 couples	
Pregnancy-related stress scale (Ahn, 1985) Lee et al. (2021)	Korean	120 couples	
Tilburg Pregnancy Distress Scale (Pop et al., 2011) Warriner et al. (2018)	English	86 women, 69 men	GAD-7, PSS-14
Maternal Measures of Pregnancy-Related Anxiety			
Pregnancy-Related Anxiety Measure (PRAM; Rini et al., 1999) Saxbe et al. (2018) Stevenson et al. (2019)	English English	51 couples 48 couples	
Pregnancy-Related Anxiety Questionnaire (PRAQ; Van den Bergh, 1990) Winter et al. (2016), 20-item adaptation	Dutch	185 women, 157 men	
10-item revised PRAQ (PRAQ-R; Huizink et al., 2004) Lucero et al. (2013) Tolvanen et al. (2013)	English Finnish	178 couples 99 women, 74 men	HOP-A-CL-10 STAI-S
Pregnancy Outcome Questionnaire (Theut et al., 1988) Armstrong (2002) Armstrong (2004) Franche & Mikail (1999) Theut et al. (1988)	English English English English	103 couples 40 couples 62 women, 51 men 56 couples	STAI-T

Note. This table lists only the measures used to assess anxiety or related constructs, such as worry, stress, and fear (other study measures are not shown). Studies using multiple measurement instruments are listed according to the primary anxiety(-related) measure used, with additional measures shown as secondary measures (studies using measures as secondary measures are also shown in parentheses). ANX = Anxiety subscale. GHQ-12 = 12-item version of General Health Questionnaire. PSS-5, PSS-10, PSS-14 = 5-item, 10-item, and 14-item versions

of Perceived Stress Scale. BSI = Brief Symptom Inventory. STAI = Stait-Trait Anxiety Inventory, including Stait (S) and Trait (T) subscales. SCL-90R-ANX10 = 10-item anxiety subscale of Revised Symptom Check List. VAS = Visual Analogue Scale. FOC-VAS = Fear of Childbirth Visual Analogue Scale. HADS-A = Hospital Anxiety and Depression Scale, anxiety subscale. GAD-7 = 7-item Generalized Anxiety Disorder scale. HOP-A-CL-10 = 10-item Hopkins Anxiety Check List.

^aTwo entries for van Batenburg-Eddes et al. (2013) represent two cohorts of Dutch and English parents, using different measures (CCEI and BSI).

^bKvalevaag et al. (2014) primarily focused on fathers, however it is included in this table because the research was part of a larger study also involving mothers.

Table 2.2 presents details of the measurement instruments used by 50 studies (specifically focused on expectant fathers) which examined anxiety and related constructs. The “c” superscript in Table 2.2 denotes those measures which have been specifically developed or validated for use in expectant fathers. Consistent with the approach used in research with couples, research examining anxiety in expectant fathers has also predominantly relied on generic measures of anxiety, with the STAI being the most commonly used measure of anxiety.

Table 2.2*Measures of Anxiety and Related Constructs in Research with Expectant Fathers*

Studies grouped by primary measures	Language	Sample size	Secondary measures
Generic Measures of Anxiety			
State-Trait Anxiety Inventory (STAI; Spielberger et al., 1970)			
Charandabi et al. (2017)	Persian	126	
Finnbogadóttir & Persson (2019)	Swedish	532 ^a	
Finnbogadóttir & Persson (2022), State	Swedish	as above ^b	
Fishbein (1984), State	English	103	
Latifses et al. (2005), State	English	175	
Mohammadpour et al. (2021)	Persian	102	PSS-14
Pinto et al. (2016), State	Portuguese	86	
Pinto et al. (2022), State	Portuguese	85	
Teichman & Lahav (1987), Trait	Hebrew	90	
Vreeswijk et al. (2014)	Dutch	301	
(Secondary: Pinto et al., 2018 State: Glazer, 1989; Pinto et al., 2017)			
Depression Anxiety and Stress Scale (DASS-21; Lovibond & Lovibond, 1995)			
Wee et al. (2015)	English	150	
(Secondary: Ghaffari, Elyasi, Mousavinasab, & Shahhosseini, 2022; Ghaffari, Elyasi, Nikbakht, & Shahhosseini, 2022)			
Hospital Anxiety & Depression Scale, anxiety subscale (HADS-A; Zigmond & Snaith, 1983)			
Koh et al. (2015)	Chinese	622	
Sartori et al. (2018)	English	300	
Generalized Anxiety Disorder scale (GAD-7; Spitzer et al, 2006)			
Beesley et al. (2019)	English	166	
Zacher et al. (2023)	German	163	
(Secondary: Göbel et al., 2020)			
Beck Anxiety Inventory (BAI; Beck et al., 1988)			
Sockol & Allred (2018)	English	145	
IPAT Anxiety Scale Questionnaire, Hebrew version (ASQ; Gerzi & Berman, 1981)			
Gerzi & Berman (1981)	Hebrew	51	
Goldberg Depression and Anxiety Scales (Goldberg et al., 1988)			
Leach et al. (2015)	English	88	
General Health Questionnaire (GHQ-28; Goldberg & Hillier; 1979)			
Boyce et al. (2007)	English	312	HSC
Condon et al. (2004)	English	as above ^b	HSC, MHI-5
Hopkins Symptom Checklist, 90-item (HSC; Lipman et al., 1979)			
(Secondary: Boyce et al., 2007; Condon et al., 2004)			
Mental Health Inventory (MHI-5; Berwick et al., 1991)			
(Secondary: Condon et al., 2004)			

Table 2.2 (continued)

Studies grouped by primary measures	Language	Sample size	Secondary measures
Crown-Crisp Experiential Index (CCEI; Birtchnell et al., 1988)			
Ramchandani et al. (2008)	English	8332	
Brief symptom inventory (BSI; Derogatis & Spencer, 1982)			
Diemer (1997)	English	83	
Symptom Checklist-90, Revised (SCL-90-R; Derogatis, 1984)			
Mangialavori et al. (2020)	Italian	350	PSS-10
(Secondary: 25-item version, SCL-25 used by Golchin et al., 2022; Hajikhani et al., 2018)			
Computer-Assisted Personal Interview (CAPI)			
Knappe et al. (2021)	German	109	
Measures of Psychological Stress/Distress			
Perceived Stress Scale (PSS; Cohen et al., 1983)			
Kuljanić et al. (2016), 10-item	Croatian	143	
Underwood et al. (2017), 10-item	English	3,523	
(Secondary: 14-item: Mohammadpour et al., 2021. 10-item: Ibrahim, 2020; Mangialavori et al., 2021)			
Ireton Personal Inventory (IPI; Ireton, 1980)			
Clinton (1986)	English	81	
Antenatal Psychosocial Assessment Tools			
° Paternal Adjustment and Paternal Attitudes, Antenatal (PAPA-AN; Pinto et al., 2017)			
Pinto et al., 2017	Portuguese	128	STAI-S
Pinto et al., 2018	Portuguese	197	STAI
° Antenatal Multidimensional Paternal Perinatal Scale (ANT-MPPS; Gemayel et al., 2021)			
Gemayel et al. (2021)	English	198	
Fear of Childbirth Measures			
Wijma Delivery Expectancy Questionnaire (W-DEQ-A; Wijma et al., 1998)			
Bergström et al. (2013)	Swedish	762	CWS
Ryding et al. (2018)	Finnish	228 ^a	
° Father's Fear of Childbirth Scale (FFCS; Ghaffari et al., 2021)			
Ghaffari et al. (2021)	Persian	433	
Ghaffari, Elyasi, Mousavinasab, & Shahhosseini (2022)	Persian	50	DASS-21
Ghaffari, Elyasi, Nikbakht, & Shahhosseini (2022)	Persian	502	DASS-21
Fear of Birth Scale, 2-item VAS (FOBS; Haines et al., 2011)			
Hildingsson, Johansson, et al. (2014)	Swedish	1047	
Hildingsson, Haines, et al. (2014)	Swedish	as above ^b	

Table 2.2 (continued)

Studies grouped by primary measures	Language	Sample size	Secondary measures
Measures of Pregnancy Concerns, Worries, or Fears			
Cambridge Worry Scale (CWS; Green et al., 2003) Göbel et al. (2020) (Secondary: Bergström et al., 2013)	German	129	GAD-7
Worry scale for expectant fathers (Forsyth et al., 2011) Forsyth et al. (2011)	English	48	
Assessment of birth and future concerns in fathers (Gawlik et al., 2014) Gawlik et al. (2014)	German	102	
^c Fathers' Concerns Questionnaire (FCQ) on low-risk pregnancies of their wives (Hajikhani et al., 2020) Hajikhani et al. (2020)	Persian	302	
^c Men's Worry about High-risk Pregnancy Questionnaire (MWHQP; Hajikhani et al., 2018) Hajikhani et al. (2018)	Persian	370	SCL-25
^c Expectant Fathers' Fear Scale, (EFFS; Waldbaum, 1975) Waldbaum (1975)	Persian	294	SCL-25
^c Expectant Fathers' Fear Scale, (EFFS; Waldbaum, 1975) Waldbaum (1975)	English	63	
Measures of Pregnancy Stress/Distress			
Revised Prenatal Distress Questionnaire (Lobel et al., 2008) Ibrahim (2020), adapted for fathers	English	156	PSS-10
^c Feelings of Pregnancy Questionnaire (Glazer, 1989) Glazer (1989)	English	108	STAI-S
Maternal Measures of Pregnancy-Related Anxiety			
^c Pregnancy-Related Anxiety Measure (PRAM; Rini et al., 1999) Cameron et al. (2021), adapted for fathers	English	142	
PRAQ-R (Huizink et al., 2004), 7-item adapted scale Skjothaug et al. (2015)	Norwegian	881	
Skjothaug et al. (2018) and Skjothaug et al. (2020)	Norwegian	835	

Note. This table lists only the measures used to assess anxiety or related constructs, such as worry, stress, and fear (other study measures are not shown). Studies using multiple measurement instruments are listed according to the primary anxiety(-related) measure used, with additional measures shown as secondary measures (studies using measures as secondary measures are also shown in parentheses). PSS-10 and PSS-14 = 10-item and 14-item versions of Perceived Stress Scale. HSC = Hopkins Symptom Checklist. MHI-5 = Mental Health Inventory. STAI = Stait-Trait Anxiety Inventory, including Stait (S) and Trait (T) subscales. CWS = Cambridge Worry Scale. DASS-21 = 21-item Depression Anxiety and Stress Scale. SCL-25 = 25-item version of Revised Symptom Checklist-90. GAD-7 = 7-item Generalized Anxiety Disorder scale.

^a Sample included female partners.

^b Same study sample included in the research shown in row above.

^c Measure has been specifically developed or validated for use in expectant fathers.

Consistent with current clinical practice, the research outlined in Tables 2.1 and 2.2 with couples and expectant fathers has largely relied on generic measures of anxiety (and to a lesser extent, generic measures of psychological stress or distress) to assess men for anxiety or stress symptoms during the prenatal period. However, this assessment approach may be argued as problematic, because these measures primarily assess the core symptoms of anxiety or distress, and do not address the worries, fears, or concerns that are directly related to pregnancy. Consequently, there is increased likelihood of these generic measures of anxiety or stress not effectively identifying fathers with problematic anxiety that is specifically bound to their partner's pregnancy (Cameron et al., 2021). Measurement instruments using the five other assessment approaches shown in Tables 2.1 and 2.2 (namely, antenatal psychosocial assessment tools; fear of childbirth measures; measures of pregnancy concerns, worries, or fears; measures of pregnancy stress/distress; and maternal measures of pregnancy-related anxiety) may better address the potential limitations of using generic measures of anxiety or distress with expectant fathers, by including items related to pregnancy experiences or concerns. It is noteworthy that across these five categories of pregnancy-specific assessment approaches outlined in this chapter, there is considerable overlap in the content of items included in the reviewed measures. In many cases, researchers have developed new measures, and given them titles which do not always accurately reflect the content assessed (Dunkel Schetter & Ponting, 2022). For example, in accordance with its title, the Tilburg Pregnancy Distress Scale (Pop et al., 2011) is included in Table 2.1 with measures of pregnancy stress/distress, however, the items more closely represent the construct of pregnancy-related anxiety than distress.

A review of the research using each of the five pregnancy-specific assessment approaches is outlined below. The relevant measures used within this research will be

described and evaluated in terms of their potential to evaluate pregnancy-related anxiety in expectant fathers.

Antenatal Psychosocial Assessment Tools

Antenatal psychosocial assessment tools have been used in research with couples by adapting a previously developed maternal scale (Yu et al., 2011) or by self-constructing a scale for immediate research purposes (Hjelmstedt, Widström, Wramsby, Matthiesen, & Collins, 2003). In research with expectant fathers, new paternal measures have been created using psychometric scale development methodologies (Gemayel et al., 2021) or by adapting an existing maternal scale for fathers (Pinto et al., 2017).

To improve the assessment of psychosocial well-being in expectant parents, Yu et al. (2011) evaluated the Prenatal Psychosocial Profile (Curry, 1994), a maternal scale of psychosocial functioning, by comparing the factor structure of this measure between expectant women and their partners. The 44-item Prenatal Psychosocial Profile is comprised of four subscales, assessing: stress, support from partner, social support from others, and self-esteem. While internal consistency reliability was equal for women and men ($\alpha = .89$), there were unique differences in the items which loaded onto each subscale for women versus men. For example, the following items loaded as financial stressors for men but as emotional stressors for women: “problems related to family,” “the current pregnancy,” and, “feeling generally overloaded.” These findings highlight that maternal measures cannot be assumed to function equivalently when used with men. Although the Prenatal Psychosocial Profile is considered a pregnancy-specific psychosocial measure, the 11-item stress subscale assessed the following stressors: financial worries (e.g., food, shelter, health care, transportation), other money worries (e.g., bills), family problems, moving house (recently or in future), recent loss of loved one, current pregnancy, current abuse, problems with alcohol and/or drugs, work problems, problems related to friends, and generally feeling ‘overloaded;’ rather

than addressing pregnancy-specific stressors. Given the absence of items addressing pregnancy-specific concerns (e.g., childbirth, health of pregnant partner, transition to parenthood), the Prenatal Psychosocial Profile is unlikely to be a suitable measure of pregnancy-related anxiety in expectant fathers.

The Emotional Responses to Pregnancy Scale (ERPS; Hjelmstedt, Widström, Wramsby, Matthiesen, & Collins, 2003) was self-constructed for research to compare the experiences of couples who had conceived by In Vitro Fertilisation (IVF) with couples who had conceived naturally, in cross-sectional (Hjelmstedt, Widström, Wramsby, Matthiesen, & Collins, 2003) and longitudinal (Hjelmstedt, Widström, Wramsby, & Collins, 2003) research. Partly based on concepts within the Baby Schema Questionnaire (BSQ; Gloger-Tippelt, 1983), the 7-item ERPS includes four factors (internal consistency values include men and women): ambivalence about the pregnancy (2 items, $\alpha = .76$), difficulty imagining the pregnancy (2 items, $\alpha = .71$), anxiety about losing the pregnancy (2 items, $\alpha = .61$), and anxiety related to the baby's health (1 item). High ERPS total scores indicate a high degree of ambivalence toward the pregnancy, difficulty to imagine the pregnancy, anxiety related to the pregnancy, and anxiety related to the health and normality of the expected baby. Since the ERPS addresses concerns about the pregnancy and health of the baby, it would provide a better measure of pregnancy-related anxiety than the Prenatal Psychosocial Profile. However, the potential usefulness of the ERPS as a paternal pregnancy-related anxiety measure is limited by the restricted breadth of pregnancy-specific items included in the scale (i.e., two items related to miscarriage, and one item related to health of the fetus), and their low internal consistency reliability.

Recent research with expectant fathers has led to the development of the Antenatal Multidimensional Paternal Perinatal Scale (ANT-MPPS; Gemayel et al., 2021). The ANT-MPPS is a 36-item psychosocial scale to assess fathers for risk of developing poor emotional

wellbeing, including depression, anxiety, and stress. The scale is comprised of five subscales: father-mother relationship, parental competency, father-mother sexual relationship, expectations, and father's support to the mother. Internal consistency reliability ranged from $\alpha = .64$ to $.94$ for each subscale. Example items are, "I find it challenging to give support for my partner since pregnancy" and "I wish I was more prepared to have a new child." Although many of the scale items are relevant to the construct of paternal pregnancy-related anxiety, the ANT-MPPS is limited by low internal consistency reliability for some subscales and the absence of items addressing commonly reported concerns of fathers during their partner's pregnancy; including concerns regarding the health of partner and baby (e.g. Baldwin et al., 2019; Pilkington & Rominov, 2017) and childbirth concerns (e.g. Dolan & Coe, 2011; Sercekus, Vardar, Goral Turkcu, & Ozkan, 2020).

Pinto et al. (2017) assessed paternal adjustment during pregnancy by adapting a maternal scale to create the 30-item Paternal Adjustment and Paternal Attitudes-Antenatal questionnaire (PAPA-AN). Three PAPA-AN subscales broadly assess paternal adjustment, by measuring attitudes towards: the pregnancy and baby (10 items, $\alpha = .71$), the relationship with partner (10 items, $\alpha = .74$), and the sexual relationship (10 items, $\alpha = .82$). High internal consistency reliability for the full scale ($\alpha = .91$) has been reported for two different samples of expectant fathers (Pinto et al., 2017; Pinto et al., 2018). As a measure of prenatal adjustment, higher scores on the PAPA-AN indicate higher paternal adjustment and more positive paternal attitudes during pregnancy. Therefore, as expected, the PAPA-AN was negatively correlated with anxiety (STAI-S), $r = -.30$, and depression (EPDS), $r = -.48$ (Pinto et al., 2017). The PAPA-AN captures pregnancy-related concerns relevant for assessing pregnancy-related anxiety, including worries about being a good father, worries about caring for the baby, and worries that life will be more difficult after birth. However, this broad measure of adjustment omits more commonly reported concerns of expectant fathers, such as

worries about partner and baby health (e.g. Baldwin et al., 2019; Biehle & Mickelson, 2011), childbirth concerns (e.g. Greer et al., 2014; Pilkington & Rominov, 2017), and financial concerns (e.g. Biehle & Mickelson, 2011; Pilkington & Rominov, 2017), restricting the utility of the PAPA-AN as a potential measure for paternal pregnancy-related anxiety in fathers.

Overall, the antenatal psychosocial assessment tools used in research with expectant couples and fathers have provided researchers with useful pregnancy-specific scales for assessing men's adjustment and attitudes during pregnancy. However, these scales are unlikely to effectively evaluate pregnancy-related anxiety in expectant fathers, because they do not encompass the range of men's concerns, worries, or fears related to their partner's pregnancy. One important area of concern for expectant fathers relates to childbirth. The approaches which have been used to assess fear of childbirth in couples and fathers are now outlined.

Fear of Childbirth Measures

Fear of childbirth has been predominantly examined by adapting maternal measures for use with couples (Biehle & Mickelson, 2011; Hildingsson et al., 2010; Mäkelä et al., 2023; Sercekus et al., 2020; Szeverényi et al., 1998) and expectant fathers (Bergström et al., 2013; Ryding et al., 2018). A range of measurement approaches has been used by these researchers, including the visual analogue scales comprised of one (Rouhe et al., 2009) or two linear scales (Haines et al., 2011), a single item self-rated scale (Waldenström et al., 2006), and a 52-item scale (Szeverényi et al., 1998). Aside from adapting maternal measures for fathers, recent research has developed a father-specific scale, the 17-item Father's Fear of Childbirth Scale (FFCS; Ghaffari et al., 2021).

The Fear of Childbirth Visual Analogue Scale (Rouhe et al., 2009) was used by Mäkelä et al. (2023) in conjunction with the 33-item Wijma Delivery Expectancy

Questionnaire (W-DEQ-A; Wijma et al., 1998), in research comparing the wellbeing of expectant mothers and their partners. Using a visual analogue scale to assess fear of childbirth is a simple and easily administered measurement approach. The Fear of Childbirth Visual Analogue Scale required participants to indicate how afraid they were of childbirth by marking a line from 0 mm (*feeling confident about childbirth*) to 100 mm (*feeling extremely afraid of childbirth*). Scores greater than 50 mm are considered indicative of severe fear of childbirth.

Two visual analogue scales (one capturing level worries and the other capturing level of fears) are included in the Fear of Birth Scale (Haines et al., 2011). Used in research with couples (Sercekus et al., 2020) and expectant fathers (Hildingsson, Haines, et al., 2014; Hildingsson, Johansson, et al., 2014), respondents rated their feelings in response to the question, “How do you feel right now about the approaching birth?” by placing a mark on two lines: (a) 0 mm (*calm*) to 100 mm (*worried*) and (b) 0 mm (*no fear*) to 100 mm (*strong fear*). Including two visual analogue scales allowed internal consistency reliability to be calculated for the measure. In research with fathers, values for Cronbach’s alpha were .83 (Hildingsson, Johansson, et al., 2014) and .84 (Hildingsson, Haines, et al., 2014), and $\alpha = .92$ was reported for couples (Sercekus et al., 2020).

Hildingsson et al. (2010) examined fear of childbirth in couples using a 4-point rating scale (Waldenström et al., 2006). Participants responded to a single question, “How do you feel when thinking about labour and birth?” by selecting from one of four options (*very positive, fairly positive, rather negative and very negative*).

In addition to the Fear of Childbirth Visual Analogue Scale, Mäkelä et al. (2023) also examined fear of childbirth in expectant couples with the 33-item Wijma Delivery Expectancy Questionnaire (Wijma et al., 1998). Questionnaire items addressed various feelings and thoughts about childbirth, rated on 6-point Likert scales. Example items include:

(a) “How do you think your labour and delivery will turn out as a whole?” rated from 0 (*extremely fantastic*) to 5 (*not at all fantastic*); (b) “How do you think you will feel during labor and delivery?” rated from 0 (*no panic at all*) to 5 (*extreme panic*); and (c) “Have you during the last month had fantasies that your child will be injured during labor/delivery?” rated from 0 (*never*) to 5 (*very often*). Higher total scores indicate higher fear of childbirth. In research focused on expectant fathers, there have been inconsistent approaches in using the Wijma Delivery Expectancy Questionnaire. For example, Ryding et al. (2018) used the complete 33-item scale, while Bergström et al. (2013) excluded eight items considered irrelevant for men, after piloting the instrument with expectant fathers. Values of Cronbach’s alpha were .91 (Mäkelä et al., 2023) and .92 (Ryding et al., 2018) using the 33-item scale, and .89 using 25 items (Bergström et al., 2013). Fathers with high scores on the 25-item Wijma Delivery Expectancy Questionnaire during their partner’s pregnancy, subsequently had an increased likelihood of reporting that their actual childbirth experiences had been frightening (Bergström et al., 2013). These findings provide some evidence for the validity of using the 25-item questionnaire with men. However, the validity of the 33-item questionnaire for men has not yet been evaluated.

In descriptive research examining the nature of childbirth fears experienced by parents, Szeverényi et al. (1998) used a questionnaire, reported to have been originally designed by Marianne Ringler (published in a German-language book in 1985). The questionnaire comprised of 49 and 52 items for women and men respectively, grouped into six dimensions of childbirth fear (injury, complications, being controlled completely by others, somatic events of childbirth, losing control, and fear of the unknown). Items were rated on a 5-point descriptive scale (*absolutely not, slightly, quite, quite strong, very*) to complete the sentence, “I am afraid of...,” (example item, “being helpless”). Szeverényi et al. (1998) compared the proportion of women and men who strongly endorsed specific childbirth

fears. The most strongly endorsed item for women was, “having a malformed baby.” Men most strongly endorsed, “my wife having severe pain and suffering.” Internal consistency reliability was not reported since total scores were not used. Rather than indicating levels of childbirth fear, this measure would be useful in identifying which childbirth concerns are considered by an individual to be most relevant to themselves. However, the narrow focus on childbirth limits the scale’s utility as a measure of paternal pregnancy-related anxiety.

In further research with expectant couples, childbirth worry was measured by Biehle and Mickelson (2011) using seven items, adapted from the Childbirth Attitudes Questionnaire (Areskog et al., 1982): (a) “I fear losing control of myself (or feeling helpless) at the delivery,” (b) “I fear something being wrong with the baby,” (c) “I fear needing to have a Cesarean section,” (d) “I fear (my wife) being torn during the birth of the baby,” (e) “I fear (my wife having) painful labor contractions,” (f) “I fear (my wife) not getting the kind of care that I want,” and (g) “I have overall anxiety about childbirth.” Responses ranged from 0 (*never had that fear*) to 3 (*it worries me a lot*). Higher mean scores indicated greater levels of childbirth worries. Given the small number of items in the scale, internal consistency reliability in expectant fathers ($\alpha = .72$) was somewhat lower than for other longer childbirth fear measures, such as the Wijma Delivery Expectancy Questionnaire. Evidence for construct validity was found through significant correlations with convergent constructs, including anxiety ($r = .25, p < .05$) and depression ($r = .28, p < .01$), and a non-significant correlation with the divergent construct of positive affect ($r = -.10, p > .05$).

The only fear of childbirth measure identified in the current review, which was developed specifically for use with expectant fathers, is the 17-item Father’s Fear of Childbirth Scale (FFCS; Ghaffari et al., 2021). The items included in the new scale were generated on the basis of semi-structured interviews with 20 expectant fathers, in conjunction with a literature review. The FFCS is comprised of two subscales: a 12-item fear of childbirth

subscale (example item, “during my spouse’s childbirth, I will feel helpless”), and a 5-item fear of hospital subscale (example item, “I am afraid that the hospital staff will not take enough care of my spouse”). The FFCS has been used in research examining the relationship between maternal and paternal fear of childbirth (Ghaffari, Elyasi, Nikbakht, & Shahhosseini, 2022); and in research examining whether childbirth fear would be reduced in fathers, after participating in a 6-session telehealth group counseling program, led by midwives (Ghaffari, Elyasi, Mousavinasab, & Shahhosseini, 2022). Internal consistency reliabilities were $\alpha = .91$ for childbirth subscale, $\alpha = .86$ for the hospital subscale (Ghaffari et al., 2021), and $\alpha = .84$ for the overall scale (Ghaffari, Elyasi, Mousavinasab, & Shahhosseini, 2022; Ghaffari, Elyasi, Nikbakht, & Shahhosseini, 2022). Evidence for construct validity was found through a second-order confirmatory factor analysis using structural equation modeling, demonstrating that the two FFCS subscales represent a more general latent construct, tokophobia. Having been developed specifically for fathers, the FFCS is the best available measure of fear of childbirth in expectant fathers, because the items comprehensively address men’s unique concerns regarding their partner’s upcoming childbirth.

The fear of childbirth measures described in the present review, including the FFCS, would likely have limited ability to effectively measure paternal pregnancy-related anxiety, because these measures do not address other pregnancy-related concerns experienced by expectant fathers. For example, qualitative research has identified other concerns relevant to expectant fathers, such as concerns about their child having a genetic problem or disability (e.g., des Robert et al., 2020; Sercekus et al., 2020), or concerns about the transition to parenthood (Shorey & Chan, 2020) which are not captured by the aforementioned scales/measures. Therefore, pregnancy-specific scales used to measure a broader range of men’s pregnancy concerns, worries, or fears would be better suited to screen for pregnancy-related anxiety in expectant fathers.

Measures of Pregnancy Concerns, Worries, or Fears

Studies examining the pregnancy concerns, worries, or fears of expectant fathers have at times adapted the Cambridge Worry Scale (CWS; Green et al., 2003) for research with couples (Lindgren et al., 2017) and expectant fathers (Bergström et al., 2013; Göbel et al., 2020). Otherwise, studies have often used self-constructed scales for their immediate research purposes with couples (Kannenbergh et al., 2016) or expectant fathers (Forsyth et al., 2011; Gawlik et al., 2014; Waldbaum, 1975). More recently, research conducted in Iran has led to the development of questionnaires assessing men's concerns during their partner's low-risk pregnancy (Hajikhani et al., 2020) and their worries during high-risk pregnancy (Hajikhani et al., 2018).

The 16-item CWS was originally developed for pregnant women, to measure pregnancy-related and general concerns, grouped according to four subtests which address the following dimensions of worry: socio-medical, own health, relationship, and socio-economic. Researchers have adapted the CWS for men using varying approaches. Swedish researchers adapted the CWS for fathers in two studies (Bergström et al., 2013; Lindgren et al., 2017). Lindgren et al. (2017) examined psychological distress in expectant mothers ($N = 194$) and fathers ($N = 186$) who were eligible to receive first trimester combined screening at their maternal health care centre (typically performed for approximately 50% pregnancies, e.g., mothers with higher age). The anxiety and depression subscales of the HADS, together with a 12-item adaptation of the CWS, were used as measures of psychological distress. The 12-item adaptation included three CWS subscales (socio-medical, health, and relationship), and excluded two items ("fear of gynecological examinations" and "If my partner will be present during childbirth"). Limited information has been provided regarding the reliability and validity of this adapted measure. Internal consistency reliability was not reported,

correlations between the 12-item adapted CWS and HADS subscales were not reported, nor were other types of psychometric evaluation reported.

In the same study previously described in relation to fear of childbirth measures, Bergström et al. (2013), used a 14-item adaptation of the CWS as an additional measure. The researchers excluded two items (“going to the hospital” and “internal examinations”) and modified the item, “whether your partner will be with you for the birth,” to, “whether I will be able to be with my partner for the birth.” The 14-item adapted CWS was used to assess mid-pregnancy worry in fathers with ($n = 83$) and without ($n = 679$) fear of childbirth. Good internal consistency reliability was demonstrated in this sample ($\alpha = .81$). Bergström et al. (2013) found that fathers were more likely to have higher worry scores on the 14-item adapted CWS if they had been identified as having a fear of childbirth (measured by Wijma Delivery Expectancy Questionnaire). While these results can be interpreted as providing preliminary validity for the adapted CWS in identifying pregnancy-related worry in men, no further validity evaluation was conducted.

In a German study focused on expectant fathers, Göbel et al. (2020) used a 15-item adapted CWS to investigate the relationship between psychosocial variables, including anxiety, depression, level of hostility, and perceived social support, with pregnancy-related worries. Anxiety and depression were assessed using the Generalized Anxiety Disorder Scale (GAD-7; Spitzer et al., 2006) and the EPDS, respectively. The adapted CWS demonstrated good internal consistency reliability ($\alpha = .83$) in this sample and displayed moderate positive correlations with anxiety ($r = .37$) and depression ($r = .38$). These results indicate that this adapted version of the CWS may not differentiate between expectant fathers with anxiety or those with depression. Moreover, since the CWS was originally designed for women, adapting this measure for men may not fully encompass the pregnancy-related concerns of fathers.

Other researchers examining pregnancy concerns, worries, or fears chose to self-construct measures for their immediate research purposes, rather than adapting an established maternal scale, in their research with couples (Kannenberg et al., 2016) and fathers (Forsyth et al., 2011; Gawlik et al., 2014). For example, in research with couples, Kannenberg et al. (2016) developed a 25-item pregnancy-fears questionnaire, to examine expectant parents' fears across four domains: (a) examination situation, (b) examination results, (c) birth/delivery, and (d) post-partum period. The basis on which the items were generated for this self-constructed scale was not reported. Example items included, "problems during the birth," "not being capable of the tasks of a mother/father," and "having a handicapped child." Each situation was rated from 1 (*makes me not at all anxious*) to 4 (*makes me very anxious*). The pregnancy-fears questionnaire developed for this research covered a comprehensive range of fears pertaining to the health of the baby, birth complications, healthcare, financial concerns, and the transition to parenthood. However, no evaluation of reliability or validity was reported, limiting its wider application.

To examine the effects of childbirth classes on men's fears, Waldbaum (1975) developed a new measure, the Expectant Fathers' Fear Scale (EFFS). Scale development was conducted through a pilot study, using psychometric scale development methodologies. An item pool of 69 questions was initially generated on the basis of a literature review and assessed by ERP. Scale reduction resulted in a 47-item scale, assessing expectant fathers' fears across six categories identified from the literature (with example items in parentheses): (a) fears for self (e.g., "I worry about the problems involved in being a good father"), (b) fears for wife during labour and delivery (e.g., "I worry about my wife having a great deal of pain during childbirth"), (c) fears surrounding change in the marital relationship (e.g., "I worry that my wife won't want sex after the baby is born"), (d) fears for baby (e.g., "I worry that the baby will not live"), (e) fears about practical matters (e.g., "I get apprehensive when I

think about the cost of raising a child”), and (f) miscellaneous items (e.g., “I have felt that my wife’s pregnancy is long and tiresome”). Internal consistency reliability of the EFFS using the Spearman-Brown formula for split half reliability, was $r = .94$. No psychometric evaluation of scale validity was conducted beyond the initial assessment of items by ERP. The EFFS included an extensive range of items addressing men’s pregnancy concerns, worries, and fears. As such, it was a potentially useful measure of pregnancy-related anxiety in expectant fathers, however, the research conducted by Waldbaum (1975) is yet unpublished. Therefore, the EFFS has not been further evaluated or refined by other researchers. Moreover, should the EFFS be used in the present day, item wording of many items would require updating to more current language, as some language is no longer used (e.g., “I worry that the baby will be mentally retarded”).

Two more recent research studies have self-constructed shorter scales for their immediate research purposes, to examine men’s birth-related and future concerns (Gawlik et al., 2014) and their pregnancy-related concerns (Forsyth et al., 2011). Gawlik et al. (2014) investigated whether birth-related concerns or future concerns were associated with perinatal depression, as measured by the EPDS. The researchers created two 9-item questionnaires to assess these two pregnancy-related concerns. Birth-related concerns and future concerns were both correlated with postnatal depression ($r = .34$ and $r = .22$, respectively). Birth-related concerns included items related to coping during labour, childbirth complications, and the support role of fathers during labour. Future concerns included concerns about having less time for friends, family, wife, and hobbies, as well as financial and employment issues. Although the birth-related and future concerns assessed by Gawlik et al. (2014) have been identified as relevant to fathers in the literature (e.g., Finnbogadóttir et al., 2003; Pilkington & Rominov, 2017), the two questionnaires are unlikely to fully capture the breadth of men’s pregnancy-related concerns. Moreover, no assessment of reliability or validity was reported.

For both these reasons, these measures of birth-related and future concerns developed by Gawlik et al. (2014) are unlikely to effectively screen for pregnancy-related anxiety in expectant fathers.

A 9-item worry scale was developed by Forsyth et al. (2011) to assess the extent men experienced pregnancy-related concerns, such as “the baby being born with an abnormality,” and “not being a good enough father.” The basis on which items were generated for the new scale was not reported. Fathers rated the extent of their agreement from 1 (*strongly disagree*) to 5 (*strongly agree*), with higher scores indicating more pregnancy-related concerns. This self-constructed scale demonstrated good internal consistency reliability ($\alpha = .81$). However, it was solely developed for research purposes rather than as a screening tool, and no other psychometric evaluation, particularly in relation to validity, was reported.

Two newly developed Persian-language questionnaires, assess the concerns and worries of fathers during their partner’s high-risk (Hajikhani et al., 2018) and low-risk (Hajikhani et al., 2020) pregnancies. The 30-item High-Risk Worry Questionnaire (Hajikhani et al., 2018) was developed to assess men’s worry about their partner’s high-risk pregnancy. The questionnaire was developed after a review of literature and interviews with 40 men, whose partners were experiencing various pregnancy risk factors (e.g., medical conditions, fetal health concerns, and obstetric and gestational problems). The High-Risk Worry Questionnaire is comprised of four subscales (pregnancy and delivery, neonatal health, maternal health, and personal-family), which include many typical pregnancy-related concerns, such as concerns related to the health of the baby, the outcome of the pregnancy, childbirth complications, financial concerns, relationship concerns, and the transition to parenthood. Excellent internal consistency reliability ($\alpha = .91$) and positive correlations with anxiety ($r = .63$) and depression ($r = .62$) were reported during scale development (Hajikhani et al., 2018). Factor analysis confirmed the presence of the four subscales, providing evidence

for validity. Since its development, the High-Risk Worry Questionnaire has been used to examine the predictors of men's worry during high-risk pregnancy, finding that the strongest predictors of men's worry were: elevated worry in their pregnant partner ($\beta = .31$), and the mental health of fathers ($\beta = .30$; Golchin et al., 2022). Given that it was specifically developed for use during high-risk pregnancy, the questionnaire items include some highly specific concerns, such as: "I am not pleased with my loneliness at home during my wife's hospitalisation period due to a medical problem," and "Sometimes I think that my child is weak and could soon contract a disease," and "I am worried that pregnancy complications would have a negative impact on the normal life of my child in the future." Consequently, the suitability of the High-Risk Worry Questionnaire as a screening tool for paternal pregnancy-related anxiety in general contexts is limited.

Since the development of the High-Risk Worry Questionnaire, the same researchers have developed the Low-Risk Concerns Questionnaire to assess the concerns of fathers during their partner's low-risk pregnancy (Hajikhani et al., 2020). The Low-Risk Concerns Questionnaire includes 24 items, grouped by four factors: pregnancy and delivery, concern for care of child, personal-family concern, and concern about meeting the requirements of the family. The Low-Risk Concerns Questionnaire includes 18 comparable items found in the High-Risk Worry Questionnaire and excludes many of the highly specific items (including the examples previously given), making it more useful for general use with expectant fathers. Internal consistency reliability was excellent ($\alpha = .93$). However, as a potential measure of pregnancy-related anxiety in expectant fathers, the Low-Risk Concerns Questionnaire has a limited breadth of items addressing men's concerns during pregnancy. For example, no items address men's concern for the health of their pregnant partner, or their experiences of ambivalence; despite qualitative research previously identifying that the health of the pregnant partner is an important concern to fathers (e.g., des Robert et al., 2020), and many

men feel anxious about their ambivalent feelings toward the pregnancy (e.g., Fenwick et al., 2012).

In summary, the aforementioned measures of pregnancy concerns, worries, or fears generally capture a broader range of men's pregnancy-related concerns during their partner's pregnancy, when compared with antenatal psychosocial assessment tools or fear of childbirth measures. However, many of the measures are limited in their wider application as paternal pregnancy-related anxiety measures, because of the following reasons: (a) psychometrically sound approaches to scale development were not systematically followed, (b) limited examination of reliability and/or validity, (c) absence of the independent evaluation of the measures by other researchers, (d) a lack of scale refinement of lengthy scales to reduce the number of items, and (e) despite addressing certain pregnancy-related concerns, the measures lack breadth in the concerns addressed by the items to adequately capture the construct of paternal pregnancy-related anxiety.

Addressing the above limitations would be best accomplished by developing a new pregnancy-related anxiety measure for expectant fathers. The recent development of the Persian-language Low-Risk Concerns Questionnaire (Hajikhani et al., 2020) has come closest to achieving this goal. However, since an English-language measure which better encompasses the construct of paternal pregnancy-related anxiety has remained unavailable, researchers have either used measures of pregnancy stress or distress, or they have adapted maternal measures of pregnancy-related anxiety for research with couples and expectant fathers.

Measures of Pregnancy Stress/Distress

Measures of pregnancy stress or distress aim to assess expectant parents for reactions/responses to stressors commonly experienced during pregnancy. Therefore, unlike the PSS (Cohen et al., 1983), which is a commonly used generic measure of perceived stress

in expectant parents, the measures outlined below are considered pregnancy-specific measures of stress/distress. It is worth noting, however, that researchers sometimes interchange the terms for pregnancy anxiety and pregnancy stress/distress, such that some of the measures described below may also be considered as measures of pregnancy-related anxiety.

Pregnancy stress and distress in expectant fathers has been examined within research with couples, with diverse aims, such as comparing the health of expectant parents (Brown, 1986), examining spouse-related stress in expectant couples (Lee et al., 2021), and evaluating the benefits of a mindfulness-based childbirth course (Warriner et al., 2018). In research focused on expectant fathers, Glazer (1989) examined anxiety levels and stressors experienced by men during pregnancy, and Ibrahim (2020) examined the role of pregnancy stress on men's intentions to participate in parenting.

The Stress Amount Checklist (Barnett et al., 1983), used by Brown (1986) in research with couples, measured stress commonly experienced during pregnancy. Items addressed stressful events, including marital problems, financial problems, and moving. The Stress Amount Checklist required parents to rate 12 situations according to how stressful such events had been for them, with higher total scores indicating greater levels of perceived stress. Acceptable internal consistency reliability for the Stress Amount Checklist was reported ($\alpha = .72$). In other research with expectant couples, Lee et al. (2021) examined spouse-related stress experienced by parents, using items taken from a pregnancy-related stress scale (Ahn, 1985). Cronbach's alpha of $\alpha = .83$ was reported for spouse-related stress for the expectant fathers (Lee et al., 2021), with no descriptions provided regarding item wording.

In further research with couples, the Tilburg Pregnancy Distress Scale (Pop et al., 2011) was used by Warriner et al. (2018) as one of several outcome measures (including the

PSS, GAD-7, and EPDS) to evaluate the benefits of a mindfulness-based childbirth course for expectant parents. Originally developed for women, the 16-item scale assessed psychological distress arising from a range of concerns and experiences related to pregnancy, including concerns about the pregnancy, childbirth, health of baby, relationship with partner, partner involvement, and taking care of the baby (Pop et al., 2011). Example items include: “I worry about the health of my baby,” and, “I worry about our financial situation after childbirth.” Parents indicated how they felt during the past seven days from 0 (*rarely or never*) to 3 (*very often*). Internal consistency reliability when used with expectant fathers was $\alpha = .74$ (Warriner et al., 2018). Correlations between the Tilburg Pregnancy Distress Scale and other study variables were not reported. Of the three pregnancy stress/distress measures used with couples, the Tilburg Pregnancy Distress Scale is the most comprehensive pregnancy-specific measure of distress, closely resembling the construct of pregnancy-related anxiety.

In research focused on expectant fathers, the 79-item Feelings of Pregnancy Questionnaire was self-constructed by Glazer (1985; 1989). The questionnaire comprehensively captured fathers’ concerns relating to childbirth, health care, baby, self, family and friends, and finances. Example items are, “if your baby will be healthy and normal,” “your role in labour and delivery,” and, “whether the nurses will give your partner good care.” Fathers indicated how stressful each item was from 0 (*not at all stressful*) to 3 (*very much, so stressful*). The Feelings of Pregnancy Questionnaire demonstrated strong psychometric properties (Glazer, 1989). Construct validity was assessed by comparing scores on the Feelings of Pregnancy Questionnaire across four different groups of participants who reported they were: (a) “not at all stressed,” (b) “somewhat stressed,” (c) “moderately so stressed,” or (d) “very much stressed.” Analysis of variance indicated that men’s scores on the Feelings of Pregnancy Questionnaire were significantly related to their reported level of stress during pregnancy. Good internal consistency reliability was demonstrated using

Cronbach's alpha ($\alpha = .96$), split-half reliability ($r = .85$), and test-retest reliability ($r = .82$). However, the Feelings of Pregnancy Questionnaire, which is comprised of 79 items, would not be acceptable as a screening tool, due to the time required for administration and scoring. Moreover, despite including a large number of items, the questionnaire overlooks concerns identified in qualitative literature as important to expectant fathers, such as concerns about lifestyle (e.g., des Robert et al., 2020; Fenwick et al., 2012) and the transition to parenthood (e.g., Åsenhed et al., 2013; Gage & Kirk, 2002).

In recent, yet unpublished research with expectant fathers, Ibrahim (2020) adapted a maternal pregnancy-specific stress scale, the 17-item Revised Prenatal Distress Questionnaire (Lobel et al., 2008). The scale, as adapted for fathers (hereinafter, "adapted Prenatal Distress Questionnaire"), included 21 items assessing pregnancy-specific stress experienced by fathers (Ibrahim, 2020). Despite being named as a measure of prenatal stress/distress by the scale developers (Ibrahim, 2020; Lobel et al., 2008), in reality, the adapted Prenatal Distress Questionnaire measures pregnancy-related anxiety, by requiring fathers to rate the extent that they are feeling "bothered, upset, or worried" about different aspects of their partner's pregnancy (e.g., "taking care of a newborn baby," and "whether you and your partner may have an unhealthy baby"). When developing the maternal scale, Lobel et al. (2008), defined pregnancy-specific stress as stress arising from multiple pregnancy-specific issues, including concerns about physical health, the baby's health, the relationship, parenting, and childbirth anxiety. This operationalisation of pregnancy-specific stress is in keeping with the operationalisation of pregnancy-related anxiety, provided by other researchers (e.g., Bayrampour et al., 2016; Huizink et al., 2004). As a measure of paternal pregnancy-related anxiety, the adapted scale has good internal consistency reliability ($\alpha = .86$), however, the validity of the adapted Prenatal Distress Questionnaire is unknown given that no other psychometric evaluation was reported.

Considering the range of items included in scales such as the Feelings of Pregnancy Questionnaire, the Tilburg Pregnancy Distress Scale, and the adapted Prenatal Distress Questionnaire, the measurement of pregnancy stress/distress in expectant fathers using these scales has enabled researchers to measure a construct which is very closely related to pregnancy-related anxiety. However, there are limitations associated with relying on these measures to assess pregnancy-related anxiety in expectant fathers. The Feelings of Pregnancy Questionnaire is too lengthy for a screening tool in clinical settings and the validity of using adapted maternal measures to assess pregnancy-related anxiety in fathers is not well established. Nevertheless, considering the unavailability of pregnancy-related anxiety measures specifically developed for fathers, researchers have not only adapted maternal measures of pregnancy stress/distress, but they have also adapted maternal measures of pregnancy-related anxiety for men.

Maternal Measures of Pregnancy-Related Anxiety, Adapted for Fathers

Three maternal pregnancy-related anxiety scales have been adapted for use in fathers, predominantly to examine the experiences of couples. The Pregnancy Outcome Questionnaire (POQ; Theut et al., 1988) assessed pregnancy anxiety in couples who had previously experienced perinatal loss (Armstrong, 2002, 2004; Franche & Mikail, 1999; Theut et al., 1988). The Pregnancy-Related Anxiety Measure¹ (PRAM; Rini et al., 1999) has been used with first-time expectant parents (Saxbe et al., 2018) and with couples who had conceived after in vitro fertilisation (Stevenson et al., 2019). In other research with couples, a 20-item adaptation of the Pregnancy-Related Anxiety Questionnaire (PRAQ; Van den Bergh, 1990) was used by Winter et al. (2016), and the 10-item revised PRAQ (PRAQ-R; Huizink et al., 2004) was used by Tolvanen et al. (2013) and Lucero et al. (2013). In research

¹ Note, the measure of maternal pregnancy-related anxiety developed by Rini et al. (1999) was referred to as the Pregnancy-Related Anxiety Measure (PRAM) by Stevenson et al. (2019), the Pregnancy Anxiety Scale (PAS) by Saxbe et al. (2018), and the Pregnancy Related Anxiety Scale (PRAS) by Cameron et al. (2021).

specifically focused on expectant fathers, Cameron et al. (2021) adapted the PRAM for use in men and longitudinal research (Skjothaug et al., 2015, 2018; Skjothaug et al., 2020) has used a 7-item adaptation of the PRAQ-R to examine pregnancy-related anxiety in men.

In research with couples, the 15-item POQ was originally developed after interviewing seven women and three husbands who had experienced perinatal loss (Theut et al., 1988). Although the POQ is not strictly a maternal scale adapted for use in men, it is included in the present discussion since the questionnaire consists of parallel items, with wording adjusted, depending on use for mothers or fathers. Some evidence for the validity of using the POQ as a measure of pregnancy-related anxiety in fathers is demonstrated by significant correlations between POQ scores and current subjective distress related to expectant parents' previous experiences of perinatal loss in women, $r = .57, p < .0001$, and men, $r = .32, p < .05$ (Armstrong, 2004). Additional evidence for validity is indicated by two studies which compared POQ scores in expectant parents with and without a history of previous perinatal loss, finding that women and men with a prior history of perinatal loss displayed higher levels of pregnancy-related anxiety (higher POQ scores) than couples with no prior history of loss (Armstrong, 2002; Franche & Mikail, 1999). However, research conducted by Theut et al. (1988), which compared parents with and without prior perinatal loss, produced unexpected results, with expectant fathers with a prior experience of perinatal loss displaying lower correlations between their POQ scores and trait anxiety, $r = .32, p < .01$, than those who had not experienced a prior loss, $r = .48, p < .01$. Conversely, women with a prior loss showed higher correlations between POQ scores and trait anxiety, $r = .59, p < .01$, than those with no prior loss, $r = .47, p < .01$ (Theut et al., 1988). These findings indicate that the validity of using the POQ in fathers cannot be assumed. Internal consistency reliability of the POQ has been reported as moderately high ($\alpha = .80$) for women and men (Theut et al., 1988), with Armstrong (2002) reporting somewhat higher internal consistency

reliability in women ($\alpha = .88$), than men ($\alpha = .77$). Taken together, the inconsistent evidence for the reliability and validity of the POQ to measure pregnancy-related anxiety in fathers raises concerns of the suitability of this measure for evaluating paternal pregnancy-related anxiety in fathers.

The 10-item PRAM has recently been adapted for men in research with couples (Saxbe et al., 2018; Stevenson et al., 2019) and fathers (Cameron et al., 2021). However, the wording used in the PRAM adaptations for fathers was not consistent between studies. For example, Cameron et al. (2021) retained the item, “I am confident of having a normal childbirth,” while Stevenson et al. (2019) modified the wording to, “I am confident my partner will have a normal childbirth.” Saxbe et al. (2018) used the PRAM with couples, providing no explanation regarding modifications to item wording for fathers, and no psychometric evaluation.

Stevenson et al. (2019) reported comparable internal consistency reliabilities for the PRAM when used with women ($\alpha = .85$) and men ($\alpha = .84$), consistent with Cameron et al. (2021), who reported $\alpha = .87$ for expectant fathers. Cameron et al. (2021) further examined the psychometric properties of the adapted PRAM for fathers, finding a single factor structure and reporting evidence for convergent validity, demonstrated through significant correlations between the adapted PRAM and general anxiety (STAI; $r = .45, p < .001$) and depression (EPDS; $r = .52, p < .001$). However, these findings highlight a potential limitation in the validity of using the adapted PRAM in fathers, given that it demonstrated a stronger correlation with depression than anxiety. A psychometrically sound measure of pregnancy-related anxiety would be expected to be more highly correlated with an anxiety measure (convergent validity) than depression (divergent validity).

Saxbe et al. (2018) assessed the convergent validity of their newly designed measure, of the perceived stressfulness of birth experiences after childbirth (Birth Experiences

Questionnaire [BEQ]) with the PRAM. They administered the PRAM during the second or third trimester of pregnancy and the BEQ within two days after childbirth, hypothesising that more stressful birth experiences (BEQ) would correlate with higher levels of pregnancy-related anxiety (PRAM). However, only women ($r = .44$, $p < .01$) and not men ($r = .21$, $p > .05$) in this study showed a significant correlation between the PRAM and BEQ scores. While this result may be due to the dissimilar experiences of mothers and fathers during childbirth, it may also indicate a lack of validity for using the adapted PRAM in fathers. Altogether, the findings of Cameron et al. (2021) and Saxbe et al. (2018) highlight that adapting the PRAM to measure pregnancy-related anxiety in men may not be a psychometrically sound approach.

The PRAQ has been used in research with couples (Lucero et al., 2013; Tolvanen et al., 2013; Winter et al., 2016) and fathers (Skjothaug et al., 2015, 2018; Skjothaug et al., 2020), with three different approaches to adaptation for fathers. Winter et al. (2016) used a 20-item short version of the PRAQ (four subscales) with expectant couples, including those who had conceived after preimplantation genetic diagnosis, or after intracytoplasmic sperm injection, or those who had conceived spontaneously. Half of the items were reworded to provide a male perspective, for example, “I am afraid that I will not get my shape back after pregnancy” was changed to, “I am afraid that my wife will not get her shape back after pregnancy.” Internal consistency reliabilities for the 20-item PRAQ ranged across the four subscales for women ($\alpha = .71$ to $.89$) and men ($\alpha = .68$ to $.90$). Lucero et al. (2013) and Tolvanen et al. (2013) used the 10-item PRAQ-R (three subscales) with couples, but did not report any reliability or validity, nor provide descriptions regarding the adaptation of item wording for fathers. Longitudinal research conducted with over 800 fathers (Skjothaug et al., 2015, 2018; Skjothaug et al., 2020) assessed pregnancy-related anxiety in fathers at five time points during pregnancy, using a 7-item adaptation of the PRAQ-R. Internal consistency reliability was greater than $\alpha = .75$ across all five time points (Skjothaug et al., 2020),

however, no other psychometric evaluation or rationale for the adapted scale was provided. The three items removed from the original 10-item scale related to childbirth pain, change in body perception, and fear of gaining weight. However, research has identified that many expectant fathers worry about their partner's pain in childbirth (e.g., Forsyth et al., 2011; Greer et al., 2014; Sercekus, Vardar, Goral Turkcu, et al., 2020) and some have concerns about their partner's changing body shape (Draper, 2003). Therefore, the items removed from the PRAQ-R may have been relevant to fathers in a modified form. This highlights the need for a sound psychometric approach to scale development, that extends beyond adapting pre-existing maternal scales for use in men.

Taken together, despite some evidence for the reliability and validity of adapted maternal scales, the overall findings indicate that there remains limited psychometric evidence for the reliability and validity of scales such as the POQ, PRAM, and PRAQ, to measure pregnancy-related anxiety in fathers. Moreover, by using adapted maternal scales, researchers have assumed that the construct of pregnancy-related anxiety in fathers is captured equally well by items originally designed for women. Although there is overlap in the nature of concerns held by men and women, an accurate measure of pregnancy-related anxiety in fathers would also require items which capture the breadth of men's unique concerns during their partner's pregnancy.

Summary and Conclusion

In summary, aside from the use of generic measures of anxiety and generic measures of psychological stress/distress, studies have measured pregnancy-related anxiety and closely related constructs in expectant couples and fathers, using five main pregnancy-specific approaches: antenatal psychosocial assessment tools; fear of childbirth measures; measures of pregnancy concerns, worries, or fears; measures of pregnancy stress/distress; and adaptations of maternal measures of pregnancy-related anxiety.

Antenatal psychosocial assessment tools are useful in identifying potential risk factors for psychological difficulties. These broad, pregnancy-specific measures may include items assessing anxiety, stress, worry, self-esteem, attitudes towards the pregnancy, childbirth fear, perceived social support, and other relationship factors. Therefore, they typically include some items which would tap into pregnancy-related anxiety in expectant fathers. However, the broad nature of these measures means that they are inadequate for specifically identifying expectant fathers with high levels of pregnancy-related anxiety.

Conversely, fear of childbirth measures focus on one aspect of anxiety during pregnancy (childbirth) by examining a range of childbirth-related concerns, worries, and fears. Despite high relevancy to expectant fathers and overlap in scale content with pregnancy-related anxiety scales, fear of childbirth measures are unlikely to be adequate as screening tools for paternal pregnancy-related anxiety, because of their narrow focus.

Measures of pregnancy concerns, worries, or fears display a high degree of overlap in their items and wording, when compared with established maternal measures of pregnancy-related anxiety. However, these measures are generally inadequate as screening tools for pregnancy-related anxiety in expectant fathers, because they may lack items spanning the breadth of expectant fathers' concerns during pregnancy, or they may include too many items, limiting their practical application. Moreover, many of these measures have been self-constructed by researchers, without using a systematic, psychometrically grounded approach to scale development.

Measures of pregnancy stress or distress can vary in the degree in which they overlap with measures of pregnancy-related anxiety. Some of these measures are relatively general scales which address a number of stressors which may occur during pregnancy (e.g., moving house), while others, such as the Feelings of Pregnancy Questionnaire, the Tilburg Pregnancy Distress Scale, and the adapted Prenatal Distress Questionnaire would be considered to assess

a construct synonymous with pregnancy-related anxiety. These scales are limited in providing adequate assessment of the construct of paternal pregnancy-related anxiety, given that these measures have all been adapted for expectant couples and fathers, on the basis of maternal scales.

Similarly, despite the use of adapted maternal measures of pregnancy-related anxiety being one of the better approaches for assessing expectant fathers for pregnancy-related anxiety, this approach is also associated with limitations. Considering that these scales were originally designed for women, they may not properly capture men's unique pregnancy-related concerns, worries or fears. Moreover, there remains some lack of evidence for the reliability and validity of using these scales in men.

In conclusion, despite the variety of pregnancy-specific measurement tools reviewed in the present chapter, there remains a lack of availability of an English-language measure of pregnancy-related anxiety, specifically developed for expectant fathers. The development of a new measure of paternal pregnancy-related anxiety is the focus of the subsequent chapters. Before generating potential items for the new scale, a systematic review was conducted, to examine the nature of paternal pregnancy-related anxiety, and identify the range of men's concerns, worries, and fears related to their partner's pregnancy. Chapter 3 presents the systematic review.

Chapter 3: Paternal Pregnancy-Related Anxiety: Systematic Review of Men's Concerns and Experiences During Their Partners' Pregnancies

Introduction to the Systematic Review Findings and Supplementary Materials

Chapter 3 presents a systematic review² of quantitative and qualitative literature, conducted to examine the experiences of expectant fathers and to identify the nature of their concerns, worries, and fears related to their partner's pregnancy. The systematic review included 14 quantitative and 41 qualitative studies. Quality appraisal of the included articles was completed by two independent reviewers. The published article refers readers to a "supplementary quality appraisal spreadsheet," which shows the quality appraisal ratings, allocated by each reviewer for the quantitative and qualitative studies, as presented in Appendix A and B, respectively. The quality appraisal ratings for the quantitative and qualitative studies are also found in Appendix C and D, respectively, presenting the studies in ranked order of quality, according to their average total scores. The systematic review findings were reported with reference to information about the contexts and primary findings of the included studies, presented as supplementary material (refer to Appendix E, F, G, and H).

Detailed methodology and results, as reported by the included quantitative studies are presented in Appendix E ("Supplementary Table 1" in article). Appendix F ("Supplementary Table 2" in article) presents expectant fathers' pregnancy-related concerns, worries, and fears which were identified from the studies included in the systematic review; listed with the number and percentage of studies which identified each concern. As shown in Appendix F, the six most frequently identified concerns within the quantitative studies were: baby health

² This article was published in the *Journal of Affective Disorders*, Volume 323, Dabb, C., Dryer, R., Brunton, R. J., Yap, K., & Roach, V. J. Paternal pregnancy-related anxiety: Systematic review of men's concerns and experiences during their partners' pregnancies, 640-658, Copyright Elsevier (2023).

(57%), childbirth complications (50%), being a good parent (50%), partner's pain and suffering in childbirth (43%), responsibility of parenthood (43%), and caring for infant (43%).

Findings from the qualitative literature were based on the verbatim quotes of fathers and the descriptions provided by the researchers of the included articles. This information is presented in detail in Appendix G ("Supplementary Table 3" in article). The detailed methodology and study themes, as reported by the included qualitative studies are presented in Appendix H ("Supplementary Table 4" in article). As shown in Appendix F, the six most frequently identified concerns, reported by the qualitative studies were: baby health (49%), feeling excluded from antenatal care (41%), ability to fulfil support role during labour and delivery (37%), partner health (34%), childbirth complications (32%), and feeling unprepared for parenthood (32%).

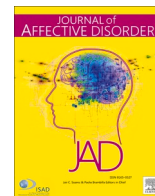
In addition to examining the concerns, worries, and fears experienced by expectant fathers, the systematic review identified four themes from the qualitative studies, which describe fathers' experiences of pregnancy: experiencing excitement while managing apprehension, providing support while feeling excluded, making preparations while carrying uncertainty, and accepting responsibility while losing freedom. The findings from the qualitative research also provided a clinical picture of symptoms (e.g., difficulty sleeping, difficulty managing worries, and irritability), which may indicate elevated levels of pregnancy-related anxiety. Moreover, the qualitative research indicated that fathers often perceive themselves to be excluded from receiving support, which may prevent fathers from seeking support for their mental health wellbeing.

The findings of the following systematic review have important implications for clinicians. Expectant fathers may experience anxiety symptoms characterised by excessive worry across multiple domains of pregnancy-related concerns. Health care professionals play

an important role, not only in identifying fathers who are experiencing pregnancy-related anxiety, but also in addressing the sense of exclusion experienced by many men during the antenatal period.

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Review article

Paternal pregnancy-related anxiety: Systematic review of men's concerns and experiences during their partners' pregnancies

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ABSTRACT

Background: Up to 25 % of expectant parents experience anxiety symptoms. Pregnancy-related anxiety is characterised by concerns and worries specific to pregnancy, childbirth, and the transition to parenthood. While pregnancy-related anxiety is well-researched in women, the exact nature of this construct in men is unclear. The purpose of the current review was to examine men's concerns, worries, and fears during pregnancy and gain an understanding of their experiences during pregnancy.

Methods: An integrative review design was adopted, using thematic content analysis to synthesise findings from quantitative and qualitative studies. Quality appraisal of the quantitative studies used the AXIS appraisal tool. The Critical Appraisal Skills Program (CASP) checklist was used for the qualitative studies.

Results: A comprehensive search of nine databases led to inclusion of 14 quantitative and 41 qualitative studies. Ten dimensions of paternal pregnancy-related anxiety were identified: childbirth concerns, attitudes towards childbirth, baby concerns, acceptance of pregnancy, partner concerns, relationship concerns, worry about self, transition to parenthood, attitudes towards health care professionals, and practical and financial concerns. The pregnancy transition was characterised by mixed emotions and conflicted experiences for fathers.

Limitations: Generalizability of review findings was limited by poor reporting of demographic information by many included studies, exclusion of studies not published in English, and focus on heterosexual relationships.

Conclusions: Expectant fathers may experience anxiety symptoms characterised by excessive worry across multiple domains of pregnancy-related concerns. Clinicians play an important role in identifying and supporting fathers with pregnancy-related anxiety and addressing the sense of exclusion often experienced by them.

Pregnancy represents a significant transitional period for parents (Deave et al., 2008; LaRossa and Sinha, 2006). Along with joyful anticipation of new life, parents may experience ambivalence (Ekström et al., 2013; Wikman et al., 1993) and increased uncertainty (Osofsky et al., 1985). Research suggests that the prevalence of anxiety during pregnancy is comparable for parents, regardless of gender, with up to 25 % of women (Bayrampour et al., 2015) and men (Philpott et al., 2019) experiencing anxiety symptoms. Given the importance of maternal physical and mental health to pregnancy outcomes, researchers have largely focused on anxiety in expectant mothers (Philpott et al., 2019). However, there is considerable evidence that anxiety in expectant fathers is associated with multiple adverse outcomes for fathers, their infants, and their partners.

During pregnancy, fathers with anxiety are more likely to report low

positive affect and increased depressive symptoms (Biehle and Mickelson, 2011). Post-birth, these fathers may experience persistent fatigue (Tzeng et al., 2009), reduced parental self-efficacy (Pinto et al., 2016), lower responsiveness to their infants (Parfitt et al., 2013), and increased parenting stress associated with increased negative reactivity in their infants (Prino et al., 2016). Moreover, a longitudinal study has reported that prenatal anxiety in fathers predicts paternal postnatal depression, which is associated with the development of social difficulties and psychiatric disorders in their children after 7 years (Ramchandani et al., 2008). Anxiety in expectant fathers is also associated with maternal anxiety and depression during pregnancy (Koh et al., 2015) and reduced couple satisfaction (Cameron et al., 2020). These in turn may undermine the critical support fathers provide their pregnant partners, thereby increasing the risk of complications in maternal mental health or birth

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outcomes (Ghosh et al., 2010; Nylen et al., 2013; Parfitt and Ayers, 2014).

Considering the prevalence of anxiety in expectant fathers, and the multiple links between men's anxiety during pregnancy and adverse outcomes for themselves, their infants, and their partners, it is not surprising that clinical practice guidelines are placing greater emphasis on men's perinatal mental health (e.g., Centre of Perinatal Excellence (COPE), 2017).

According to the *Diagnostic and Statistical Manual of Mental Disorders* (5th ed.; DSM-5), anxiety involves excessive fear or worry about imminent perceived threats or anticipated future threats (American Psychiatric Association, 2013). Anxiety disorders differ based on the contexts or objects that provoke fear and anxiety-related thoughts and behaviors (American Psychiatric Association, 2013). Although parents experience specific and generalized anxiety disorders during pregnancy (Blair et al., 2011; Leach et al., 2016), research conducted with women suggests that pregnancy-related anxiety (also referred to as pregnancy anxiety and pregnancy-specific anxiety) is a form of anxiety, not currently recognised in the DSM-5, that is distinct from general anxiety and depression (Anderson et al., 2018; Brunton et al., 2019; Huizink et al., 2004).

In women, pregnancy-related anxiety is characterised by multiple dimensions of worries and fears regarding pregnancy, including fetal health, loss of fetus, childbirth, health-care concerns, mother's well-being, body image, caring for the child, financial concerns, and family and social support (Bayrampour et al., 2016). Pregnancy-related anxiety is uniquely associated with preterm birth (Dunkel Schetter et al., 2022; Khalesi and Bokaie, 2018; Kramer et al., 2009; Orr et al., 2007; Ramos et al., 2019; Weis et al., 2020); increased rates of caesarean section (Koelewijn et al., 2017); lower rates of exclusive breastfeeding (Horsley et al., 2019); and adverse outcomes for children, including negative emotional reactivity in infancy (Nolvi et al., 2016) and early childhood (Blair et al., 2011; Mahrer et al., 2020); and cognitive deficits in middle childhood (Buss et al., 2011). Given the clinical significance of these adverse outcomes for women and their children, pregnancy-related anxiety is receiving increased attention by researchers, particularly in terms of psychometrically sound measures to assist in diagnosing for this form of anxiety (e.g., Brunton et al., 2021; Dryer et al., 2022a; Dryer et al., 2022b).

Paternal pregnancy-related anxiety, however, remains currently under-researched (Cameron et al., 2020). Studies investigating anxiety in expectant fathers have predominantly focused on general anxiety (Leach et al., 2016). However, it is highly likely that men also experience worries and concerns, specifically related to their partner's pregnancy and tapping into the construct of pregnancy-related anxiety in men (Cameron et al., 2020). Researchers have identified common worries and concerns held by expectant fathers, relating to perinatal loss of infant, partner health, finances, and changing lifestyle (e.g., des Robert et al., 2020; Kao and Long, 2004; Pilkington and Rominov, 2017). However, the various dimensions of paternal pregnancy-related anxiety have not yet been fully explored, with the exact nature of this construct in men largely unknown. Although expectant fathers are likely to share similar concerns with their partners, research suggests that men and women may differ in the nature or ranking of importance of their worries (Biehle and Mickelson, 2011; Glazer, 1985). Concerns about baby health, mother's pain in childbirth, childbirth complications, and losing the baby in childbirth are generally ranked equally by men and women (Glazer, 1985). However, fathers may report security worries more frequently, including worry about money, or work-home balance (Biehle and Mickelson, 2011). Moreover, fathers may have unique concerns, such as fulfilling their support role during labour and worries about their partners receiving good antenatal healthcare (Glazer, 1985).

A comprehensive understanding of expectant fathers' concerns would be valuable for researchers and clinicians alike. For researchers, this knowledge would extend current understandings of anxiety in expectant fathers, leading to identification of the relevant pregnancy-

related dimensions of anxiety in men. Identification of men's core concerns, worries, and fears around pregnancy can inform future scale development to assess and screen for paternal pregnancy-related anxiety. For clinicians, the availability of psychometrically sound scales and screeners would lead to better identification of men with elevated levels of pregnancy-related anxiety and enhance the provision of targeted prenatal mental health support to fathers. This would benefit the well-being of fathers and potentially reduce the risk of associated adverse outcomes for their infants and pregnant partners.

Existing systematic reviews of qualitative research highlight many dimensions of men's concerns during pregnancy, including partner and baby health (Kowlessar et al., 2015); the couple relationship (Chin et al., 2011; Genesoni and Tallandini, 2009; Poh et al., 2014); concerns about childbirth and new parenting roles (Baldwin et al., 2018; Shorey and Chan, 2020); and accessing support for themselves (Steen et al., 2012; Venning et al., 2020). These existing systematic reviews provide valuable insight regarding the nature of fathers' prenatal concerns, however, none primarily focused on men's concerns, worries, and fears specific to pregnancy. Rather, they examined fathers' experiences relating to general pregnancy and childbirth experiences (Kowlessar et al., 2015; Poh et al., 2014), transition to parenthood (Chin et al., 2011; Genesoni and Tallandini, 2009), encounters with maternity care (Steen et al., 2012; Venning et al., 2020), and broad mental health needs (Baldwin et al., 2018; Shorey and Chan, 2020). Therefore, existing systematic reviews cannot be relied upon for a comprehensive examination of the core dimensions of paternal pregnancy-related anxiety.

Two informative systematic reviews encompassing 52 quantitative studies provide insight into the stressors experienced by expectant fathers (Philpott et al., 2017) and factors contributing to prenatal anxiety in men (Philpott et al., 2019). In their first review, Philpott et al. (2017), identified numerous stressors experienced by expectant fathers. Stressors relating to dimensions of fathers' concerns during pregnancy included role restriction, negative feelings about the pregnancy or upcoming birth, anticipating the first weeks with a newborn, feelings of incompetence, low levels of social support, and financial concerns. In their later review, Philpott et al. (2019) identified psychological and contextual factors contributing to men's prenatal anxiety symptoms. Contextual factors included multiple births, lower income, becoming a father at a younger age, and work-family conflict. These contextual factors indicate potential dimensions of expectant father concerns relating to responsibility, finances, or balancing work with family. Both reviews by Philpott and colleagues highlighted the breadth of men's experiences with respect to prenatal stress and anxiety, however, they did not aim to identify or categorise expectant father concerns, worries or fears. This emphasises the importance of further examining the nature and dimensions of fathers' concerns in the prenatal period, which is the primary aim of the current systematic review.

Given that there have been no previous systematic reviews on this issue, the main goal of the current review was to examine specifically men's concerns, worries, and fears of pregnancy, as reported in the quantitative and qualitative literature. In addition, the current review aimed to explore the qualitative literature for an understanding of men's general experiences of pregnancy and their specific experiences of pregnancy-related anxiety. The following research questions were addressed:

1. What dimensions of paternal pregnancy-related anxiety are explored in the quantitative and qualitative literature?
2. What key themes emerge from the qualitative literature on fathers' experiences of pregnancy?
3. What do the qualitative findings tell us about paternal pregnancy-related anxiety?

1. Method

This review was guided by the Enhancing Transparency in Reporting the Synthesis of Qualitative research statement (ENTREQ; Tong et al., 2012), alongside the Preferred Reporting Items for Systematic reviews and Meta-Analyses (PRISMA; Page et al., 2021a, 2021b). The protocol was registered with the International Prospective Register of Systematic Reviews (PROSPERO: CRD42021230435). Two reviewers (CD, and research assistant) independently screened articles for inclusion and conducted quality appraisal of the included articles.

1.1. Design

The current review adopted an integrative review design using thematic content analysis. An integrative review design allowed both quantitative and qualitative findings to be included to comprehensively address the first research question by providing an in-depth understanding of expectant fathers' concerns, worries, and fears. Synthesising information sourced from multiple studies with diverse methodological approaches and contexts is potentially problematic (Thomas and Harden, 2008). However, thematic content analysis enabled themes to be identified across findings from various primary studies to develop new analytical themes, with the identified themes and patterns quantified into frequencies (Wilkinson, 2000).

1.2. Search methods

The following electronic databases of peer-reviewed journal articles were searched on the 25th October 2021, with no date limits (year of publication limits from 1860): Proquest, PubMed, Ovid (Embase, Emtree, and Medline), and EBSCO (CINAHL, Medline and PsycInfo). A search for relevant grey literature was also conducted using psycEXTRA and Proquest Dissertations and Theses. The search strategy included the Boolean terms "OR" and "AND" and used truncation "*". Keywords and their synonyms were combined as follows to search titles or abstracts: (pregnan* OR expectant OR expecting OR prenatal OR prepartum OR antenatal OR antepartum OR perinatal OR peripartum) AND (Partner* OR Father* OR paternal OR dad* OR male* OR men) AND (worr* OR concern* OR anxiet* OR fear* OR experience*).

1.3. Eligibility criteria

Only English language published research papers or dissertations were included. Therefore, other literature such as editorials, letters to the editor, reviews, meta-analyses, or book chapters were excluded. Qualitative and mixed-methods studies were included if they provided any descriptions about the nature, content, and themes of men's concerns during their partners' pregnancies. Studies examining childbirth were included if they examined childbirth fears or concerns, however, they were excluded if they reported solely on men's experiences during labour and childbirth. Quantitative studies were included if they used measures to assess concerns, stressors, worries, or fears, and reported descriptive results at the item-level (e.g., percentage of participants who endorsed being worried about the health of their partner), not solely based on total scale scores.

Exclusion criteria were applied to ensure that included studies examined the typical concerns of fathers during uncomplicated or low risk pregnancies. Therefore, studies predominantly focused on examining high risk pregnancies such as multiple pregnancies, assisted reproduction pregnancies or parents younger than 18 years were excluded. Studies were also excluded if specifically researching fathers with previous perinatal loss experiences, or with diagnosed mental health conditions, or if either parent had chronic or serious medical conditions (e.g., HIV or diabetes).

1.4. Quality appraisal

The purpose of the quality appraisal was to systematically assess the quality of the included studies and report any methodological limitations. However, consistent with recommendations, all studies were retained regardless of their methodological rigour, so as to maximise the breadth of findings and minimise the likelihood of unwarranted exclusions when relying on appraisal tools (Dixon-Woods et al., 2007).

The AXIS appraisal tool (Downes et al., 2016) was used to evaluate the quantitative studies. Twenty items evaluated all aspects of research reporting, including the aims, methods, results, ethics, and conflict of interest. An example item is, "Were the limitations of the study discussed?" Items were scored according to whether criteria were met, from 0 (*no*), 0.5 (*unsure or unreported*), to 1 (*yes*). The maximum score possible for any study was 20.

The Critical Appraisal Skills Program (CASP) checklist was used for the qualitative studies (<https://casp-uk.net/wp-content/uploads/2018/01/CASP-Qualitative-Checklist-2018.pdf>). The 10-item checklist assessed the appropriateness of the aims, methodology, study design, data collection, ethics, data analysis, findings, and significance of each report. An example item is, "Was the research design appropriate to address the aims of the research?" A scoring system consistent with Butler et al. (2016) was applied. Items were scored 0, 0.5 or 1, based on clearly defined criteria relevant to each item (see quality appraisal spreadsheet in supplementary material). The maximum score possible for any study was 10.

Quality appraisal was conducted by two reviewers independently (CD and research assistant). Percentage agreement between reviewers was calculated. The Intraclass Correlation Coefficient (ICC) was also calculated for absolute agreement, using SPSS v28 (two-way mixed-effects model). Since it was decided a priori to include all studies irrespective of their quality rating, quality appraisal total scores were recorded unchanged for both reviewers.

1.5. Data extraction and analysis

1.5.1. Extracting descriptive information

The following descriptive information was extracted from each study and recorded in an Excel spreadsheet: authors, year, country, paper type (e.g., published paper), study aims, study design (e.g., qualitative design using thematic analysis), sample context and recruitment method, method of obtaining fathers' concerns (e.g., semi-structured interview), number of participants, mean age and range, trimester of partner, parity, relationship status, and employment status.

1.5.2. Recording fathers' pregnancy-related concerns, worries, and fears

Fathers' concerns were extracted from the quantitative studies by recording the relevant questionnaire items which were endorsed as concerns, worries, stressors, or fears by fathers (e.g., "I worry about being a good provider").

Fathers' concerns were extracted from the qualitative and mixed method studies by recording direct quotes from participants or recording paper-described findings when verbatim participant quotes were insufficiently reported in the article.

1.5.3. Coding fathers' concerns, worries, and fears

Each concern, worry, stressor, or fear extracted from both the quantitative and qualitative studies was coded using consistent language across the studies. For example, the following concern code, "financial responsibility to support the family" was applied to an endorsed item from a quantitative study, "I worry about being a good provider" (Wapner, 1976) and a participant quote from a qualitative study, "Money is also very important. We therefore have to save as much as we can. I need to work as hard as possible" (Kao and Long, 2004).

Coding was initially conducted with no attempt to create categories, and no hierarchical structure. With each new study, codes were added to

the list as needed. If various ideas were expressed within a description or participant quote, findings were allocated several codes.

1.5.4. Categorising fathers' concerns, worries, and fears

The coded concerns derived from the quantitative and qualitative studies were categorised according to themes describing the dimensions of fathers' concerns during their partner's pregnancy.

1.5.5. Identifying themes describing fathers' experiences during pregnancy

After coding and categorising expectant fathers' concerns, worries, and fears, all qualitative studies were re-read to gain an understanding of fathers' general experiences during pregnancy. Themes were identified based on the similarities in experiences described across all the

qualitative studies.

2. Results

2.1. Search outcomes

The PRISMA flow diagram, providing a summary of the search outcomes is shown in Fig. 1. The search strategy initially identified 40,483 records which were imported into Endnote software. Removal of 21,662 duplicates resulted in 18,821 records. The remaining titles were searched electronically within Endnote using terms representative of the various exclusion criteria (e.g., stillborn, diabetes, or teen), so that 11,957 records were marked "ineligible" and removed in batches based

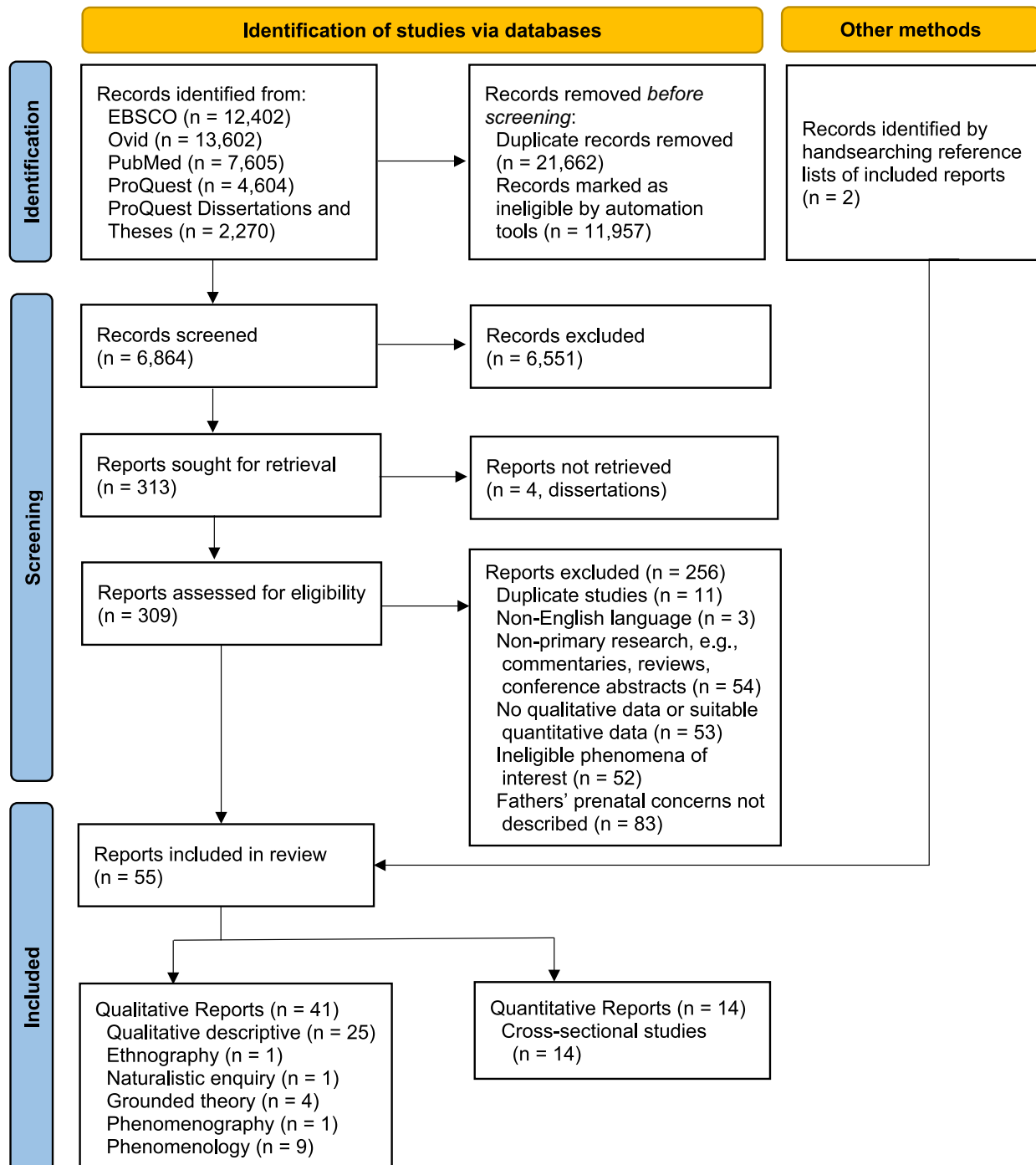


Fig. 1. PRISMA flow diagram showing search outcomes.

on these searches. A further 6551 records were removed when manual title screening revealed that they addressed unrelated subjects (e.g., reproductive decision-making, or studies involving animals). Full texts were sought for the remaining 313 articles. Four dissertations were not retrievable through interlibrary loans and were excluded. Abstracts and full texts of the remaining 309 articles were independently screened for inclusion by the two reviewers. Percentage agreement was 89.6 %, and Cohen's kappa (.66) indicated substantial agreement between the reviewers (κ ranges: .41 to .60 = moderate, .61 to .80 = substantial, .81 to 1 = near perfect; Belur et al., 2018). Double screening led to the exclusion of 256 articles. Fig. 1 shows the reasons for exclusion, with the most common reason being an absence of reporting about the specific concerns, worries, or fears of expectant fathers. Discrepancies were discussed between reviewers until consensus was reached. Manually handsearching reference lists of the included articles identified two additional reports. Altogether, 55 reports were included in the current review, comprising 14 quantitative (including five dissertations) and 41 qualitative (including eight dissertations) reports.

2.2. Quality of included studies

Percentage agreement in the reviewer quality rating scores for all items in each tool was 74.6 % for the quantitative studies (AXIS) and 80.2 % for the qualitative studies (CASP). Based on average ratings, ICC estimates indicated good reliability for the quantitative (ICC = .84, 95 % CI [.50, .95]) and qualitative (ICC = .84, 95 % CI [.71, .92]) studies (Koo and Li, 2016). The quality of the studies included in the review ranged from low to high quality, based on the lower of the two quality rating values allocated by either reviewer. The AXIS and CASP quality rating total scores allocated by both reviewers are shown in Tables 1 and 2 for the quantitative and qualitative studies, respectively (for item-level detail, refer to the supplementary quality appraisal spreadsheet).

The quantitative studies were mostly of moderate quality, with seven studies receiving a score of 15 or more on the AXIS tool. Only one study was considered high quality, with a score of 18. The remaining six quantitative studies were lower in quality, scoring between 10 and 15 by both reviewers. Most of the included quantitative studies did not clearly justify their sample sizes (13 studies, 93 %), nor take measures to address and categorise (10 studies, 71 %) or describe non-responders (12 studies, 86 %). Main factors affecting the lower quality studies included using nonstandard or previously unpublished measures, poor reporting of basic data, lack of evidence for internal consistency within the report results, and minimal discussion about limitations.

The qualitative studies were mostly of moderate (17 studies) to high (13 studies) quality. The 11 lower quality studies displayed variability in quality rating scores between reviewers, with scores ranging from 4.5 to 9 out of 10. The lower quality studies were mostly affected by insufficient reporting regarding recruitment strategy, inadequate consideration for the relationship between the researcher and participants, and limited discussion about the value and relevance of the research to existing knowledge and current practice. Despite the varying quality of the quantitative and qualitative studies, the information gained from the included studies was considered valuable for addressing the exploratory nature of the research questions of the current review.

2.3. Characteristics of included studies

The 14 quantitative studies involved 1785 fathers, (936 first-time fathers) from six countries, including the USA (six studies, see Table 1 for details), Germany (two studies), and one study each from Australia, Hungary, South Africa, and Sweden.

Of the 41 qualitative studies, 38 studies involved 1811 fathers (1070 first-time fathers). These studies originated from the USA (seven studies, see Table 2 for details), Sweden (seven studies), Scandinavia (one study conducted in Sweden, Denmark, and Finland), UK (six studies), Australia (five studies), Canada (two studies), and one study each from

Brazil, France, Iceland, India, Iran, Israel, Northern Ireland, New Zealand, Taiwan, and Turkey. An additional qualitative study from Sweden (Bäckström et al., 2017) included fathers and co-mothers in their sample of 14 first-time co-parents (gender breakdown not reported). Two additional qualitative studies examined 11 first-time father internet blogs (Sweden; Åsenhed et al., 2013) and 535 online posts written by 426 fathers (Australia; Pilkington and Rominov, 2017).

Ethnicity was reported by 30 (55 %) of the included quantitative and qualitative studies. Of these, 16 studies included a majority (90 % to 100 %) of fathers with Caucasian or European ethnicity. Socioeconomic status was reported by 32 (58 %) studies. Fifteen studies included fathers with diverse socioeconomic backgrounds and education and 17 studies included predominantly middle class or higher educated fathers.

The research was predominantly conducted during pregnancy (46 studies), with most participants recruited from maternity hospitals or clinics (20 studies), childbirth classes (15 studies), or a combination of settings (7 studies). Only one quantitative study (Chalmers and Meyer, 1996) and eight qualitative studies reported on fathers' pregnancy experiences as described retrospectively, or after the birth (Baldwin et al., 2019; des Robert et al., 2020; Ekström et al., 2013; Eriksson et al., 2007; Eriksson et al., 2006; Kulpa, 1992; Spektor, 2007; Talley, 2017).

Of the 14 quantitative studies, nine studies specifically examined fathers' concerns (Weiss, 1983; White, 1998), worries (Biehle and Mickelson, 2011; Forsyth et al., 2011; Göbel et al., 2020), stressors (Chandler, 1998; Glazer, 1989), anxiety (Kannenberget al., 2016), and childbirth-related fear (Szeverényi et al., 1998). The remaining five quantitative studies explored fathers' pregnancy experiences (one study) and the transition to parenthood (four studies, see Table 1 for study aims).

Of the 41 qualitative studies, one study specifically investigated fathers' worries during pregnancy (Pilkington and Rominov, 2017) and five examined childbirth-related fear (Eriksson et al., 2007; Eriksson et al., 2006; Grand, 2015; Greer et al., 2014; Sercekus et al., 2020). The remaining 35 studies explored fathers' experiences in pregnancy (16 studies, see Table 2 for study aims), their transition to parenthood (11 studies), their involvement in the pregnancy (three studies), their childbirth expectations (one study), and their experiences of professional support during pregnancy (four studies). Taken together, the breadth of research represented by the quantitative and qualitative studies included in this integrative review provided a comprehensive understanding of men's experiences of pregnancy in order to address the research questions of the current review.

2.4. Research question 1: dimensions of paternal pregnancy-related anxiety

The concerns, worries, and fears which emerged from the quantitative and qualitative studies were coded into a total of 75 separate concern codes (see Table 3). Fifty-six concerns were identified from within the quantitative studies, representing questionnaire items endorsed by fathers as relevant to their concerns, worries, stressors, or fears during pregnancy. Table 1 shows which concern codes were identified from each of the quantitative studies (refer to Supplementary Table 1 for more detailed methodology and results, as reported by the primary quantitative studies).

The six most frequently identified concerns across the quantitative studies were: baby health (57 %), childbirth complications (50 %), being a good parent (50 %), partner's pain and suffering in childbirth (43 %), responsibility of parenthood (43 %), and caring for infant (43 %). Supplementary Table 2 presents the number and percentage of studies from which each concern was identified.

Concerns were identified from the qualitative literature by examining the verbatim quotes of fathers and descriptions provided by the researchers (reported in Supplementary Table 3, along with the corresponding concern codes). Seventy-one concerns were identified from within the 41 qualitative studies. Table 2 shows which concern codes

Table 1
 Characteristics of included quantitative studies ($n = 14$) and AXIS quality ratings.

Author(s) (year), country	Study aim	Methodology	Participants	Concern codes (see Table 3)			AXIS R1 R2
Biehle and Mickelson (2011) USA	Comparing the types of worries of expectant fathers and mothers. Investigating the relationship between worries and perinatal well-being and relationship satisfaction.	Cross-sectional. An online and telephone questionnaire were completed in 3rd trimester.	104 primiparous pregnant couples were recruited from local birthing classes and online message boards. Age range of fathers: 18 to 52 years 91 % married, 9 % cohabiting 100 % employed	1.01 2.02 2.01 3.01 5.01 5.02	6.01 8.01 8.02 8.03 8.04 8.06	8.07 10.01 10.03 10.07 10.08	17 18.5
Chalmers and Meyer (1996) South Africa	To explore fathers' perceptions of their experiences at four stages of their transition to parenthood: during pregnancy, in response to antenatal preparation programs, at birth, and a few months after the birth.	Cross-sectional. A 34-item questionnaire within a few days following the birth.	46 first-time fathers were recruited from two maternity hospitals (private and state service). Age range 18 to 40 years 92.5 % married employment status not reported	1.01 1.03 1.06 1.07 1.12	1.13 1.09 2.02 2.03 3.01	3.02 3.06 6.03 8.03 10.01	14 11.5
Chandler (1998) Dissertation USA	To investigate the relationship between stress and marital satisfaction during the pregnancy period for expectant fathers.	Cross-sectional. Questionnaires completed in 2nd and 3rd trimester.	70 first-time expectant fathers were recruited from hospital tours, obstetrician offices, and childbirth education and baby care classes. Age range 20 to 47 years 100 % married employment status not reported	1.01 1.02 1.03 1.05 1.06 1.08 1.11 1.13 2.04	3.01 3.02 3.05 5.05 6.05 7.01 7.04 7.06	8.01 8.03 8.06 9.02 10.01 10.02 10.03 10.08	18 18.5
Forsyth et al. (2011) Australia	To investigate which emotions and worries men experienced when learning about and during their partner's pregnancy.	Cross-sectional. Questionnaires completed in 2nd and 3rd trimester.	48 pregnant couples (48 % primiparous) were invited to participate via local newspaper advertisements, general practitioner offices, pregnancy exercise classes, radiology clinics, obstetrician's offices and online pregnancy forums. Mean age 33.54 83 % married employment status not reported	1.03 2.03 3.02	5.07 6.01 6.02	8.03 10.04 10.07	17 18
Glazer (1989) USA	Exploratory study to identify anxiety levels and stressors of expectant fathers.	Cross-sectional. Questionnaires completed during pregnancy (96 % in 3rd trimester)	108 expectant fathers (72 % first-time fathers) were randomly selected from lists of men attending childbirth education classes offered by 5 organisations. Age range 20 to 48 years relationship status not reported 96 % employed	1.01 1.02 1.03 1.05 1.06 1.08 1.11 1.13	2.04 3.01 3.05 3.03 6.01 6.05 7.01 7.06	8.01 8.03 9.02 10.01 10.02 10.03 10.08	17 19
Göbel et al. (2020) Germany	To investigate the manifestation of paternal pregnancy-related worries in a population-based sample and to identify relevant associated factors.	Cross-sectional. Questionnaires completed in 2nd or 3rd trimester.	129 expectant fathers (61 % first-time fathers) were recruited when accompanying pregnant partner to a study appointment for another ongoing population-based pregnancy study at a university medical centre. Age range 24 to 49 years 100 % married/cohabiting employment status not reported	2.01 3.02 3.05 3.03	7.04 8.06 8.09	10.01 10.05 10.08	16.5 17
Kannenber et al. (2016) Germany	To determine whether pregnant women and their partners are affected by anxiety differently at various stages of pregnancy.	Cross-sectional. Questionnaires completed in 1st, 2nd or 3rd trimester.	183 expectant fathers (and 259 pregnant women) of mixed parity were recruited whilst attending hospital for antenatal ultrasound assessment, or general antenatal care, or for delivery. Participant ages, relationship status, and employment not reported.	1.01 3.02			12 14

(continued on next page)

Table 1 (continued)

Author(s) (year), country	Study aim	Methodology	Participants	Concern codes (see Table 3)			AXIS R1 R2
Karstens (1989) Dissertation USA	To investigate whether fathers at different ages/stages of adult development have characteristically different ways of preparing for the birth of their first child.	Cross-sectional. Questionnaires completed in 2nd and 3rd trimester.	114 first-time expectant fathers were recruited from prenatal classes at several hospitals to voluntarily complete an anonymous survey. Age range 22 to 40 years 94 % married 80 % were professionals, proprietors, or skilled workers.	3.01 5.01 6.01	6.05 7.04 8.06	8.09 10.04 10.07	14.5 14
Medalia (1981) Dissertation USA	To investigate the psychological experience of men as they make the transition to fatherhood.	Cross-sectional. Questionnaires completed in 1st (2 %), 2nd (16 %), or 3rd (82 %) trimester.	100 first-time expectant fathers were recruited through childbirth instructors or obstetricians in the New York and Newark areas. Age range 20 to 43 years 100 % married 99 % employed	2.01 3.01 5.01 5.04 6.02 6.05	6.06 7.06 7.07 8.01 8.04 8.06	8.09 10.02 10.03 10.08 10.09	15 18
Szeverényi et al. (1998) Hungary	To explore the contents of childbirth-related fears among expecting parents.	Cross-sectional. Parents completed questionnaire in 3rd trimester.	216 pregnant couples participating in an antenatal preparatory course were invited to participate. No-one declined to take part. Age range fathers 20–46 years 100 % married parity and employment status not reported	1.01 1.02 1.03 1.07 1.08	1.11 1.12 1.13	2.06 2.07 6.01 9.02	15.5 13
Wapner (1976) USA	To investigate the experiences, feelings, fears, worries, joys and satisfactions of the expectant father.	Cross-sectional. Questionnaires completed in 3rd trimester.	128 first-time expectant fathers were recruited by being asked to respond to a questionnaire before their first Lamaze childbirth class. Age, relationship status or employment status not reported	3.06 4.02 5.01	5.07 6.02	7.04 10.04	12.5 10
Weiss (1983) Dissertation USA	To describe the attitudes and concerns of first-time expectant fathers and compare these with those of first-time expectant mothers and a control group of childless, non-pregnant couples.	Cross-sectional. Questionnaires were completed in the home by interview in the 3rd trimester and after birth.	96 first-time expectant fathers were recruited from among the patients of several obstetrician/ gynaecologists on staff at a hospital. Mean age 28.2 years 100 % married employment status not reported	1.01 1.03 2.02 2.04 3.01	5.01 5.07 7.06 8.01 8.03	8.06 8.09 10.02 10.04	16 16
White (1998) USA	To examine the common concerns of expectant fathers identified in the literature.	Cross-sectional. Questionnaires completed in 2nd or 3rd trimester.	98 first-time expectant fathers were recruited from a 6-week, hospital-based childbirth education class. Age range: 19–51 Relationship and employment status not reported	1.10 2.06	3.01 6.02	8.03 10.04	13.5 10.5
Wikman et al. (1993) Sweden	To study attitudes, emotions and conflicts with respect to reproductive ability, pregnancy, delivery and parenthood in men and women using a psychometric instrument.	Cross-sectional. Parents independently completed a questionnaire provided during an antenatal appointment.	345 expectant fathers (and 369 pregnant partners) were recruited by midwives from three antenatal clinics. Age range 19 to 52 years Parity, trimester, relationship and employment status not reported.	6.06 6.07 7.06	7.07 8.01	8.09 10.07	16.5 17.5

Note. Concern codes relate to fathers' concerns according to category as shown in Table 3. AXIS = quality appraisal tool for cross-sectional studies. Maximum AXIS score = 20. R1 and R2 = AXIS score rating by reviewer 1 and reviewer 2, respectively.

Table 2
Characteristics of included qualitative studies ($n = 41$) and CASP quality ratings.

Author(s) (year), country	Study aim	Methodology	Participants	Concern codes (see Table 3)	CASP R1	CASP R2
Aponte (1991) Dissertation USA	To explore how prospective fatherhood represents an important transitional moment in men's normative psychological and emotional development - using object relational framework.	Qualitative descriptive. Framework analysis of semi-structured interviews in 3rd trimester (1.5 to 2.5 h).	20 first-time expectant fathers, recruited from childbirth education classes. Age range of 19 fathers: 20 to 39 years, 79 % married, 21 % committed relationship, 100 % employed.	6.02 7.07 6.07 8.01 7.05 8.03 7.06 8.06	8	8.5
Åsenhed et al. (2013) Sweden	To identify and describe the process of fatherhood during pregnancy among expectant, first-time fathers.	Qualitative descriptive. Content analysis of 11 online written blogs.	11 blogs written by first-time expectant fathers. Age range of 6 fathers: 22 to 34 years	1.01 8.02 2.04 8.06 2.05 9.01 3.01 10.06 8.01	9	9.5
Bäckström et al. (2017) Sweden	To explore pregnant women's partners' perceptions of professional support during pregnancy.	Phenomenography. Semi-structured telephone interviews (30 to 60 min) were conducted in 3rd trimester.	14 partners (including co-mothers) of primiparous pregnant women, recruited by midwives in antenatal units. Age range: 26 to 39 years, other descriptive statistics not reported.	2.04 8.06 5.07 9.01 6.02 10.06	9.5	10
Baldwin et al. (2019) UK	To develop an understanding of men's experiences of first-time fatherhood, their mental health and wellbeing needs.	Qualitative descriptive. Framework analysis of semi-structured interviews (12 to 52 min).	21 first-time fathers with children under 12 months. Study was advertised in father's groups, medical practices, health centres, and children's centres. Age range (90 %): 30 to 44 years, 90 % cohabiting/married, 10 % not residing with partner & baby. Employment: 90 % Full-time, 10 % Part-time.	3.01 8.03 5.01 8.04 8.02	10	9.5
Barclay et al. (1996) Australia	To identify and explore the social and relationship changes that Australian men experience during their partner's first pregnancy.	Grounded theory. Focus groups (30 to 45 min) conducted in 3rd trimester.	53 men attending antenatal classes at two hospitals and one community health centre. All pregnancies were the first in current relationship (one father had a child from previous relationship). Age range: 19 to 51 years, Employment status not reported.	1.01 6.05 1.02 7.03 1.03 7.09 2.02 8.01 2.04 8.02 2.05 9.01 2.07 9.02 3.06 10.01 6.01 10.03 6.02	9.5	9
Brennan et al. (2007) UK	To explore the emotional, physical, and psychological characteristics of couvade syndrome, and their explanations as perceived by men with pregnant partners.	Phenomenology. Interviews (60 to 90 min) of men who were experiencing a minimum of 4 physical or psychological symptoms of couvade.	14 expectant fathers (60 % first-time fathers) recruited from teaching hospital and through project website. Age range 19 to 48 years 86 % married, 14 % cohabiting 86 % employed	3.01 8.01 3.02 8.08 3.05 9.01 5.01 9.02 5.07 10.01 6.01 10.05	9	9
de Brito et al. (2013) Brazil	To investigate the difficulties experienced by men during pregnancy, describing their reactions when facing such difficulties.	Qualitative descriptive. Thematic analysis of semi-structured interviews conducted in 2nd or 3rd trimester.	27 expectant fathers (parity not reported), recruited from prenatal assistance programs of four health units. Age range 22 to 36 years 100 % cohabiting with partners Employment status not reported.	5.04 9.02 6.01 10.02 6.02 10.04	5	6
Deave et al. (2008) UK	To explore the needs of first-time fathers in relation to the care, support and education provided by healthcare professionals during the antenatal period.	Qualitative descriptive. Content analysis of semi-structured interviews (25 to 80 min) in 3rd trimester, then 3 to 4 months post-birth.	20 first-time expectant fathers, recruited by community midwives in two healthcare organisations. Age range 19 to 37 years Relationship status not reported. 85 % employed	7.03 7.08 8.06 9.01	8	8.5
des Robert et al. (2020) France	To explore first-time fathers' experiences at the announcement of intended or unintended pregnancy. Focus was on the realisation of pregnancy.	Qualitative descriptive. Men retrospectively (up to 32 years later) described their experiences at the announcement of their partner's first pregnancy.	44 men recruited by General practitioner. Age range at announcement of pregnancy: 18 to 40 years Relationship status: 27 % married, 45 % cohabiting, 18 % living apart, and 9	3.01 7.06 3.02 8.04 3.03 10.05 5.02	6	8

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Table 2 (continued)

Author(s) (year), country	Study aim	Methodology	Participants	Concern codes (see Table 3)	CASP R1	CASP R2
			% civil union. 89 % employed at time of pregnancy.			
Dolan and Coe (2011) UK	To explore how men construct masculine identities within the context of pregnancy and childbirth.	Qualitative descriptive. Semi-structured interviews (average length 1.5 h) 4 to 8 weeks before and after the birth.	5 first-time expectant fathers were recruited in 3rd trimester while attending antenatal appointments with partners. Age range 28 to 33 years 100 % in stable relationship 100 % employed	1.01 7.04 1.02 7.08 2.06 9.01 2.07 9.02 3.01 9.03 5.01 10.04	9	8
Donovan (1995) Australia	To explore the social and emotional experiences of men during their partners' pregnancies. To systematically develop a substantive grounded theory, drawn from their experiences during this transitional period.	Grounded theory. Four meetings (2 to 3 h) held over 8 weeks and additional meeting post-birth.	6 expectant fathers were recruited for the group from a general medical practice. Partners were in 2nd trimester of pregnancy (parity not reported). Participant ages, relationship status and employment status not reported.	5.04 7.06 6.01 8.04 6.02 9.01 6.05	7.5	6
Draper (2003) UK	To explore men's experiences of the transition to fatherhood. To explore expectant fathers' encounters with the pregnant and labouring body.	Ethnography. Semi-structured interviews twice during pregnancy and once post-birth, and 3 preliminary pilot focus groups.	18 men (33 % first-time fathers) with partners in 2nd and 3rd trimester, recruited from antenatal classes. Age range: early 20s to early 50s. 100 % stable relationship Employment status not reported.	1.06 2.07 1.1 6.06	5	8
Drobeck (1990) Dissertation USA	To investigate the impact on men of the transition to fatherhood. Study focused on subjective experience of the pre- to postpartum transition to fatherhood.	Phenomenology. Two in-depth open-ended interviews (1 to 2 h) in 3rd trimester and 12 to 16 weeks post-birth.	30 first-time expectant fathers with partners in 3rd trimester, recruited from childbirth education classes. Age range 22 to 42 years 100 % married Employment status not reported.	7.06 8.03 7.08 8.06 8.01 10.07 8.02	9.5	9
Ekström et al. (2013) Sweden	To explore fathers' feelings and experiences during pregnancy and childbirth.	Qualitative descriptive. Written interviews were analysed using content analysis.	8 fathers (63 % first-time fathers) were recruited post-birth from two maternity wards. Age range 30 to 36 years Relationship status and employment status not reported.	1.01 3.04 1.09 9.01 2.01 10.05 2.04 10.06 3.01 10.07 3.02	7	6.5
Eriksson et al. (2007) Sweden	To investigate and describe the implications, from a father's perspective, of experiencing intense fear related to childbirth.	Qualitative descriptive. Retrospective study, 1–2 years after birth. Approximately 1.5 h interviews.	20 fathers with high childbirth-related fear (35 % with previous birth complications and 30 % were first-time fathers). Age range 28 to 57 years 90 % married or cohabiting Employment status not reported.	1.03 5.06 1.1 6.07 1.11 7.01 1.12 7.02 1.13 7.03 2.04 9.01 2.05 9.02 2.07	7.5	7.5
Eriksson et al. (2006) Sweden	To analyse the content of childbirth-related fear.	Qualitative descriptive. Mixed methods study using content analysis of written responses to an open-ended question.	194 fathers (41 % first-time fathers) who had a baby born at a university hospital. Age range 22 to 57 years 95 % married/cohabiting Employment status not reported.	1.01 1.13 1.02 2.04 1.03 2.06 1.05 2.07 1.08 3.01 1.1 3.02 1.11 9.01 1.12 9.02	7	7
Fenwick et al. (2012) Australia	To describe expectant fathers' experiences of pregnancy and their childbirth expectations.	Grounded theory. Thematic analysis of interviews (30 to 90 min) and diaries. Interviewed in 2nd & 3rd trimester, and approximately 8 weeks post-birth.	12 expectant fathers (42 % first-time fathers), recruited from teaching hospital when attending antenatal appointments or immediately before antenatal education classes. 75 % aged over 30 years 100 % employed	1.01 6.01 1.03 7.06 2.04 7.07 2.06 9.01 3.01 10.01 4.01 10.06	9	8.5
Finnbogadóttir et al. (2003) Sweden	To describe first-time expectant fathers' experiences of pregnancy.	Qualitative descriptive. Interviews (30 to 60 min) were conducted between week 38 and 39.	7 first-time expectant fathers, recruited by a midwife during a visit to antenatal clinic. Age range 28 to 37 years. 100 % cohabiting with partner 100 % employed or studying	3.01 7.07 5.01 8.01 5.04 8.02 5.07 8.09 6.05 9.01 7.01 10.04 7.03 10.06 7.04	9	8

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Table 2 (continued)

Author(s) (year), country	Study aim	Methodology	Participants	Concern codes (see Table 3)		CASP R1 R2
Gage and Kirk (2002) New Zealand	To describe first-time expectant fathers' perceptions of preparedness for and the transition to parenthood.	Phenomenology. Thematic analysis of semi-structured focus groups: 2 groups with prospective first-time fathers, and 2 with recent first-time fathers (infants 3–6 months).	19 first-time fathers. Prospective and recent first-time fathers who had enrolled in prenatal education classes. Age range 25 to 44 years 95 % married 90 % employed full-time, 10 % part-time.	7.04 7.09 8.02 8.03	8.09 10.02 10.06	9 5.5
Gervais et al. (2016) Canada	To describe fathers' current situation with regard to services in order to determine their needs as expectant parents.	Qualitative descriptive. Thematic analysis of semi-structured interviews (60 to 90 min).	17 couples including expectant and new parents (child under 2 years) who had received services for the pregnancy or child in the preceding six months. Age range of men: 22 to 46 years. Employment status not reported.	2.04 5.07	9.01 9.03	9 8
Gerzi and Berman (1981) Israel	To investigate the emotions of the expectant father during the first pregnancy of his wife.	Qualitative descriptive. Mixed methods study including semi-structured clinical interviews.	6 first-time expectant fathers were chosen at random from the full sample of 51, and interviewed in 3rd trimester. Recruited from family health centres. Age range 22 to 27 years 100 % married Employment status not reported.	1.1 1.11 2.06 3.02 4.01	5.04 6.05 8.02 8.06	4.5 5.5
Gottfredsdóttir (2005) Iceland	To explore prospective first-time fathers' views concerning fatherhood in relation to new legislation on parental leave in Iceland; and to describe their educational needs before the birth of their child.	Qualitative descriptive. Thematic content analysis of semi-structured focus groups (60 to 90 min).	15 first-time expectant fathers were recruited from antenatal clinic. Partners were 27 to 37 weeks pregnant. Mean age 24.2 years Relationship and employment status not reported.	2.02 2.06 3.01 5.01 5.07 6.02 7.01	7.02 7.08 8.01 8.02 8.06 9.01 10.03	7.5 7.5
Grand (2015) Dissertation USA	To provide an explanation for the fears in expectant fathers and understand how prenatal education can help fathers to cope with their fears.	Qualitative descriptive. Collective case study design (using thematic analysis) comprised of semi-structured interviews with each father (20 to 30 min) and two focus groups (each attended by 5 and 3 fathers respectively).	Participants were 16 first-time fathers. Expectant fathers who attended a 3-h men's antenatal workshop across 3 sites, were invited to participate. Age range 25–45 years. Relationship and employment status not reported.	1.01 1.03 1.07 2.04 2.06 2.07 3.01 3.02 3.03 5.01 5.03 5.04	6.02 7.05 7.06 7.08 8.02 8.03 8.04 8.09 9.02 10.05	9 9.5
Greer et al. (2014) Northern Ireland	To explore "fear of childbirth" and its impact on birth choices among women and their partners.	Qualitative descriptive. Semi-structured interviews (approximately 1-h).	19 expectant fathers (and their pregnant partners), recruited during routine antenatal visits at large maternity hospital. Descriptive statistics for age, relationship status, and employment not reported.	1.01 1.02 1.03 1.04 1.1 1.11 2.04	2.05 5.03 6.01 7.09 8.03 9.02	8 7
Hallgren et al. (1999) Sweden	To discover the expectations and experiences of childbirth preparation and childbirth of Swedish men in order to contribute to a basis of reflections in the midwifery profession.	Hermeneutic phenomenology. Three interviews (20–60 min) were conducted before childbirth preparation, after childbirth preparation, and 1 to 3 weeks post-birth.	11 men with partners in 3rd trimester (100 % primiparous), recruited from antenatal classes. All men were first-time fathers except one, with two children from a previous relationship. Age range 21 to 49 years 100 % cohabiting Employment status not reported.	1.01 1.02 1.13 2.02 2.01 2.04	2.05 2.06 2.07 5.06 7.07 8.03	7 8
Johansson et al. (2015) Sweden	To describe how expectant fathers experienced physical and emotional changes during partner's pregnancy.	Qualitative descriptive. Longitudinal mixed-method study with questionnaires in 2nd & 3rd trimester, with open-ended questions about physical and emotional changes.	871 expectant fathers and their pregnant partners (47.1 % primiparous), recruited from three hospitals. Age range 15 to 66 years 98 % cohabiting/married Employment status not reported.	3.01 3.03 4.01 4.02 5.01	5.04 8.01 8.02 8.04	6 7.5

(continued on next page)

Table 2 (continued)

Author(s) (year), country	Study aim	Methodology	Participants	Concern codes (see Table 3)	CASP R1 R2
Johnsen et al. (2017) Sweden (n = 18) Denmark (n = 8) Finland (n = 5)	To illuminate expectant first-time fathers' experiences of participation during pregnancy in three Nordic countries.	Qualitative descriptive. Content analysis of semi-structured interviews (20 to 60 min) at 30 weeks or more.	31 first-time expectant fathers, recruited from antenatal care facilities or parental classes. Age range 24 to 43 years Relationship status not reported 100 % employed	3.01 5.07 5.02 7.01 5.03 7.02 5.06 9.03	7.5 8.5
Joy and Paul (2012) India	To explore the unique experiences of expectant fathers.	Phenomenology. In-depth interviews (10 to 20 min) were conducted during scheduled visit at antenatal clinic.	6 men, recruited from a hospital outpatient department and private antenatal clinic. 4 out of 6 partners were 6 to 9 months pregnant (parity not reported). 50 % aged between 31 and 35 years 100 % married 50 % business men	3.01 5.01 10.01	5 4.5
Kao and Long (2004) Taiwan	To explore the life experiences of Taiwanese first-time expectant fathers while their wives were in the third trimester of pregnancy.	Husserlian phenomenology. Content analysis of unstructured interviews (duration not reported) in 3rd trimester (34–36 weeks).	14 first-time expectant fathers with wives in the 3rd trimester were invited to participate through contact made to their wives. Age range 20 to 43 years 100 % married 100 % employed	1.02 6.02 2.02 6.03 2.04 6.04 2.05 7.01 2.07 7.07 3.01 8.01 5.01 8.03 5.04 8.06 5.07 10.04 6.01 10.07	9 8.5
Kulpa (1992) Dissertation USA	To explore the father's experience of childbirth, encompassed by pregnancy, labor, and delivery.	Qualitative descriptive. Interviews (1 to 2 h) were conducted 6 months to 2 years post-birth.	10 fathers (50 % first-time) included personal acquaintances of the researcher and other men sourced through referrals. Age range Mid 20's to Late 30's 100 % married, 100 % employed	1.02 7.01 3.02 7.03 4.01 8.01 5.01 8.02 5.06	9.5 9.5
Levenstein (1992) Dissertation USA	To construct a theory of the experience of men becoming fathers for the first time.	Grounded theory. The researcher, as a participant observer, interviewed men expecting a child for the first time. Men were interviewed once in 1st or 2nd trimester, a second time in 3rd trimester, and a third time one month post-birth.	17 first-time expectant fathers were sourced through contacts made by personal acquaintances of the researcher and other study participants. Age range 16–37 years 88 % married, 12 % committed relationship One student (6 %), 94 % employed	1.01 6.06 1.02 7.02 1.1 7.06 1.11 7.07 2.04 8.01 3.01 8.03 3.02 8.06 3.06 8.09 5.01 9.01 5.07 10.01 6.01 10.02 6.02 10.03 6.03 10.04 6.04 10.05 6.05	8 7.5
May (1982) USA	To examine the social-psychological experience of first-time expectant fatherhood, and the progression of pregnancy from the father's perspective.	Naturalistic enquiry. 11 fathers interviewed 2 to 4 times during pregnancy and 9 fathers intensively interviewed once. Additional data from brief interviews with 80 other men.	20 first-time expectant fathers and 80 short field interviews with men (various stages of pregnancy). Recruitment from childbirth classes, clinics, and private offices. 100 % married or cohabiting. Descriptive statistics for age and employment status not reported.	7.01 10.01 8.04 10.08	5.5 6.5
Pilkington and Rominov (2017) Australia	To identify the types of worries and concerns that men report during pregnancy by conducting a qualitative analysis of an online community of expectant fathers.	Qualitative descriptive. All posts submitted to the Reddit community, "PreDaddit," since its inception were examined for inclusion in the qualitative content analysis.	A total of 535 posts written by 426 unique users were included in the analysis. Posts were written by first-time and multiparous fathers at various stages of their partner's pregnancy.	2.01 7.06 3.02 8.03 3.03 8.05 3.07 8.09 3.06 8.1 4.02 9.04 5.01 10.01 5.02 10.05 5.06 10.06 6.01 10.07 7.01	9.5 10
Rominov et al. (2018) Australia	To explore men's experiences of seeking support for their mental health and parenting in the perinatal period,	Qualitative descriptive. Semi-structured interviews (30 min)	20 men (5 first-time and 7 multiparous expectant fathers, and 8 men with infants under 2 years).	1.01 7.03 3.01 7.09 7.01 9.01	10 10

(continued on next page)

Table 2 (continued)

Author(s) (year), country	Study aim	Methodology	Participants	Concern codes (see Table 3)	CASP R1	CASP R2
	and identify their specific support needs during this time.	conducted in-person with 4 participants and by telephone with 16 participants.	Snowball sampling using word of mouth & online advertising. Age 30 to 42 years, 100 % married/cohabiting 100 % employed.			
Sartori et al. (2018) Australia	To evaluate the impact of maternal nausea and vomiting in pregnancy on expectant fathers.	Qualitative descriptive. Mixed methods sub-study within longitudinal study, with open ended question in antenatal questionnaire during 3rd trimester.	77 participants (out of 300) wrote detailed comments about their partner's nausea and vomiting. Recruitment from antenatal clinics and community settings. Full sample statistics: Mean age 30.5 years, 49 % first-time fathers, 89 % married, 91 % employed.	3.04 5.03	5.07 10.07	7 7.5
Sercekus et al. (2020) Turkey	To determine the fears associated with childbirth among first time expectant fathers and the reasons for these fears.	Phenomenology. Semi-structured interviews (21 to 37 min) conducted in 3rd trimester.	16 first-time expectant fathers, who stated they had childbirth fears, were recruited from the obstetric outpatient clinic of a university hospital. Age range 22 to 38 years 100 % married, 100 % employed	1.01 1.02 1.03 1.07 1.1 1.11	1.12 1.13 2.04 2.07 3.02 9.02	8 6
Spektor (2007) Dissertation/ Thesis UK	To explore the experiences of first time fathers during pregnancy, birth and the post-natal period.	Phenomenology. Semi-structured interviews (45 to 90 min) were conducted with fathers 9 months to 3 years after birth of first child.	9 first-time fathers involved in care of their children, recruited through a parenting service. One father had separated, but equally shared care of child. Age range 28–43 years. 66 % employed, 33 % primary caregiver.	1.02 1.03 2.05 2.06 3.01 4.01 5.04 5.07	7.03 8.01 8.02 8.03 9.01 10.01 10.06	9.5 9.5
Talley (2017) Dissertation/ Thesis USA	To understand how first-time fathers perceive or experience pregnancy, childbirth, and fatherhood.	Phenomenology. Semi-structured interviews were conducted within 6 months after birth of first child.	12 first-time fathers. Recruitment through advertising in obstetrician offices. Age range 18 to 34 years, 100 % married or cohabiting, 84 % employed, 8 % fulltime student, 8 % unemployed.	1.01 1.02 1.12 3.01 3.02 3.03	3.07 5.01 5.04 5.07 6.05 8.03	9.5 9.5
Taylor (1992) Dissertation/ Thesis Canada	To explore and describe expectations for childbirth from the perspective of the expectant father.	Qualitative descriptive. Latent content analysis of in-depth, open-ended interviews (1 to 1.5 h) in 3rd trimester.	10 expectant fathers (80 % first-time), recruited through prenatal classes and word of mouth. Age range 23 to 36 years, 100 % married, 90 % full-time & 10 % part-time employment	1.02 1.03 2.02 2.04	2.05 2.06 2.07	10 9.5
Tehrani et al. (2015) Iran	To explore how first time fathers describe their experiences of pregnancy.	Qualitative descriptive. Open-ended interviews (19 to 32 min) in 3rd trimester.	26 first-time expectant fathers, recruited from five public health prenatal clinics. Age range 23 to 34 years, 100 % married, 100 % employed.	3.01 5.01 5.04	6.01 10.04	7 7.5
Widarsson et al. (2015) Sweden	To describe the perspectives of expectant mothers and fathers on fathers' involvement during pregnancy.	Qualitative descriptive. 60 % were interviewed within focus groups (4 groups, 71 to 109 min). 40 % were interviewed individually (31 to 61 min).	10 Expectant fathers (and 20 pregnant women) in 2nd or 3rd trimester, recruited from hospitals, maternity care units, & services for newly arrived immigrants. 80 % of men were first-time expectant fathers. Age range 21 to 56 years, 100 % married or cohabiting, employment status not reported.	5.03 5.06 5.07 7.08	7.09 8.02 10.04 10.07	7 8

Note. Concern codes relate to fathers' concerns according to category as shown in Table 3. CASP = Critical Appraisal Skills Program quality appraisal checklist for qualitative studies. Maximum CASP score = 10. R1 and R2 = CASP score rating by reviewer 1 and reviewer 2, respectively.

were identified from each of the qualitative studies (refer to Supplementary Table 4 for more detailed methodology and findings, as reported by the primary qualitative studies).

The six most frequently identified concerns across the qualitative studies (see Supplementary Table 2) were: baby health (49 %), feeling excluded from antenatal care (41 %), ability to fulfil support role during labour and delivery (37 %), partner health (34 %), childbirth complications (32 %), and feeling unprepared for parenthood (32 %).

The 75 concern codes identified from the quantitative and qualitative studies were grouped into the following 10 categories of fathers' concerns (see Table 3), representing 10 dimensions of fathers' pregnancy-related anxiety: childbirth concerns, attitudes towards childbirth, baby concerns, acceptance of pregnancy, partner concerns, relationship concerns, worry about self, transition to parenthood, attitudes towards health care professionals, and practical and financial concerns.

Table 3
Coding and categorisation of fathers' concerns during their partner's pregnancy.

1. Childbirth Concerns
1.01 Childbirth complications ^{a,b}
1.02 Unforeseen events in childbirth ^{a,b}
1.03 Partner's pain and suffering in childbirth ^{a,b}
1.04 Partner being traumatised by childbirth
1.05 Partner not coping during labour and childbirth
1.06 Partner being torn or needing to be cut during childbirth ^a
1.07 Partner requiring emergency caesarian
1.08 Medical interventions (e.g., medication or forceps) ^a
1.09 Not arriving to hospital in time for birth
1.10 Partner injured during childbirth
1.11 Baby injured during childbirth ^a
1.12 Death of partner in childbirth
1.13 Death of baby in childbirth ^a
2. Attitudes Towards Childbirth
2.01 Anxiety about childbirth ^a
2.02 Ambivalence about being present during childbirth ^a
2.03 Being absent or excluded from delivery
2.04 Ability to fulfil support role during labour and delivery ^{a,b}
2.05 Feeling helpless to ease partner's suffering ^b
2.06 Being unable to cope with labour and delivery ^b
2.07 Experiencing unpleasant reactions (e.g., feeling faint, sick, or disgusted) ^b
3. Baby Concerns
3.01 Baby health ^{a,b}
3.02 Baby with genetic abnormality or disability ^{a,b}
3.03 Partner having miscarriage
3.04 Partner's morning sickness affecting baby's development
3.05 Baby born prematurely or overdue ^a
3.06 Sex during pregnancy harming the baby
3.07 Sex of baby
4. Acceptance of Pregnancy
4.01 Ambivalence about pregnancy
4.02 Feeling unprepared for the pregnancy
5. Partner Concerns
5.01 Partner health ^{a,b}
5.02 Pregnancy complications
5.03 Mental health/or wellbeing of partner
5.04 Fluctuating emotions in pregnant partner ^b
5.05 Partner's feelings towards pregnancy
5.06 Concealing personal worries from partner to protect them
5.07 Adequately supporting partner during the pregnancy ^{a,b}
6. Relationship Concerns
6.01 Relationship concerns during pregnancy ^{a,b}
6.02 Changes to relationship with partner post-birth ^{a,b}
6.03 Finding time for the relationship post-birth
6.04 Changing roles within the couple
6.05 Changes to sexual relationship during pregnancy ^a
6.06 Changing shape of pregnant partner
6.07 Sexual relationship post-birth
7. Worry About Self
7.01 Preoccupation with worry ^b
7.02 Constantly prepared for the worst
7.03 Lack of support for oneself ^a
7.04 Personal physical health ^a
7.05 Managing on reduced sleep post birth
7.06 Impact on lifestyle ^{a,b}
7.07 Loss of independence
7.08 Acquiring sufficient information to feel prepared
7.09 Managing conflicting advice/information
8. Transition to Parenthood
8.01 Responsibility of parenthood ^{a,b}
8.02 Feeling unprepared for parenthood ^b
8.03 Being a good parent ^{a,b}
8.04 Uncertainty about future
8.05 Protecting child after birth
8.06 Caring for infant ^{a,b}
8.07 Bonding with baby
8.08 Impact on other siblings
8.09 Concerns regarding family and friends ^a

Table 3 (continued)

8.10 Safety of infant with pets
9. Attitudes Towards Health Care Professionals
9.01 Feeling excluded from antenatal care ^b
9.02 Concern for partner to receive good medical care ^{a,b}
9.03 Not disclosing worries to professionals so partner receives optimal care
9.04 Prenatal appointments
10. Practical and Financial Concerns
10.01 Financial concerns ^{a,b}
10.02 Constrained finances/Loss of partner income ^a
10.03 Added cost of having child ^a
10.04 Financial responsibility to support family ^a
10.05 Housing
10.06 Practical readiness for baby ^b
10.07 Work-Family balance ^a
10.08 Work or education stress ^a
10.09 Housekeeping

Note. Table shows dimensions of concerns, worries, and fears experienced by expectant fathers, identified by quantitative ($n = 14$) and qualitative studies ($n = 41$).

^a Concerns identified from 20 % or more quantitative studies.

^b Concerns identified from 20 % or more qualitative studies.

2.4.1. Fathers' key concerns according to dimensions of pregnancy-related anxiety

Sixteen concerns were identified from within the findings of at least 20 % of both the quantitative and qualitative studies (denoted with the superscript "ab" in Table 3). These key concerns are shown below, according to each dimension of fathers' pregnancy-related anxiety, with example items or quotes from the literature.

2.4.1.1. Childbirth concerns. Not surprisingly, fathers feared their partner experiencing pain and suffering, they feared childbirth complications, and they feared unforeseen events occurring during childbirth. In quantitative studies, 69 % of fathers endorsed the following item as a worry, "partner would experience pain," (Forsyth et al., 2011, p. 54), and 81 % endorsed the following item as a stressor, "complications occurring during labour" (Glazer, 1989, p. 53). Fears of unforeseen events in childbirth were described by researchers as, "the unknown or unpredictable course of labour and delivery," (Eriksson et al., 2006, p. 114).

2.4.1.2. Attitudes towards childbirth. The key concern was a fear of not being able to fulfil their support role during labour and delivery. For example, one father worried that he "would be standing there helpless and just looking on" (Eriksson et al., 2006, p. 114).

2.4.1.3. Baby concerns. Results indicated that fathers worried about the health of their baby and feared the possibility of a genetic abnormality or disability. Fathers ranked, "concern for the health of my unborn child," as their top concern in quantitative research (White, 1998, p. 5). In qualitative research, fathers described fearing, "the child having a defect or disability" (Eriksson et al., 2006, p. 114).

2.4.1.4. Partner concerns. Key concerns included worry about partner health and being able to adequately provide support to the partner throughout pregnancy. In quantitative research, 84 % of fathers endorsed the item, "I worry about my mate's health" (Karstens, 1989, p. 69), and 71 % of fathers agreed with the item, "I feel I should do more to protect and take care of my wife now that she is pregnant" (Wapner, 1976, p. 8).

2.4.1.5. Relationship concerns. Relationship concerns during pregnancy, and concerns about future changes to the relationship post-birth were the key paternal worries. During pregnancy, one father described, "we are getting into issues that we never had before" (Levenstein, 1992,

p. 66), and regarding the future relationship, “there’s a risk that my wife and I will not get along after the baby - we have a good relationship now, but it may not be after the baby” (Aponte, 1991, p. 68).

2.4.1.6. Worry about self. The key concern highlighted by the research was that parenthood would adversely impact lifestyle. In quantitative research, 74 % of fathers endorsed the following item as a stressor, “changes in your way of living” (Glazer, 1989, p. 53).

2.4.1.7. Transition to parenthood. Three key concerns included concerns about the increased responsibility of parenthood, concerns about being a good parent, and worry about not knowing how to care for the infant. One father stated, “well I guess I was worried about becoming a dad ... it’s a lot of responsibility ya know what I’m sayin” (Brennan et al., 2007, p. 28). Anxiety about being a good father was also expressed, “...My biggest fear my entire life is I wouldn’t be a good father...” (Pilkington and Rominov, 2017 p. 211). Thoughts of caring for the infant were associated with fear, “I don’t know how to interact with my child when she’s born. ...I’ve never been a father, so I feel quite terrified” (Kao and Long, 2004, p. 64).

2.4.1.8. Attitudes to health care professionals. The key concern was for their partner to receive good medical care. The following item was endorsed as a stressor by 58 % of fathers in quantitative research, “whether the doctor or midwife will give your partner good care” (Glazer, 1989, p. 53).

2.4.1.9. Practical and financial concerns. Concern about finances was identified as the key concern. The following item in a quantitative study was endorsed as a stressor by 61 % of fathers, “being able to buy the things your partner and you will need and want” (Glazer, 1989, p. 53).

The key concerns discussed above, represent important pregnancy-related concerns for fathers, being identified from within at least 20 % of the quantitative and qualitative studies included in the current review. The following four concerns only emerged as relevant from within the qualitative studies: feeling excluded from antenatal care, lack of support for oneself, practical readiness for baby, and feeling unprepared for parenthood. The importance of these four concerns is highlighted by the following comments. One father expressed frustration about being excluded from antenatal care: “I told the midwife at the antenatal care clinic that I was the one who was afraid, not her, and I noted that there were no routines for dealing with the man’s fears” (Eriksson et al., 2007, p. 414). Concern about a lack of support for oneself was also described: “certainly my anxieties had built up, and it would have been nice to have had a forum, an opportunity to express some of them” (Spektor, 2007, p. 42). An example of how practical readiness for baby was expressed included: “I felt pressure to fix all practical stuff such as larger apartment, car and so on” (Ekström et al., 2013, p. 2). And regarding feeling unprepared for parenthood: “We’ve been too busy getting all the physical stuff done ... and haven’t thought much about actually being a dad... past the labour and the birth” (Gage and Kirk, 2002, p. 19).

2.5. Research question 2: key themes describing fathers’ experiences of pregnancy

The qualitative literature on fathers’ general experiences of pregnancy highlighted fathers having mixed emotions and conflicted experiences during the pregnancy transition. Four key themes emerged: experiencing excitement while managing apprehension, providing support while feeling excluded, making preparations while carrying uncertainty, and accepting responsibility while losing freedom. The studies which explicitly identified each theme, and example quotes are presented in Table 4.

2.5.1. Experiencing excitement while managing apprehension

The theme of experiencing excitement while managing apprehension describes the mixed positive and negative emotions often experienced concurrently by expectant fathers. This theme emerged from nine of the qualitative studies (see Table 4). Fathers described having mixed emotions due to fears around the possibility of miscarriage (Pilkington and Rominov, 2017) or the anticipated changes that fatherhood would bring (Johansson et al., 2015; Kulpa, 1992). Towards the end of pregnancy, fathers experienced conflicting emotions, especially regarding the upcoming delivery (Åsenhed et al., 2013; Taylor, 1992).

2.5.2. Providing support while feeling excluded

This theme refers to fathers endeavoring to provide support to their pregnant partners while experiencing a concurrent lack of support for themselves due to exclusion from antenatal care, lack of social support, or a choice to keep their personal concerns to themselves. This theme was described within 10 of the included qualitative studies (see Table 4).

For some fathers, the support needs of their pregnant partners took priority over their personal needs for support. They chose not to share their worries with their partners during pregnancy, in order to protect them (Eriksson et al., 2007; Hallgren et al., 1999; Johnsen et al., 2017; Kulpa, 1992; Pilkington and Rominov, 2017; Widarsson et al., 2015). Others chose to say nothing to health care professionals about their personal concerns, to ensure that their pregnant partners would receive full attention during antenatal care (Dolan and Coe, 2011; Gervais et al., 2016; Johnsen et al., 2017). The need for support within a separate context to their pregnant partners was also highlighted (Kulpa, 1992).

2.5.3. Making preparations while carrying uncertainty

The theme, making preparations while carrying uncertainty, highlights that during pregnancy, necessary preparations are made for the approaching birth of a child, however, pregnancy is also associated with uncertainty about many aspects of life and the future. The tension, between preparation and uncertainty was explicitly described by 10 studies (see Table 4). Fathers made practical preparations (Åsenhed et al., 2013; Bäckström et al., 2017; Ekström et al., 2013; Fenwick et al., 2012; Finnbogadóttir et al., 2003; Gage and Kirk, 2002; Pilkington and Rominov, 2017; Spektor, 2007) and engaged in information gathering (Deave and Johnson, 2008; Dolan and Coe, 2011; Drobeck, 1990; Gottfredsdóttir, 2005; Grand, 2015; Widarsson et al., 2015). Notably, however, fathers recognised that despite preparations, they were not able to eliminate uncertainty about childbirth (Levenstein, 1992), nor the future (des Robert et al., 2020; Grand, 2015; Johansson et al., 2015), and they expressed uncertainty about whether the information they had acquired was adequate (Widarsson et al., 2015).

2.5.4. Accepting responsibility while losing freedom

The theme of accepting responsibility while losing freedom emerged as fathers considered the increased responsibility associated with their transition to parenthood, coupled with a loss of freedom. This theme emerged from 17 of the included studies, with many fathers expressing apprehension about increased responsibility (Aponte, 1991; Åsenhed et al., 2013; Barclay et al., 1996; Brennan et al., 2007; de Brito et al., 2013; Drobeck, 1990; Finnbogadóttir et al., 2003; Gottfredsdóttir, 2005; Johansson et al., 2015; Kulpa, 1992; Levenstein, 1992; Spektor, 2007), and others describing concerns about losing their freedom (Aponte, 1991; Donovan, 1995; Fenwick et al., 2012; Finnbogadóttir et al., 2003; Hallgren et al., 1999; Kao and Long, 2004; Levenstein, 1992; Pilkington and Rominov, 2017). However, the link between parenting responsibility and reduced freedom was only described explicitly in four of the included studies (see Table 4).

2.6. Research question 3: qualitative findings regarding paternal pregnancy-related anxiety

The qualitative findings provide insight regarding three aspects of

Table 4

Key Themes Emerging from the Qualitative Literature on Fathers' Experiences of Pregnancy.

Key theme (Studies identifying the theme)	Example participant quotes
Experiencing excitement while managing apprehension (Aponte, 1991; Baldwin et al., 2019; Fenwick et al., 2012; Johansson et al., 2015; Kulpa, 1992; Pilkington and Rominov, 2017; Rominov et al., 2018; Spektor, 2007; Taylor, 1992)	<p>“excitement was probably the first thing that I felt ... it was a little bit of, kind of, apprehension, as in how - what will I need to, kind of, do in terms of being a dad,” (Baldwin et al., 2019, p. 5)</p> <p>“Slightly scared, I mean we had been preparing for, for a long time. But um, but when it finally happens then it's like suddenly oh wow kind of there's no going back now um, so yeah I think excited but apprehensive, anxious...,” (Spektor, 2007, p. 38)</p> <p>“the fear of miscarriage has really put a major buzz kill on the whole thought of bringing a little ‘us’ into the world” (Pilkington and Rominov, 2017, p. 211)</p> <p>“I realize now that I'm going to be a father, and I have both good and bad feelings about it; how will this influence my life?” (Johansson et al., 2015, p. 16)</p> <p>“I was happy but shocked. I was a husband, and now soon-to-be father” (Kulpa, 1992, p. 86)</p> <p>“I'm looking forward to it, but I'm not looking forward to it” (Taylor, 1992, p. 54)</p>
Providing support while feeling excluded (Bäckström et al., 2017; Barclay et al., 1996; Donovan, 1995; Ekström et al., 2013; Eriksson et al., 2007; Finnbogadóttir et al., 2003; Gervais et al., 2016; Gottfredsdóttir, 2005; Kulpa, 1992; Spektor, 2007)	<p>“We are not getting any support when it comes to the, the crunch and the crunch is that we are making contributions,” (Spektor, 2007, p. 45)</p> <p>“If I am to be supportive and serve as a source of security for my partner, I must feel calm and safe, too” (Bäckström et al., 2017, p. 6)</p> <p>“I worried a great deal, but I never shared my feelings with her because I didn't want her to worry” (Kulpa, 1992, p. 90)</p> <p>“You can see that the office is full. You can feel it. You do not want to waste his time. And Lucie, given what she is experiencing, I want him to take care of her needs” (Gervais et al., 2016, p. 130)</p>
Making preparations while carrying uncertainty (Åsenhed et al., 2013; Bäckström et al., 2017; des Robert et al., 2020; Finnbogadóttir et al., 2003; Gottfredsdóttir, 2005; Grand, 2015; Johansson et al., 2015; Levenstein, 1992; Pilkington and Rominov, 2017; Widarsson et al., 2015)	<p>“am I adequately prepared, am I searching for too little information, or too much information, is it good information, what do I think of all this?” (Widarsson et al., 2015, p. 1064)</p> <p>“I think maybe I am a little bit of an over-preparer because I have been very anxious about getting everything ready, all the products that the baby needs, and just wanting to provide a safe environment for him” (Grand, 2015, p. 79)</p> <p>“this is a situation where you have no control. You can go and prepare with each other for the delivery. But you cannot possibly foresee how it will be” (Levenstein, 1992, p. 104)</p> <p>“you feel anything can happen despite all the preparations” (Johnsen et al., 2017, p. 228)</p>
Accepting responsibility while losing freedom (Aponte, 1991; Finnbogadóttir et al., 2003; Kao and Long, 2004; Levenstein, 1992)	<p>“The thing that scares me most is the responsibility. It means a dramatic change in lifestyle and decisions that used to just affect me and more recently have affected two of us, will now be affecting another generation. And that's a little intimidating to think of,” (Aponte, 1991, p.69)</p> <p>“I've lost my bachelorhood in going from couplehood to parenthood. It's got its ups; it's going to have its downs,” (Levenstein, 1992, p. 66)</p>

paternal pregnancy-related anxiety. Firstly, the qualitative findings demonstrate the multidimensional nature of paternal pregnancy-related anxiety. Secondly, they provide a clinical picture of symptoms which may indicate the presence of pregnancy-related anxiety. And thirdly, the findings highlight that fathers may be at greater risk of experiencing pregnancy-related anxiety when they perceive themselves to be excluded from receiving support.

The qualitative studies indicate that paternal pregnancy-related anxiety is a multidimensional construct, encompassing a wide range of concerns, worries, and fears. A total of 44 distinct pregnancy-related concerns were identified by at least 10 % of the included qualitative studies (see Supplementary Table 2). Consequently, there is no single way for men to describe their experiences of fear or anxiety during pregnancy. Fathers' concerns, worries, and fears associated with pregnancy, extend beyond the dimensions of pregnancy, labour, and the baby, and are encompassed by 10 dimensions of paternal pregnancy-related anxiety: childbirth concerns, attitudes towards childbirth, baby health, acceptance of pregnancy, partner concerns, relationship concerns, worry about self, transition to parenthood, attitudes towards health care professionals, and practical and financial concerns.

Through the rich descriptions provided by the participants, the qualitative findings provide a picture of symptoms which may indicate the presence of paternal pregnancy-related anxiety. Symptoms may include excessive worry, “I am not the type to worry, but during her pregnancy I worried about everything” (Kulpa, 1992, p. 88), and persistent thoughts about bad things happening (Eriksson et al., 2007). Constant nervousness may be experienced (Åsenhed et al., 2013), and fathers may have trouble sleeping (Pilkington and Rominov, 2017).

Irritability may indicate anxiety, “everyone said ‘your life's going to change’ and I was so sick of people telling me that...” (Fenwick et al., 2012, p. 6). And engaging in over-preparation, “I think maybe I am a little bit of an over-preparer because I have been very anxious about getting everything ready ...” (Grand, 2015, p. 79).

Given the previously outlined qualitative findings indicating that fathers are sometimes not sufficiently supported or are excluded from antenatal care, it is important to consider that lack of support may increase the risk of fathers experiencing pregnancy-related anxiety. Moreover, comments from fathers in the qualitative literature indicate that their anxiety levels may have been reduced if they had received sufficient support (Eriksson et al., 2007; Kulpa, 1992; Spektor, 2007).

Overall, the qualitative findings provide a comprehensive understanding of the breadth and dimensions of concerns which make up fathers' pregnancy-related anxiety; they provide detailed information about men's experiences and potential symptoms of pregnancy-related anxiety; and they highlight the importance of supporting fathers during the pregnancy period, so that their risk of developing pregnancy-related anxiety may be reduced.

3. Discussion

The current integrative review aimed to examine the available quantitative and qualitative literature to identify the dimensions of fathers' pregnancy-related concerns, worries, and fears. Additionally, the qualitative literature was explored to gain further understanding regarding expectant father's general experiences of pregnancy, along with their experiences of pregnancy-related anxiety. The search strategy

was broad and inclusive, using general search terms, applying no date limits, and including grey literature. This resulted in identifying 14 quantitative and 41 qualitative reports, which represent the available relevant research to address the review objectives.

Ten dimensions of paternal pregnancy-related anxiety were identified in the current integrative review. These encompassed men's concerns described in previous systematic reviews, including childbirth concerns, attitudes towards childbirth, and baby concerns (e.g., Baldwin et al., 2018); acceptance of pregnancy, and partner concerns (e.g., Shorey and Chan, 2020); relationship concerns, worry about self, and concerns about the transition to parenthood (e.g., Genesoni and Tallandini, 2009); attitudes towards health care professionals (e.g., Vennig et al., 2020); and practical and financial concerns (Genesoni and Tallandini, 2009). The current review extended on previous systematic review findings by providing a detailed and thorough description of fathers' specific concerns, worries, and fears during pregnancy, concurrently identifying 10 overarching dimensions of paternal pregnancy-related anxiety.

Four key themes emerged from the qualitative literature on fathers' experiences of pregnancy. The first theme, experiencing excitement while managing apprehension, was consistent with findings from previous systematic reviews (Genesoni and Tallandini, 2009; Kowlessar et al., 2015; Poh et al., 2014), describing strong mixed emotions often experienced by fathers during pregnancy. Despite excitement, expectant fathers often feel anxiety, inadequacy, and a sense of powerlessness (Poh et al., 2014). The second theme, providing support while feeling excluded, described the tension many fathers experience when balancing their own unmet support needs with providing support to their pregnant partners. This is in line with previous findings of Steen et al. (2012), describing the dissonance associated with dual needs: to be the supporter and to be supported. The third theme, making preparations while carrying uncertainty, was consistent with findings of Steen et al. (2012), describing men's attempts to manage the risk and uncertainty of pregnancy and labour through information seeking. The fourth theme, accepting responsibility while losing freedom, was in line with findings from two systematic reviews describing men's changed priorities and responsibilities (Baldwin et al., 2018) as they recognised they were leaving their old lives behind (Kowlessar et al., 2015).

Three key findings regarding paternal pregnancy-related anxiety were gained from the qualitative literature. Firstly, consistent with previous research in women, paternal pregnancy-related anxiety is a multidimensional construct encompassing a wide range of concerns, worries, and fears. Bayrampour et al. (2016) previously identified nine dimensions of pregnancy-related anxiety in women, including fetal health, loss of fetus, childbirth, mother's wellbeing, body image, parenting and care for child, health care related, financial, and family and social support. These dimensions differ in several ways from the 10 paternal dimensions identified in the current review. The maternal dimension of body image is encompassed by a broader dimension for men, relating to relationship concerns. Furthermore, the maternal dimension of mother's wellbeing corresponds to the paternal dimension, partner concerns, and an additional paternal dimension, worry about self. Moreover, another additional paternal dimension identified in the current review was acceptance of pregnancy, encompassing men's concerns about ambivalence or unpreparedness regarding pregnancy.

The second key finding from the qualitative literature provided descriptions of symptoms relevant to fathers who may have pregnancy-related anxiety, including: excessive worry, persistent thoughts about the possibility of bad things occurring, nervousness, irritability, difficulty sleeping, and engaging in overpreparation. These symptoms are clinically relevant, given their overlap with essential features of generalized anxiety disorder, which include difficulty controlling worry, along with physiological symptoms, such as restlessness, irritability, or sleep disturbances (American Psychiatric Association, 2013; Leahy, 2002). It is important to recognise that many fathers experience anxiety or worry as part of the developmental journey of transitioning to

parenthood, without developing anxiety symptoms (Kowlessar et al., 2015). For many men, worry serves an adaptive role by motivating them to prepare for the future (Leahy, 2002). While these men may experience productive worry, leading to improved situational and wellbeing outcomes (Sweeny and Dooley, 2017), it is estimated that 3.4 % to 25 % of fathers may experience clinically significant symptoms of anxiety prenatally (Philpott et al., 2019). Therefore, the symptoms described within this review highlight the crucial role clinicians play in identifying fathers experiencing excessive worry with associated anxiety features. This is particularly important when considering that paternal prenatal anxiety is associated with adverse outcomes for fathers, their children, and their partners (Prino et al., 2016; Ramchandani et al., 2008; Tzeng et al., 2009).

The third key finding gained from the qualitative literature emphasised the importance of providing prenatal support to fathers to minimise their risk of developing pregnancy-related anxiety. Previous findings suggest that men experience greater stress during pregnancy, compared with labour or postnatally (Genesoni and Tallandini, 2009). Pregnancy exposes fathers to many possible concerns, worries, and fears, associated with an increased risk of experiencing anxiety symptoms (Biehle and Mickelson, 2011; Göbel et al., 2020). However, the risk of developing anxiety symptoms is greater for fathers with low perceived social support (Cameron et al., 2020; Göbel et al., 2020; Koh et al., 2015). Approximately 18 % of expectant fathers report having no support (Hildingsson and Sjoling, 2011). Therefore, health care professionals fulfil two roles in addressing pregnancy-related anxiety in fathers. By providing prenatal support, they may reduce the risk of fathers developing pregnancy-related anxiety. Secondly, by identifying fathers presenting with symptoms of pregnancy-related anxiety, targeted interventions can be provided.

3.1. Strengths and limitations

Overall, the included studies varied from low to high quality, using diverse methodological approaches with different research objectives and inclusion criteria (see Tables 1 and 2). Limitations of the included studies included the minimal reporting of original participant quotes for six qualitative studies (Åsenhed et al., 2013; Donovan, 1995; Eriksson et al., 2006; Gerzi and Berman, 1981; Gottfredsdóttir, 2005; Hallgren et al., 1999), and the reliance on retrospective reports of fathers' pregnancy experiences for nine studies (Baldwin et al., 2019; Chalmers and Meyer, 1996; des Robert et al., 2020; Ekström et al., 2013; Eriksson et al., 2007; Eriksson et al., 2006; Kulpa, 1992; Spektor, 2007; Talley, 2017). While these limitations are likely to have resulted in a loss of information from these studies, the overall results were not likely affected, since these studies represent a small proportion of the included studies. Overall, despite variations in the methodologies and quality of the included studies, the findings displayed similarities in the descriptions and themes of fathers' experiences and their pregnancy-related concerns, worries, and fears, providing a degree of confidence in the results.

The main strength of the current integrative review was the comprehensive search strategy, allowing for data from a large number of fathers to be synthesised. Moreover, the differences in the included studies minimise the problems associated with having a homogenous sample, potentially aiding generalizability of the findings. Additionally, this integrative review has presented findings using a transparent approach by presenting thorough information regarding the contexts and primary findings of the included studies in the supplementary material. This approach adds credibility to the current findings.

A limitation of the current review relates to the diverse aims of the included studies. While the primary objective of the current review was to explore the nature and dimensions of fathers' pregnancy-related concerns, worries, and fears, a total of nine quantitative studies (Biehle and Mickelson, 2011; Chandler, 1998; Forsyth et al., 2011; Glazer, 1989; Göbel et al., 2020; Kannenberg et al., 2016; Szeverényi

et al., 1998; Weiss, 1983; White, 1998) and six qualitative studies (Eriksson et al., 2007; Eriksson et al., 2006; Grand, 2015; Greer et al., 2014; Pilkington and Rominov, 2017; Sercekus et al., 2020) specifically aimed to explore dimensions of fathers concerns, worries or fears. The remaining 40 studies provided varying amounts of information about fathers' pregnancy-related anxiety. Therefore, when considering the key themes and findings identified in the current review, it must be recognised that these are influenced by the underlying number of included studies which represent specific aspects of fathers' experiences, such as childbirth-related fear, or the sense of exclusion experienced during antenatal care.

It is also worth noting that the current review findings may not fully apply to co-parents in same sex relationships, since the included studies focused on heterosexual relationships. Some concerns identified in the current review may be more prominent in one group of parents than in another. For example, fears around the wellbeing of the unborn child may be more prominent in surrogacy arrangements compared to other dimensions of worry. Currently, there are very few studies that have explored the experiences of pregnancy and the concerns and worries of co-parents in same sex relationships. Much more research is needed in this area to understand the nature of pregnancy-related anxiety in this group of parents.

Another limitation of the current integrative review was the exclusion of studies not published in English, which may limit the generalizability of the current findings to non-English speakers and/or less industrialised countries. Moreover, generalizability of the review findings was limited by the poor reporting of demographic information by many of the included studies. While the known characteristics of the overall sample (reported in Tables 1 and 2) indicate some variability in the types of fathers represented by the included studies, the findings of the current integrative review primarily reflect the experiences of expectant first-time and experienced fathers living in economically developed countries. Therefore, further research investigating expectant fathers' experiences and concerns in non-English speaking and less industrialised countries is warranted.

In addition to inconsistent reporting of demographic information, the majority of the quantitative studies included in the review did not consider demographic variables as potential covariates in their analyses. Four studies included covariates, such as paternal age (Biehle and Mickelson, 2011; Chandler, 1998; Göbel et al., 2020; Kannenberg et al., 2016) and pregnancy-related variables, including history of miscarriage (Biehle and Mickelson, 2011; Göbel et al., 2020), parity, and gestational age (Göbel et al., 2020; Kannenberg et al., 2016). Notably, after controlling for gestational age, Göbel et al. (2020) found that fathers with lower income, lower perceived social support, and higher anxiety levels were more likely to experience increased pregnancy-related worries. Further research including covariates relating to demographic and pregnancy-related variables is warranted when examining risk factors and outcomes associated with paternal pregnancy-related anxiety.

3.2. Conclusion

Taken together, the findings from the current integrative review indicate that the experiences of expectant fathers during pregnancy are complex, often requiring them to balance seemingly competing feelings and situations. Moreover, during pregnancy, fathers may experience anxiety symptoms characterised by excessive worry across a wide range of concerns, worries, and fears related to their partners' pregnancy, comprising 10 dimensions of fathers' pregnancy-related anxiety.

These findings have implications for clinical practice. Pregnancy-related anxiety may be overlooked by health care professionals, since the nature of fathers' concerns, worries, and fears are developmentally appropriate during the pregnancy transition when not experienced excessively. However, health care professionals should be aware that for some fathers, their pregnancy-related concerns, worries, and fears may be overwhelming, being associated with clinically relevant symptoms of

anxiety, including unmanageable worry, nervousness, irritability, and difficulty sleeping. Moreover, health care professionals can play an important role, not only in identifying fathers who are experiencing pregnancy-related anxiety, but also in addressing the sense of exclusion experienced by many men during the antenatal period. Providing support to fathers during their partners' pregnancy may reduce the risk of fathers developing clinically significant symptoms of pregnancy-related anxiety. Future research aimed at scale development is warranted. The availability of a specific measure assessing pregnancy-related anxiety in fathers would aid health care professionals in better identifying and supporting fathers experiencing pregnancy-related anxiety.

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CRediT authorship contribution statement

All authors were involved in the conceptualisation of the study. CD conducted the data collection and analysis and drafted the initial manuscript. RD, RJB, KY, and VJR reviewed and revised the manuscript. CD drafted the final manuscript. All authors approved the final manuscript as submitted.

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The funding source had no role in the study design, collection of data, analysis or interpretation, the writing of the review or the decision to submit the article for publication.

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Conflict of Interest

None.

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Chapter 4: Evaluation of Item Pool by Expert Review Panel (ERP)

Chapter 4 Introduction

The systematic review, reported in Chapter 3, found that fathers may experience a wide range of concerns, worries or fears during their partner's pregnancy, which are encompassed by 10 categories of paternal pregnancy-related anxiety: childbirth concerns, attitudes towards childbirth, baby concerns, acceptance of pregnancy, partner concerns, relationship concerns, worry about self, transition to parenthood, attitudes towards medical staff, and practical and financial concerns.

Many fathers experience developmentally normative worries and concerns during their partner's pregnancy without displaying symptoms of anxiety disorder (Kowlessar et al., 2015). These concerns can be described as productive worry, which motivates them to actively prepare for the future (Leahy, 2002). Productive worry is seen as an adaptive response to stress, often leading to improved situational wellbeing through effective problem solving (Sweeny & Dooley, 2017). Conversely, unproductive worry is associated with distress and negative emotions, with a focus on abstract or less immediate problems (Leahy, 2002; Sweeny & Dooley, 2017). When fathers engage in unproductive worry, they are more likely to become overly preoccupied with pregnancy-related concerns and have difficulty managing their worries. In this way, they become more vulnerable to developing anxiety, given that excessive or persistent fear or worry is a core feature of anxiety disorders (APA, 2013; Leahy, 2002).

The new scale aimed to incorporate items which represent the broad range of fathers' concerns, worries, and fears experienced during their partner's pregnancy. Generic measures of anxiety which are currently used to measure anxiety symptoms in men during the prenatal period do not address any of men's pregnancy-related concerns. Therefore, including items

addressing a range of fathers' pregnancy-related concerns will improve the current assessment of paternal pregnancy-related anxiety. It is anticipated that men with pregnancy-related anxiety will endorse a wider range of items in the new scale, more strongly than fathers experiencing developmentally normative worries and concerns. Therefore, the new scale aims to better identify fathers experiencing elevated levels of pregnancy-related anxiety, by tapping into men's pregnancy-related concerns, worries, and fears.

The first step in scale development involved generating an initial item pool of potential items for the new scale, based on the results of the systematic review. Following this, the initial item pool was presented to an Expert Review Panel (ERP) for evaluation. This chapter presents the initial item pool and outlines the methods and results of the ERP evaluation.

Initial Item Pool

The initial item pool was generated by the research candidate in collaboration with the supervisory team. Items were gleaned from the systematic review by rewording items previously used in quantitative research or rewording participant quotes from the qualitative research. For example, the item, "Adequately supporting partner" from the quantitative study conducted by Forsyth et al. (2011) was adapted to, "I worry about whether I am doing enough to support my partner." The following participant quote from the qualitative research of Brennan et al. (2007), "I was worried about becoming a dad ... it's a lot of responsibility," was amended to, "I worry about the responsibility that goes with becoming a parent."

Appendix I shows the potential items which were generated for the new scale, listed according to the concerns identified from the literature review. A total of 113 items were generated for the initial item pool. The following nine concerns were not frequently reported concerns (percentages shown in parentheses indicate the percentage of the 55 studies reviewed which identified each concern – refer to Appendix F for frequencies): arriving to

hospital in time for the birth (3.6%), being absent or excluded from delivery (3.6%), worry about the sex of the baby (3.5%), concern about the pregnant partner's feelings towards the pregnancy (1.8%), being prepared for the worst (7.2%), worry about the impact of the new baby on other siblings (1.8%), concern for the safety of the new baby with pets (1.8%), anxiety about prenatal appointments (1.8%), and worry about housekeeping (1.8%).

Therefore, no corresponding item was included in the initial item pool for these nine concerns.

Method

ERP Questionnaire

Following approval from the Australian Catholic University Human Research Ethics Committee (HREC; project 2020-185E), an online Qualtrics survey was created for members of the ERP to complete (see Appendix J). The items included in the item pool were grouped according to the 10 categories of paternal pregnancy-related concerns, worries, and fears. Each item was rated for relevance on a scale from 1 (*redundant/not important to include*) to 4 (*extremely relevant/extremely important to include*). Following this, the clarity, language, and conciseness of each item was rated on a scale from 1 (*poor*) to 4 (*excellent*). Demographic questions addressing characteristics of the panel members, such as their age, gender, country of residence, profession, and years of experience, were also included in the survey.

ERP Members

Health professionals experienced in the provision of antenatal care, who were known by the research candidate or members of the supervisory team, were invited in person or by email to participate as ERP members. The following health professionals were invited: practising obstetrician/gynaecologists, midwives, general practitioners who provide antenatal care, and allied health professionals providing perinatal mental health support to couples. Additionally, individuals with research expertise, who were personally known to the

supervisory team, or who had been identified through the literature as experts in the field of men's/fathers'/partners' perinatal mental health, or experts in scale development and psychometrics were invited by email to participate. ERP members were given the opportunity to be acknowledged in any future publication arising from this study. Between December 2021 and February 2022, 37 potential ERP members were invited by email to participate, with 15 reminder emails sent in January 2022. Emails included a link to the participant information letter with an opportunity to provide consent to participate.

Stages of ERP Evaluation

Evaluation of the initial item pool took place in three stages. The data collected from the ERP questionnaire was first examined to evaluate the relevancy of items included in the item pool and identify items for exclusion due to low relevancy. Following this, items were examined in relation to the ratings given for clarity, language, and conciseness and improvements were made to item wording. Finally, additional comments made by ERP members were reviewed, to guide further improvements to the retained items.

Results

Demographic Characteristics of ERP Members

The ERP was composed of 12 members (nine female, three male). Most members were living in Australia (seven), with two living in the United Kingdom, two from Sweden, and one member was from Germany. ERP members included five professionals currently practising within clinical contexts, with an average of 24.4 years of relevant clinical experience. These professionals included a general practitioner providing antenatal care, an obstetrician and gynaecologist, a clinical nurse consultant, a midwife, and a clinical psychologist. The other seven ERP members were researchers or academics affiliated with various universities. These academics had an average of 15 years of experience in their fields,

including six with considerable clinical practice experience either in clinical midwifery (two members) or clinical psychology (four members).

Eight ERP members completed the entire questionnaire, two completed 33% and, two completed 26% of the questionnaire. Partial responses were included in the analyses. The average length of time for the full questionnaire to be completed was 55 minutes.

Relevancy of Items in Initial Item Pool

The relevance scores allocated by members of the ERP were averaged for each item. The mean relevance score across all items was: 3.27 ($SD = 0.34$). Following this, the mean relevance score for each item was converted to a standardised z-score. Any items with a z-score less than -1.28 (denoting the cut-point for the bottom 10% of relevance ratings) were re-examined for relevancy (see items 1 to 10 in Table 4.1). Additionally, all items which were allocated a relevancy score of 1 (*redundant/not important to include*) by 25% or more of the ERP members were also re-examined. Seven items met this criterion, three of which also had z-scores below -1.28 (items 1, 6, and 8 in Table 4.1). Therefore, a total of 14 items were re-examined for relevancy, as listed in Table 4.1.

Table 4.1*Low Relevancy Items Identified by Expert Review Panel*

Item	Mean Relevance Rating	Relevance Rating z-score	Percentage of ERP Ratings = 1	Number of ERP Responses
1. I'm afraid that my partner's vomiting due to pregnancy will affect the baby's development	2	-3.75	50	10
2. I worry about my partner losing control during labour	2.25	-3.01	16.7	12
3. The pregnancy has put a strain on our relationship, and I worry that this will be ongoing	2.63	-1.91	12.5	8
4. I feel anxious about how to handle conflicting or unwanted advice from people	2.63	-1.91	12.5	8
5. I worry that my partner will tear or need to be cut during the birth	2.64	-1.88	9	11
6. I worry that I may pass out or not be able to cope with aspects of labour and birth	2.67	-1.79	25	12
7. I am concerned about trying to keep my worries to myself so I can support my partner	2.75	-1.54	12.5	8
8. I feel the extra weight of responsibility from parenthood	2.75	-1.54	25	8
9. I worry about my baby being overdue	2.8	-1.4	10	10
10. I worry about the use of interventions during delivery, such as forceps or vacuum extraction	2.83	-1.3	8	12
11. I worry that the medical staff are too complacent in their care of my partner	2.88	-1.18	25	8
12. This is not an ideal time in my life to be expecting a baby	3	-0.81	25	8
13. I don't feel I can ask midwives/doctors anything because my partner's needs should have priority	3	-0.81	25	8
14. I do not do well with blood and surgery rooms	3.08	-0.56	25	12

Note. This table includes any item with a standardised z-score relevance rating below -1.28, and/or any item allocated a relevancy rating of 1 (*redundant/not important to include*) by 25% or more ERP members. Number of ERP responses varies for each item according to the number of ERP members who completed each stage of the questionnaire.

After examination, 11 of the 14 items with low relevancy ratings were removed from the item pool. However, items 5, 6, and 14 were retained, given that the concerns addressed by these items were not adequately covered by other retained items. The wording of item 6

(“I worry that I may pass out or not be able to cope with aspects of labour and birth”) was simplified to, “I’m afraid I will not cope during childbirth.”

Evaluation of Item Clarity, Language, and Conciseness

Items retained in the item pool were evaluated for wording based on the ERP ratings for clarity (*Is the meaning of the item clear, with unambiguous wording?*), language (*Is the language simple, unbiased, and acultural - avoiding fashionable expressions or colloquialisms?*), and conciseness (*Does the item convey meaning without wordiness?*). Mean ERP ratings for clarity, language, and conciseness were calculated for each item. Across all items, the mean ratings were 3.32 ($SD = 0.74$) for clarity, 3.40 ($SD = 0.71$) for language, and 3.38 ($SD = 0.69$) for conciseness. Any items with mean clarity, language, or conciseness ratings below 3, were identified so that any problems with wording could be addressed. Fifteen items were identified using this approach. Table 4.2 shows a detailed list of these items and the changes made. The wording of six items was amended, while nine items were discarded from the item pool, since other retained items adequately covered the same concerns.

Table 4.2*Items With Mean Ratings Below 3 for Clarity, Language or Conciseness*

Item	Clarity	Language	Conciseness	Changes
1. I'm afraid that unexpected events may happen during childbirth	2.58	3.17	3.25	Item deleted
2. I worry about my partner's condition during childbirth	2.33	3	3	Item deleted
3. I worry about what I will do if my baby is not normal	2.9	3	3.1	Item deleted
4. Having mixed feelings about the pregnancy makes me anxious	2.86	3.14	3.14	My mixed feelings about this pregnancy bother me
5. At times, my worries seem to snowball	2.38	2.38	3	My worries sometimes overwhelm me
6. A sense of things being out of control is really bothering me	2.88	3	3	Item deleted
7. I'm afraid I'll always feel guilty if I'm doing something just for myself once the baby arrives	2.75	2.88	2.63	Item deleted
8. The feeling of responsibility makes me feel anxious	2.63	2.88	3.25	I worry about the extra responsibility of parenthood
9. I have concerns about the unknown in relation to parenthood	2.75	2.75	2.88	Item deleted
10. I often feel overlooked by the medical staff	2.88	3	3.13	Item deleted
11. I worry I will not be able to calm my partner if they experience fear and anxiety in childbirth	3.17	3.25	2.83	I worry I will not be able to calm my partner if they become afraid during childbirth
12. I worry about being able to support my partner when I am feeling a lack of control myself	2.88	3.25	2.75	Item deleted
13. I worry that I can't support my partner well when I am not receiving enough support for myself	3.25	3.25	2.71	I worry about my ability to emotionally support my partner
14. I worry that my partner's mood swings will not improve after the birth	2.75	3	3	I'm afraid that my partner's pregnancy-related mood changes will continue after the birth
15. I worry that the messiness of childbirth will be too unpleasant for me	2.83	3	3	Item deleted

ERP Member Comments

The final stage of evaluating the initial item pool involved examining the additional comments made by ERP members, to guide further improvements to the retained items. The written responses of four ERP members who provided additional comments are below.

ERP Member 1

I think the items are fairly general and may be open to interpretation by the responder. This may make it difficult to compare across people. For instance, asking whether someone is anxious about childbirth could be interpreted in many ways - e.g., in terms of which aspect of childbirth they are thinking and responding about, thinking of childbirth as also including labour, etc. Thus, I would suggest being more specific so that it is clear what exactly you are referring to in each question.

I suggest having the same sentence stem for all items. For instance, do not mix items starting with "I am anxious about childbirth" with, "I feel ill at the sight of blood". The first is specific to the context of pregnancy, while the second is far more general. Also bear in mind framing effects. It is likely that asking the question "Do you feel ready for childbirth" would have far more people imply they are ready, than if you asked "Do you feel anxious about childbirth". If you have a mix of both, psychometrically they almost definitely will be differentiated (cross-reference literature on positive and negative wording effects). So just think about what would be useful to the research question here.

ERP Member 2

I scored items lower for 'language' if they used terms that are a little technical (e.g. forceps: not sure if partners will have come across this term before), and also if they were focused on the word anxiety/anxious (rather than worry or stress).

ERP Member 3

Some items did not relate to worrying or anxiety e.g., the ones about not feeling cared for by medical staff could just be true. Some items were double barrelled

ERP Member 4

In terms of clarity of language:

- 1) "childbirth" seemed to be used sometimes interchangeably with "labour" and "birth" and "delivery", so I thought that with some of the early questions about labour and the actual physical birth of the baby you might need to either give a definition of childbirth as including both "labour and birth of the baby" or be more precise about what stage of the process you were referring to, if that's what you were wanting. For instance "pain" and "complications": can occur during the labouring process AND during the act of pushing a baby out so did you want to specify some of those times or are most of those questions really about labour and birth altogether? ie. Tearing and being cut, and forceps and vacuum are all things that happen in the moments of the expulsion of the baby, the actual birth. Feeling traumatised for instance can occur anytime though the whole labour/birth process.
- 2) "messiness of childbirth" - just wondered if that's meant to refer to the blood and other body fluids or to the sense of chaos and being out of control?
- 3) "blood" is very clear, however "surgery room" not so much (did you mean hospital rooms generally, or the operating theatre or the delivery/labour room in particular?)
- 4) "mood swings" of the pregnant partner - did you mean pregnancy related mood changes or an actual mental health condition?
- 5) in the section on partner's response or feelings about pregnancy care givers in hospitals you used "medical staff", "health professionals" and "doctors and midwives" across that section of questions, just wanted to point out that depending on the care

model the couple choose/ are allocated (private, public or independent practitioners at home) , they may meet a range of health professionals, but the main care is usually delivered via midwives and doctors (private and public doctors always have midwives working with them, in the public system, midwives may deliver all the care through the pregnancy, birth continuum without any input from a doctor if the pregnancy is uncomplicated), so maybe an encompassing term like "health professionals" or one that covers common bases, like "midwives and doctors"?

Revisions based on ERP Member Comments

After considering the comments made by the ERP members, the initial item pool was revised with attention to the following details. Words relating to labour and childbirth were no longer used interchangeably, and the word, “childbirth” was chosen to generally represent labour and delivery. Technical language was minimised, for example items with words such as forceps were removed. Language was also simplified, with words such as anxiety or anxious, for example, replaced where possible with words such as worry or stress. Wording for “mood swings” was updated to “pregnancy-related mood changes.” The term, medical professionals was amended to health care professionals. Double-barrelled items were identified and simplified or discarded. Further improvements to word clarity were made, for example, “I do not do well with blood and surgery rooms,” was amended to, “I am concerned about seeing blood or body fluids during childbirth.” Refer to Appendix K for the amended item pool, comprising 95 items.

Conclusion

Chapter 4 has outlined the approach used to evaluate the initial item pool, generated for the new Paternal Pregnancy-related Anxiety Scale (PPrAS). Significant revisions were made to the items, in response to the feedback received from the experienced professionals who comprised the ERP. Revisions included changes in wording of items to improve their

clarity, language, and conciseness. Moreover, items rated low in relevance were removed, reducing the number of items in the item pool from 113 to 95 items. The next stage in scale development was to administer the revised item pool to a sample of expectant fathers and evaluate the 95 items within the framework of the Rasch measurement model. Rasch analysis was used to identify the 'best' items to retain in the scale and to reduce the size of the scale. Chapter 5 provides a rationale for using Rasch analysis for the development of the scale as well as the procedures involved in applying the Rasch measurement model to scale development.

Chapter 5: Scale Development using the Rasch Measurement Model

Introduction to the Rasch Measurement Model

The Rasch measurement model was first developed by Georg Rasch in the 1950s to measure children's achievement on educational tests, by assessing their abilities in relation to test items of varying difficulty, using probabilities (Bond et al., 2021). The Rasch measurement model predicts that individuals with higher abilities have a greater probability of answering any question correctly on a test (regardless of the difficulty of the item), while test items which are less difficult have a higher probability of being answered correctly by individuals ranging in abilities (Rasch, 1960). Application of the Rasch measurement model has since extended to the measurement of latent traits, for example, anxiety and depression (Balsamo et al., 2014; Pallant & Tennant, 2007) or mindfulness (Medvedev & Krägeloh, 2022). When measuring latent traits, person "ability" refers to how much of the latent trait an individual holds, and test item "difficulty" refers to the likelihood that individuals high or low in the latent trait would strongly endorse the item. For example, when measuring anxiety levels, a "high ability" individual is a person with high levels of anxiety, and a "high difficulty" item is one that is only endorsed strongly by individuals with high levels of anxiety. Rasch analysis assesses each item included in a measure, by considering each person's ability (e.g., level of anxiety) and their response to items of varying difficulty (e.g., the level of anxiety expressed by the item). The probability of an individual's response to each item is calculated based on the difference between their ability and the difficulty of the item in question (Bond et al., 2021). These probabilities undergo logarithmic transformation into a linear interval scale using log-odds units (logits) to measure each person's ability or each item difficulty (Townsend, 2017).

Therefore, Rasch analysis makes it possible to transform ordinal-level observations (i.e., total scale scores of a latent variable) into a true linear interval scale (i.e., person abilities measured in logits), resulting in improved quantitative measurement precision (Bond et al., 2021; Medvedev & Krägeloh, 2022). Moreover, the person and item parameters are calculated separately, resulting in parameter estimates which are independent of each other (Bond et al., 2021; Townsend, 2017). Therefore, unlike Classical Test Theory (CTT) approaches, such as factor analysis, the Rasch model is less susceptible to undue influence by individual respondents (Balsamo et al., 2014; Linsner et al., 2020).

Rationale for using the Rasch Measurement Model

Rasch analysis was chosen over Classical Test Theory approaches to bypass the known limitations associated with CTT in regard to internal consistency, assumptions of a linear relationship between the latent variable and the observed score, and the lack of precision in estimating the true score. Moreover, Rasch analysis was chosen to minimise the risk of undue influence on scale development by individual respondents, since parameters such as reliability, discrimination location, and factor loadings, are dependant on the sample being used when applying CTT approaches (Balsamo et al., 2014; Linsner et al., 2020).

Additionally, the Rasch measurement model was chosen as the framework for scale development because the present research aimed to select items for the final scale on the basis of item parameters and how well each item contributed to the final scale as a unidimensional measure of pregnancy-related anxiety. Unidimensionality is considered to be an essential psychometric property of measurement scales, because it ensures that the sum of all items is a valid measure of a single latent variable (Tennant & Conaghan, 2007). A lack of unidimensionality in measurement scales leads to ambiguity about what the total scores represent, such that it is unclear whether two individuals with the same score can be considered comparable (Hagell, 2014).

One of the objectives for scale development of the PPrAS was to comprehensively include items drawn from the breadth of concerns, worries, and fears experienced by expectant fathers. Therefore, the 95 items included in the item pool were generated based on the range of concerns identified across 10 categories of expectant fathers' pregnancy-related concerns, identified by systematic review. This was done to ensure content validity of the new scale. While this could have resulted in item response data that is multidimensional, research has found that multidimensionality in the item response data does not necessarily require a multidimensional statistical approach (Ip, 2010). We took the approach of Reise et al. (2015) and treated the construct of pregnancy-related anxiety as a target latent variable which is in common among all the items. Using this approach, we aimed to create a scale which was sufficiently unidimensional to fit the Rasch measurement model (Reise et al., 2015).

In addition to achieving a unidimensional scale, Rasch analysis was also chosen to fulfil another fundamental characteristic of good measurement instruments, which is that measurement instruments should work equally well for all individuals, regardless of differences in their personal attributes (Tennant & Conaghan, 2007). Rasch analysis makes this possible by identifying any problematic items which undermine this characteristic, by testing for Differential Item Functioning (DIF) and excluding items from the final scale if they function differently depending on differences in personal attributes.

Rasch analysis was also chosen for scale development to achieve another important characteristic of good measurement instruments, which is that measurement instruments should rely on units of measurement which remain consistent along a linear continuum (Thurstone, 1931). This is achieved through the Rasch transformation of ordinal-level total scores to interval-level scores in logits, making it possible for future researchers to examine

paternal pregnancy-related anxiety with greater precision than if solely relying on ordinal total scale scores.

Moreover, by choosing the Rasch measurement model for scale development, it was possible to select items with strong psychometric properties from a larger item-pool (Balsamo et al., 2014; Townsend, 2017); while concurrently evaluating the response formats of each item, to ensure that each point on a rating scale is meaningful and distinct from the other options (Balsamo et al., 2014; Bond et al., 2021). Taken together, applying the Rasch measurement model made it possible to address several measurement issues simultaneously (Tennant & Conaghan, 2007). Items could be selected for the new scale, which are free of DIF, fit model expectations, and demonstrate unidimensionality (Tennant & Conaghan, 2007), thereby producing a more reliable scale with greater measurement precision (Medvedev & Krägeloh, 2022).

Scale Reduction of Item Pool

Rasch analysis was conducted using RUMM2030 software (Andrich et al., 2009). Rasch analysis was used to evaluate the item pool, using an iterative approach, ultimately leading to scale reduction. The analytical steps included: evaluating overall model fit, examining individual item fit statistics, testing for DIF, inspecting item category probability curves and the item threshold map, assessing for local dependency, testing for unidimensionality, examining the Person Separation Index (PSI), evaluating sample targeting, and computing the ordinal-to-interval transformation of scores. A description of these analyses now follows.

Overall Model Fit

Overall model fit was examined by checking the overall item-trait interaction chi-square statistic. Improvements to the scale were expected to produce lower chi-square statistic values. When the chi-square probability is nonsignificant ($p > .05$), the overall model

is considered to demonstrate good fit, implying that the whole set of items conforms to a single trait in the sample (Balsamo et al., 2014). A well-fitting model is also indicated by mean standardised fit residual values for persons and items close to zero, with standard deviations close to 1 (Medvedev & Krägeloh, 2022).

Individual Item Fit Statistics

The standardised residuals for each item provided a measure for individual item fits. Items with standardised fit residuals outside the range of -2.50 to +2.50 were considered misfitting and deleted (Medvedev & Krägeloh, 2022; Pallant & Tennant, 2007). Each time misfitting items were removed from the item pool, overall fit was recalculated, and further checking for misfitting items was conducted.

Differential Item Functioning (DIF)

DIF was examined, to verify that the scale would perform equally well in fathers, regardless of differences in their personal factors. The following personal factors were explored as categorical variables, grouping fathers according to country of residence (Australia vs. USA), parity (first baby vs. second/subsequent baby), partner's pregnancy trimester (first, second or third), and fathers' ages (within ranges: 20-26 years, 27-29 years, or 30-47 years). Testing for DIF ensured that participants who differed on these personal factors (e.g., age), did not respond differently to any item compared with other participants sharing equal levels of the underlying trait being measured (i.e., pregnancy-related anxiety).

Participants were first grouped according to their levels of pregnancy-related anxiety into class intervals. Analysis of Variance (ANOVA) was conducted for each item, by comparing participant scores at each class interval, across the different categories within each personal factor (Medvedev & Krägeloh, 2022; Pallant & Tennant, 2007). Non-significant ANOVA results implied the absence of DIF. Any items displaying DIF were removed, to ensure that the new scale would function equally well for all individuals, regardless of

personal factors.

Item Category Probability Curves and Item Threshold Map

Item category probability curves were examined, in conjunction with the item threshold map, to check the response patterns for each item, across response categories. The model expectation is that participants with high levels of the measured trait would endorse high scoring responses, and participants with low levels of the trait would consistently endorse low scoring responses (Pallant & Tennant, 2007). Any items with disordered thresholds were removed.

The item threshold map, ordered by item difficulty, was also examined to identify psychometrically redundant items, defined as groups of two or more items with similar difficulty values and similar threshold patterns. Items were selected from each of these groups to retain in the final scale, ensuring that items were retained from all 10 categories of expectant fathers' concerns (identified by the systematic review), and spanned the complete range of individual item difficulties found in the item pool.

Local Dependency

Local dependency between items was assessed by examining the residual correlation matrix. Correlation values exceeding the mean of all residual correlations by more than .20 indicated local dependency (Christensen et al., 2017), implying that two or more items have a strong association over and above their relationship to the underlying trait being measured. Examining local dependency would highlight additional items for removal due to similar wording or redundancy.

Unidimensionality

Unidimensionality was tested by conducting a Principal Components Analysis (PCA) of the standardised residuals, which examines the associations between residuals, once the Rasch factor has been extracted (Bond et al., 2021). For evidence of unidimensionality, the

remaining associations should be random, displaying no meaningful pattern (Tennant & Conaghan, 2007). Following the procedure of Smith (2002), items with the highest positive (or highest negative) factor loadings on the first component of the PCA of residuals were grouped into two subsets. The person estimates for each subset were compared on a person-by-person basis using paired-samples *t*-tests. The percentage of significant *t*-tests and 95% binomial proportions Confidence Interval (CI) for the percentage were calculated. When the percentage of significant *t*-tests is below 5% (using statistical convention of alpha .05), or the lower bound CI value for the percentage is below 5%, unidimensionality was inferred (Tennant & Pallant, 2006).

Person Separation Index (PSI)

The PSI assessed how well the new scale differentiated between individuals at different levels of pregnancy-related anxiety. PSI is an estimate of internal consistency reliability, interpreted similarly to Cronbach's alpha (Tennant & Conaghan, 2007). A minimum value of 0.70 indicates suitability of the scale for reliable group comparisons, and a minimum value of 0.85 indicates suitability for within-participant comparisons. Models with a high PSI allow for a greater number of class intervals, enabling more accurate differentiation of people based on their level of latent variable.

Sample Targeting

Evaluating sample targeting assessed how well the items in the new scale covered the range of pregnancy-related anxiety levels found in the sample. A well-targeted measure should not show evidence of floor and ceiling effects, which occur when more than 15% of the sample obtains the minimum or maximum score on a scale (McHorney & Tarlov, 1995). The mean person location provides some indication of sample targeting (mean item location is fixed at zero). The mean person location of a well-targeted scale should be between -0.50 and +0.50 logits (Medvedev & Krägeloh, 2022). Additional visual evaluation of targeting

was conducted by examining the person-item threshold distribution plot.

Transformation of Ordinal-Level Total Scores to Interval-Level Scores

After achieving scale reduction, the third characteristic of good measurement instruments was achieved through the transformation of ordinal-level total scores to produce measurement units in logit values, measuring persons and items along the same linear continuum of the latent variable (pregnancy-related anxiety). An ordinal-to-interval transformation table was created, to allow future users of the PPrAS to transform scores based on ordinal responses into Rasch interval scoring and assess paternal pregnancy-related anxiety on a linear continuum (Leung et al., 2014).

Conclusion

Chapter 5 has outlined the characteristics of the Rasch measurement model and provided an explanation of the statistical methods to develop the new scale. By using the Rasch measurement model as the framework for scale development, the PPrAS should demonstrate three essential features of good measurement instruments. First, scale development aimed to create a unidimensional scale, comprised of items drawn from the 10 categories of paternal pregnancy-related anxiety, identified by systematic review. Second, it was aimed that the PPrAS would work equally well for fathers, regardless of differences in their personal factors. Finally, Rasch analysis made it possible to transform scale scores from ordinal-level to interval-level scores, allowing future users of the PPrAS to measure pregnancy-related anxiety in fathers, on a linear continuum.

Following on from Chapter 4, which outlined the procedures used to generate and evaluate an item pool for scale development, the procedures outlined in Chapter 5 were used to reduce the item pool to the final scale while evaluating the psychometric properties of the scale using Rasch analysis. The methods described in detail in Chapters 4 and 5 are included in Chapter 6, which presents a manuscript in preparation for submission to the journal,

Psychological Assessment.

The manuscript in Chapter 6 reports on the initial development of the PPrAS, by outlining the methods and results of three stages of scale development. Stage 1 of scale development involved generating an initial item pool of potential items based on the systematic review findings (reported in Chapter 3) in conjunction with the results of a qualitative pilot study, conducted by a co-author of the manuscript (refer to the Research Portfolio Appendix for the contributions made by co-authors). Stage 2 of scale development focused on the evaluation and revision of the item pool, using an ERP (reported in Chapter 4). Stage 3 involved administering the item pool to a sample of expectant fathers from Australia and the USA, using online questionnaires. The data from these questionnaires was analysed within the Rasch measurement framework, as outlined in Chapter 5, resulting in scale reduction. Stage 3 also involved additional psychometric evaluation of the final scale using CTT approaches.

Chapter 6: Initial Development and Rasch Analysis of the Paternal Pregnancy-Related Anxiety Scale using Australian and USA Samples

Chapter 6 Introduction

Parents may experience multiple worries during the pregnancy period, predisposing them to experiencing anxiety symptoms (Biehle & Mickelson, 2011; Göbel et al., 2020). Systematic reviews have reported prevalence rates of anxiety symptoms from 18% to 25% in women (Dennis et al., 2017), and 3% to 25% in men (Philpott et al., 2019). To date, the majority of pregnancy anxiety research has understandably focused on women and the impact of maternal anxiety on maternal health, baby health, and birth outcomes. However, researchers are increasingly recognising that the perinatal mental health of fathers may affect the wellbeing of mothers, infants, and the family unit (Fisher et al., 2021); with anxiety in expectant fathers linked to multiple adverse outcomes (Philpott et al., 2019).

During pregnancy, the association between paternal anxiety and depressive symptoms is well established (e.g., Finnbogadóttir & Persson, 2019; Wee et al., 2015). Additionally, expectant fathers with anxiety are more likely to experience sleeping difficulties (Finnbogadóttir & Persson, 2019) and poorer quality of prenatal attachment to their unborn child (Vreeswijk et al., 2014). Following childbirth, prenatal paternal anxiety is a predictor of paternal postnatal depression (Howarth & Swain, 2020; Ramchandani et al., 2008), which is linked to psychiatric disorders and social difficulties in children at 7 years of age (Ramchandani et al., 2008). Other post-birth outcomes include lower paternal responsiveness to infants at three months (Parfitt et al., 2013), increased parenting stress which in turn is associated with increased infant negative reactivity at three months (Prino et al., 2016), parenting stress at six months (Skjothaug et al., 2018), and reduced parental self-efficacy at six months (Pinto et al., 2016).

Anxiety in expectant fathers is also associated with a higher incidence of maternal anxiety and depression during pregnancy (Brandão et al., 2019; Canário & Figueiredo, 2017; Koh et al., 2015), and other psychosocial outcomes, potentially affecting the couple relationship and reducing the critical support provided to women during pregnancy. For example, fathers with prenatal anxiety are more likely to experience gender role stress, feeling that they are not measuring up to societal standards (Durkin et al., 2001). Additionally, they are vulnerable to feelings of anger (Durkin et al., 2001) and general hostility, such as hostile thoughts, annoyance, argumentative tendencies, and anger outbursts (Göbel et al., 2020). Not surprisingly, paternal prenatal anxiety is associated with reduced relationship satisfaction (Brandão et al., 2019; Cameron et al., 2021). These psychosocial outcomes may undermine the level of support provided by fathers to their partners, leading to an increased risk of maternal mental health difficulties during pregnancy (Cheng et al., 2016; Hyer et al., 2022) and after childbirth (Parfitt & Ayers, 2014; Pilkington et al., 2015). Moreover, women with low partner support are at increased risk of preterm birth (Ghosh et al., 2010) and having low birth-weight babies (Lee et al., 2018). Therefore, addressing anxiety in expectant fathers is likely to improve outcomes not only for fathers, but also for mothers, and their infants.

Despite growing evidence that anxiety in expectant fathers is associated with multiple adverse outcomes, research indicates that they often feel excluded from professional support during the perinatal period (Rominov et al., 2018; Venning et al., 2020). Moreover, the diagnosis and treatment of anxiety in expectant fathers has been largely overlooked (Koh et al., 2015). To address this gap, clinical practice guidelines increasingly emphasise men's perinatal mental health (Fisher et al., 2021; Highet et al., 2023) and the need for routine mental health assessment of partners during the perinatal period (Darwin et al., 2021). However, to date, there are few psychometrically sound measures for pregnancy anxiety,

developed specifically for men during the prenatal period (Highet et al., 2023).

Assessing Anxiety in Expectant Fathers in Clinical Practice and Research

Current clinical practice guidelines provide limited recommendations for the assessment and treatment of fathers experiencing prenatal anxiety (Leach et al., 2016). While antenatal mental health screening of fathers is largely seen as optional in the USA (Fisher et al., 2021), the Australian guidelines, outlined by the Centre of Perinatal Excellence (COPE; Highet et al., 2023), recommend routine perinatal mental health screening of fathers. However, given the absence of male-specific measures of anxiety, COPE does not recommend any specific screening tools for fathers (Highet et al., 2023). The current consensus-based recommendation is for clinicians to select a screening tool in accordance with which tools are available, and their professional competencies (Highet et al., 2023). Within perinatal health settings, the Edinburgh Postnatal Depression Scale (EPDS; Cox et al., 1987) is readily available and has been validated for fathers with a lower cut-off score of 5/6 (Matthey et al., 2001). When administering the EPDS to men, the Australian guidelines recommend that practitioners examine responses to individual items rather than solely relying on total scores (Highet et al., 2023). Responses to EPDS items 3, 4, and 5 would provide clinicians with some information about men's anxiety symptoms. Otherwise, clinicians may choose to administer a generic measure of anxiety, such as the anxiety subscale of the Depression Anxiety and Stress Scale (DASS-21; Lovibond & Lovibond, 1995).

Similarly, research examining anxiety in expectant fathers has predominantly relied on generic measures of anxiety. The State-Trait Anxiety Inventory (STAI; Spielberger et al., 1970) is the most commonly used scale in paternal prenatal anxiety research (e.g., Finnbogadóttir & Persson, 2019; Pinto et al., 2016; Vreeswijk et al., 2014). The anxiety subscale of the Hospital Anxiety and Depression Scale (HADS-A; Zigmond & Snaith, 1983) is also commonly used (e.g., Brandão et al., 2019; Koh et al., 2015; Sartori et al., 2018).

Other studies (e.g., Beesley et al., 2019; Göbel et al., 2019) have used the 7-item Generalized Anxiety Disorder scale (GAD-7; Spitzer et al., 2006) or the DASS-21 (Wee et al., 2015).

Assessing Pregnancy-Related Anxiety

Although clinical practice and research have largely relied on generic measures of anxiety to assess anxiety in expectant fathers, this assessment approach is unlikely to adequately identify fathers with problematic anxiety relating to their partner's pregnancy (Cameron et al., 2021). Research with women indicates that in addition to experiencing specific and generalised anxiety disorders during pregnancy (Blair et al., 2011; Leach et al., 2017), women may also experience pregnancy-related anxiety (Huizink et al., 2004), also known as pregnancy anxiety or pregnancy specific anxiety (Dunkel Schetter & Ponting, 2022). Pregnancy-related anxiety is characterised by multiple worries and fears regarding the pregnancy, childbirth, infant health, and the transition to parenthood (Bayrampour et al., 2016). Research provides strong evidence that pregnancy-related anxiety is a different construct to general anxiety or depression in expectant mothers (Anderson et al., 2018; Brunton et al., 2019; Huizink et al., 2004) and fathers (Cameron et al., 2021). Moreover, reliance on generic measures of anxiety does not adequately identify individuals with pregnancy-related anxiety (Anderson et al., 2018; Brunton et al., 2019; Cameron et al., 2021; Huizink et al., 2004), nor reliably predict outcomes commonly associated with pregnancy-related anxiety (Blair et al., 2011; Cameron et al., 2021; Lobel et al., 2008; Nolvi et al., 2016). Considering the limitations of using generic measures of anxiety during pregnancy, researchers have directed increased attention to developing psychometrically sound measures of pregnancy-related anxiety for women (e.g., Brunton et al., 2021; Dryer et al., 2022). However, no pregnancy-related anxiety measure has yet been specifically developed for expectant fathers.

In the absence of established pregnancy-related anxiety measures for fathers,

researchers have relied on adaptations of existing maternal scales in research with couples and fathers. In research with couples, the Pregnancy Outcome Questionnaire (POQ; Theut et al., 1988) has been used to assess pregnancy anxiety after a previous experience of perinatal loss (Armstrong, 2002, 2004; Franche & Mikail, 1999; Theut et al., 1988). The Pregnancy-Related Anxiety Measure (PRAM; Rini et al., 1999) has been used with couples who conceived after in vitro fertilization (Stevenson et al., 2019) and first-time expectant parents (Saxbe et al., 2018). In other research with couples, a 20-item adaptation of the Pregnancy-Related Anxiety Questionnaire (PRAQ; Van den Bergh, 1990) was used by Winter et al. (2016), and the 10-item revised PRAQ (PRAQ-R; Huizink et al., 2004) was used by Tolvanen et al. (2013). In research focused solely on fathers, Cameron et al. (2021) used an adaptation of the PRAM; and a 7-item adaptation of the PRAQ-R has been used in longitudinal research (Skjothaug et al., 2015, 2018; Skjothaug et al., 2020). These researchers have brought the relevancy of paternal pregnancy-related anxiety to the forefront, within a historical context of men being overlooked in perinatal mental health research, or research focusing more on paternal depression or non-specific anxiety. Moreover, given that there is overlap in the concerns experienced by men and women during pregnancy, adapting maternal measures of pregnancy-related anxiety for men is likely to be more effective at identifying fathers in need of support during their partner's pregnancy, than relying on generic measures of anxiety.

However, there are limitations with adapting maternal scales for fathers. This approach assumes that items originally designed for women are equally effective at capturing the construct of pregnancy-related anxiety in men. Additionally, the methods used to adapt the scales are inconsistent or poorly reported across studies. For example, Skjothaug et al. (2015) adapted the PRAQ-R by removing three items related to childbirth pain, change in body perception, and fear of gaining weight, despite previous research identifying that fathers

may worry about their partner's pain in childbirth (e.g., Forsyth et al., 2011) or changing body shape (Draper, 2003). In other research, Tolvanen et al. (2013) used all 10 items of the PRAQ-R, without describing how item wording was adapted for fathers. A further limitation is that psychometric evidence for the reliability and validity of using maternal scales in fathers is limited. To address this, Cameron et al. (2021) evaluated the psychometric properties of the PRAM, adapted for expectant fathers, finding good internal consistency ($\alpha = .87$) and evidence for predictive validity. However, the adapted PRAM had higher correlations with depression (EPDS; $r = .52$) than anxiety (STAI; $r = .45$), warranting further examination of construct validity. Within the Classical Test Theory (CTT) framework, a psychometrically sound measure of pregnancy-related anxiety would be expected to demonstrate a stronger correlation with a measure of anxiety (convergent validity) than a measure of depression (divergent validity).

Purpose of the Study

The current absence of psychometrically sound measures assessing pregnancy-related anxiety in fathers means that screening continues to rely on the use of generic measures of anxiety. Since these scales do not address specific pregnancy-related concerns of expectant fathers, there is presently an ongoing risk that pregnancy-related anxiety in expectant fathers is not being adequately detected and treated in clinical practice.

The primary goal of the present study was to develop the Paternal Pregnancy-related Anxiety Scale (PPrAS) as a psychometrically sound measure of pregnancy-related anxiety, specifically developed for expectant fathers; and capturing men's relevant concerns during their partner's pregnancy. This is not to say that fathers may not also be affected by general anxiety, however, the rationale for developing a paternal pregnancy-related anxiety scale was on the basis of the previous research on maternal pregnancy-related anxiety, indicating that pregnancy-related anxiety is distinct from general anxiety, and is not reliably detected when

using generic measures of anxiety (e.g., Brunton et al., 2019; Huizink et al., 2004). Therefore, in the present study, the development of a pregnancy-related anxiety scale for fathers followed an approach consistent with the previous research on maternal pregnancy-related anxiety (e.g., Brunton et al., 2021; Dryer et al., 2022).

An additional goal of the present study was to test the cross-country generalisability of the newly developed PPrAS, taking into consideration that antenatal care systems vary between countries and have the potential to affect the wellbeing of parents (Bäckström et al., 2017). Therefore, expectant fathers were recruited from Australia and the United States of America (USA), because these two countries have very different healthcare and maternity care systems, despite sharing similar socioeconomic standards. For example, Australia provides readily accessible obstetric care through the public health system, whereas in the USA, individuals receive different standards of care depending on their level of health insurance. The present study compared participant responses to items in the new scale, between expectant fathers residing in Australia with those living in the USA, to explore whether the new scale could be used regardless of the healthcare or maternity system in place within a country.

Finally, the current study applied the Rasch measurement model (Rasch, 1960) as the primary framework for scale development, followed by additional evaluation of the scale using CTT approaches. The Rasch measurement model was selected for scale development in order to overcome known limitations with applying CTT approaches, which can result in parameters such as reliability, discrimination location, and factor loadings, being dependent on the sample being used (Balsamo et al., 2014; Linsner et al., 2020). Rasch analysis minimises the risk of undue influence on scale development by individual respondents by calculating the person and item parameters separately, resulting in parameter estimates which are independent of each other (Bond et al., 2021; Townsend, 2017). Moreover, Rasch

analysis was chosen for scale development because it facilitates the development of measurement instruments according to three essential principles of fundamental measurement (Medvedev & Krägeloh, 2022). First, measurement instruments should be unidimensional, so that the sum of all items is a valid measure of a single latent variable (Tennant & Conaghan, 2007). Second, measurement instruments should work equally well for all individuals, regardless of differences in their personal attributes (Medvedev & Krägeloh, 2022). And third, instruments should rely on units of measurement which remain consistent along a linear continuum (Thurstone, 1931). Development of the PPrAS was guided by these same principles of fundamental measurement by: (a) establishing the unidimensionality of the final scale, while including items drawn from a comprehensive range of men's pregnancy-related concerns, worries and fears; (b) ensuring no Differential Item Functioning (DIF), so that the final scale is applicable regardless of personal attributes, such as country of residence; and (c) transforming scale scores from ordinal-level to interval-level scores, allowing future users of the PPrAS to measure pregnancy-related anxiety in fathers, on a linear continuum.

In addition to applying the Rasch model, further psychometric evaluation of the PPrAS was conducted, using CTT approaches. Namely, internal consistency was evaluated using Cronbach's alpha; convergent validity was assessed through correlation with the adapted maternal measure of pregnancy-related anxiety (adapted PRAM); and divergent validity assessed through correlation with a generic measure of anxiety (GAD-7). The PPrAS was expected to be more strongly correlated with the adapted PRAM than with the GAD-7.

Method

Ethics approval was granted by the Human Research Ethics Committee of the Australian Catholic University (reference: 2020-185E). Scale development was conducted in three stages. First, an initial item pool was generated based on the findings of a systematic review. Second, the initial item pool was evaluated by an Expert Review Panel (ERP) and

revised accordingly. Finally, the item pool was administered by online questionnaires to expectant fathers from Australia and the USA, and the data was examined using Rasch analysis to identify the items retained in the final scale. The psychometric properties of the new scale were evaluated using Rasch analysis and CTT approaches to assess reliability and validity.

Generation of Item Pool

To comprehensively capture men's pregnancy-related concerns, a systematic review of qualitative and quantitative literature was conducted. The review identified 75 distinct concerns relevant to expectant fathers, grouped into 10 categories of concern: childbirth concerns, attitudes towards childbirth, baby concerns, acceptance of pregnancy, partner concerns, relationship concerns, worry about self, transition to parenthood, attitudes towards health care professionals, and practical and financial concerns (for complete review, see Dabb et al., 2023). The systematic review findings informed the generation of 113 items for the initial item pool. Appendix I shows the initial item pool, listed according to the pregnancy-related concerns of expectant fathers, as identified by the systematic review.

Evaluation of Item Pool by Expert Review Panel (ERP)

Between December 2021 and February 2022, 37 clinicians and/or researchers were invited by email to participate in the ERP. Emails included a link to the participant information letter with an opportunity to provide informed consent. The ERP included nine female and three male members, living in Australia ($n = 7$), the United Kingdom ($n = 2$), Sweden ($n = 2$), and Germany ($n = 1$). ERP members included five professionals currently practising within clinical contexts, with an average of 24.4 years of experience providing medical care and/or mental health support to parents during the perinatal period. The other seven ERP members were researchers or academics affiliated with various universities, with an average of 15 years of experience.

The ERP members completed an online survey consisting of the 113 items, which were rated for relevance on a 4-point scale from 1 (*redundant/not important to include*) to 4 (*extremely relevant/extremely important to include*). Following this, items were rated from 1 (*poor*) to 4 (*excellent*) for wording, using the following characteristics: clarity (*Is the meaning of the item clear, with unambiguous wording?*), language (*Is the language simple, unbiased, and acultural - avoiding fashionable expressions or colloquialisms?*), and conciseness (*Does the item convey meaning without wordiness?*). ERP members could also provide additional written comments or feedback regarding the item pool.

Eight ERP members fully completed the questionnaire, two completed 33%, and the remaining two members completed 26% of the questionnaire. Partial responses were included in the analyses. After examining the ERP ratings and comments, items were removed due to low relevancy or poor wording, where alternative items addressing the same concerns were retained. In cases where removal of low-rated items would lead to specific concerns being omitted from the item pool, the wording of these items was amended to improve item clarity, language, and/or conciseness. The revised item pool included 95 items (refer to Appendix K for the revised item pool, listed by item number).

Refinement of Item Pool using Rasch Analysis and Psychometric Evaluation

Procedure

The study was promoted on Facebook/Meta and Instagram using paid advertising from 21 August 2022 to 30 November 2022. Participation was anonymous. A modest incentive was offered to enter a prize draw for one of twenty AUD20.00 gift cards for Australian fathers. Participants accessed the survey through a hyperlink and first provided informed consent. Upon completion, (and for those screened out) participants were provided with debrief information which included telephone counselling numbers and support groups should they have experienced distress or discomfort.

Participants

The current study aimed to collect data from 250 participants, based on sample size guidelines for Rasch analysis (Linacre, 1994). Inclusion criteria required participants to be fluent English-speaking males, over the age of 18 years, living in Australia or the USA, with partners also over 18 years and pregnant with singleton pregnancies. Since the study aimed to identify scale items appropriate for general community use, exclusion criteria were set to minimise potential influence from participants already predisposed to experiencing high levels of anxiety during pregnancy. Therefore, men who self-reported having partners who achieved pregnancy through assisted reproductive technology or partners experiencing medical complications in the current or a previous pregnancy were excluded. Additionally, men with a previous experience of miscarriage or stillbirth, or men currently receiving treatment for a mental health condition were excluded.

Beginning with 869 attempted survey responses, 195 participants who did not meet eligibility criteria were excluded. A further 198 participants who did not attempt questions in the item pool, and 18 participants who completed less than 50% of the item pool were removed, resulting in 458 responses. In accordance with guidelines for screening online survey data (Xu et al., 2022), 166 entries were deleted as potentially fraudulent (e.g., multiple survey responses from same respondent, completion time below 5 minutes, or straight-lined responses). The final sample included 292 expectant fathers. Equal numbers ($n = 146$) were living in Australia and the USA. Table 6.1 provides the demographic data for both groups.

Table 6.1*Participant Demographics for Expectant Fathers Living in Australia and the USA*

	Australia (<i>n</i> = 146)	USA (<i>n</i> = 146)
Relationship status		
Married/Defacto	146 (100%)	143 (97.9%)
Single	0(0%)	3 (2.1%)
Gestation of partner (weeks)	<i>M</i> = 18.01, <i>SD</i> = 8.65	<i>M</i> = 26.13, <i>SD</i> = 8.89
Trimester 1 (0-13 weeks)	52 (35.6%)	15 (10.3%)
Trimester 2 (14-26 weeks)	68 (46.6%)	50 (34.2%)
Trimester 3 (27+ weeks)	26 (17.8%)	81 (55.5%)
Parity		
First-time father	119 (81.5%)	73 (50%)
Second or subsequent pregnancy	27 (18.5%)	73 (50%)
Country of birth		
Australia	133 (91.1%)	13 (8.9%)
USA	4 (2.7%)	130 (89.0%)
New Zealand	2 (1.4%)	0 (0%)
Canada	2 (1.4%)	3 (2.1%)
UK	2 (1.4%)	0 (0%)
Germany or Netherlands	2 (1.4%)	0 (0%)
Philippines	1 (0.7%)	0 (0%)
Cultural background		
Caucasian	110 (75.3%)	133 (91.1%)
Aboriginal/Torres Strait Islander	14 (9.6%)	0 (0%)
European	5 (3.4%)	2 (1.4%)
Hispanic	3 (2.1%)	10 (6.8%)
African	2 (1.4%)	1 (0.7%)
Asian	6 (4.1%)	0 (0%)
Caucasian & Aboriginal/Torres Strait Islander	1 (0.7%)	0 (0%)
European & Caucasian	3 (2.1%)	0 (0%)
European & Middle Eastern	1 (0.7%)	0 (0%)
Not specified	1 (0.7%)	0 (0%)
Education		
High School	12 (8.2%)	2 (1.4%)
Trade certificate or diploma	13 (8.9%)	6 (4.1%)
University (undergraduate, i.e., Bachelor)	99 (67.8%)	110 (75.3%)
University (postgraduate, i.e., Masters, PhD)	22 (15.1%)	28 (19.2%)
Employment status		
Full-time employment	123 (84.2%)	120 (82.2%)
Part-time, more than 20 hours per week	5 (3.4%)	6 (4.1%)
Casual/Part-time, below 20 hours per week	1 (0.7%)	1 (0.7%)
Self-employed	14 (9.6%)	19 (13.0%)
Unemployed	3 (2.1%)	0 (0%)

Participants were aged between 20 and 47 years ($M_{\text{age}} = 29.9$ years, $SD = 5.55$). Fathers living in Australia ($M_{\text{age}} = 28.94$ years, $SD = 4.47$) were significantly younger than those from the USA ($M_{\text{age}} = 30.88$ years, $SD = 6.33$), $t(290) = -3.02$, $p = .003$, two-tailed (using Welch's t -test due to greater variance in USA sample), $d = -0.354$, 95% CI of the mean difference $[-3.20, -0.68]$. Moreover, gestation for the Australian sample ($M_{\text{gestation}} = 18.01$ weeks, $SD = 8.65$) was significantly lower than the USA sample ($M_{\text{gestation}} = 26.13$ weeks, $SD = 8.89$), $t(290) = -7.91$, $p < .001$, two-tailed, $d = -0.926$, 95% CI of the mean difference $[10.14, 6.10]$. A greater proportion of fathers from the USA were expecting a second or subsequent baby, $\chi^2(1) = 32.18$, $p < .001$. Fathers from the USA were more likely to have a higher level of education than fathers from Australia, $\chi^2(3) = 11.02$, $p = .012$. However, no significant differences in employment were found between the two groups.

Table 6.2 shows the participant medical and mental health information. No fathers reported currently receiving treatment for a mental health condition. Six fathers from Australia reported a history of a mental health condition, compared with none from the USA. No other significant differences were found between the two groups. Given that the medical and mental health information was based solely on participant self-report, with no independent verification, the decision was made to retain the participants reporting a history of a mental health condition in the data analyses.

Table 6.2*Medical and Mental Health Information for Participants*

	Australia (<i>n</i> = 146)	USA (<i>n</i> = 146)
Currently undergoing treatment for mental health ^a		
Yes	0 (0%)	0 (0%)
No	146 (100%)	146 (100%)
History of a mental health condition		
Yes	6 (4.1%)	0 (0%)
No	140 (95.9%)	146 (100%)
Currently experiencing a serious or chronic medical condition		
Yes	2 (1.4%)	0 (0%)
No	143 (97.9%)	145 (99.3%)
Missing data	1 (0.7%)	1 (0.7%)
Partner currently diagnosed with a mental health condition		
Yes	10 (6.8%)	6 (4.1%)
No	135 (92.5%)	140 (95.9%)
Missing data	1 (0.7%)	0 (0%)
Partner currently receiving treatment for mental health		
Yes	3 (2.1%)	3 (2.1%)
No	143 (97.9%)	143 (97.9%)
Partner currently experiencing serious or chronic medical condition		
Yes	3 (2.1%)	0 (0%)
No	143 (97.9%)	145 (99.3%)
Missing data	0 (0%)	1 (0.7%)

^a Eligibility criteria required that all participants not be currently undergoing treatment for anxiety or depression or another mental health condition.

Measures

Participants completed the self-report online study via an online survey platform (Qualtrics.com). Participants were first screened according to the eligibility criteria. Next, demographic questions were completed (e.g., age, marital status, education, employment, cultural background, gestation of partner, parity, and medical history for themselves and their partners).

Participants then completed the 7-item GAD-7 (Spitzer et al., 2006). Participants rated

how often they had experienced anxiety symptoms during the previous two weeks, from 0 (*Not at all*) to 3 (*Nearly every day*). An example item is, “Worrying too much about different things.” Higher scores indicated greater levels of anxiety. The scale has moderately high internal consistency ($\alpha = .82$) for expectant fathers (Göbel et al., 2019). Cronbach’s alpha in the present sample was .87.

Additionally, the 10-item PRAM (Rini et al., 1999), as adapted for fathers by Cameron et al. (2021) was completed. Participants rated the extent of their agreement from 1 (*Not at all or Never*) to 4 (*Very much or Almost all of the time*) for items, such as, “I am concerned or worried about losing the baby.” After summing scores, the mean provided an overall measure of pregnancy-related anxiety, with scores ranging from 1 to 4. Higher scores indicated greater levels of paternal pregnancy-related anxiety. The scale has previously demonstrated moderately high internal consistency ($\alpha = .87$) for expectant fathers (Cameron et al., 2021). Cronbach’s alpha in the present sample was .77.

Finally, the 95-item revised item pool was presented in randomized order to prevent response-order effects. Items were rated from 1 (*not at all*) to 4 (*very often*).

Data Analyses

Descriptive statistics and correlation analyses were calculated using IBM SPSS v29. Rasch analysis was conducted using RUMM2030 software (Andrich et al., 2009). A likelihood ratio test determined which Rasch model to adopt (Leung et al., 2014). Where significant differences between response option thresholds existed across individual items, the unrestricted partial-credit model (Masters, 1982) was selected rather than the rating scale model (Andrich, 1978).

Rasch analysis guided the reduction of the item pool, using an iterative approach. The overall model fit for the entire item pool was evaluated by examining the item-trait interaction chi-square statistic. A nonsignificant chi-square probability ($p > .05$) indicated

good fit (Balsamo et al., 2014). Misfitting items with standardized residuals outside the range of -2.50 to +2.50 were deleted (Medvedev & Krägeloh, 2022; Pallant & Tennant, 2007). DIF was examined in relation to the following person factors: country of residence (Australia vs. USA), parity (first baby vs. second/subsequent baby), partner's pregnancy trimester (first, second or third), and fathers' age (within ranges: 20-26 years, 27-29 years, or 30-47 years). Items displaying DIF were removed to ensure that the new scale would function equally well for all individuals, regardless of personal factors. Item category probability curves and the item threshold map were examined to identify items with disordered thresholds.

Once the item pool was reduced, additional psychometric evaluation was conducted within the Rasch measurement framework. Local dependency between items was assessed by examining the residual correlation matrix as a means to identify sources of misfit. Unidimensionality was tested by conducting a Principal Components Analysis (PCA) of the standardized residuals. Following the procedure of Smith (2002), items with the highest positive or negative factor loadings on the first component of the PCA of residuals were grouped into two subsets and the person estimates for each subset were compared using paired-samples *t*-tests. When the percentage of significant *t*-tests was below 5% (or the lower bound binomial proportions Confidence Interval [CI] value for the percentage was below 5%), unidimensionality was inferred (Tennant & Pallant, 2006). The Person Separation Index (PSI) was examined as an estimate of internal consistency reliability (Tennant & Conaghan, 2007). Models with a high PSI allow for a greater number of class intervals, enabling more accurate differentiation of individuals based on their level of latent variable. A minimum value of .70 indicates suitability of the scale for reliable group comparisons, and a minimum value of .85 indicates suitability for within-participant comparisons (Tennant & Conaghan, 2007). Finally, sample targetting was examined before creating ordinal-to-interval transformation tables.

Further evaluation of the newly developed PPrAS was conducted using CTT approaches with the same sample. Before calculating scale total scores and correlations, a missing-values analysis was conducted with the Little's Missing Completely at Random (MCAR) test. Missing values for any items were imputed using Expectation Maximization (EM), considered a superior approach to the regression method, which may artificially inflate correlations (Schafer & Olsen, 1998). Internal consistency was examined using Cronbach's alpha. Convergent and divergent validity of the new PPrAS was evaluated by calculating the Pearson's r correlation coefficients of the new scale with the adapted PRAM and GAD-7, respectively.

Results

The likelihood-ratio test confirmed the selection of the unrestricted partial-credit model for Rasch analysis. Initial analysis of the complete item pool of 95 items indicated a considerable degree of misfit between the data and the overall model, with a significant item-trait interaction, $\chi^2(855) = 1139.32, p < .0001$. Table 6.3 provides the overall Rasch model statistics for the initial and subsequent analyses.

Table 6.3

Summary of Rasch Model Fit Statistics for the Paternal Pregnancy-Related Anxiety Scale

	Person location		Person fit residual		Item fit residual		Overall model fit: Item-trait interaction		PSI
	Mean	SD	Mean	SD	Mean	SD	χ^2 (df)	<i>p</i>	
Initial analysis 95 items	-0.85	1.37	-0.16	1.87	0.06	1.53	1139.32 (855)	<.0001	.98
87 items	-0.89	1.41	-0.17	1.80	0.05	1.14	925.89 (783)	<.0001	.98
86 items	-0.89	1.42	-0.17	1.81	0.04	1.10	911.47 (774)	<.0001	.98
Final analysis 33 items	-0.92	1.44	-0.18	1.25	0.01	1.08	332.75 (297)	.075	.96

Note. $N = 292$. SD = Standard Deviation. χ^2 = chi-square statistic. df = degrees of freedom. PSI = Person Separation Index.

Individual item fit statistics were examined, and eight items with standardized fit residuals outside the range of -2.50 to +2.50 were removed from the item pool (items 2, 27, 29, 41, 42, 46, 69, and 66; shown in Appendix K). The overall model statistics were recalculated on the remaining 87 items. One additional misfitting item (i.e., item 14) was identified and removed. The remaining 86 items still showed a significant item-trait interaction, $\chi^2(774) = 911.47, p < .0001$.

Once there were no remaining misfitting items, examination of DIF was conducted. No evidence of DIF was found for any items, across the following person factors: country of residence, parity, partner's pregnancy trimester, and fathers' age. This indicated that all items were measuring pregnancy-related anxiety in an equivalent way, for all expectant fathers, across the examined demographic groups.

No items with disordered thresholds were found when examining the item category probability curves and item threshold map. Groups of psychometrically redundant items were identified, which included two or more items with similar difficulty values and similar threshold patterns. Items from each group were selected for the final scale, maintaining the full range of item difficulties found in the item pool, and ensuring that items were retained that reflected the breadth of expectant fathers' concerns previously identified (Dabb et al., 2023). Items were selected for retention during collaboration between research team members and guided by theoretical considerations. For example, item 62 (*I worry about experiencing a loss of independence*) was retained in preference to item 60 (*I am concerned about how I will manage with less sleep once the baby is born*) for the following considerations. Independence had previously been more frequently identified as a relevant concern for expectant fathers than loss of sleep (15% vs. 5% of qualitative studies included in systematic review) and represents a more enduring aspect of the transition to parenthood. Another example is the removal of item 80 (*I worry about caring for the baby*), in favor of two retained items which

addressed the practical (item 76; *I'm afraid I don't have the ability to be a good parent*) and emotional (item 83; *I am afraid that I will find it hard to love the baby*) aspects of caring for the baby.

The resultant scale included 33 items (see Appendix L). Refer to Figure 6.1 for the threshold map, ordered by item location. The overall model for the 33 items indicated good fit, with a non-significant item-trait interaction, $\chi^2(198) = 226.86, p = .078$. A repeated analysis of the 33 items confirmed no DIF. Inspection of the residual correlation matrix confirmed no local dependency. The PCA of standardized residuals was conducted to assess unidimensionality, followed by paired samples *t*-tests (items 3, 5, 6, and 14, vs. items 12, 13, 28, and 31; refer to Appendix K to identify relevant items by item number). The number of significant *t*-tests was 21 out of 292 participants (7.19%). The lower bound of the 95% binomial CI for the percentage was 4.69%, which provided acceptable evidence for unidimensionality. The PSI for the 33-item scale was .96, indicating excellent internal consistency reliability. Table 6.3 shows the overall model statistics for the final scale and Table 6.4 shows the individual item statistics.

Figure 6.1

Threshold Map for 33 Items Selected for Final Scale, Ordered by Item Location/Difficulty

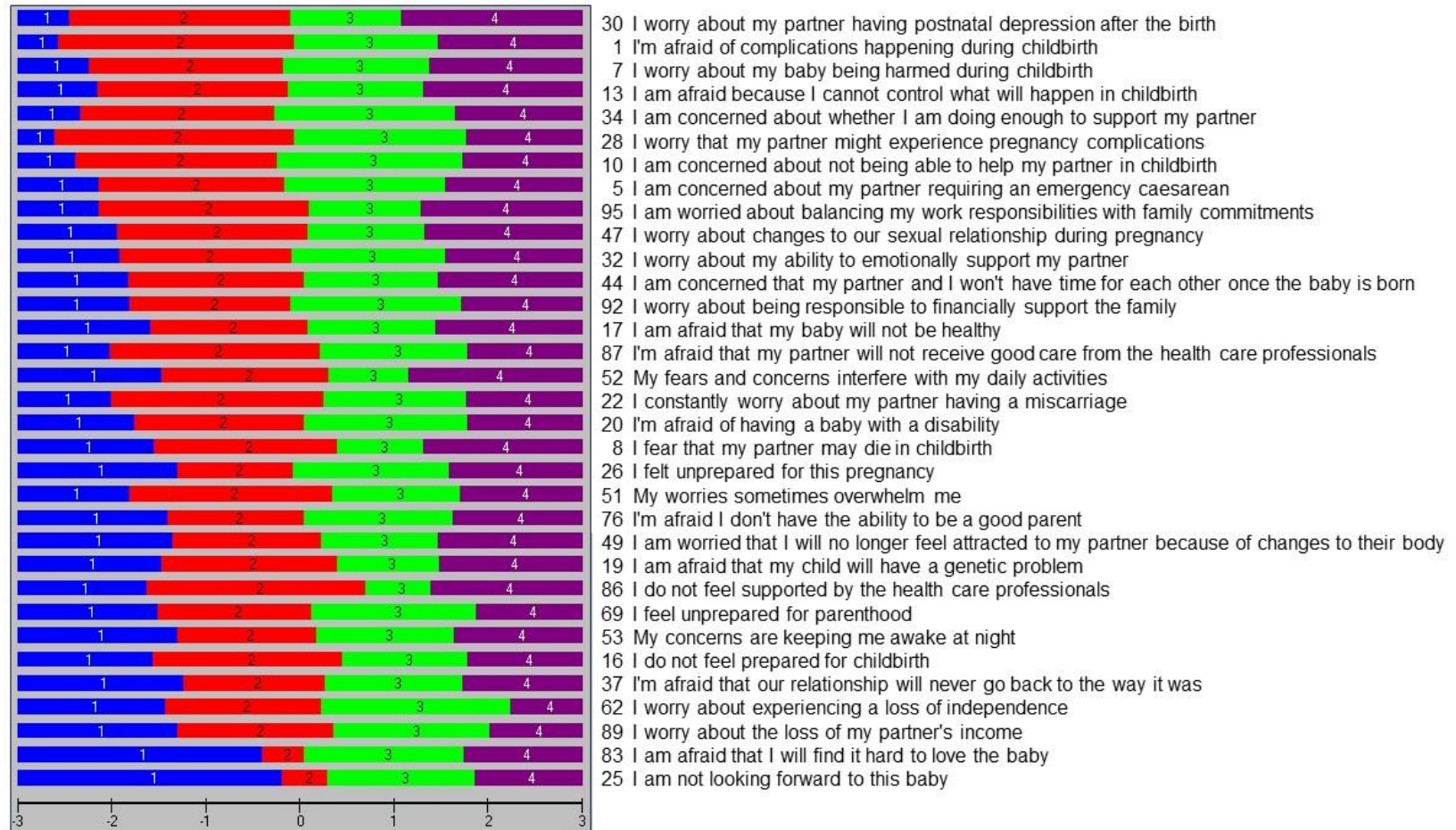


Table 6.4

Individual Item Fit Statistics for the Final 33-Item Scale, With Items Listed in Order of Increasing Item Difficulty (Location)

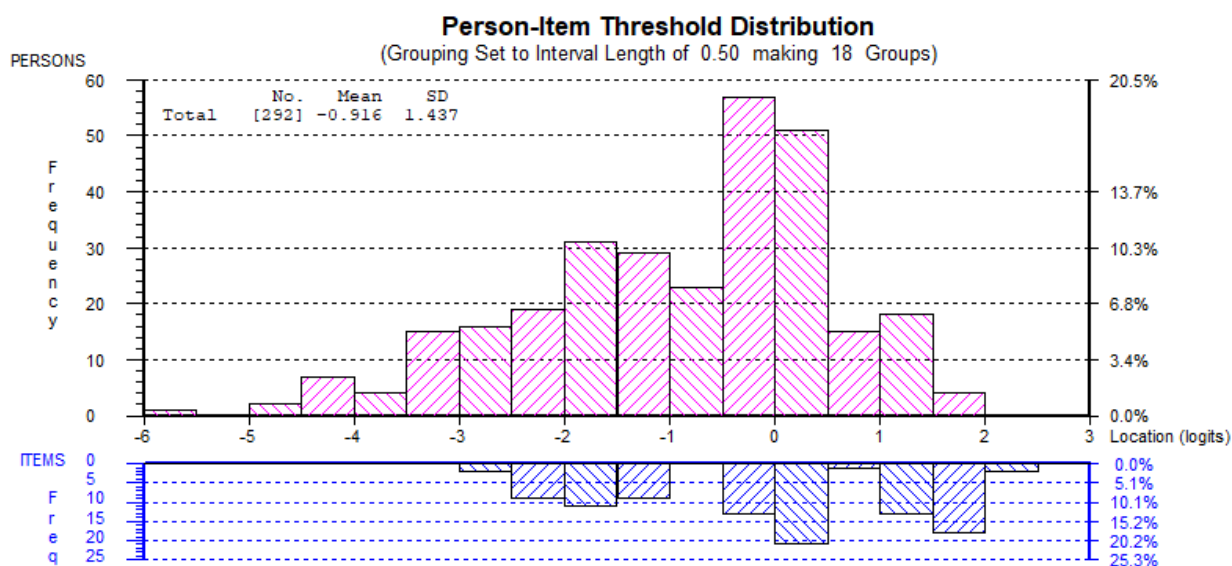
Item no.	Original	Item Content	Location	SE	Fit Residual	Chi-Square
15	30	Partner postnatal	-0.49	0.09	1.28	19.51
1	1	Birth Complications	-0.38	0.09	-0.11	7.11
3	7	Baby harm	-0.34	0.09	1.16	5.37
6	13	Childbirth control	-0.32	0.09	-0.38	6.85
17	34	Support partner	-0.31	0.09	-0.18	9.95
14	28	Pregnancy complications	-0.3	0.09	-0.75	4.93
5	10	Help Partner	-0.3	0.09	1.23	12.71
2	5	Caesarean	-0.25	0.09	2.28	16.74
33	95	Balancing work	-0.25	0.09	0.53	10.8
20	47	Sexual relationship	-0.17	0.09	0.03	6.15
16	32	Give emotional support	-0.15	0.09	0.32	8.54
19	44	Relationship time	-0.1	0.09	0.76	1.38
32	92	Financial responsibility	-0.06	0.09	1.79	13.72
30	87	Partner health care	-0.01	0.09	2.07	20.46
8	17	Baby health	0	0.09	-0.82	5.92
23	52	Daily activities	0	0.08	-1.3	14.89
11	22	Miscarriage	0.01	0.09	1.04	12.56
10	20	Disability	0.02	0.09	0.89	9.05
4	8	Partner death	0.06	0.09	0.08	8.98
13	26	Unprepared pregnancy	0.08	0.09	-0.92	7.9
22	51	Worries overwhelm	0.09	0.09	-1.52	10.53
27	76	Good parent	0.09	0.09	0.01	7.62
21	49	Attraction to partner	0.12	0.09	-0.05	15.01
9	19	Genetic problem	0.14	0.09	-1.06	5.52
29	86	Unsupported professionals	0.16	0.09	-0.45	9.38
26	69	Unprepared parenthood	0.16	0.09	0.07	9.51
24	53	Keeping awake	0.17	0.09	-1.15	8.73
7	16	Unprepared birth	0.23	0.09	-1.55	8.02
18	37	Relationship changes	0.26	0.09	-1.14	14.4
25	62	Independence	0.35	0.09	-0.81	8.18
31	89	Partner income	0.36	0.09	-0.74	3.47
28	83	Love baby	0.46	0.08	1.18	14.35
12	25	Looking forward baby	0.66	0.09	-1.41	14.55

Note. Item no. = item numbers for 33-item scale (as shown in Appendix L). Original = original item numbers allocated to the 95 items included in item pool (as shown in Appendix K). *SE* = Standard Error.

The mean person location for the final scale was -0.92 logits, falling outside the recommended range for a well targeted scale (-0.50 to $+0.50$), and indicating that fathers in this sample generally had low levels of pregnancy-related anxiety. To further evaluate sample targeting, the person-item threshold distribution plot was generated (see Figure 6.2). As shown, more than 90% of the sample had pregnancy-related anxiety levels (top panel) which were well covered by the item thresholds (bottom panel) of the scale. The sample was better covered by item thresholds at higher levels of pregnancy-related anxiety (see right side of plot). At the lower end, 29 participants (9.93%) were outside the item threshold coverage, indicating that the scale was unable to differentiate between individuals with low levels of pregnancy-related anxiety. However, there was no evidence of a floor effect, since the percentage of participants not covered at the lower end was below 15% (McHorney & Tarlov, 1995). Therefore, the scale demonstrated acceptable targeting of the sample by item thresholds, and ordinal-to-interval transformation of scores was computed.

Figure 6.2

Person-Item Threshold Distribution for the Final 33-Item PPrAS



Appendix M presents the ordinal-to-interval conversion table. The SPSS syntax to convert the total PPrAS scores to the corresponding Rasch interval scores, is provided in Appendix N. Transformation of the PPrAS scores from ordinal to interval resulted in a significant difference between the mean PPrAS ordinal score ($M = 68.67$, $SD = 20.16$) and the mean Rasch interval score ($M = 75.37$, $SD = 12.68$), compared using a paired samples t -test, $t(291) = -13.85$, $p < .001$, two-tailed, $d = -0.810$, 95% CI of the mean difference $[-7.65, -5.74]$. Moreover, the Standard Error (SE) of the mean Rasch interval score ($SE = 0.74$) was lower than for the ordinal scores ($SE = 1.18$), indicating that transformation of the ordinal scores to interval scores resulted in reduced measurement error. Together, these results suggest that transformation of ordinal scores into interval level data enhances the accuracy of the assessment and encourages usage of interval scores.

Further Psychometric Evaluation

Missing values analysis was conducted on the 33-item PPrAS, GAD-7, and adapted PRAM items along with participant ages and the number of weeks gestation of pregnant partners. No item was missing more than 2% of values. Little's MCAR test was not significant, $\chi^2(2310) = 2401.99$, $p = .089$, indicating that the data was missing completely at random. EM was used to impute missing values.

Internal consistency reliability of the PPrAS was excellent ($\alpha = .96$). Correlations were calculated between the PPrAS and adapted PRAM, $r(290) = .74$, $p < .001$, to assess convergent validity; and the PPrAS and GAD-7, $r(290) = .85$, $p < .001$, to assess divergent validity. Contrary to expectations, the PPrAS was more strongly correlated with the GAD-7 than the adapted PRAM.

Discussion

The purpose of the present study was to develop the PPrAS as a new measure of pregnancy-related anxiety for expectant fathers, using the Rasch measurement model as the framework for scale development. A key aim was to include a comprehensive range of fathers' pregnancy-related concerns in the final scale. Another aim was to ensure cross-country generalisability of the PPrAS when comparing item functioning for fathers from Australia compared with fathers from the USA. An additional goal was that the PPrAS would be characterised by three essential elements of measurement instruments, by demonstrating unidimensionality, showing no evidence of DIF, and allowing measurement of pregnancy-related anxiety in fathers on a linear continuum. Following development and psychometric evaluation using Rasch analysis, the present study also sought to evaluate internal consistency reliability and convergent and divergent validity, within the CTT framework.

To the best of our knowledge, the PPrAS is the first measure of pregnancy-related anxiety, designed specifically for use with expectant fathers. The 33 items included in the PPrAS were selected from a large item pool, which was generated after a comprehensive literature review and input from an ERP. Moreover, item selection for the final scale ensured that a minimum of two pregnancy-related concerns were included from each of the 10 categories of concern identified by the systematic review (Dabb et al., 2023), including: childbirth concerns, attitudes towards childbirth, baby concerns, acceptance of pregnancy, partner concerns, relationship concerns, worry about self, transition to parenthood, attitudes towards health care professionals, and practical and financial concerns. This fulfilled a key aim of the research, which was to include a comprehensive range of fathers' pregnancy-related concerns in the final scale. Moreover, this addressed one of the limitations of adapting maternal measures of

pregnancy-related for use in fathers, by avoiding assumptions about which items originally designed for women would be relevant for men. For example, consistent with previous qualitative research which identified that fathers may worry about their partner's changing body shape (Draper, 2003), the PPrAS includes the item, "I am worried that I will no longer feel attracted to my partner because of changes to their body." This is in contrast to approaches that have adapted maternal measures of pregnancy-related anxiety (e.g., Skjothaug et al., 2015) where items related to change in body perception, and fear of gaining weight are simply deleted.

Items included in the PPrAS address specific pregnancy concerns of fathers, which are not evaluated by generic anxiety measures or adapted maternal measures of pregnancy-related anxiety. For example, the PPrAS includes items consistent with systematic review findings, which have identified that fathers often worry about the financial responsibility of parenthood, and they struggle with having no control over the events of childbirth (Baldwin et al., 2018). Additionally, the PPrAS addresses men's common concerns that they will not be able to help their partner during childbirth and they often feel unprepared for pregnancy and parenthood (Kowlessar et al., 2015; Shorey & Chan, 2020). Moreover, since the PPrAS was designed specifically for fathers, items address men's commonly reported partner/relationship concerns, which are not included in maternal scales, such as worrying about whether they are doing enough to provide emotional (Kao & Long, 2004) and practical (Baldwin et al., 2018) support to their partner, worry about the impact of pregnancy and parenthood on the couple relationship (Poh et al., 2014), and worry about losing their sense of independence in the transition to parenthood (Genesoni & Tallandini, 2009; Poh et al., 2014). By drawing upon the 10 categories of men's concerns, worries, and fears, identified by systematic review (Dabb et al., 2023), the 33 items included in the PPrAS represent the core concerns of expectant fathers described in the literature.

Psychometric Evaluation of the PPrAS using the Rasch Measurement Model

The PPrAS was developed as a unidimensional scale so that the total score can be considered a valid measure of pregnancy-related anxiety in expectant fathers, as a single latent variable. Considering that the final scale included items drawn from 10 categories of pregnancy-related concerns identified by the systematic review (Dabb et al., 2023), this could have resulted in item response data that is multidimensional. However, research has found that multidimensionality in the item response data does not necessarily require a multidimensional statistical approach (Ip, 2010). The present research took the approach of Reise et al. (2015) and treated the construct of pregnancy-related anxiety as a target latent variable which is in common among all the items. Using this approach, the aim was to create a scale which was sufficiently unidimensional to fit the Rasch measurement model (Reise et al., 2015). Moreover, since the length of the new scale includes more than 20 items, this would minimise the impact of possible multidimensionality (Kirisci et al., 2001). Given that the PPrAS displayed a high internal consistency ($\alpha = .96$), the magnitude of the correlation among any possible underlying dimensions would be high, and therefore, the application of a unidimensional Rasch model is reasonable (Kirisci et al., 2001).

Cross-country generalizability of the 33-item PPrAS was demonstrated for fathers from Australia and the USA, by confirming that all items included in the final scale displayed no evidence of DIF. This means that all items measure pregnancy-related anxiety in an equivalent way for expectant fathers, whether they are residing in Australia or the USA. Examination of DIF also indicated that all items functioned equally well for fathers, regardless of their age, the pregnancy trimester of their partner, and whether or not they were first-time fathers. The creation of the ordinal-to-interval level conversion table for PPrAS scores allows future users of the

PPrAS to transform scores based on ordinal responses into interval-level scoring, resulting in greater measurement precision.

Psychometric evaluation of the PPrAS using Rasch analysis indicated that the final model achieved good fit. No evidence for local dependency or disordered thresholds were found. Moreover, the high PSI provided strong evidence for excellent internal consistency and indicated that the PPrAS differentiates well between individuals, particularly at higher levels of pregnancy-related anxiety, making it useful for identifying fathers who may need additional support and/or intervention. Additionally, the PPrAS demonstrated acceptable sample targeting, with no evidence of floor or ceiling effects.

Psychometric Evaluation of the PPrAS using Classical Test Theory (CTT)

Further psychometric evaluation of the PPrAS within the CTT framework confirmed excellent internal consistency. However, evaluation of convergent and divergent validity produced unexpected results. As a measure of pregnancy-related anxiety, the PPrAS was predicted to be more strongly correlated with an adapted maternal measure of pregnancy-related anxiety than with a measure of generalized anxiety. However, the PPrAS was more strongly correlated with the GAD-7 than with the adapted PRAM scale. A possible explanation for this finding is that the 10-item PRAM contains two positively-worded items, whereas both the PPrAS and GAD-7 only contain negatively worded items. Additionally, when comparing the 33 items included in the PPrAS with the adapted PRAM items, the majority of PRAM items addressed childbirth concerns (4 items) and baby concerns (4 items), with two additional items addressing partner concerns and concerns relating to the transition to parenthood. Unlike the PPrAS, the adapted PRAM did not include items addressing acceptance of pregnancy, relationship concerns, attitudes towards health care professionals, and practical and financial concerns. Moreover, no

PRAM items addressed anxiety-related symptoms. Contrastingly, the PPrAS includes three items which describe anxiety symptoms previously reported by expectant fathers (*my worries sometimes overwhelm me, my fears and concerns interfere with my daily activities, and my concerns are keeping me awake at night*). These anxiety-related symptoms are likely to be highly correlated with symptoms of generalized anxiety disorder, measured by the GAD-7. Taken together, the overlap of anxiety symptoms measured by the GAD-7 and PPrAS, along with the differences in content between the PPrAS and adapted PRAM is likely to have contributed to the stronger correlation between the PPrAS and GAD-7 than the PPrAS and adapted PRAM.

An additional consideration is that despite the approach used in the present study, of treating paternal pregnancy-related anxiety as distinct from general anxiety, the results of the classical test theory evaluation suggest that this may not be the case. That is, these findings suggest that pregnancy-related anxiety in expectant fathers may not be as distinct from non-specific or general anxiety as has been demonstrated in research with expectant mothers (e.g., Anderson et al., 2018; Huizink et al., 2004). However, the availability of a paternal measure of pregnancy-related anxiety, such as the PPrAS, will still be beneficial for expectant fathers given its focus on pregnancy-specific concerns. Fathers have been reported to be reluctant to seek help for their emotional needs during pregnancy and are more likely to engage with services for practical skills building or for assistance with parenting challenges (Matthey et al., 2009; Rominov et al., 2018). Moreover, while expectant fathers may be aware of their increasing levels of anxiety and/or depression during their partner's pregnancy, they may not seek help due to fears of the stigma associated with mental health conditions (Letourneau et al., 2011). Accordingly, fathers may be more willing to engage with clinicians if asked to complete a measure that explores their pregnancy-related concerns (e.g., PPrAS), rather than a generic

measure of anxiety and/or depression (e.g., HADS-A, GAD-7).

Limitations and Future Directions

Several limitations of the present study need to be noted. Due to the length of the online questionnaire (including the item pool of 95 items), the present study was limited to including the GAD-7 and adapted PRAM as the only additional measures for assessing construct validity. The unexpected correlational findings relating to convergent and divergent validity warrant further psychometric evaluation of the 33-item PPrAS to establish convergent and divergent validity. Future research using additional measures is recommended. For example, examining the correlation between the PPrAS and other adapted maternal measures of pregnancy-related anxiety, such as the adapted PRAQ-R (Skjothaug et al., 2015) may shed light on the findings of the present study. Moreover, examining correlations between the PPrAS and different constructs (e.g., depression or neuroticism), may help to establish divergent validity.

Given the present study was a cross-sectional research design, further psychometric evaluation of the 33-item scale should also include longitudinal research evaluating criterion-related and predictive validity. It is also recommended that future research examines the clinical utility of the PPrAS by assessing sensitivity and specificity, using Receiver Operating Characteristic (ROC) curve analysis.

Since this study was conducted with fathers from Australia and the USA, there may be limits on generality for fathers from different cultures or less economically developed countries. Moreover, the fathers included in this research were predominantly university graduates, with Caucasian ethnic background, and did not adequately represent the cultural and economic diversity found within the general population of Australia or the USA. Therefore, future research examining the psychometric properties of the PPrAS should endeavor to include a more diverse

cross-section of fathers. Future research should also further examine the cross-cultural validity of the PPrAS, extending the present findings to other countries. Cross-cultural examination would allow for DIF to be assessed for other ethnicities, improving the utility of the PPrAS.

Generalisability was also limited by the present study's focus on cisgender men in heterosexual relationships. The validity of the PPrAS for gender diverse or non-heterosexual co-parents cannot be assumed. Further examination of DIF on the basis of personal factors pertaining to gender or sexual identity would help to establish the utility of the PPrAS for all co-parents. Improving support provided to gender diverse and non-heterosexual co-parents is especially important, given that they face distinct challenges interacting with heteronormative systems and they often experience a lack of social recognition for their role during the antenatal period (Wojnar & Katzenmeyer, 2014).

Likewise, generalisability was limited by the present study's strict inclusion criteria. Consequently, there is a need for future research to examine pregnancy-related anxiety and the psychometric properties of the PPrAS with partners who may already be predisposed to experiencing high levels of anxiety during pregnancy. This would include partners who are currently experiencing a mental health condition, or expecting a baby after assisted reproduction technology, or have a history of perinatal loss.

Finally, the availability of a new measure of pregnancy-related anxiety for expectant fathers is only helpful to the extent that it is utilised within clinical settings. It is recognised that there is still much work remaining to improve perinatal mental health services provided to partners (Fletcher et al., 2015). Evaluation needs to be undertaken, regarding routine assessment of partners in the context of antenatal care, and how to ensure uptake by partners. Given the limited time available for clinical consultations, one factor which may limit application of the

current 33-item scale, is its length. Future research aimed at further refinement and reduction of the scale to develop a screener would address this limitation.

Implications for Clinical Practice and Research

The PPrAS is the first measure of pregnancy-related anxiety, designed specifically for use with expectant fathers, that has been evaluated using both Rasch and CTT methodologies. The items included in the PPrAS address a comprehensive range of men's pregnancy-related concerns, worries and fears, not addressed by generic measures of anxiety, nor by existing maternal scales adapted for fathers. Therefore, the PPrAS is a promising new measure for pregnancy-related anxiety, which may improve the identification of fathers experiencing anxiety relating to their partner's pregnancy. The PPrAS item thresholds provided excellent coverage of the sample at the high end of the scale. This makes the PPrAS useful in clinical contexts, since it differentiates well between fathers with high levels of pregnancy-related anxiety. Additionally, the high PSI met clinical criteria for the PPrAS as a suitable measure for group ($PSI > .70$) or individual ($PSI > .85$) assessment (Tennant & Conaghan, 2007).

The newly developed PPrAS also has implications for research. Researchers examining pregnancy-related anxiety in expectant fathers no longer need to rely on generic measures of anxiety, nor self-constructed scales, nor adapted maternal scales to measure pregnancy-related anxiety in men. Moreover, with the availability of the ordinal-to-interval conversion table, analysis of PPrAS scores is made more precise. Provided that the transformed interval-level data is normally distributed, researchers may confidently use parametric statistics, knowing that fundamental test assumptions are not being violated by using ordinal data in arithmetic operations.

Conclusion

The initial development of the PPrAS outlined in the present study addresses a current need in clinical practice and research. The PPrAS provides clinicians with a comprehensive measure of pregnancy-related anxiety in expectant fathers, developed using the robust psychometric approach of Rasch analysis. With a high PSI, the PPrAS is suitable for group or individual assessment. Moreover, with item thresholds displaying excellent coverage at the high end of the scale, the PPrAS differentiates well between fathers with high levels of pregnancy-related anxiety. In research settings, the PPrAS offers researchers an opportunity to extend on the current understanding of pregnancy-related anxiety in partners. Moreover, researchers may benefit from the improved precision made possible by analysing interval-level data. Therefore, the PPrAS is a valuable new measure for evaluating paternal pregnancy-related anxiety that can aid in the provision of support for fathers during pregnancy.

Chapter 7: Psychometric Evaluation of the Paternal Pregnancy-Related Anxiety Scale (PPrAS) using Classical Test Theory (CTT) Approaches

Chapter 7 presents a manuscript in preparation for submission to the *Journal of Anxiety Disorders*. The manuscript extends on the research reported in Chapter 6, which resulted in the development of the 33-item PPrAS, as a measure of pregnancy-related anxiety in expectant fathers. Further evaluation of the psychometric properties of the newly developed scale was conducted in Chapter 7, using CTT approaches. Internal consistency reliability was evaluated using Cronbach's alpha. Construct validity was assessed by comparing correlations between the PPrAS and similar measures (convergent validity) with correlations between the PPrAS and dissimilar measures (divergent validity). Binary logistic regression and an ROC curve were used to evaluate the ability of the PPrAS to identify fathers classified as anxious versus non-anxious. Finally, the coordinates of the ROC curve were examined, to identify an optimal range of PPrAS cut-off scores for identifying fathers likely to be experiencing pregnancy-related anxiety.

Chapter 7 Introduction

Expectant fathers typically experience a range of emotions during pregnancy, including joy and anticipation for the new baby, along with ambivalence and uncertainty (Ekström et al., 2013). A previous metasynthesis examining the experiences of expectant fathers found that across the 13 included qualitative studies, all fathers expressed some form of anxiety or worry in response to their partner's pregnancy (Kowlessar et al., 2015). While worry during pregnancy can be understood as a normal part of men's developmental transition to parenthood (Kowlessar et al., 2015), increased worry frequency is associated with anxiety symptoms (Biehle & Mickelson, 2011). In their systematic review, Philpott and colleagues (2019) identified that between 3% to 25% of men experience anxiety during their partner's pregnancy, with anxiety being linked to multiple adverse outcomes for themselves, their infants, and relationships.

Expectant fathers with anxiety are more likely to experience sleeping difficulties during pregnancy (Finnbogadóttir & Persson, 2019); and have an increased risk of experiencing depressive symptoms during the prenatal (Durkin et al., 2001; Finnbogadóttir & Persson, 2019) and postnatal (Howarth & Swain, 2020; Ramchandani et al., 2008) periods, with paternal postnatal depression predicting the later development of psychiatric disorders and social difficulties in their children at 7 years of age (Ramchandani et al., 2008). Paternal prenatal anxiety is also associated with adverse parenting outcomes, including poorer paternal prenatal attachment to the unborn child (Vreeswijk et al., 2014). At three months post-birth, fathers who experienced prenatal anxiety are more likely to exhibit lower responsiveness to their infants (Parfitt et al., 2013) and increased parenting stress, associated with increased infant negative reactivity (Prino et al., 2016). At six months post-birth, these fathers continue to be at risk of

increased parenting stress (Skjothaug et al., 2018) and reduced development of parental self-efficacy (Pinto et al., 2016).

Paternal prenatal anxiety is also associated with adverse maternal outcomes, including maternal prenatal anxiety and depression (Brandão et al., 2019; Canário & Figueiredo, 2017; Koh et al., 2015). Moreover, anxiety in expectant fathers may undermine the crucial support they provide their pregnant partners, in that paternal prenatal anxiety has been associated with paternal gender role stress and symptoms of anger (Durkin et al., 2001), hostility (Göbel et al., 2020), and reduced relationship satisfaction (Brandão et al., 2019; Cameron et al., 2021). With low perceived partner support, pregnant women risk experiencing prenatal (Cheng et al., 2016; Hyer et al., 2022) and postnatal (Parfitt & Ayers, 2014; Pilkington et al., 2015) mental health difficulties and are at increased risk of preterm birth (Ghosh et al., 2010) and having low birth-weight babies (Lee et al., 2018).

Considering the abovementioned adverse outcomes for fathers, their infants, and their pregnant partners, addressing anxiety in expectant fathers is likely to improve the wellbeing of fathers as well as the whole family unit (Fisher et al., 2021). However, fathers often report feeling excluded by health care professionals during pregnancy (Rominov et al., 2018), and the diagnosis and treatment of anxiety in expectant fathers is often overlooked (Koh et al., 2015). Clinical practice guidelines are therefore increasingly placing importance on addressing men's perinatal mental health (Fisher et al., 2021; Highet et al., 2023) and recommend the inclusion of partners of pregnant women in routine mental health screening (Darwin et al., 2021).

The Australian guidelines do not currently recommend any specific screening tools for fathers, given the absence of male-specific measures of anxiety (Highet et al., 2023). The current consensus-based recommendation is for clinicians to select a screening tool in accordance with

which tools are available, and their professional competencies (Highet et al., 2023). Therefore, clinicians may choose to administer the Edinburgh Postnatal Depression Scale (EPDS; Cox et al., 1987), which is readily available in perinatal settings and has been validated for fathers as a measure of distress (Matthey et al., 2001). Otherwise, clinicians may select a generic measure of anxiety, such as the anxiety subscale of the Depression Anxiety Stress Scales (DASS; Lovibond & Lovibond, 1995) or the Generalized Anxiety Disorder scale (GAD-7; Spitzer et al., 2006). While some parents experience generalised anxiety disorders during pregnancy (Blair et al., 2011; Leach et al., 2017) and may benefit from the use of well-established generic measures of anxiety, such as the DASS or GAD-7, research indicates that parents may also be susceptible to pregnancy-related anxiety (Cameron et al., 2021; Huizink et al., 2004), which is distinct from general anxiety or depression (Anderson et al., 2018; Cameron et al., 2021; Huizink et al., 2004).

Pregnancy-related anxiety, also known as pregnancy anxiety or pregnancy-specific anxiety (Dunkel Schetter, & Ponting, 2022), is defined as nervousness and fear experienced by parents, arising from pregnancy-specific concerns or worries across a range of domains, such as the health of the mother and baby, complications in childbirth, and the transition to parenthood (Bayrampour et al., 2016). Measures of pregnancy-related anxiety are distinguishable from generic measures of anxiety or distress, since the nature and content of the items included in pregnancy-related anxiety scales are specifically related to pregnancy. Research indicates that generic measures of anxiety do not adequately identify men (Cameron et al., 2021) or women (Anderson et al., 2018; Huizink et al., 2004) with pregnancy-related anxiety, nor reliably predict the adverse outcomes uniquely associated with pregnancy-related anxiety. In women, measures of pregnancy-related anxiety have uniquely predicted preterm delivery (Lobel et al., 2008), negative emotional reactivity in infants at 6 months of age (Nolvi et al., 2016), and negative

affectivity in children at 2 years of age (Blair et al., 2011). In men, pregnancy-related anxiety was found to be a better predictor of paternal postnatal depression and anxiety, than prenatal general anxiety (Cameron et al., 2021). The abovementioned findings suggest benefits to using pregnancy-specific measures rather than solely relying on generic measures of anxiety, when assessing for anxiety in expectant parents.

Generic measures of anxiety are not suitable to assess pregnancy-related anxiety, given that they do not contain items covering specific concerns or worries experienced by parents in relation to pregnancy. Improved assessment of pregnancy-related anxiety in women has been made possible through the increased availability of psychometrically sound measures, addressing the multiple concerns of pregnancy-related anxiety, including childbirth concerns, baby concerns, and body-image concerns (e.g., Brunton et al., 2021; Huizink et al., 2016). However, unavailability of measures specifically developed for fathers has meant that research with expectant fathers has largely relied on adaptations of maternal scales to measure paternal pregnancy-related anxiety.

Researchers have mostly adapted maternal scales for fathers when investigating pregnancy-related anxiety in couples, by administering the same maternal scale to pregnant women and their partners, without consistently reporting on the item wording or psychometric properties when used with fathers. For example, the Pregnancy-Related Anxiety Measure (PRAM; Rini et al., 1999) has been used with couples conceiving after in vitro fertilization (Stevenson et al., 2019) or expecting their first baby (Saxbe et al., 2018). Only Stevenson et al. (2019) reported on internal consistency reliability with fathers ($\alpha = .84$) and item wording changes to reflect their partner's pregnancy (e.g., "I am confident of having a normal childbirth" was modified to, "I am confident my partner will have a normal childbirth"). In other research

with couples, a 20-item adaptation of the Pregnancy-Related Anxiety Questionnaire (PRAQ; Van den Bergh, 1990) was used by Winter and colleagues (2016), reporting a range of internal consistency reliabilities across the subscales, when used with men ($\alpha = .68$ to $.90$). Winter and colleagues reworded 10 of the items to a male perspective (e.g., “I am afraid that I will not get my shape back after pregnancy” was modified to, “I am afraid that my wife will not get her shape back after pregnancy”). The 10-item revised PRAQ (PRAQ-R; Huizink et al., 2004) was used by Tolvanen et al. (2013) with couples, without reporting on the psychometric properties nor providing descriptions regarding item wording for the scale when adapted for the fathers.

In longitudinal research specifically focused on fathers, a 7-item adaptation of the PRAQ-R (adapted PRAQ-R) was completed by fathers at five timepoints during pregnancy (Skjothaug et al., 2015, 2018; Skjothaug et al., 2020). Internal consistency reliability of the adapted PRAQ-R was greater than $.75$ across all time points (Skjothaug et al., 2020). The three items removed from the original 10-item PRAQ-R related to childbirth pain, change in body perception, and fear of gaining weight. However, some expectant fathers do have concerns about their partner’s changing body shape (Draper, 2003) and many worry about their partner’s pain in childbirth (Sercekus et al., 2020). Therefore, the items removed from the PRAQ-R may have been relevant to fathers if modified and included. More recently, Cameron and colleagues (2021) adapted the PRAM for fathers (adapted PRAM) and examined its psychometric properties. While item wording was mostly amended to reflect fathers’ perspectives, the item, “I am confident of having a normal childbirth,” remained unchanged, unlike the approach of Stevenson et al. (2019). The adapted PRAM displayed a single factor structure, moderately high internal consistency reliability ($\alpha = .87$); and evidence for construct validity, showing stronger correlations with

convergent constructs, such as anxiety ($r = .45$) and depression ($r = .52$), than with divergent constructs, such as sexual satisfaction ($r = -.23$).

The abovementioned researchers who adapted existing maternal measures for fathers were more successful at capturing the construct of paternal pregnancy-related anxiety than if they had relied on generic measures of anxiety to assess for pregnancy-related anxiety (Cameron et al., 2021). However, psychometric evidence for the validity of using maternal scales in fathers is limited. This approach assumes that items originally designed for women are equally effective at capturing the construct of pregnancy-related anxiety in fathers. A recent systematic review of qualitative and quantitative research identified 10 categories of pregnancy-related concerns and worries experienced by expectant fathers, including: childbirth concerns, attitudes towards childbirth, baby concerns, acceptance of pregnancy, partner concerns, relationship concerns, worry about self, transition to parenthood, attitudes towards health care professionals, and practical and financial concerns (Dabb et al., 2023). Adapted maternal pregnancy-related anxiety measures do not include items addressing partner concerns (e.g., concern about providing adequate support to pregnant partner), attitudes towards health care professionals (e.g., feeling unsupported), or financial concerns. All things considered, the absence of established pregnancy-related anxiety measures for expectant fathers means that the current assessment approaches either: (a) do not capture any aspect of pregnancy-related anxiety (e.g., using generic measures of anxiety), or (b) do not adequately and comprehensively address the pregnancy-related concerns specific to fathers (e.g., adapting maternal measures).

As described in Chapter 6, the Paternal Pregnancy-related Anxiety Scale (PPrAS) was developed to address the absence of psychometrically sound measures to comprehensively assess for pregnancy-related anxiety in fathers. The rationale for scale development of the PPrAS was

on the basis of previous research on maternal pregnancy-related anxiety, indicating that pregnancy-related anxiety is distinct from general anxiety (e.g., Brunton et al., 2019; Huizink et al., 2004). Therefore, scale development of the PPrAS was conducted using approaches consistent with previous research developing maternal measures of pregnancy-related anxiety (e.g., Brunton et al., 2021; Dryer et al., 2022). A sound theoretical foundation underpinned the development of the 33-item PPrAS, with items generated on the basis of the 10 categories of men's pregnancy-related concerns, identified by systematic review, a qualitative pilot study, and an expert review panel to evaluate the initial item pool. To ensure strong psychometric properties, scale development was conducted within the framework of the Rasch measurement model, resulting in a scale with high reliability (person separation index = .96). However, initial examination of construct validity yielded unexpected results, warranting further psychometric evaluation. The correlation between the PPrAS and general anxiety ($r = .85, p < .001$), measured using the GAD-7, was greater than the correlation with pregnancy-related anxiety ($r = .74, p < .001$), measured using the adapted PRAM (Cameron et al., 2021).

Therefore, the purpose of the current chapter was to further examine the psychometric properties of the PPrAS within the Classical Test Theory (CTT) framework. In addition to examining the internal consistency reliability (using Cronbach's alpha), construct validity was evaluated by examining the correlation between the PPrAS with additional convergent and divergent measures. Concurrent validity was investigated by assessing the ability of the PPrAS to discriminate between fathers classified as anxious versus non-anxious. Finally, sensitivity and specificity of the PPrAS were examined. It was hypothesised that the PPrAS would show high internal consistency reliability and strong evidence for construct validity, demonstrated through:

(a) stronger correlations with convergent constructs, such as an adapted pregnancy-related

anxiety measure and general anxiety, and (b) weaker correlations with divergent constructs such as depression and neuroticism. It was also hypothesised that the PPrAS would significantly predict whether fathers belonged to groups classified as anxious versus non-anxious, and that the PPrAS would demonstrate high sensitivity and specificity. The current study also determined an optimal range of PPrAS total scores, for identifying a cut-off to indicate that fathers are likely to be experiencing high levels of pregnancy-related anxiety.

Method

Procedure

Institutional ethics approval was first granted. The recruitment strategy used for the research outlined in the present chapter is identical to the recruitment strategy used in Chapter 6. Participation was anonymous and voluntary, with a modest incentive offered to enter a prize draw for one of twenty AUD20.00 gift cards. The study was promoted on Facebook/Meta and Instagram using paid advertising. Participants accessed the survey through a hyperlink in the advertisement and first provided informed consent. Only participants meeting inclusion criteria were able to access the full questionnaire. Upon completion, (and for those not meeting the inclusion criteria) participants were provided with debrief information, which included telephone counselling numbers and support groups, should they have experienced distress or discomfort.

Participants

This study used two samples of expectant fathers. Sample 1 was used to assess internal consistency reliability and examine convergent and divergent validity of the PPrAS. Sample 2 was used to assess how well the PPrAS discriminated between fathers with high or low levels of pregnancy-related anxiety symptoms, and was comprised of two groups of expectant fathers, classified into so-called anxious and non-anxious groups. Sample 2 was also used to determine

the optimal range of cut-off scores for the PPrAS in identifying fathers with high pregnancy-related anxiety.

Inclusion criteria required participants to self-report that they were fluent in English, over the age of 18 years, with partners also over 18 years and pregnant with singleton pregnancies. To comply with ethics requirements and in order to evaluate the psychometric properties of the PPrAS for general community use, exclusion criteria were set to minimise potential influence from participants already predisposed to experiencing high levels of anxiety during pregnancy. Therefore, men with partners who had achieved pregnancy with assisted reproductive technology, such as In Vitro Fertilisation (IVF); or with partners experiencing medical complications in the current or a previous pregnancy were excluded. Additionally, men with a previous experience of miscarriage or stillbirth, or men currently receiving treatment for a mental health condition were excluded.

Sample 1

Online data collection for Sample 1 occurred between 9 February 2023 and 27 May 2023 (Phase 2 data collection for current thesis). Beginning with 920 attempted survey responses, 119 participants were excluded due to not confirming consent after reading the study information sheet or not meeting eligibility criteria. Potentially fraudulent entries (e.g., multiple survey responses from same respondent, straight-lined responses, or responses flagged by Qualtrics as potential bots) were identified and removed ($n = 519$), according to screening guidelines for online survey data (Xu et al., 2022). The final sample included 282 expectant fathers, aged between 18 and 49 years ($M_{\text{age}} = 28.50$, $SD = 4.60$). Four fathers reported a previous history of diagnosis with a mental health condition, and one reported a current chronic health condition (reported as “pancreatitis”). Thirteen fathers reported that their partners were currently diagnosed

with anxiety, depression, or other mental health condition (10 of which were receiving treatment for their mental health). One participant reported that their pregnant partner was currently diagnosed with a chronic medical condition (reported as “Hidradentis Suppurative”).

Sample 2

In order to examine the ability of the PPrAS to discriminate between anxious and non-anxious expectant fathers, Sample 2 was created, to comprise of two distinct groups of fathers, classified according to their self-reported levels of anxiety symptoms. Participants included in Sample 2 were drawn from all expectant fathers who had completed online questionnaires during both data collection phases of the current thesis, namely, Phase 1 (i.e., sample included in Chapter 6; $N = 292$) and Phase 2 (i.e., Sample 1 of Chapter 7, described above; $N = 282$). Considering the potential problems with relying on self-report measures for diagnosis, and the current absence of a diagnostic gold standard for pregnancy-related anxiety in fathers, fathers in the participant pool were classified into so-called anxious and non-anxious groups, according to an approach used previously in similar research (Dryer et al., 2022; Matthey et al., 2013; Nolvi et al., 2016). Fathers scoring in the highest 20% or lowest 20% of scores for both general anxiety (GAD-7) and pregnancy-related anxiety (adapted PRAM) were assigned to the so-called anxious or non-anxious groups, respectively. Middle scorers and those scoring in the highest or lowest 20% on only one measure were excluded from Sample 2. Expectant fathers in the so-called anxious group had adapted PRAM scores (calculated using mean scores) of 2.62 or greater and GAD-7 scores (calculated using total scores) of 11 or greater. Those in the so-called non-anxious group had adapted PRAM scores of 1.88 or lower and GAD-7 scores of 3 or lower.

Sample 2 included 152 expectant fathers, aged between 19 and 47 years ($M_{\text{age}} = 29.26$, $SD = 4.55$), with 75 fathers in the anxious group ($M_{\text{age}} = 28.80$, $SD = 3.75$) and 77 fathers in the

non-anxious group ($M_{\text{age}} = 29.71$, $SD = 5.21$). The two groups did not significantly differ on age. Table 7.1 provides the demographic information for Sample 1 and Sample 2, including details of the anxious and non-anxious groups within Sample 2.

Table 7.1*Demographic Information for Samples 1 and 2*

Demographic information	Sample 1 ^a (<i>n</i> = 282)	Sample 2 ^b		
		Anxious (<i>n</i> = 75)	Non-anxious (<i>n</i> = 77)	Overall (<i>n</i> = 152)
Relationship status				
Married/Defacto	278 (98.6%)	73 (97.3%)	76 (98.7%)	149 (98.0%)
Single	2 (0.7%)	0 (0%)	1 (1.3%)	1 (0.7%)
Divorced/Separated	2 (0.7%)	2 (2.7%)	0 (0%)	2 (1.3%)
Weeks gestation	<i>M</i> = 19.87, <i>SD</i> = 8.39	<i>M</i> = 23.32, <i>SD</i> = 7.72	<i>M</i> = 20.96, <i>SD</i> = 8.75	<i>M</i> = 22.13, <i>SD</i> = 8.31
Birth order				
First baby	207 (73.4%)	47 (62.7%)	61 (79.2%)	108 (71.1%)
Second or more	75 (26.6%)	28 (37.3%)	16 (20.8%)	44 (28.9%)
Country of residence				
Australia	149 (52.8%)	16 (21.3%)	39 (50.6%)	55 (36.2%)
USA	116 (41.1%)	58 (77.3%)	32 (41.6%)	90 (59.2%)
UK, Canada, & New Zealand	17 (6.0%)	1 (1.3%)	6 (7.8%)	7 (4.6%)
Cultural background				
Caucasian	256 (90.8%)	71 (94.7%)	64 (83.1%)	135 (88.8%)
European	6 (2.1%)	2 (2.7%)	4 (5.2%)	6 (3.9%)
Aboriginal/Torres Strait Islander	11 (3.9%)	0 (0%)	4 (5.2%)	4 (2.6%)
Other	9 (3.2%)	2 (2.6%)	5 (6.5%)	7 (4.6%)
Education				
High School	6 (2.1%)	0 (0%)	6 (7.8%)	6 (3.9%)
Trade certificate or diploma	63 (22.3%)	13 (17.3%)	8 (10.4%)	21 (13.8%)
University (undergraduate, i.e., Bachelor)	192 (68.1%)	49 (65.3%)	44 (57.1%)	93 (61.2%)
University (postgraduate, i.e., Masters/PhD)	21 (7.4%)	13 (17.3%)	19 (24.7%)	32 (21.1%)
Employment status				
Full-time employment	229 (81.2%)	56 (74.7%)	70 (90.9%)	126 (82.9%)
Part-time, more than 20 hr per week	40 (14.2%)	3 (4.0%)	2 (2.6%)	5 (3.3%)
Casual or Part-time, below 20 hr per week	7 (2.5%)	1 (1.3%)	1 (1.3%)	2 (1.4%)
Self-employed	6 (2.1%)	15 (20.0%)	3 (3.9%)	18 (11.8%)
Unemployed	0 (0%)	0 (0%)	1 (1.3%)	1 (0.7%)

^a Participants for Sample 1 were all recruited during Phase 2 (*N* = 282) data collection for the current thesis.

^b Participants for Sample 2 were a subset of participants (*N* = 152), who were classified as either anxious or non-anxious; and were drawn from all participants recruited during Phase 1 (*N* = 292) and Phase 2 (*N* = 282) of data collection for the current thesis.

Measures

After initial screening questions confirming eligibility criteria, demographic questions were completed (e.g., age, marital status, education, employment, cultural background, gestation of partner, parity, and medical history for themselves and their partners), followed by the 33-item PPrAS. Six additional measures, detailed below, were then presented in randomised order to address potential order effects.

Paternal Pregnancy-related Anxiety Scale (PPrAS)

As described in Chapter 6, the 33-item PPrAS is a unidimensional measure of pregnancy-related anxiety for use with expectant fathers. In addition to addressing concerns related to pregnancy, childbirth, the health of partner and baby, and the transition to parenthood, the PPrAS items also address specific concerns of expectant fathers, not included in maternal measures. For example, items address financial concerns (e.g., “I worry about being responsible to financially support the family”), supporting the pregnant partner (e.g., “I am concerned about whether I am doing enough to support my partner”), and feeling excluded from antenatal care (e.g., “I do not feel supported by the health care professionals”). Three items addressing symptoms of anxiety are also included (e.g., “My concerns are keeping me awake at night”). Participants rated how they generally felt in the previous 7 days from 1 (*not at all*) to 4 (*very often*). Excellent internal consistency reliability ($\alpha = .96$) was found in Sample 1 of the present study, consistent with the value reported in Chapter 6.

Pregnancy-Related Anxiety Measure, Adapted for Fathers (Adapted PRAM)

The 10-item adapted PRAM (Cameron et al., 2021) was used along with the GAD-7 to classify fathers for Sample 2 into the anxious group and non-anxious group. The adapted PRAM examines the extent to which men worry about pregnancy-related concerns, such as childbirth complications, their partner’s health, and caring for a new baby. Participants rated their level of agreement with statements or how they generally felt over the previous 7 days,

from 1 (*Not at all or Never*) to 4 (*Very much or Almost all of the time*). An example item is, “I am fearful regarding the health of my baby.” Total mean scores (ranging from 1 to 4) provide an overall measure of pregnancy-related anxiety. High scores indicate greater levels of pregnancy-related anxiety. The adapted PRAM has demonstrated moderately high internal consistency ($\alpha = .87$) previously (Cameron et al., 2021) and in the present sample ($\alpha = .84$).

Generalized Anxiety Disorder Scale (GAD-7)

The 7-item GAD-7 (Spitzer et al., 2006) was included along with the adapted PRAM to classify fathers into the anxious group and non-anxious group for Sample 2. The GAD-7 measures symptoms of generalized anxiety disorder, experienced over the previous 2 weeks. An example item is, “feeling nervous, anxious or on edge.” Items were rated from 0 (*not at all*) to 3 (*nearly every day*). Higher total scores indicate higher levels of anxiety symptoms. Moderately high internal consistency has been demonstrated when using the GAD-7 with expectant fathers previously ($\alpha = .82$; Göbel et al., 2019) and in the present sample ($\alpha = .84$).

Pregnancy-Related Anxiety Questionnaire-Revised, Adapted for Men (Adapted PRAQ-R)

The 7-item adapted PRAQ-R (Skjothaug et al., 2015) was included to establish the convergent validity of the PPrAS. The adapted PRAQ-R includes two of the three original PRAQ-R subscales, namely, fears related to childbirth and fears related to the health of the baby. An example item is, “I sometimes think that our child will be in poor health or will be prone to illness.” Items were rated from 0 (*absolutely not relevant*) to 4 (*very relevant*). Higher total scores indicate higher levels of pregnancy-related anxiety. Cronbach’s alpha of .83 has been demonstrated previously (Skjothaug et al., 2015) and in the current sample.

Hospital Anxiety and Depression Scale, Anxiety Subscale (HADS-A)

The 7-item anxiety subscale of the Hospital Anxiety and Depression Scale (HADS-A; Zigmond & Snaith, 1983) was included to establish the convergent validity of the PPrAS. The HADS-A assessed anxiety symptoms experienced over the previous week. An example

item with corresponding rating is, “Worrying thoughts go through my mind,” rated from 0 (*Only occasionally*) to 3 (*A great deal of the time*). Higher total scores indicate greater levels of anxiety. Moderate to high internal consistency ($\alpha = .76$ to $.93$) has been reported by five studies researching various medical conditions (Bjellanda et al., 2002). With expectant fathers, moderate internal consistency ($\alpha = .77$) has been reported using Chinese (Koh et al., 2015) and Portuguese (Brandão et al., 2019) versions of the HADS-A, consistent with the current sample ($\alpha = .70$).

Edinburgh Postnatal Depression Scale (EPDS)

The 10-item EPDS (Cox et al., 1987) was included to establish the divergent validity of the PPrAS. The EPDS is widely used to measure pre- and post-natal depressive symptoms with women and men (Cameron et al., 2021). Depressive symptoms experienced over the previous 7 days were assessed. An example item with corresponding rating is, “I have looked forward with enjoyment to things,” rated from 0 (*As much as I ever did*) to 3 (*Hardly at all*). Higher total scores indicate higher levels of depressive symptoms. Moderately high internal consistency ($\alpha = .85$) was demonstrated previously (Cameron et al., 2021) and in the present sample ($\alpha = .88$).

Neuroticism Subscale of International Personality Item Pool (IPIP-N)

The 10-item neuroticism subscale of the International Personality Item Pool (IPIP-N; Goldberg, 1999) was included to establish the divergent validity of the PPrAS. The IPIP-N assessed neuroticism traits, with items, such as “Am often down in the dumps.” Participants rated their agreement from 1 (*Very inaccurate*) to 5 (*Very accurate*). Higher scores indicate greater neuroticism. Moderately high to excellent internal consistency has been found in research with pregnant women ($\alpha = .82$; Brunton et al., 2020) and non-clinical adult samples ($\alpha = .92$; Morey et al., 2022). Cronbach’s alpha in the present sample was $.83$.

Data Analyses

Data analyses were conducted using IBM SPSS v.29. Missing Values Analysis (MVA) was conducted on the quantitative variables of participant age and gestational weeks along with individual item responses, before calculating total scale scores. Missing values were imputed using Expectation Maximisation (EM), which is less likely than other methods, such as the regression method, to artificially inflate correlations (Schafer & Olsen, 1998). Internal consistency reliability of the PPrAS in Sample 1 was evaluated using Cronbach's alpha, according to the following conventions: less than .59 very low, .60 - .69 low, .70 - .79 moderate, .80 - .89 moderately high, and greater than .90 high or excellent (Davidshofer & Murphy, 2005).

Sample 1 was used to examine construct validity, using Pearson correlation analyses between the PPrAS and convergent and divergent constructs. The assumptions of normality, linearity, and homoscedasticity were first assessed. The convergent constructs were pregnancy-related anxiety (adapted PRAQ-R) and general anxiety (HADS-A). The divergent constructs were depression (EPDS) and neuroticism (IPIP-N). The PPrAS was expected to be more strongly correlated with the convergent measures than the divergent measures. Fisher's r to z transformations for dependent samples were used to compare correlations.

Sample 2 was used to investigate concurrent validity, by examining how well the PPrAS discriminated between fathers in the anxious group versus fathers in the non-anxious group, using binary logistic regression. Sensitivity and specificity of the PPrAS were also calculated. Using Sample 2, sensitivity and specificity were further examined by plotting a Receiver Operating Characteristic (ROC) curve. The accuracy with which the PPrAS discriminated between expectant fathers in the anxious group versus non-anxious group, was determined by evaluating the Area Under the Curve (AUC). Additionally, the optimal range of cut-off scores for the PPrAS in predicting pregnancy-related anxiety in expectant fathers was determined by examining the coordinates of the curve.

All data analyses reported in the present chapter used PPrAS total scores.

Supplementary analyses were also conducted using ordinal to interval scale conversions of the PPrAS on the basis of Rasch analysis, finding similar results (refer to Appendix M and Appendix N for the ordinal-to-interval conversion table and SPSS syntax used to convert the PPrAS total scores). Results of the supplementary analyses are found in Appendix O.

Results

Sample 1: MVA and Correlations Between PPrAS and Demographics

No variable was missing more than 2.1% of data. Little's Missing Completely at Random (MCAR) test indicated that missing data was completely at random ($\chi^2 = 4154.06$, $df = 4177$, $p = .596$). Missing values were imputed using EM before total scale scores were calculated.

Spearman correlation analyses were conducted between the PPrAS and demographic variables, including age, gestation of pregnant partner in weeks, birth order of baby, and country of residence³. The following demographic variables were not included in the correlation analyses because of a lack of variability in the sample: relationship status, education, employment status, and cultural background. The calculated Spearman correlations are found in Table 7.2. Significant weak correlations were found between the PPrAS and country of residence ($r_s = .31$, $p < .001$) and pregnancy gestation ($r_s = .15$, $p < .05$), indicating higher levels of pregnancy-related anxiety found in expectant fathers residing in Australia, and those whose partners were further along their pregnancy.

³ Birth order of baby coded as 1 = first baby, 2 = second or subsequent child. Country of residence coded as 0 = other country, 1 = Australia.

Table 7.2*Sample 1: Spearman Correlations Between PPrAS and Demographic Variables*

Variable	1	2	3	4	5
1. PPrAS	1				
2. Age	-.11	1			
3. Weeks gestation	.15*	.24***	1		
4. Birth order	.07	.46***	.18**	1	
5. Country of residence	.31***	-.19**	-0.01	.14*	1

Note. $N = 282$. PPrAS = Paternal Pregnancy-related Anxiety Scale. For birth order, 1 = first baby, 2 = second or subsequent child. For country of residence, 0 = other country, 1 = Australia.

* $p < .05$, ** $p < .01$, *** $p < .001$, 2-tailed.

Sample 1: Assessment of Construct Validity

Before calculating Pearson correlation values, normal distribution of each variable was confirmed, by examining skewness and kurtosis values and inspecting histograms and Q-Q plots. Inspection of the scatterplots between the PPrAS and each convergent and divergent measure (adapted PRAQ-R, HADS-A, EPDS, and IPIP-N) confirmed homoscedasticity and linear relationships between the variables. Table 7.3 presents the correlation values. The HADS-A demonstrated the strongest correlation with the PPrAS ($r = .82$), and the IPIP-N demonstrated the weakest correlation ($r = .69$).

Table 7.3

Sample 1: Pearson Correlations, Means, and Standard Deviations for PPrAS and Convergent and Divergent Measures

Variable	1	2	3	4	5
1. PPrAS	1				
2. Adapted PRAQ-R	.76***	1			
3. HADS-A	.82***	.66***	1		
4. EPDS	.79***	.65***	.77***	1	
5. IPIP-N	.69***	.50***	.67***	.79***	1
<i>M</i>	72.73	12.33	8.63	13.35	27.44
<i>SD</i>	17.73	4.99	3.23	5.73	6.91

Note. $N = 282$. PPrAS = Paternal Pregnancy-related Anxiety Scale. Adapted PRAQ-R = Pregnancy-Related Anxiety Questionnaire, revised, adapted for fathers. HADS-A = Hospital Anxiety and Depression Scale, anxiety subscale. EPDS = Edinburgh Postnatal Depression Scale. IPIP-N = International Personality Item Pool, neuroticism subscale.

*** $p < .001$, 2-tailed.

The Pearson correlation values for the convergent measures were compared with the divergent measures using Fisher's r to z transformations, so that statistically significant differences in correlations could be identified (see Table 7.4). The PPrAS demonstrated a significantly stronger correlation with both convergent measures (adapted PRAQ-R and HADS-A) than with the divergent measure for neuroticism (IPIP-N), but not for depression (EPDS).

Table 7.4

Sample 1: Comparison of Pearson Correlations with PPrAS using Fisher's r to z

Transformations

Comparison measures			Pearson correlation with PPrAS		z-score for difference in correlation	Probability
Convergent		Divergent	Convergent	Divergent		
adapted PRAQ-R	vs.	EPDS	.76	.79	-1.11	.134
adapted PRAQ-R	vs.	IPIP-N	.76	.69	2.01	.022
HADS-A	vs.	EPDS	.82	.79	1.41	.080
HADS-A	vs.	IPIP-N	.82	.69	4.71	< .001

Note. $N = 282$. PPrAS = Paternal Pregnancy-related Anxiety Scale. Adapted PRAQ-R = Pregnancy-Related Anxiety Questionnaire, Revised, adapted for fathers. HADS-A = Hospital Anxiety and Depression Scale, anxiety subscale. EPDS = Edinburgh Postnatal Depression Scale. IPIP-N = International Personality Item Pool, neuroticism subscale.

Given that PPrAS scores were significantly correlated with both HADS-A and EPDS scores, a follow-up multiple regression analysis was conducted, to examine the amount of variance in PPrAS scores accounted for by HADS-A and EPDS scores. Pregnancy gestation and country of residence (Australia vs other) were included as covariates, to control for their potential effects on outcomes, since they had been found to be correlated with the PPrAS. A two-step hierarchical multiple regression was conducted with total PPrAS scores as the dependent variable. Pregnancy gestation and country of residence were entered in the first step, and HADS-A and EPDS scores were entered in the second step. Assumption testing confirmed that there were no influential univariate or multivariate outliers; no evidence for multicollinearity; and residuals displayed normality, linearity, homoscedasticity, and independence. Table 7.5 presents a summary of the regression statistics. Overall, model 1 and model 2 collectively explained 75% of the variance in PPrAS scores, $F(4, 277) = 208.45$, $p < .001$, $R^2 = .75$. Of this, HADS-A and EPDS contributed 65.0% after controlling for pregnancy gestation and country of residence, $\Delta R^2 = .65$, $\Delta F(2, 277) = 360.94$, $p < .001$. In the final model, HADS-A ($\beta = .49$, $p < .001$) and EPDS ($\beta = .39$, $p < .001$) were both significant

predictors of PPrAS scores, uniquely explaining 9.6% and 6.3% of the variance in PPrAS scores, respectively.

Table 7.5

Sample 1: Hierarchical Multiple Regression Analysis Predicting Pregnancy-Related Anxiety (PPrAS) Total Scores

	<i>B</i>	<i>SE B</i>	95% CI for <i>B</i>	β	<i>p</i> -value	<i>sr</i>	<i>sr</i> ²
Model 1							
Weeks gestation	0.25	0.12	0.01, 0.48	.12	.041	.12	.014
Country of residence ^a	10.55	2.01	6.58, 14.51	.30	< .001	.30	.090
Model 2							
Weeks gestation	0.16	0.06	0.04, 0.29	.08	.011	.08	.006
Country of residence ^a	4.14	1.09	1.99, 6.29	.12	< .001	.11	.012
HADS-A	2.67	0.26	2.16, 3.19	.49	< .001	.31	.096
EPDS	1.22	0.15	0.93, 1.50	.39	< .001	.25	.063

Note. *B* = unstandardised regression weight. *SE B* = standard error of regression weight.

β = standardised regression weight. *sr* = semi-partial correlation. *sr*² = semi-partial correlation squared. HADS-A = Hospital Anxiety and Depression Scale, anxiety subscale. EPDS = Edinburgh Postnatal Depression Scale.

^a For country of residence, 0 = other country, 1 = Australia.

Model 1: $R^2 = .10$, adjusted $R^2 = .09$, $F(2, 279) = 15.63$, $p < .001$.

Model 2: $R^2 = .75$, adjusted $R^2 = .75$, $\Delta F(4, 277) = 360.94$, $p < .001$.

Sample 2: Binary Logistic Regression

Assumption testing confirmed that the minimum expected cell frequencies were met, and linearity of the logit was not problematic for the dataset. Independence of errors was assumed since the data was not nested (Tabachnick et al., 2019). Two outliers were identified after examining the saved values for Cooks distance, leverage, standardised residuals, and DFBeta values. The outliers were retained, since they represented less than 5% of the total sample (Field, 2018) and the overall model was not significantly changed when they were removed. The binary logistic regression was conducted with PPrAS total scores as the predictor and the categorical anxiety groups (anxious vs. non-anxious) as the binary outcome.

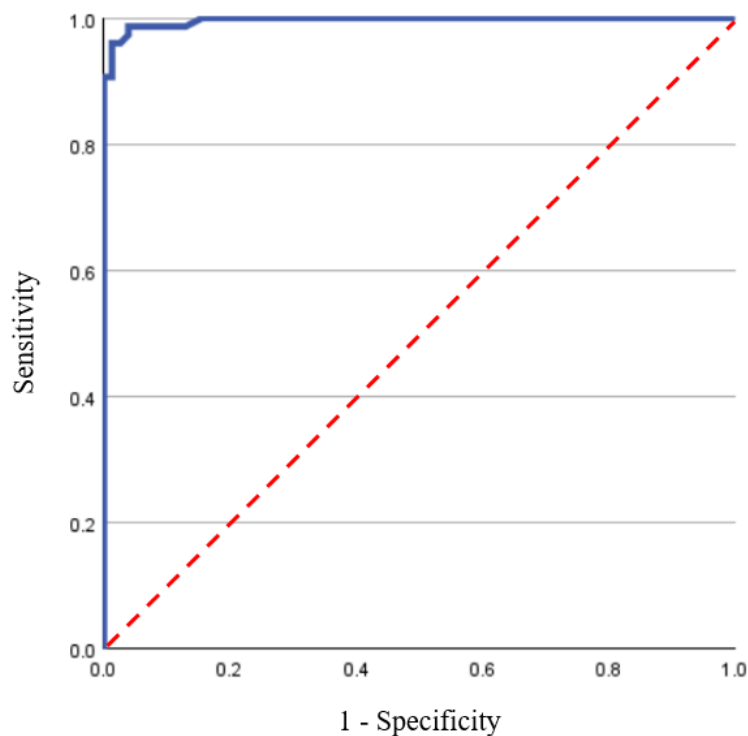
The overall model resulted in a significant chi-square statistic, $\chi^2(1) = 187.55, p < .001$, indicating that PPrAS scores significantly predicted anxiety classification, $B = .29$ ($SE = 0.07$), $Wald = 17.17, OR = 1.33, 95\% CI[1.16, 1.52], p < .001$. The Hosmer and Lemeshow test $\chi^2(8) = .473, p = 1.00$, indicated a good fitting model, with 96.7% accuracy in predicting group membership. The model explained up to 95% of the variance in anxiety symptoms (Cox and Snell $R^2 = .71$ and Nagelkerke $R^2 = .95$), with calculated specificity of 97.4% and sensitivity of 96.0%.

Sample 2: Receiver Operating Characteristic (ROC) Curve

For each PPrAS score, the ROC curve plotted sensitivity values (true positive rate) on the y-axis against values for 1-specificity (false positive rate) on the x-axis (refer to Figure 7.1). The calculated AUC was .996, 95% CI[.991, 1.000], indicating high accuracy in discriminating between expectant fathers in the anxious versus non-anxious groups.

Figure 7.1

Receiver Operating Characteristic (ROC) Curve for PPrAS Scores



Note. For each PPrAS score, the blue ROC curve (bolded line) plots the true positive rate (sensitivity) on the y-axis against the false positive rate (1 minus specificity) on the x-axis to indicate changes in sensitivity and specificity of the PPrAS at different cut-off points. The red (dashed) diagonal reference line is shown for comparison, to represent a measurement scale with equal likelihood of predicting a true positive or false positive at each cut-off point (i.e., no more likely to make accurate predictions than chance).

To identify the optimal cut-off PPrAS score for determining whether an expectant father is likely to be experiencing pregnancy-related anxiety, the coordinates of the ROC curve were examined at each possible cut-off point, to identify a PPrAS score which maximises specificity, while maintaining good sensitivity. Table 7.6 presents the coordinates of the ROC curve, showing the range of PPrAS scores with the corresponding sensitivity and specificity of the PPrAS at each value of cut-off score. For parsimony, only cut-off scores between 48.50 and 91.00 are shown. Based on the values shown, the optimal PPrAS score for detecting pregnancy-related anxiety in expectant fathers was determined to be within the

range of 62 to 67 (see bolded values shown in Table 7.6). Within this range, a PPrAS total score of 64 corresponds to a scale sensitivity of 96.0% and specificity of 97.4%.

Table 7.6

Sample 2: Coordinates of the ROC Curve

PPrAS cut-off scores	Sensitivity (y-axis)	Specificity	1 - Specificity (x-axis)
48.50	1.000	0.636	0.364
49.04	1.000	0.688	0.312
49.54	1.000	0.701	0.299
50.50	1.000	0.753	0.247
51.50	1.000	0.792	0.208
52.50	1.000	0.831	0.169
53.50	1.000	0.844	0.156
54.50	0.987	0.870	0.130
56.00	0.987	0.883	0.117
57.03	0.987	0.896	0.104
57.53	0.987	0.909	0.091
58.50	0.987	0.935	0.065
59.50	0.987	0.948	0.052
60.07	0.987	0.961	0.039
61.57	0.973	0.961	0.039
64.00	0.960	0.974	0.026
67.50	0.960	0.987	0.013
70.50	0.920	0.987	0.013
71.50	0.907	0.987	0.013
72.50	0.907	1.000	0.000
73.50	0.893	1.000	0.000
74.14	0.880	1.000	0.000
76.14	0.867	1.000	0.000
79.00	0.840	1.000	0.000
80.50	0.813	1.000	0.000
81.50	0.787	1.000	0.000
82.50	0.747	1.000	0.000
83.50	0.733	1.000	0.000
84.84	0.720	1.000	0.000
86.10	0.707	1.000	0.000
86.55	0.693	1.000	0.000
87.29	0.680	1.000	0.000
89.00	0.667	1.000	0.000
90.50	0.653	1.000	0.000
91.00	0.640	1.000	0.000

Note: Values shown in bold highlight the range of PPrAS total scores which provide the optimal cut-off score for identifying expectant fathers with pregnancy-related anxiety.

Discussion

The current study examined the psychometric properties of the newly developed PPrAS by evaluating internal consistency reliability using Cronbach's alpha; examining construct validity by correlating the PPrAS with convergent and divergent measures; and assessing concurrent validity through binary logistic regression, which analysed the ability of the PPrAS to discriminate between expectant fathers in the anxious versus non-anxious groups. Further evaluation of the sensitivity and specificity of the PPrAS was achieved by plotting an ROC curve and determining the optimal range of PPrAS cut-off scores score for predicting pregnancy-related anxiety in expectant fathers.

As anticipated, the PPrAS demonstrated excellent internal consistency reliability ($\alpha = .96$), in line with previous evaluations of this scale (see Chapter 6). High internal consistency (greater than .90) is crucial for establishing the usefulness of the PPrAS within clinical contexts (Nunnally, 1975).

The results provided partial support for the hypotheses relating to construct validity. As hypothesised, the PPrAS displayed a significantly stronger correlation with the convergent constructs of pregnancy-related anxiety (adapted PRAQ-R) and general anxiety (HADS-A), than with the divergent construct of neuroticism (IPIP-N). However, no significant difference was found in the size of correlation between the PPrAS and the second divergent construct of depression (EPDS), when compared with the correlations between the PPrAS and the convergent measures (adapted PRAQ-R and HADS-A). These findings are consistent with the research of Cameron and colleagues (2021) with expectant fathers, which demonstrated comparable correlations between pregnancy-related anxiety (using the adapted PRAM) and measures of general anxiety ($r = .45$) and depression ($r = .52$). Moreover, research with pregnant women, conducted by Anderson and colleagues (2018), has demonstrated similar findings, showing comparable correlations between the three PRAQ-R subscales and general

anxiety (.27 to .44) and depression (.34 to .38). However, unlike previous research with women, which has demonstrated through multiple regression analyses that general anxiety and depression did not account for a large proportion of variance in pregnancy-related anxiety levels (Anderson et al., 2018; Huizink et al., 2004); multiple regression analysis in the present study indicated that general anxiety (HADS-A) and depression (EPDS) explained a significant proportion of the variance in PPrAS scores in expectant fathers, uniquely explaining 9.6% and 6.3% of the variance in PPrAS scores, respectively. These results suggest that for expectant fathers, pregnancy-related anxiety may not be so distinct from general anxiety, as previously demonstrated for women.

In the present study, the strong associations between general anxiety and pregnancy-related anxiety suggest that the two constructs are not easy to tease apart. For example, it is possible that some men may already be experiencing higher levels of general anxiety at the outset of their partner's pregnancy, which may then predispose them to increased frequency of pregnancy-related concerns, worries, and fears, in turn leading to increased levels of pregnancy-related anxiety. Conversely, it is possible that other men may not have been experiencing any anxiety symptoms at the outset of pregnancy, and these men may still have subsequently developed pregnancy-related anxiety. Longitudinal research examining the course and emergence of general anxiety and pregnancy-related anxiety at different time points during the pregnancy is warranted, to further understand these relationships.

An implication of the results found in the present study is that despite the present approach of treating paternal pregnancy-related anxiety as distinct from general anxiety, psychometric evaluation suggests that this may not be the case. That is, these findings suggest that pregnancy-related anxiety in expectant fathers may not be as distinct from general anxiety or depression as has been demonstrated in research with expectant mothers (e.g., Anderson et al., 2018; Huizink et al., 2004). However, this does not mean that fathers would

not benefit from a paternal measure of pregnancy-related anxiety, such as the PPrAS.

Previous research has found that fathers are often reluctant to seek help for their emotional wellbeing during pregnancy and are more comfortable seeking help for practical or parenting challenges (Matthey et al., 2009; Rominov et al., 2018). This barrier to help-seeking may occur because many men struggle to discuss their emotional health difficulties (Brownhill et al., 2005; Fletcher et al., 2006). Therefore, by providing specific and tangible concerns for fathers to assess in terms of their level of anxiety, the PPrAS may be more acceptable as a screening tool for fathers, than being asked directly about their emotional health or being presented with a generic measure of anxiety. Future qualitative research is recommended to confirm whether the PPrAS is more acceptable to expectant fathers during routine screening than other approaches.

Using binary logistic regression, the PPrAS was demonstrated to significantly predict whether fathers belonged to groups classified as anxious versus non-anxious, providing preliminary evidence for concurrent validity. Moreover, support for the clinical utility of the PPrAS as a screening tool was found by plotting the ROC curve, resulting in a high AUC value (.996), indicating high accuracy in discriminating between expectant fathers in the anxious versus non-anxious groups (Greiner et al., 2000). The optimal range of PPrAS cut-off scores for detecting pregnancy-related anxiety was determined to be between 62 and 67, with a total score of 64 demonstrating high scale sensitivity (96.0%) and specificity (97.4%).

Limitations and Future Directions

The results of the present study need to be examined in the context of the limitations. Given the cross-sectional research design, the use of binary logistic regression was limited to evaluating concurrent validity of the PPrAS. Longitudinal research would make it possible to evaluate the predictive validity of the PPrAS in expectant fathers, by measuring their levels

of pregnancy-related anxiety during pregnancy and assessing outcome variables in the postpartum period (e.g., anxiety and depression symptomatology).

An additional limitation to consider is that the classification of fathers to the anxious group and non-anxious group for the binary logistic regression and ROC curve relied on self-report measures. While the method of classification used in the present study was consistent with established methods (e.g., Dryer et al., 2022; Matthey et al., 2013; Nolvi et al., 2016), it is recognised that any measurement error associated with the scales used for classification (GAD-7 and adapted PRAM), means that the classification of fathers was not without error. However, the approach used was still the best method available, given that there is currently no gold standard for the diagnosis of pregnancy-related anxiety in expectant fathers.

A further limitation was the use of strict inclusion criteria in the present study. This was done to comply with ethics requirements and to minimise potential influence from participants already predisposed to experiencing high levels of anxiety during pregnancy. It is noteworthy, however, that 9% of expectant fathers who attempted to participate in the present study, were excluded from participation, because their partners had achieved pregnancy through assisted reproductive technology, such as IVF. Considering the increasing success and uptake of IVF, excluding these parents may not only be unwarranted, but may limit generalisability; especially given recent findings from a pilot study, which showed that levels of stress, anxiety, and pregnancy-related anxiety in couples were not different depending on whether they had conceived spontaneously or through IVF (Stevenson et al., 2019). Therefore, future research examining the PPrAS using broader inclusion criteria is warranted. There is also a need for future research to explore factors which may influence pregnancy-related anxiety in expectant fathers. Therefore, including fathers expecting multiple births or with a history of perinatal loss, would provide valuable information regarding risk factors for pregnancy-related anxiety.

Given that the present research was conducted through online questionnaires, it is recommended that future research evaluates the clinical utility of the PPrAS within contexts which more closely resemble the anticipated clinical application. For example, evaluation of the PPrAS with samples of expectant fathers recruited through antenatal clinics or birthing classes would help to further establish the clinical utility of the present research findings. Moreover, it is recommended that future longitudinal research be conducted to examine whether using the PPrAS leads to better outcomes, not only for fathers, but also among mothers and children.

In addition, the usefulness of the PPrAS as a measurement tool depends on the extent that it is utilised in clinical settings. Therefore, future research evaluating how best to integrate the PPrAS into routine antenatal care and provide support to fathers, is warranted. Given the limited time available for clinical consultations, one factor which may limit application of the current 33-item PPrAS, is its length. Future research aimed at further refinement and reduction of the scale to develop a screener would address this limitation.

Generalisability

Evidence for the sound psychometric properties of the PPrAS was found in the current study with expectant fathers who completed anonymous online questionnaires. While the measurement properties of internet self-report questionnaires are equivalent to paper-and-pencil questionnaires (Weigold et al., 2013), research indicates that participants recruited through paid Facebook advertising are more likely to be university educated and less likely to represent diverse cultures or live in disadvantaged neighborhoods than population-based samples (Bennetts et al., 2019). This is consistent with the demographic characteristics of the present research, which included a high proportion of Caucasian fathers with high levels of education. Future research using face-to-face recruitment approaches may improve the demographic variability in future samples, to better approximate the general population.

Generalisability was also limited by the present study's focus on partners who are cisgender men in heterosexual relationships. Parenthood includes many types of biological and nonbiological parents, who may be gender diverse or non-heterosexual. However, the validity of the PPrAS for all partners cannot be assumed. Future research will need to extend on the present study to ensure that support is improved for all co-parents, irrespective of gender or sexuality.

Implications for Research and Clinical Practice

To the best of our knowledge, the PPrAS is the first measure of pregnancy-related anxiety, to be specifically developed for fathers and evaluated using both Rasch and CTT methodologies. The present study found evidence for the sound psychometric properties of the PPrAS, including excellent internal consistency reliability and evidence for construct and concurrent validity. The availability of the PPrAS makes it possible for researchers to further explore pregnancy-related anxiety in expectant fathers, without the need to rely on generic measures of anxiety nor adapted maternal scales. Considering the importance of paternal wellbeing for the entire family unit and the increasing research interest in the area of partners' perinatal mental health, the PPrAS provides researchers with a valuable tool for further exploring the construct of pregnancy-related anxiety in expectant fathers.

The findings also indicate that the PPrAS is useful in clinical contexts, for identifying expectant fathers with high levels of pregnancy-related anxiety. Moreover, since the PPrAS is a comprehensive measure of pregnancy-related anxiety which includes items not addressed by generic measures of anxiety, nor by existing maternal scales adapted for fathers, the PPrAS provides clinicians with nuanced information about fathers' experiences of anxiety relating to their partner's pregnancy. This is particularly important, considering that fathers are typically more comfortable seeking support for practical or parenting challenges, rather than raising any concerns about their own mental health during pregnancy (Rominov et al.,

2018). Therefore, using the PPrAS, rather than a generic measure of anxiety with expectant fathers is advantageous when screening for anxiety during pregnancy because the majority of items pertain to aspects of pregnancy and the transition to parenthood, creating a space for fathers to explore their concerns without fear of stigma.

In conclusion, the PPrAS addresses a current need in research and clinical practice, by making available a psychometrically sound measure of pregnancy-related anxiety, specifically developed for expectant fathers. The PPrAS provides researchers an opportunity to extend on the current understanding of pregnancy-related anxiety in parents. Moreover, the PPrAS is a valuable tool available to clinicians seeking to improve the support provided to fathers during their partner's pregnancy.

Chapter 8: Discussion and Conclusion

The aim of this thesis was to develop and evaluate a new scale to assess pregnancy-related anxiety in expectant fathers, the Paternal Pregnancy-related Anxiety Scale (PPrAS). As outlined in Chapter 2, a wide variety of measures have been used to date, in research examining anxiety and related constructs in expectant couples and fathers. Despite the existence of pregnancy-specific measures to assess constructs which overlap with pregnancy-related anxiety, no suitable English-language measure was identified, which was specifically developed to assess pregnancy-related anxiety in fathers. Therefore, the present research aimed to address this gap in the literature, so that the measurement of pregnancy-related anxiety in expectant fathers would be improved with the availability of a new psychometrically sound measure.

Outline of Scale Development

Rather than adapting an existing maternal measure of pregnancy-related anxiety, the present research aimed to develop the new scale based on a thorough understanding of the unique pregnancy-related concerns of expectant fathers, gained through a systematic review. As reported in Chapter 3, the following 10 categories of paternal pregnancy-related concerns, worries, and fears were identified in the systematic review: childbirth concerns, attitudes towards childbirth, baby concerns, acceptance of pregnancy, partner concerns, relationship concerns, worry about self, transition to parenthood, attitudes towards medical staff, and practical and financial concerns.

Potential items for the new PPrAS were generated on the basis of 75 unique concerns, identified across the 10 categories of paternal pregnancy-related concerns, worries, and fears identified in the systematic review. After ERP evaluation, as described in Chapter 4, the initial item pool of potential items was revised and reduced from 113 items to 95 items.

Following this, online questionnaires including the 95 items were completed by two groups of 146 expectant fathers each, living in Australia or the USA. The statistical methods detailed in Chapter 5 were then used to analyse the data collected through the online questionnaires, using the Rasch measurement model as the framework for scale development. As reported in Chapter 6, the final scale included 33 items, drawn from the 10 categories of concern identified from the systematic review. As a consequence of using the Rasch measurement model for scale development, the final 33-item scale displayed the following three attributes, which are considered to be fundamental characteristics of good measurement instruments. First, all items in the final scale performed equivalently for expectant fathers regardless of differences in the following personal factors: country of residence (Australia vs. USA), parity (first baby vs. second/subsequent baby), partner's pregnancy trimester (first, second or third), and fathers' ages (within ranges: 20-26 years, 27-29 years, or 30-47 years). Second, the final scale was confirmed to be unidimensional, so that the sum of all items would be considered a valid measure of a single latent variable. Finally, Rasch analysis made it possible to transform PPrAS total scores from ordinal to interval level scores, to improve measurement precision in future research.

Further psychometric evaluation of the 33-item PPrAS was conducted using CTT approaches, reported in Chapter 7. Internal consistency reliability was found to be excellent ($\alpha = .96$). Some evidence of construct validity was found, with the PPrAS demonstrating significantly stronger correlations with the two convergent measures of pregnancy-related anxiety (adapted PRAQ-R) and general anxiety (HADS-A) than with the divergent measure of neuroticism (IPIP-N). However, the correlations between the PPrAS and the two convergent measures (adapted PRAQ-R and HADS-A) were not significantly different to its correlation with the divergent measure of depression (EPDS). These findings suggest that the construct of pregnancy-related anxiety may not be as distinct from general anxiety or

depression for expectant fathers as has been found previously in research with expectant mothers.

Psychometric evaluation of the PPrAS also involved examining concurrent validity, by assessing the ability of the PPrAS to discriminate between fathers classified into the anxious group versus non-anxious group, using logistic regression. The PPrAS was found to be a significant predictor of group membership and displayed high sensitivity (96.0%) and specificity (97.4%) for identifying whether fathers were classified as anxious or non-anxious. Additionally, the ROC curve demonstrated a high area under the curve ($AUC = .996$), also indicating high accuracy in discriminating between expectant fathers in the anxious group versus non-anxious group. The optimal cut-off score for identifying expectant fathers likely to be experiencing high levels of pregnancy-related anxiety was identified to fall within the range of 62 to 67 (PPrAS total score of 64 demonstrates scale sensitivity = 96.0% and scale specificity = 97.4%).

Limitations and Future Directions

Several limitations in the research conducted to develop the PPrAS should be noted. Considering that the research was all completed using cross-sectional research design, the predictive validity of the PPrAS was not fully explored. Future research using longitudinal research design is warranted, to examine whether men's levels of pregnancy-related anxiety, assessed during pregnancy are linked to adverse outcomes, such as anxiety or depression, after the birth. Moreover, it is recommended that research be conducted to examine whether using the PPrAS leads to better outcomes, not only for fathers, but also among mothers and children. A better understanding of the links between pregnancy-related anxiety and post-birth outcomes may provide more evidence for the clinical importance of assessing fathers for pregnancy-related anxiety during the prenatal period. Longitudinal research conducted at

multiple time-points during pregnancy would also be valuable for examining the course of pregnancy-related anxiety in fathers throughout the stages of pregnancy.

This research was conducted with fathers living primarily in Australia and the USA. Therefore, generalisability to fathers from other cultures or less economically developed countries may be limited. Future research should further examine the cross-cultural validity of the PPrAS, extending the present findings to other countries.

Additionally, the fathers included in this research displayed little diversity in their demographic characteristics, being predominantly from Caucasian ethnic backgrounds, with university education. Therefore, the samples included in the present research did not adequately represent the cultural and economic diversity found within the general population of the countries in which they were residing in (e.g., Australia or the USA). The lack of diversity in the samples may in part have been due to the method of recruitment, using Facebook advertising and online questionnaires (Bennetts et al., 2019). It is recommended that future research should endeavor to include a more diverse cross-section of fathers.

Moreover, future research within contexts which more closely resemble the anticipated clinical application of the PPrAS is warranted. For example, evaluation of the psychometric properties of the PPrAS with expectant fathers recruited through antenatal clinics or birthing classes would help to further establish the clinical utility and generalisability of the research findings.

The strict inclusion criteria used in the present research was an additional limitation. The criteria were set to comply with requirements of the ethics review panel and to minimise potential influence from participants already predisposed to experiencing high levels of anxiety during pregnancy. However, future studies examining the PPrAS using broader inclusion criteria, would allow researchers to explore factors which may influence pregnancy-related anxiety in expectant fathers. Therefore, future research including fathers expecting a

baby after IVF, or with a multiple pregnancy, or with a history of perinatal loss, would provide valuable information regarding risk factors for pregnancy-related anxiety.

Generalisability was also limited by the focus on cisgender men in heterosexual relationships. Therefore, the PPrAS currently only captures the experiences of partners who are expectant cisgender fathers in relationships with pregnant women and the validity of the PPrAS for gender diverse or non-heterosexual co-parents cannot be assumed. Parenthood includes many types of biological and nonbiological parents, who may be gender diverse or non-heterosexual. While the PPrAS may capture some of the fears and worries of LGBTQI+ individuals, it is unlikely to capture the full range of their pregnancy-related fears and worries. Therefore, future research is needed to explore whether this scale captures all domains of their concerns, worries, and fears, and whether it is psychometrically sound with this population. Additionally, Rasch analysis can allow further examination of differential item functioning on the basis of personal factors pertaining to gender or sexual identity. This would help to establish the utility of the PPrAS for all co-parents. Improving support provided to gender diverse and non-heterosexual co-parents is especially important, given that they face distinct challenges interacting with heteronormative systems and they often experience a lack of social recognition for their role during the antenatal period (Wojnar & Katzenmeyer, 2014).

An additional limitation to consider is the method of classification used in Chapter 7 to allocate fathers to the anxious group and non-anxious group for the binary logistic regression and ROC curve. Classification relied on self-report measures with inherent measurement error. Therefore, the classification of fathers was not without error. However, the method of classification used in the present research was consistent with established methods (e.g., Dryer et al., 2022; Matthey et al., 2013; Nolvi et al., 2016) and is still the best

method available, given that there is currently no gold standard for the diagnosis of pregnancy-related anxiety in expectant fathers.

Another limitation relates to the length of the scale, which currently includes 33 items. The time required to complete the scale may reduce its usefulness in clinical practice, given the limited time available for clinical consultations. Future research aimed at further refinement and reduction of the scale to develop a screener would address this limitation, potentially improving uptake of this measure within routine antenatal care.

Additionally, the availability of a new measure of pregnancy-related anxiety for expectant fathers is only helpful to the extent that it is utilised within clinical settings. It is recognized that there is still much work remaining to improve perinatal mental health services provided to partners (Fletcher et al., 2015). The Australian COPE guidelines (Highet et al., 2023) highlight that there are significant individual and social impacts resulting from paternal perinatal depression and anxiety and recommend routine screening of fathers. However, outstanding issues related to the screening of mental health concerns in fathers remain. Important considerations include when and where screening should take place, which clinicians should be involved, and how support should be provided for fathers identified as having difficulties (Highet et al., 2023). With regards to the PPrAS, research is needed to examine the level of acceptability amongst clinicians for including this measure in their delivery of antenatal care, and whether the use of this measure results in better outcomes for fathers with elevated anxiety during the perinatal period. Future evaluation also needs to be undertaken, regarding routine assessment of fathers in the context of antenatal care, and how to improve their involvement.

Implications for Clinical Practice and Research

To the best of our knowledge, the PPrAS is the first English-language measure of pregnancy-related anxiety, specifically developed for fathers and evaluated using both Rasch

and CTT methodologies. The present research indicates that the PPrAS would be useful in clinical contexts, for identifying expectant fathers with high levels of pregnancy-related anxiety. Moreover, since the PPrAS is a comprehensive measure of pregnancy-related anxiety, including items not addressed by generic measures of anxiety, nor by existing maternal scales adapted for fathers, the PPrAS can provide nuanced information about the pregnancy-specific concerns, worries, or fears being experienced by expectant fathers.

Although the research findings suggest that pregnancy-related anxiety may not be as distinct from general anxiety or depression for expectant fathers, as in the case of women, it is anticipated that men would still benefit from a paternal measure of pregnancy-related anxiety, such as the PPrAS. Previous research has found that fathers are often reluctant to seek help for their emotional wellbeing during pregnancy and are more comfortable seeking help for practical or parenting challenges (Matthey et al., 2009; Rominov et al., 2018). This barrier to help-seeking may occur because many men struggle to discuss their emotional health difficulties (Brownhill et al., 2005; Fletcher et al., 2006). Therefore, by providing specific and tangible concerns for fathers to assess in terms of their level of anxiety, the PPrAS may be more acceptable as a screening tool for fathers, than being asked directly about their emotional health or being presented with a generic measure of anxiety. Therefore, the PPrAS presents a useful opportunity for clinicians to explore anxiety in fathers during their partner's pregnancy. Future qualitative research is recommended to confirm whether the PPrAS is more acceptable to expectant fathers during routine screening than other approaches.

Beyond clinical practice, the newly developed PPrAS also has implications for research within the field of men's perinatal mental health. The Rasch methodologies used in the present research provide future researchers with the ability to convert PPrAS total scores to interval-level values, so that analysis of PPrAS scores can be made more precise. Provided

that the transformed interval-level data is normally distributed, researchers may confidently use parametric statistics, knowing that fundamental test assumptions are not being violated by using ordinal data in arithmetic operations.

Moreover, researchers examining pregnancy-related anxiety in expectant fathers no longer need to rely on existing methods of assessment, which were not specifically developed for paternal pregnancy-related anxiety, such as: (a) generic measures of anxiety; (b) generic measures of psychological distress/stress; (c) antenatal psychosocial assessment tools; (d) fear of childbirth measures; (e) measures of pregnancy concerns, worries, or fears; (f) measures of pregnancy stress/distress; and (g) maternal measures of pregnancy-related anxiety. While many of these existing approaches assess constructs showing considerable overlap with the construct of paternal pregnancy-related anxiety, there exists limited evidence that these approaches are psychometrically sound. Therefore, the availability of the PPrAS provides researchers with greater confidence to continue extending the current understanding of pregnancy-related anxiety in expectant fathers.

Conclusion

This thesis reported on the development and psychometric evaluation of the Paternal Pregnancy-related Anxiety Scale (PPrAS) for expectant fathers. The newly developed PPrAS was developed as a comprehensive, 33-item measure of pregnancy-related anxiety, which addresses a broad range of fathers' concerns, worries, and fears related to their partner's pregnancy. The wellbeing of fathers during the prenatal period is receiving increased attention in clinical practice and research, with growing evidence for the interrelationship between the mental health of fathers and outcomes for themselves and the entire family unit. Therefore, the PPrAS addresses a current need in clinical and research settings, by making available a psychometrically sound measure of pregnancy-related anxiety, specifically developed for expectant fathers.

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Research Portfolio Appendix

Ethics Approval Letter

[2020-185E] - Ethics application approved!

Evshen Okan <Evshen.Okan@acu.edu.au>
on behalf of Res Ethics <Res.Ethics@acu.edu.au>

To: Rachel Dryer <Rachel.Dryer@acu.edu.au>; Carol Dabb
Cc: Res Ethics <Res.Ethics@acu.edu.au>

Wed 25/11/2020 10:18 AM

Dear Applicant,

Chief Investigator: Dr Rachel Dryer
Student Researcher: Ms Carol Dabb
Ethics Register Number: 2020-185E
Project Title:
Development and Psychometric Evaluation of the Paternal Pregnancy-Related Anxiety Scale
Date Approved: 25/11/2020
End Date: 30/11/2021

This is to certify that the above human ethics [application](#) has been reviewed by the Australian Catholic University Human Research Ethics Committee (ACU HREC). The application has been approved for the period given above, subject to:

- **The inclusion of information in the debrief letter that will be displayed to participants who do not meet the inclusion criteria.**

Continued approval of this research project is contingent upon the submission of an annual progress report which is due on/before each anniversary of the project approval. A final report is due upon completion of the project. A report proforma can be downloaded from the ACU Research Ethics website.

Researchers are responsible for ensuring that all conditions of approval are adhered to and that any modifications to the protocol, including changes to personnel, are approved prior to implementation. In addition, the ACU HREC must be notified of any reportable matters including, but not limited to, incidents, complaints and unexpected issues.

Researchers are also responsible for ensuring that they adhere to the requirements of the National Statement on Ethical Conduct in Human Research, the Australian Code for the Responsible Conduct of Research and the University's Research Code of Conduct.

Any queries relating to this application should be directed to the Ethics Secretariat (res.ethics@acu.edu.au). Please quote your ethics approval number in all communications with us.

We wish you every success with your research.

Kind regards,

Evshen Okan
on behalf of ACU HREC Chair, Assoc Prof. Michael Baker

Research Ethics and Compliance Officer | Research Services | Office of the Deputy Vice-
Chancellor (Research)
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Tue 20-June-2023 11:35 PM

To: carol.clinical@outlook.com <carol.clinical@outlook.com>

Dear Carol Dabb

We hereby grant you permission to reprint the material below at no charge in your thesis subject to the following conditions:

RE: Paternal pregnancy-related anxiety: Systematic review of men's concerns and experiences during their partners' pregnancies, Journal of Affective Disorders, Volume 323, 2023, Pages 640-658, Dabb et al.

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Author Contributions

Chapter 3: Published Manuscript

Dabb, C., Dryer, R., Brunton, R. J., Yap, K., & Roach, V. J. (2023). Paternal pregnancy-related anxiety: Systematic review of men's concerns and experiences during their partners' pregnancies. *Journal of Affective Disorders*, 323, 640-658.

<https://doi.org/10.1016/j.jad.2022.11.092>

Statement of Contribution

Carol Dabb was involved in the conceptualisation of this study and submission to the PROSPERO registry. Carol conducted the literature searches, screening, data extraction, and synthesis of the data. Carol was also responsible for the preparation of the manuscript.

Rachel Dryer and Robyn Brunton were involved in the conceptualisation of this study, they provided supervision and guidance for each stage of the research, and they provided critical review of the manuscript. Keong Yap, and Vijay Roach were involved in the conceptualisation of this study and provided critical review of the manuscript.

I acknowledge that my contribution to the above paper is 70 percent
Carol Dabb

I acknowledge that my contribution to the above paper is 10 percent
Rachel Dryer

I acknowledge that my contribution to the above paper is 10 percent
Robyn J. Brunton

I acknowledge that my contribution to the above paper is 5 percent
Keong Yap

I acknowledge that my contribution to the above paper is 5 percent
Vijay J. Roach

Chapter 6: Manuscript in Preparation

Dabb, C., Dryer, R., Brunton, R. J., Krägeloh, C., Moussa, M., Yap, K., Roach, V. J., & Medvedev, O. (2023). *Initial development and Rasch analysis of the paternal pregnancy-related anxiety scale using Australian and USA samples* [Manuscript in preparation]. Australian Catholic University.

Statement of Contribution

Carol Dabb was involved in the conceptualisation of this study and the ethics application. Carol contributed to the generation of the initial item pool and was responsible for all aspects of the Expert Review Panel, including member recruitment, data collection, and data analysis. Carol was responsible for the recruitment of expectant fathers for the third stage of scale development and contributed to the data analyses and refinement of the item pool. Carol was also responsible for the preparation of the manuscript.

Rachel Dryer and Robyn Brunton were involved in the conceptualisation of this study and they contributed to the generation of the initial item pool and the data analyses and refinement of the item pool. They also provided supervision and guidance throughout each stage of the research and provided critical review of the manuscript.

Chris Krägeloh and Oleg Medvedev conducted the Rasch analysis used in stage three of scale development. They were involved with refinement of the item pool and provided critical review of the manuscript.

Michele Moussa contributed to the conceptualisation of this study. Keong Yap, and Vijay Roach provided supervision and critical review of the manuscript. They also contributed to member recruitment for the Expert Review Panel.

I acknowledge that my contribution to the above paper is 60 percent
Carol Dabb

I acknowledge that my contribution to the above paper is 12 percent
Rachel Dryer

I acknowledge that my contribution to the above paper is 10 percent
Robyn J. Brunton

I acknowledge that my contribution to the above paper is 5 percent
Chris Krägeloh

I acknowledge that my contribution to the above paper is 4 percent
Michele Moussa

Verbally confirmed with R.Dryer

I acknowledge that my contribution to the above paper is 2 percent
Keong Yap

I acknowledge that my contribution to the above paper is 2 percent
Vijay J. Roach

I acknowledge that my contribution to the above paper is 5 percent
Oleg Medvedev

Chapter 7: Manuscript in Preparation

Dabb, C., Dryer, R., Brunton, R. J., Yap, K., & Roach, V. J. (2023). *Psychometric Evaluation of the Paternal Pregnancy-related Anxiety Scale (PPrAS)* [Manuscript in preparation]. Australian Catholic University.

Statement of Contribution

Carol Dabb was involved in the conceptualisation of this study. She was responsible for the ethics application, data collection and analyses, and preparation of the manuscript. Rachel Dryer and Robyn Brunton guided the conceptualisation of this study, they provided supervision and direction for each stage of the research, they were involved in data analysis, and they provided critical review of the manuscript. Keong Yap, and Vijay Roach were involved in the conceptualisation of this study and provided critical review of the manuscript.

I acknowledge that my contribution to the above paper is 60 percent
Carol Dabb

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Rachel Dryer

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Robyn J. Brunton

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Keong Yap

I acknowledge that my contribution to the above paper is 5 percent
Vijay J. Roach

Appendices

Appendix A: AXIS Quality Appraisal Ratings of Quantitative Studies Listed Alphabetically

Author(s) (year)	AXIS Tool item number																				Total	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20		
Biehle & Mickelson (2011)	R1	1	1	0	1	1	0.5	0.5	1	1	1	1	1	0.5	0.5	1	1	1	1	1	1	17
	R2	1	1	0.5	1	1	1	0.5	1	1	1	1	1	0.5	1	1	1	1	1	1	1	18.5
Chalmers & Meyer (1996)	R1	1	1	1	1	1	1	0	1	0	0.5	0.5	0.5	0.5	0.5	0.5	1	1	0	1	1	14
	R2	1	0.5	1	1	1	1	0.5	0.5	0	0	0.5	0	0	0.5	0.5	1	0.5	0	1	1	11.5
Chandler (1998)	R1	1	0.5	0	1	1	1	1	1	1	1	1	1	1	0.5	1	1	1	1	1	1	18
	R2	1	0.5	0.5	1	1	1	1	1	1	1	1	1	1	0.5	1	1	1	1	1	1	18.5
Forsyth et al. (2011)	R1	1	1	0	1	1	0.5	1	1	0	1	1	1	1	0.5	1	1	1	1	1	1	17
	R2	1	1	0	1	1	0.5	0.5	1	1	1	1	1	1	1	1	1	1	1	1	1	18
Glazer (1989)	R1	1	1	0	1	1	0.5	0.5	1	0.5	1	1	1	1	0.5	1	1	1	1	1	1	17
	R2	1	1	0.5	1	1	0.5	1	1	1	1	1	1	1	1	1	1	1	1	1	1	19
Gobel et al. (2020)	R1	1	1	0	1	0.5	0.5	0	1	1	1	1	1	1	0.5	1	1	1	1	1	1	16.5
	R2	1	1	0	1	0.5	0.5	0.5	1	1	1	1	1	1	0.5	1	1	1	1	1	1	17

Author(s) (year)		AXIS Tool item number																				Total
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	
Kannenberget al. (2016)	R1	1	1	0	1	0	0	0	1	1	1	0.5	0	1	0.5	0.5	0.5	1	0	1	1	12
	R2	1	1	0.5	0	1	1	1	0.5	1	1	0.5	0	0	1	0.5	1	1	0	1	1	14
Karstens (1989)	R1	1	1	0	1	1	1	0	0.5	0	1	1	1	1	0	0.5	1	1	1	1	0.5	14.5
	R2	1	0.5	0	1	1	1	0	0.5	0	1	1	1	0.5	0.5	0.5	1	1	1	1	0.5	14
Medalia (1981)	R1	1	1	0.5	1	0.5	0	0.5	0.5	0	1	1	1	1	0.5	1	1	1	1	1	0.5	15
	R2	1	1	1	1	1	1	0.5	1	1	1	1	1	0	1	0.5	1	1	1	1	1	18
Szeverényi et al. (1998)	R1	1	1	0	1	1	1	1	0.5	0.5	1	0.5	0.5	1	1	0.5	1	1	0	1	1	15.5
	R2	1	0.5	0	1	1	1	0.5	0.5	1	0.5	1	0.5	0.5	0	0.5	1	1	0.5	1	0	13
Wapner (1976)	R1	0.5	0.5	0	1	1	1	0.5	0.5	0	1	0.5	0.5	1	0.5	0.5	1	1	0	1	0.5	12.5
	R2	1	0.5	0	1	1	0.5	0.5	0.5	0	0.5	0.5	0	1	0	0.5	0.5	1	0	1	0	10
Weiss (1983)	R1	1	1	0	1	0.5	0.5	0.5	1	1	1	1	1	1	0.5	0.5	1	1	0.5	1	1	16
	R2	1	1	0	1	1	0.5	0.5	0.5	1	1	1	1	1	0.5	0.5	1	1	0.5	1	1	16

Author(s) (year)		AXIS Tool item number																				Total
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	
White (1998)	R1	1	1	0	1	0.5	0.5	0	0.5	0	0.5	1	1	1	0.5	0.5	1	1	1	1	0.5	13.5
	R2	1	1	0	0	1	0	0	0.5	0.5	0.5	0.5	0.5	0.5	0	0.5	1	1	1	1	0	10.5
Wikman et al. (1993)	R1	0.5	0.5	0	1	1	1	1	1	1	1	1	0.5	1	1	1	1	1	0	1	1	16.5
	R2	1	1	0	1	1	1	1	1	1	1	1	1	0.5	1	1	1	1	0	1	1	17.5

Note. AXIS = Axis Appraisal Tool for Cross-Sectional Studies. AXIS items: 1 (Were the aims/objectives of the study clear?), 2 (Was the study design appropriate for the stated aim(s)?), 3 (Was the sample size justified?), 4 (Was the target/reference population clearly defined?), 5 (Was the sample frame taken from an appropriate population base so that it closely represented the target/reference population under investigation?), 6 (Was the selection process likely to select subjects/participants that were representative of the target/reference population under investigation?), 7 (Were measures undertaken to address and categorise non-responders?), 8 (Were the risk factor and outcome variables measured appropriate to the aims of the study?), 9 (Were the risk factor and outcome variables measured correctly using instruments/measurements that had been trialled, piloted or published previously?), 10 (Is it clear what was used to determine statistical significance and/or precision estimates?), 11 (Were the methods (including statistical methods) sufficiently described to enable them to be repeated?), 12 (Were the basic data adequately described?), 13 (Does the response rate raise concerns about non-response bias?), 14 (If appropriate, was information about non-responders described?), 15 (Were the results internally consistent?), 16 (Were the results for the analyses described in the methods, presented?), 17 (Were the authors' discussions and conclusions justified by the results?), 18 (Were the limitations of the study discussed?), 19 (Were there any funding sources or conflicts of interest that may affect the authors' interpretation of the results?), and 20 (Was ethical approval or consent of participants attained?)

R1 = Reviewer 1, R2 = Reviewer 2. **Ratings in bold font indicate lack of agreement in reviewer ratings.**

Appendix B: CASP Quality Appraisal Ratings of Qualitative Studies Listed Alphabetically

Author(s) (year)		CASP Item number										Total
		1	2	3	4	5	6	7	8	9	10	
Aponte (1991)	R1	1	1	1	1	0.5	1	1	1	0.5	0	8
	R2	1	1	1	1	1	1	1	1	0.5	0	8.5
Åsenhed et al. (2013)	R1	1	1	1	1	1	1	1	0.5	1	0.5	9
	R2	1	1	1	1	1	1	1	1	1	0.5	9.5
Bäckström et al. (2017)	R1	1	1	1	1	1	0.5	1	1	1	1	9.5
	R2	1	1	1	1	1	1	1	1	1	1	10
Baldwin et al. (2019)	R1	1	1	1	1	1	1	1	1	1	1	10
	R2	1	1	1	1	1	1	1	0.5	1	1	9.5
Barclay et al. (1996)	R1	1	1	0.5	1	1	1	1	1	1	1	9.5
	R2	1	1	0.5	1	1	1	1	0.5	1	1	9
Brennan et al. (2007)	R1	1	1	1	1	1	0.5	1	1	1	0.5	9
	R2	1	1	1	1	1	0.5	1	1	1	0.5	9
de Brito et al. (2013)	R1	1	1	0.5	0.5	0	0	1	0.5	0.5	0	5
	R2	1	1	0.5	0.5	0	0.5	1	0.5	1	0	6
Deave & Johnson (2008)	R1	1	1	0.5	1	0.5	0	1	1	1	1	8
	R2	1	1	0.5	1	0.5	0.5	1	1	1	1	8.5
des Robert et al. (2020)	R1	1	1	0.5	0.5	0.5	0	1	0.5	0.5	0.5	6
	R2	1	1	1	0.5	1	0.5	0	1	1	1	8
Dolan & Coe (2011)	R1	0.5	1	1	1	1	1	1	1	1	0.5	9
	R2	0.5	1	1	1	1	0.5	1	1	0.5	0.5	8
Donovan (1995)	R1	1	1	1	1	0.5	1	1	0.5	0.5	0	7.5
	R2	1	1	1	0.5	0.5	0	1	0.5	0.5	0	6
Draper (2003)	R1	0.5	1	1	0	0.5	0	1	0.5	0.5	0	5
	R2	1	1	0.5	1	1	1	0	1	1	0.5	8
Drobeck (1990)	R1	1	1	1	1	1	0.5	1	1	1	1	9.5
	R2	1	1	1	1	1	0.5	0.5	1	1	1	9

Author(s) (year)		CASP Item number										Total
		1	2	3	4	5	6	7	8	9	10	
Ekström et al. (2013)	R1	1	1	0.5	1	0.5	0	1	0.5	1	0.5	7
	R2	1	1	0.5	1	0	0	1	0.5	1	0.5	6.5
Eriksson et al. (2007)	R1	1	1	0.5	1	0.5	0	1	1	1	0.5	7.5
	R2	1	1	1	1	1	0	0	1	1	0.5	7.5
Eriksson et al. (2006)	R1	1	1	0.5	1	0.5	0	1	0.5	1	0.5	7
	R2	1	1	0.5	1	0.5	0	1	0.5	1	0.5	7
Fenwick et al. (2012)	R1	1	1	1	1	1	0	1	1	1	1	9
	R2	1	1	1	0.5	1	0	1	1	1	1	8.5
Finnbogadóttir (2003)	R1	1	1	1	1	1	0	1	1	1	1	9
	R2	1	1	1	0.5	1	0	1	1	1	0.5	8
Gage & Kirk (2002)	R1	1	1	1	1	1	0	1	1	1	1	9
	R2	0.5	1	0.5	0.5	1	0	0	1	0.5	0.5	5.5
Gervais et al. (2015)	R1	1	1	1	1	1	0	1	1	1	1	9
	R2	1	1	1	0.5	1	0	1	1	1	1	8
Gerzi & Berman (1981)	R1	0.5	0.5	0.5	0.5	0.5	0	0.5	0	0.5	1	4.5
	R2	0.5	0.5	0.5	1	0.5	0	0	1	1	0.5	5.5
Gottfredsdóttir (2005)	R1	1	1	1	1	1	0	1	0.5	0.5	0.5	7.5
	R2	1	1	1	1	0.5	0	1	0.5	1	0.5	7.5
Grand (2015)	R1	1	1	0.5	0.5	1	1	1	1	1	1	9
	R2	1	1	1	0.5	1	1	1	1	1	1	9.5
Greer et al. (2014)	R1	1	1	1	1	1	0	1	0.5	1	0.5	8
	R2	1	0.5	1	1	0.5	0	1	0.5	1	0.5	7
Hallgren et al. (1999)	R1	1	1	0.5	0.5	0.5	0	1	1	1	0.5	7
	R2	1	1	0.5	1	1	0	1	1	1	0.5	8
Johansson et al. (2015)	R1	1	1	0.5	1	0	0	1	0.5	1	0	6
	R2	1	1	1	0.5	0.5	0	1	1	1	0.5	7.5

Author(s) (year)		CASP Item number										Total
		1	2	3	4	5	6	7	8	9	10	
Johnsen et al. (2017)	R1	1	1	0.5	1	1	0	1	0.5	1	0.5	7.5
	R2	1	1	1	1	1	0	1	0.5	1	1	8.5
Joy & Paul (2012)	R1	1	1	0.5	0.5	1	0	0	0.5	0.5	0	5
	R2	1	0.5	1	0.5	0.5	0	0	0.5	0.5	0	4.5
Kao & Long (2004)	R1	0.5	1	1	1	1	1	1	1	1	0.5	9
	R2	1	1	1	1	1	0	1	1	1	0.5	8.5
Kulpa (1992)	R1	1	1	1	0.5	1	1	1	1	1	1	9.5
	R2	1	1	1	0.5	1	1	1	1	1	1	9.5
Levenstein (1992)	R1	1	1	0.5	0.5	1	1	0.5	0.5	1	1	8
	R2	1	1	0.5	0.5	1	1	0.5	0.5	1	0.5	7.5
May (1982)	R1	0.5	1	0.5	0.5	0.5	0	1	0.5	0.5	0.5	5.5
	R2	0.5	1	0.5	1	0.5	0	1	0.5	1	0.5	6.5
Pilkington & Rominov (2017)	R1	1	1	0.5	1	1	1	1	1	1	1	9.5
	R2	1	1	1	1	1	1	1	1	1	1	10
Rominov et al. (2018)	R1	1	1	1	1	1	1	1	1	1	1	10
	R2	1	1	1	1	1	1	1	1	1	1	10
Sartori et al. (2018)	R1	1	1	0.5	1	0	0.5	1	0.5	1	0.5	7
	R2	1	1	0.5	1	1	0	1	0.5	1	0.5	7.5
Sercekus et al. (2020)	R1	1	1	1	0.5	1	0	1	1	1	0.5	8
	R2	1	1	0.5	0.5	1	0	0	0.5	1	0.5	6
Spektor (2007)	R1	1	1	1	0.5	1	1	1	1	1	1	9.5
	R2	1	1	1	0.5	1	1	1	1	1	1	9.5
Talley (2017)	R1	1	1	1	0.5	1	1	1	1	1	1	9.5
	R2	1	1	1	0.5	1	1	1	1	1	1	9.5

Author(s) (year)		CASP Item number										Total
		1	2	3	4	5	6	7	8	9	10	
Taylor (1992)	R1	1	1	1	1	1	1	1	1	1	1	10
	R2	1	1	1	0.5	1	1	1	1	1	1	9.5
Tehrani et al. (2015)	R1	1	1	0.5	0.5	1	0	1	0.5	1	0.5	7
	R2	1	1	0.5	1	0.5	0	1	1	1	0.5	7.5
Widarsson et al. (2015)	R1	1	1	0.5	0.5	1	0	1	0.5	1	0.5	7
	R2	1	1	1	1	1	0	1	0.5	1	0.5	8

Note. CASP = Critical Appraisal Skills Program checklist. CASP Items: 1 (*Was there a clear statement of the aims of the research?*), 2 (*Is a qualitative methodology appropriate?*), 3 (*Was the research design appropriate to address the aims of the research?*), 4 (*Was the recruitment strategy appropriate to the aims of the research?*), 5 (*Was the data collected in a way that addressed the research issue?*), 6 (*Has the relationship between researcher and participants been adequately considered?*), 7 (*Have ethical issues been taken into consideration?*), 8 (*Was the data analysis sufficiently rigorous?*), 9 (*Is there a clear statement of findings?*), and 10 (*How valuable is the research?*). R1 = Reviewer 1, R2 = Reviewer 2. **Ratings in bold font indicate lack of agreement in reviewer ratings.**

Appendix C: AXIS Quality Appraisal Ratings of Quantitative Studies Ranked According to Average Total Scores

Author(s) (year)	AXIS Tool item number																				Average Total Score	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20		
Chandler (1998)	R1	1	0.5	0	1	1	1	1	1	1	1	1	1	1	0.5	1	1	1	1	1	1	18.25
	R2	1	0.5	0.5	1	1	1	1	1	1	1	1	1	1	0.5	1	1	1	1	1	1	1
Glazer (1989)	R1	1	1	0	1	1	0.5	0.5	1	0.5	1	1	1	1	0.5	1	1	1	1	1	1	18
	R2	1	1	0.5	1	1	0.5	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Biehle & Mickelson (2011)	R1	1	1	0	1	1	0.5	0.5	1	1	1	1	1	0.5	0.5	1	1	1	1	1	1	17.75
	R2	1	1	0.5	1	1	1	0.5	1	1	1	1	1	0.5	1	1	1	1	1	1	1	1
Forsyth et al. (2011)	R1	1	1	0	1	1	0.5	1	1	0	1	1	1	1	0.5	1	1	1	1	1	1	17.5
	R2	1	1	0	1	1	0.5	0.5	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Wikman et al. (1993)	R1	0.5	0.5	0	1	1	1	1	1	1	1	1	0.5	1	1	1	1	1	0	1	1	17
	R2	1	1	0	1	1	1	1	1	1	1	1	1	0.5	1	1	1	1	0	1	1	1
Gobel et al. (2020)	R1	1	1	0	1	0.5	0.5	0	1	1	1	1	1	1	0.5	1	1	1	1	1	1	16.75
	R2	1	1	0	1	0.5	0.5	0.5	1	1	1	1	1	1	0.5	1	1	1	1	1	1	1

Author(s) (year)		AXIS Tool item number																				Average Total Score
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	
Medalia (1981)	R1	1	1	0.5	1	0.5	0	0.5	0.5	0	1	1	1	1	0.5	1	1	1	1	1	0.5	16.5
	R2	1	1	1	1	1	1	0.5	1	1	1	1	1	0	1	0.5	1	1	1	1	1	
Weiss (1983)	R1	1	1	0	1	0.5	0.5	0.5	1	1	1	1	1	1	0.5	0.5	1	1	0.5	1	1	16
	R2	1	1	0	1	1	0.5	0.5	0.5	1	1	1	1	1	0.5	0.5	1	1	0.5	1	1	
Karstens (1989)	R1	1	1	0	1	1	1	0	0.5	0	1	1	1	1	0	0.5	1	1	1	1	0.5	14.25
	R2	1	0.5	0	1	1	1	0	0.5	0	1	1	1	0.5	0.5	0.5	1	1	1	1	0.5	
Szeverényi et al. (1998)	R1	1	1	0	1	1	1	1	0.5	0.5	1	0.5	0.5	1	1	0.5	1	1	0	1	1	14.25
	R2	1	0.5	0	1	1	1	0.5	0.5	1	0.5	1	0.5	0.5	0	0.5	1	1	0.5	1	0	
Kannenberget al. (2016)	R1	1	1	0	1	0	0	0	1	1	1	0.5	0	1	0.5	0.5	0.5	1	0	1	1	13
	R2	1	1	0.5	0	1	1	1	0.5	1	1	0.5	0	0	1	0.5	1	1	0	1	1	
Chalmers & Meyer (1996)	R1	1	1	1	1	1	1	0	1	0	0.5	0.5	0.5	0.5	0.5	0.5	1	1	0	1	1	12.75
	R2	1	0.5	1	1	1	1	0.5	0.5	0	0	0.5	0	0	0.5	0.5	1	0.5	0	1	1	

Author(s) (year)		AXIS Tool item number																				Average Total Score
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	
White (1998)	R1	1	1	0	1	0.5	0.5	0	0.5	0	0.5	1	1	1	0.5	0.5	1	1	1	1	0.5	12
	R2	1	1	0	0	1	0	0	0.5	0.5	0.5	0.5	0.5	0.5	0	0.5	1	1	1	1	0	
Wapner (1976)	R1	0.5	0.5	0	1	1	1	0.5	0.5	0	1	0.5	0.5	1	0.5	0.5	1	1	0	1	0.5	11.25
	R2	1	0.5	0	1	1	0.5	0.5	0.5	0	0.5	0.5	0	1	0	0.5	0.5	1	0	1	0	

Note. AXIS = Axis Appraisal Tool for Cross-Sectional Studies. AXIS items: 1 (Were the aims/objectives of the study clear?), 2 (Was the study design appropriate for the stated aim(s)?), 3 (Was the sample size justified?), 4 (Was the target/reference population clearly defined?), 5 (Was the sample frame taken from an appropriate population base so that it closely represented the target/reference population under investigation?), 6 (Was the selection process likely to select subjects/participants that were representative of the target/reference population under investigation?), 7 (Were measures undertaken to address and categorise non-responders?), 8 (Were the risk factor and outcome variables measured appropriate to the aims of the study?), 9 (Were the risk factor and outcome variables measured correctly using instruments/measurements that had been trialled, piloted or published previously?), 10 (Is it clear what was used to determined statistical significance and/or precision estimates?), 11 (Were the methods (including statistical methods) sufficiently described to enable them to be repeated?), 12 (Were the basic data adequately described?), 13 (Does the response rate raise concerns about non-response bias?), 14 (If appropriate, was information about non-responders described?), 15 (Were the results internally consistent?), 16 (Were the results for the analyses described in the methods, presented?), 17 (Were the authors' discussions and conclusions justified by the results?), 18 (Were the limitations of the study discussed?), 19 (Were there any funding sources or conflicts of interest that may affect the authors' interpretation of the results?), and 20 (Was ethical approval or consent of participants attained?)

R1 = Reviewer 1, R2 = Reviewer 2. **Ratings in bold font indicate lack of agreement in reviewer ratings.**

**Appendix D: CASP Quality Appraisal Ratings of Qualitative Studies Ranked According to
Average Total Scores**

Author(s) (year)		CASP Item number										Average Total Score
		1	2	3	4	5	6	7	8	9	10	
Rominov et al. (2018)	R1	1	1	1	1	1	1	1	1	1	1	10
	R2	1	1	1	1	1	1	1	1	1	1	
Bäckström et al. (2017)	R1	1	1	1	1	1	0.5	1	1	1	1	9.75
	R2	1	1	1	1	1	1	1	1	1	1	
Baldwin et al. (2019)	R1	1	1	1	1	1	1	1	1	1	1	9.75
	R2	1	1	1	1	1	1	1	0.5	1	1	
Pilkington & Rominov (2017)	R1	1	1	0.5	1	1	1	1	1	1	1	9.75
	R2	1	1	1	1	1	1	1	1	1	1	
Taylor (1992)	R1	1	1	1	1	1	1	1	1	1	1	9.75
	R2	1	1	1	0.5	1	1	1	1	1	1	
Kulpa (1992)	R1	1	1	1	0.5	1	1	1	1	1	1	9.5
	R2	1	1	1	0.5	1	1	1	1	1	1	
Spektor (2007)	R1	1	1	1	0.5	1	1	1	1	1	1	9.5
	R2	1	1	1	0.5	1	1	1	1	1	1	
Talley (2017)	R1	1	1	1	0.5	1	1	1	1	1	1	9.5
	R2	1	1	1	0.5	1	1	1	1	1	1	
Åsenhed et al. (2013)	R1	1	1	1	1	1	1	1	0.5	1	0.5	9.25
	R2	1	1	1	1	1	1	1	1	1	0.5	
Barclay et al. (1996)	R1	1	1	0.5	1	1	1	1	1	1	1	9.25
	R2	1	1	0.5	1	1	1	1	0.5	1	1	
Drobeck (1990)	R1	1	1	1	1	1	0.5	1	1	1	1	9.25
	R2	1	1	1	1	1	0.5	0.5	1	1	1	
Grand (2015)	R1	1	1	0.5	0.5	1	1	1	1	1	1	9.25
	R2	1	1	1	0.5	1	1	1	1	1	1	

Author(s) (year)		CASP Item number										Average Total Score
		1	2	3	4	5	6	7	8	9	10	
Brennan et al. (2007)	R1	1	1	1	1	1	0.5	1	1	1	0.5	9
	R2	1	1	1	1	1	0.5	1	1	1	0.5	
Fenwick et al. (2012)	R1	1	1	1	1	1	0	1	1	1	1	8.75
	R2	1	1	1	0.5	1	0	1	1	1	1	
Kao & Long (2004)	R1	0.5	1	1	1	1	1	1	1	1	0.5	8.75
	R2	1	1	1	1	1	0	1	1	1	0.5	
Dolan & Coe (2011)	R1	0.5	1	1	1	1	1	1	1	1	0.5	8.5
	R2	0.5	1	1	1	1	0.5	1	1	0.5	0.5	
Finnbogadóttir (2003)	R1	1	1	1	1	1	0	1	1	1	1	8.5
	R2	1	1	1	0.5	1	0	1	1	1	0.5	
Gervais et al. (2015)	R1	1	1	1	1	1	0	1	1	1	1	8.5
	R2	1	1	1	0.5	1	0	1	1	1	1	
Aponte (1991)	R1	1	1	1	1	0.5	1	1	1	0.5	0	8.25
	R2	1	1	1	1	1	1	1	1	0.5	0	
Deave & Johnson (2008)	R1	1	1	0.5	1	0.5	0	1	1	1	1	8.25
	R2	1	1	0.5	1	0.5	0.5	1	1	1	1	
Johnsen et al. (2017)	R1	1	1	0.5	1	1	0	1	0.5	1	0.5	8
	R2	1	1	1	1	1	0	1	0.5	1	1	
Levenstein (1992)	R1	1	1	0.5	0.5	1	1	0.5	0.5	1	1	7.75
	R2	1	1	0.5	0.5	1	1	0.5	0.5	1	0.5	
Eriksson et al. (2007)	R1	1	1	0.5	1	0.5	0	1	1	1	0.5	7.5
	R2	1	1	1	1	1	0	0	1	1	0.5	
Gottfredsdóttir (2005)	R1	1	1	1	1	1	0	1	0.5	0.5	0.5	7.5
	R2	1	1	1	1	0.5	0	1	0.5	1	0.5	
Greer et al. (2014)	R1	1	1	1	1	1	0	1	0.5	1	0.5	7.5
	R2	1	0.5	1	1	0.5	0	1	0.5	1	0.5	
Hallgren et al. (1999)	R1	1	1	0.5	0.5	0.5	0	1	1	1	0.5	7.5
	R2	1	1	0.5	1	1	0	1	1	1	0.5	

Author(s) (year)		CASP Item number										Average Total Score
		1	2	3	4	5	6	7	8	9	10	
Widarsson et al. (2015)	R1	1	1	0.5	0.5	1	0	1	0.5	1	0.5	7.5
	R2	1	1	1	1	1	0	1	0.5	1	0.5	
Gage & Kirk (2002)	R1	1	1	1	1	1	0	1	1	1	1	7.25
	R2	0.5	1	0.5	0.5	1	0	0	1	0.5	0.5	
Sartori et al. (2018)	R1	1	1	0.5	1	0	0.5	1	0.5	1	0.5	7.25
	R2	1	1	0.5	1	1	0	1	0.5	1	0.5	
Tehrani et al. (2015)	R1	1	1	0.5	0.5	1	0	1	0.5	1	0.5	7.25
	R2	1	1	0.5	1	0.5	0	1	1	1	0.5	
des Robert et al. (2020)	R1	1	1	0.5	0.5	0.5	0	1	0.5	0.5	0.5	7
	R2	1	1	1	0.5	1	0.5	0	1	1	1	
Eriksson et al. (2006)	R1	1	1	0.5	1	0.5	0	1	0.5	1	0.5	7
	R2	1	1	0.5	1	0.5	0	1	0.5	1	0.5	
Sercekus et al. (2020)	R1	1	1	1	0.5	1	0	1	1	1	0.5	7
	R2	1	1	0.5	0.5	1	0	0	0.5	1	0.5	
Donovan (1995)	R1	1	1	1	1	0.5	1	1	0.5	0.5	0	6.75
	R2	1	1	1	0.5	0.5	0	1	0.5	0.5	0	
Ekström et al. (2013)	R1	1	1	0.5	1	0.5	0	1	0.5	1	0.5	6.75
	R2	1	1	0.5	1	0	0	1	0.5	1	0.5	
Johansson et al. (2015)	R1	1	1	0.5	1	0	0	1	0.5	1	0	6.75
	R2	1	1	1	0.5	0.5	0	1	1	1	0.5	
Draper (2003)	R1	0.5	1	1	0	0.5	0	1	0.5	0.5	0	6.5
	R2	1	1	0.5	1	1	1	0	1	1	0.5	
May (1982)	R1	0.5	1	0.5	0.5	0.5	0	1	0.5	0.5	0.5	6
	R2	0.5	1	0.5	1	0.5	0	1	0.5	1	0.5	
de Brito et al. (2013)	R1	1	1	0.5	0.5	0	0	1	0.5	0.5	0	5.5
	R2	1	1	0.5	0.5	0	0.5	1	0.5	1	0	

Author(s) (year)		CASP Item number										Average Total Score
		1	2	3	4	5	6	7	8	9	10	
Gerzi & Berman (1981)	R1	0.5	0.5	0.5	0.5	0.5	0	0.5	0	0.5	1	5
	R2	0.5	0.5	0.5	1	0.5	0	0	1	1	0.5	
Joy & Paul (2012)	R1	1	1	0.5	0.5	1	0	0	0.5	0.5	0	4.75
	R2	1	0.5	1	0.5	0.5	0	0	0.5	0.5	0	

Note. CASP = Critical Appraisal Skills Program checklist. CASP Items: 1 (*Was there a clear statement of the aims of the research?*), 2 (*Is a qualitative methodology appropriate?*), 3 (*Was the research design appropriate to address the aims of the research?*), 4 (*Was the recruitment strategy appropriate to the aims of the research?*), 5 (*Was the data collected in a way that addressed the research issue?*), 6 (*Has the relationship between researcher and participants been adequately considered?*), 7 (*Have ethical issues been taken into consideration?*), 8 (*Was the data analysis sufficiently rigorous?*), 9 (*Is there a clear statement of findings?*), and 10 (*How valuable is the research?*). R1 = Reviewer 1, R2 = Reviewer 2. **Ratings in bold font indicate lack of agreement in reviewer ratings.**

Appendix E (Systematic Review Supplementary Table 1): Methodology and Results Reported by the Quantitative Studies (n = 14)

Author(s) (year), country	Study aim	Methodology	Participants	Results	Concern codes (see Table 3)	AXIS R1 R2
Biehle, S. N., & Mickelson, K. D. (2011) USA	Comparing the types of worries of expectant fathers and mothers. Investigating the relationship between worries and perinatal well-being and relationship satisfaction.	Cross-sectional. An online and telephone questionnaire were completed in 3rd trimester. The top worry for each parent was examined based on responses to question: "What did you worry about (in the past 6 months)? Please be as specific as possible and list them in order of intensity." Additional measures assessed worry frequency, level of childbirth worry, anxiety, depression, positive affect, and relationship satisfaction. Covariates: age, education level, and pregnancy risk.	104 primiparous pregnant couples were recruited from local birthing classes and online message boards. Age range of fathers: 18 to 52 years 91% married, 9% cohabiting 100% employed	Worries (by type) were reported as the top worry by the following percentages of fathers: • Security worries: 30.8% Money; 14.4% Balancing work and baby; Job or school stress. • Baby worries: 26.9% Baby's health (baby's health, problems during delivery, pregnancy concerns); 10.6% Preparation for baby; 9.6% Mother's health (mother's health, labour and childbirth anxiety, being present during delivery); 4.8% Transition to parenthood (uncertainty about future, coping with baby's needs, being a good parent, transition to having a baby, meeting demands of parenthood, bonding with baby) • Relationship with spouse or partner 1% • Miscellaneous (e.g., transportation) 1.9%	1.01 8.03 2.02 8.04 2.01 8.06 3.01 8.07 5.01 10.01 5.02 10.03 6.01 10.07 8.01 10.08 8.02	17 18.5
Chalmers, B., & Meyer, D. (1996) South Africa	To explore fathers' perceptions of their experiences at four stages of their transition to parenthood: during pregnancy, in response to antenatal preparation programs, at birth, and a few months after the birth.	Cross-sectional. A 34-item questionnaire was completed by 46 fathers after the birth of their baby. Questionnaires related to father's experiences of pregnancy. Other participant groups completed questionnaires regarding antenatal education experiences (36 men) and birth experiences (33 men).	46 first-time fathers were recruited from two maternity hospitals (private and state service). Questionnaires were provided by nurses in the days following birth, to be completed and returned voluntarily. Age range 18 to 40 years 92.5% married employment status not reported	The following concerns and fears were experienced by greater than 10% of fathers: Worry about finances 33%; Abnormality 72%; Partner experiencing pain 44%; Partner dying 41%; Baby dying 41%; Labour 28%; Sex harming the baby 28%; Caesarean section 15%; Episiotomy 15%; Harming the baby somehow 20%; Not being a good enough father 15%; Being at the delivery 11%; Not being at delivery 48%; Birth before arrival at hospital 15%; Not at hospital in time 24%; 'Losing' wife to baby 11%.	1.01 2.03 1.03 3.01 1.06 3.02 1.07 3.06 1.12 6.03 1.13 8.03 1.09 10.01 2.02	14 11.5

(table continues)

Author(s) (year), country	Study aim	Methodology	Participants	Results	Concern codes (see Table 3)	AXIS R1 R2
Chandler, N. B. (1998) Dissertation USA	To investigate the relationship between stress and marital satisfaction during the pregnancy period for expectant fathers.	Cross-sectional. Questionnaires completed in 2nd and 3rd trimester. The Feelings of Pregnancy Questionnaire (FOPQ; Glazer, 1986) was used to identify the number and intensity of stressors during pregnancy. Examined relationship between stress and dyadic adjustment. Covariates: age and length of marriage.	70 first-time expectant fathers were recruited from hospital tours, obstetrician offices, and childbirth education and baby care classes. Age range 20 to 47 years 100% married employment status not reported	30 out of 79 possible stressors were identified by at least 50% of fathers as at least somewhat stressful (grouped across six areas of major concern): <ul style="list-style-type: none"> • Baby: baby's condition at birth, something happening to the baby because of something inherited, having a baby depend on you, taking care of baby's physical needs, if baby will be healthy and normal, if baby premature. • Self: being worried, changes in way of living, being a good father, gaining too much weight. • Health care: whether the nurses will give partner good care, whether the doctor or midwife will give partner good care, medication partner might receive during childbirth. • Childbirth: unexpected things happening during childbirth, partner's condition during childbirth, partner being torn, partner's pain in childbirth, the cut the doctor or midwife makes when baby is delivered, something happening to the baby because of something that might happen during labour, partner losing control in labour, complications during labour, losing the baby in labour and delivery, father's role in labour and delivery. • Family and friends: how partner feels about changes in father's sex drive, how partner feels about the pregnancy. • Finances: father's job, managing the added cost of having a child, losing partner's income, being able to buy needed and wanted things, being able to buy things which current children need and want. 	1.01 6.05 1.02 7.01 1.03 7.04 1.05 7.06 1.06 8.01 1.08 8.03 1.11 8.06 1.13 9.02 2.04 10.01 3.01 10.02 3.02 10.03 3.05 10.08 5.05	18 18.5
Forsyth, C., Skouteris, H., Wertheim, E. H., Paxton, S. J., & Milgrom, J. (2011) Australia	To investigate which emotions and worries men experienced when learning about and during their partner's pregnancy.	Cross-sectional. Questionnaires completed in 2nd and 3rd trimester. 9-item pregnancy worry scale developed by researchers for this study. Higher worry scores indicated more concerns. Worries reported in order of percentage endorsement from 69% to 13%. Additional measures assessed men's experiences of various emotions when learning about their partner's pregnancy, and during the pregnancy.	48 pregnant couples (48% primiparous) were invited to participate via local newspaper advertisements, general practitioner offices, pregnancy exercise classes, radiology clinics, obstetrician's offices and online pregnancy forums. Mean age 33.54 83% married employment status not reported	All worry items were endorsed as "mostly agreed" and "strongly agreed" by at least 10% of fathers: <ul style="list-style-type: none"> • Partner would experience pain 69% • Baby born with abnormality 54% • Unable to provide financially 52% • Not being a good enough father 30% • Adequately supporting partner 26% • Not being involved enough 23% • Losing closeness with partner 19% • Losing their partner to the baby 13% • Not being present at delivery 13% 	1.03 6.02 2.03 8.03 3.02 10.04 5.07 10.07 6.01	17 18

(table continues)

Author(s) (year), country	Study aim	Methodology	Participants	Results	Concern codes (see Table 3)	AXIS R1 R2
Glazer, G. (1989) USA	Exploratory study to identify anxiety levels and stressors of expectant fathers.	Cross-sectional. The 79-item Feelings of Pregnancy Questionnaire (FOPQ) was used to calculate a stressor score. Items rated from “not at all stressful” (0), to “very much so stressful” (3). Men's scores ranged from 6 to 115. Examined relationship between stressor score and state anxiety.	108 expectant fathers (72% first-time fathers) were randomly selected from lists of men attending childbirth education classes offered by 5 organisations. 96% were in 3rd trimester. Age range 20 to 48 years relationship status not reported. 96% employed	29 out of 79 possible stressors were identified by at least 50% of fathers as at least somewhat stressful (grouped across six areas of major concern): <ul style="list-style-type: none"> • Baby: baby's condition at birth, having a baby depend on you, if baby will be healthy and normal, partner having miscarriage, baby premature, baby overdue • Self: being worried, changes in way of living, being a good father. • Health care: whether nurses will give partner good care, whether doctor or midwife will give partner good care, medication partner might receive during childbirth. • Childbirth: unexpected things happening, partner' s condition during childbirth, partner being torn when baby is born, partner's pain in childbirth, the cut the doctor or midwife makes when baby is delivered, something happening to the baby because of something that might happen during labour, partner losing control in labour, complications during labour, losing the baby in labour and delivery, father's role in labour and delivery, being able to have the type of birth experience wanted • Family and friends: how your partner feels about changes in father's sex drive, if your partner understands father's changing feelings and problems • Finances: father's job, added cost of having a child, losing partner's income, being able to buy needed and wanted things. 	1.01 6.01 1.02 6.05 1.03 7.01 1.05 7.06 1.06 8.01 1.08 8.03 1.11 9.02 1.13 10.01 2.04 10.02 3.01 10.03 3.05 10.08 3.03	17 19
Göbel, A., Arck, P., Hecher, K., Schulte-Markwort, M., Diemert, A., & Mudra, S. (2020) Germany	To investigate the manifestation of paternal pregnancy-related worries in a population-based sample and to identify relevant associated factors.	Cross-sectional. Questionnaires completed in 2nd or 3rd trimester. 15-item German adaptation of Cambridge worry scale. Items rated from 0 (not a worry) to 5 (major worry). Relationship between psychosocial factors and pregnancy-related worries was examined. Anxiety symptoms, depressive symptoms, general hostility, and perceived social support were measured. Covariates: age, household income, gestational age, parity, and history of miscarriage.	129 expectant fathers (61% first-time fathers) were recruited when accompanying pregnant partner to a study appointment for another ongoing population-based pregnancy study at a university medical centre. Age range 24 to 49 years 100% married/cohabiting employment status not reported	10 out of 15 items were endorsed by more than 10% of participants with scores between 3 to 5 (and more than 50% of participants between 1 to 5, indicating worry about these items to some extent). From highest to lowest rates of endorsement: <ul style="list-style-type: none"> • Health of someone close • Something wrong with the baby • Financial problems • Employment problems • Childbirth itself • Your own health • Coping with the new baby • Possibility of a miscarriage • Possibility of preterm birth • Housing situation 	2.01 8.06 3.02 8.09 3.05 10.01 3.03 10.05 7.04 10.08	16.5 17

(table continues)

Author(s) (year), country	Study aim	Methodology	Participants	Results	Concern codes (see Table 3)	AXIS R1 R2	
Kannenber, K., Weichert, J., Rody, A., & Banz-Jansen, C. (2016) Germany	To determine whether pregnant women and their partners are affected by anxiety differently at various stages of pregnancy.	Cross-sectional. Questionnaires completed in 1st, 2nd or 3rd trimester. 25-item questionnaire of pregnancy- associated fears. Items rated from 1 (situation makes me not at all anxious) to 4 (very anxious). An additional measure assessed anxiety symptoms. Study examined whether anxiety levels or pregnancy-associated fears varied dependant on age, education, gestational age, parity, or reasons for presenting to medical services.	183 expectant fathers (and 259 pregnant women) of mixed parity were recruited whilst attending hospital for antenatal ultrasound assessment, or general antenatal care, or for delivery. Participant ages, relationship status, and employment not reported.	Concerns were categorised into 4 categories: Examination situation, Examination results, Birth/delivery, Postpartum period. Out of 25 questions related to pregnancy fears, 4 were endorsed most highly by Fathers: <ul style="list-style-type: none"> • Problems during the birth • Having a handicapped child • Chromosomal anomaly in child • Untreatable malformation in child 	1.01 3.02	12 14	
Karstens, K., A. (1989) Dissertation USA	To investigate whether fathers at different ages/stages of adult development have characteristically different ways of preparing for the birth of their first child.	Cross-sectional. 43-item questionnaires were completed in 2nd and 3rd trimester. Questionnaire items addressed men's attitudes about and experiences of: paternity, the couple relationship, and the workplace. Items were rated using 7-point scale. Additional items addressed physical symptoms experienced by fathers during their partner's pregnancy. Comparisons were made between fathers within three ages/stages: 22-28 years stable, 29-32 years transition, and 33-40 years stable.	114 first-time expectant fathers were recruited from prenatal classes at several hospitals to voluntarily complete an anonymous survey. Age range 22 to 40 years 94% married 80% were professionals, proprietors, or skilled workers.	Items related to concerns during pregnancy were endorsed as 5 (somewhat true), 6 (very true), or 7 (extremely true) by the following percentages of fathers: <ul style="list-style-type: none"> • I worry about our baby's health 91% • These days I feel increasing responsibility for providing financially for our family 91% • I worry about my mate's health 84% • I expect that my job requirements will interfere significantly with what I would like to do as a father and mate 54% • I worry about getting sick 32% • I worry about our sex life 32% • I am afraid that our relatives will interfere in our lives because of the pregnancy 28% • I will feel self-conscious at first when interacting with our baby 26% • My mate and I disagree over parenting styles 21% • I worry that I will not be very good at caring for our infant 18% • I worry that the baby will interfere with my career plans 14% 	3.01 5.01 6.01 6.05 7.04	8.06 8.09 10.04 10.07	14.5 14

(table continues)

Author(s) (year), country	Study aim	Methodology	Participants	Results	Concern codes (see Table 3)	AXIS R1 R2
Medalia, A. A. (1981) Dissertation USA	To investigate the psychological experience of men as they make the transition to fatherhood.	Cross-sectional. Questionnaires completed in 1st (2%), 2nd (16%), or 3rd (82%) trimester. A bank of 41 questions related to potential areas of difficulty and symptoms of anxiety and depression, with 19 items addressing pregnancy specific concerns. Also included open ended question: "what kind of extra stress do you have during the pregnancy?" Other items related to family of origin, status of marriage relationship, and level of contact with social system.	100 first-time expectant fathers were recruited through childbirth instructors or obstetricians in the New York and Newark areas. Age range 20 to 43 years 100% married 99% employed	Factor analysis resulted in 8 factors out of 14 which included items relating to fathers' concerns during pregnancy as follows (items with factor loadings greater than .40 in parentheses): • Loss of freedom (loss of freedom, interference with social life, inadequate leisure time) • Care-taking competency (concern about wife's health, healthy baby, ability to handle baby, concern about birthing) • Changes in sexual relationship (decline in husband's and/or wife's sexual desire, husband not giving previous amount of affection, wife not giving previous amount of affection, worry about wife's appearance) • Disruption of dyadic relationship (effect of coming birth on marriage) • Family boundary issues (interference from in-laws) • Financial concerns (worry about expense of child, reduced income because wife not working, housekeeping not as it should be) • Anxiety (worried about future) • Work satisfaction (work satisfaction) Open ended question indicated the following concerns: increased responsibility (32%), anxiety about wife and child's health (12%), stress related to wife and increased responsibility (22%), stress related to change in wife's behaviour (6.8%).	2.01 8.01 3.01 8.04 5.01 8.06 5.04 8.09 6.02 10.02 6.05 10.03 6.06 10.08 7.06 10.09 7.07	15 18
Szeverényi, P., Póka, R., Hetey, M., & Török, Z. (1998) Hungary	To explore the contents of childbirth-related fears amongst expecting parents.	Cross-sectional. Parents completed a questionnaire (mothers 49-item, fathers 52-item) in 3rd trimester during attendance at first antenatal class. Questionnaire assessed fears related to pregnancy, childbirth and relationship with partner after childbirth. Childbirth concerns were ranked according to weighted average of endorsed rating of fear (5-point scale from "absolutely not" to "very much" fear).	216 pregnant couples participating in an antenatal preparatory course were invited to participate. No-one declined to take part. Age range fathers 20 - 46 years 100% married parity and employment status not reported	Fear level was rated as "quite," "quite strong," or "very," for items (in decreasing order of weighted average) by the following percentages of men: My wife having severe pain and suffering 56.5%; My wife requiring a caesarean or vacuum extraction 46.3%; The baby having birth injury 32.5%; The possible complications 33.4%; Being helpless 33.4%; Being unable to help 34.3%; The thought that baby may be stillborn 28.7%; The thought that my wife may die 25%; Doing something wrong 15.7%; Being unable to ease my wife's suffering 21.3%; The uncertainties of what will happen 18.5%; Being unable to give sufficient support 16.6%; Medical malpractice 8.4%; Me too suffering from it 5.6%; The sight of delivery 6.5%; Being sick 4.6%; The sight of blood 6.5%; Being unable to cope with it all 4.6%; Feeling faint 1.8%; My presence having an adverse effect on our relationship 1.8%; The delivery being disgusting 0.9%.	1.01 1.13 1.02 2.04 1.03 2.05 1.07 2.06 1.08 2.07 1.11 6.01 1.12 9.02	15.5 13

(table continues)

Author(s) (year), country	Study aim	Methodology	Participants	Results	Concern codes (see Table 3)	AXIS R1 R2
Wapner, J. (1976) USA	To investigate the experiences, feelings, fears, worries, joys and satisfactions of the expectant father.	Cross-sectional. Questionnaires completed in 3rd trimester, immediately before first childbirth class. Questionnaire included 63 items regarding men's feelings and attitudes towards: fatherhood, pregnancy, and the marital relationship. Items were rated on 4-point scale from "never" to "almost always." Additionally, wives rated their husbands on the same items, men completed items relating to physical symptoms experienced, and childbirth instructors rated husbands on level of involvement.	128 first-time expectant fathers were recruited by being asked to respond to a questionnaire before their first Lamaze childbirth class. Age, relationship status or employment status not reported	Concerns were rated as "almost always" or "often" by the following percentages of fathers: I worry about being a good provider 37.5%; The responsibility of having two people to support concerns me 32%; I think more about my health now 30.5%; My wife's discomfort has been a hard thing for me to deal with 20.4%; I am very conscious of all her physical feelings 62.5%; I don't think that this was the best time to have a baby 7.1%; I will feel concerned if the baby becomes the centre of my wife's attention 25.8%; I feel I should do more to protect and take care of my wife now that she is pregnant 71.1%; I am more concerned about our sexual relations because I'm afraid of hurting the baby 36%	3.06 6.02 4.02 7.04 5.01 10.04 5.07	12.5 10
Weiss, M. G. (1983) Dissertation USA	To describe the attitudes and concerns of first-time expectant fathers and compare these with those of first-time expectant mothers and a control group of childless, non-pregnant couples.	Cross-sectional. Questionnaires were completed in the home by interview in the 3rd trimester and after birth. The Parenting and Family Development Questionnaire asked fathers to specify their greatest concern regarding four open-ended items including: pregnancy, labour/delivery, the early postpartum period, and parenthood. Responses were categorised and ranked by the percentage of fathers indicating a specific concern for each topic. Additional measures assessed parental attitudes, anxiety symptoms, and sex role identification.	96 first-time expectant fathers were recruited from among the patients of several obstetrician/ gynaecologists on staff at a hospital. Mean age 28.2 years 100% married employment status not reported	The percentage of fathers indicating specific concerns within each domain are as follows. • Pregnancy: Health of baby 34.4%; Health of mother 56.3%; Change in lifestyle 3.1%; Financial responsibility 2.1%; Responsibility of impending parenthood 3.1% • Labour and delivery: Endure pain - mother 42.7%; Health - complications 44.8%; Providing emotional support 7.3%; Husband being there 3.1% • Postpartum period: Health of baby 24%; Health of mother 22.9%; Change in lifestyle 32.3%; Providing emotional support 8.3%; Time and energy for baby 2.1%; Dealing with relatives/friends 2.1%; Being a good parent 2.1% • Parenthood: Being a good parent 59.4%; Financial responsibility 11.5%; Coping with the pressures 7.3%; Mother going back to work 4.2%; Time and energy for baby 13.5%	1.01 7.06 1.03 8.01 2.02 8.03 2.04 8.06 3.01 8.09 5.01 10.02 5.07 10.04	16 16

(table continues)

Author(s) (year), country	Study aim	Methodology	Participants	Results	Concern codes (see Table 3)	AXIS R1 R2
White, M. B. (1998) USA	To examine the common concerns of expectant fathers identified in the literature.	Cross-sectional. Questionnaires completed in 2nd or 3rd trimester. The questionnaire listed six concerns, identified from the literature as being common concerns of expectant fathers. Fathers were asked to rank the concerns in order.	98 first-time expectant fathers were recruited from a 6-week, hospital-based childbirth education class. Age range: 19 - 51 Relationship and employment status not reported	Ranking of concerns based on aggregate scores from highest to lowest: <ul style="list-style-type: none"> • Health of my unborn child. • Safety of my partner during labour and birth • Financial responsibilities • My ability to be a good father • The effect of parenthood on our relationship • My ability to handle labour and birth 	1.10 6.02 2.06 8.03 3.01 10.04	13.5 10.5
Wikman, M., Jacobsson, L., Joelsson, I., & von Schoultz, B. (1993) Sweden	To study attitudes, emotions and conflicts with respect to reproductive ability, pregnancy, delivery and parenthood in men and women using a psychometric instrument.	Cross-sectional. Parents independently completed a questionnaire provided during an antenatal appointment. 53-item questionnaire concerning attitudes towards pregnancy and parenthood, rated on a 5-point scale.	345 expectant fathers (and 369 pregnant partners) were recruited by midwives from three antenatal clinics within the catchment area of a university hospital, after 589 pairs of questionnaires were distributed. Age range 19 to 52 years Parity, trimester, relationship and employment status not reported.	Factor analysis resulted in two factors: "children as existential satisfaction" and "children as lack of freedom." Items relevant to pregnancy-related concerns loaded onto "lack of freedom" (factor loadings between .38 and .61): <ul style="list-style-type: none"> • You lose your freedom when you have children • You become afraid to have children when you see how restricted parents of small children are • When you have children you become easily isolated from your friends • I am afraid of the addition to my dependents that a child will mean • A child is an obstacle to your professional career • Couples without children can have a better sexual relationship than couples with children • When you have children you can no longer travel around the world as you would like to • Pregnant women look clumsy and ugly • It is difficult to realize the meaning of life when you have parental responsibilities 	6.06 8.01 6.07 8.09 7.06 10.07 7.07	16.5 17.5

Note. Concern codes relate to fathers' concerns according to category as shown in Table 3. AXIS = quality appraisal tool for cross-sectional studies. Maximum AXIS score = 20. R1 and R2 = AXIS score rating by reviewer 1 and reviewer 2, respectively.

**Appendix F (Systematic Review Supplementary Table 2): Frequency of Studies Identifying
each Paternal Pregnancy-Related Concern**

Concern Codes	Quantitative		Qualitative	
	<i>n</i>	%	<i>n</i>	%
1. Childbirth Concerns				
ab 1.01 Childbirth complications	7	50	13	32*
ab 1.02 Unforeseen events in childbirth	3	21	12	29*
ab 1.03 Partner's pain and suffering in childbirth	6	43	9	22*
1.04 Partner being traumatised by childbirth	0	0	1	2
1.05 Partner not coping during labour and childbirth	2	14	1	2
a 1.06 Partner being torn or needing to be cut during childbirth	3	21	1	2
1.07 Partner requiring emergency caesarian	2	14	2	5
a 1.08 Medical interventions (e.g., medication or forceps)	3	21	1	2
1.09 Not arriving to hospital in time for birth	1	7	1	2
1.10 Partner injured during childbirth	1	7	7	17*
a 1.11 Baby injured during childbirth	3	21	6	15*
a 1.12 Death of partner in childbirth	2	14	4	10*
a 1.13 Death of baby in childbirth	4	29	4	10*
2. Attitudes Towards Childbirth				
a 2.01 Anxiety about childbirth	3	21	3	7
a 2.02 Ambivalence about being present during childbirth	3	21	5	12*
2.03 Being absent or excluded from delivery	2	14	0	0
ab 2.04 Ability to fulfil support role during labour and delivery	4	29	15	37*
2.05 Feeling helpless to ease partner's suffering	1	7	8	20*
2.06 Being unable to cope with labour and delivery	2	14	9	22*
2.07 Experiencing unpleasant reactions (e.g., feeling faint, sick, or disgusted)	1	7	10	24*
3. Baby Concerns				
ab 3.01 Baby health	8	57	20	49*
ab 3.02 Baby with genetic abnormality or disability	5	36	11	27*
3.03 Partner having miscarriage	2	14	5	12*
3.04 Partner's morning sickness affecting baby's development	0	0	2	5
a 3.05 Baby born prematurely or overdue	3	21	1	2
3.06 Sex during pregnancy harming the baby	2	14	3	7
3.07 Sex of baby	0	0	2	5
4. Acceptance of Pregnancy				
4.01 Ambivalence about pregnancy	0	0	5	12*
4.02 Feeling unprepared for the pregnancy	1	7	2	5

Concern Codes		Quantitative		Qualitative	
		<i>n</i>	%	<i>n</i>	%
5. Partner Concerns					
ab	5.01 Partner health	5	36	14	34*
	5.02 Pregnancy complications	1	7	3	7
	5.03 Mental health/or wellbeing of partner	0	0	5	12*
b	5.04 Fluctuating emotions in pregnant partner	1	7	10	24*
	5.05 Partner's feelings towards pregnancy	1	7	0	0
	5.06 Concealing personal worries from partner to protect them	0	0	6	15*
ab	5.07 Adequately supporting partner during the pregnancy	3	21	12	29*
6. Relationship Concerns					
ab	6.01 Relationship concerns during pregnancy	5	36	10	24*
ab	6.02 Changes to relationship with partner post-birth	4	29	9	22*
	6.03 Finding time for the relationship post-birth	1	7	2	5
	6.04 Changing roles within the couple	0	0	2	5
a	6.05 Changes to sexual relationship during pregnancy	4	29	6	15*
	6.06 Changing shape of pregnant partner	2	14	2	5
	6.07 Sexual relationship post-birth	1	7	2	5
7. Worry About Self					
b	7.01 Preoccupation with worry	2	14	9	22*
	7.02 Constantly prepared for the worst	0	0	4	10*
b	7.03 Lack of support for oneself	0	0	8	20*
a	7.04 Personal physical health	4	29	3	7
	7.05 Managing on reduced sleep post birth	0	0	2	5
ab	7.06 Impact on lifestyle	5	36	8	20*
	7.07 Loss of independence	2	14	6	15*
	7.08 Acquiring sufficient information to feel prepared	0	0	6	15*
	7.09 Managing conflicting advice/information	0	0	5	12*
8. Transition to Parenthood					
ab	8.01 Responsibility of parenthood	6	43	12	29*
	8.02 Feeling unprepared for parenthood	1	7	13	32*
ab	8.03 Being a good parent	7	50	12	29*
	8.04 Uncertainty about future	2	14	6	15*
	8.05 Protecting child after birth	0	0	1	2
ab	8.06 Caring for infant	6	43	9	22*
	8.07 Bonding with baby	1	7	0	0
	8.08 Impact on other siblings	0	0	1	2
a	8.09 Concerns regarding family and friends	5	36	5	12*
	8.10 Safety of infant with pets	0	0	1	2

Concern Codes	Quantitative		Qualitative	
	<i>n</i>	%	<i>n</i>	%
9. Attitudes Towards Health Care Professionals				
b 9.01 Feeling excluded from antenatal care	0	0	17	41*
ab 9.02 Concern for partner to receive good medical care	3	21	9	22*
9.03 Not disclosing worries to professionals so partner receives optimal care	0	0	3	7
9.04 Prenatal appointments	0	0	1	2
10. Practical and Financial Concerns				
ab 10.01 Financial concerns	5	36	8	20*
a 10.02 Constrained finances/Loss of partner income	4	29	3	7
a 10.03 Added cost of having child	3	21	3	7
a 10.04 Financial responsibility to support family	5	36	7	17*
10.05 Housing	1	7	6	15*
b 10.06 Practical readiness for baby	0	0	8	20*
a 10.07 Work-Family balance	4	29	6	15*
a 10.08 Work or education stress	5	36	1	2
10.09 Housekeeping	1	7	0	0

Note. Total number of quantitative studies = 14, total number of qualitative studies = 41.

a = Concerns identified from within 20% or more quantitative studies.

b = Concerns identified from within 20% or more qualitative studies.

ab = Concerns identified from within at least 20% of both the quantitative and qualitative studies.

* Number of concerns identified from within at least 10% of the included qualitative studies, totaled to 44 distinct concerns.

Appendix G (Systematic Review Supplementary Table 3): Verbatim Participant Quotes and Descriptions Reported by Qualitative Studies (n = 41)

Author(s) (year)	Participant quotes and descriptions reported by studies	Page no.	Concern codes (see Table 1)	
Aponte, N (1991)	Participant quotes:			
	• I'm apprehensive about the lifestyle change. I realize that the same things that were important to me in the past may not be in the future but still, in the back of my mind, I'm wondering if this will be too great a change.	58	7.06	
	• I expect to have my lifestyle interrupted. I'm not as negative about- that implies more than my specific concern which is the screaming and uncontrollable crying all night long. I think there's going to be a lot more stress. Not Just because we're tired but because we have a lot more decisions to make. But tiredness relates to stress really close. As I understand it, sex is going to be impossible because we're going to be tired all the time.	58	8.06 7.05 6.07	
	• A lot of the fear is just trying to still the doubt about how it's going to change my life. Knowing that it's going to change my life but my doubt about wanting to accept that change. And how to deal with the things that I might miss. The things that I'm not going to achieve that I want to achieve.	69	7.06	
	• This is a worry of mine about becoming a father there's a feeling that can I really have my own time?, have my interests? I like to read and focus on my art and those are private times and the whole idea of a child impinges on those.	68	7.07	
	• The fear is being a poor father. And a drastic change for the negative in lifestyle meaning that we are slaves to the house. I don't think that will happen but it can happen. I've seen other couples where that happened. There's a risk that my wife and I will not get along after the baby- we have a good relationship now, but it may not be after the baby.	68	8.03 7.06 6.02	
	• The thing that scares me most is the responsibility. It means a dramatic change in lifestyle and decisions that used to just affect me and more recently have affected two of us, will now be affecting another generation. And that's a little intimidating to think of.	69	8.01	
	• The intense non-stop commitment for a long period of time is probably what I'm most fearful or apprehensive about	69	8.01	
	• I have a fear of being the one who has to be in charge and to take care of someone who's absolutely dependent rather than being the dependent one. Rather than being able to fall back on someone else, I'm the one who's going to be fallen back upon.			
	• Every once in a while, I think more often now than early in the pregnancy, we're getting a few feelings of are we going to be able to handle it?, will we know what to do when the baby cries or when it gets sick?	69	8.06	
	Åsenhed, L., Kilstam, J., Alehagen, S., & Baggens, C. (2013)	Participant quotes:		
		• They call it maternity care, and that is partly why the prospective fathers are overridden. Yes, it is the expectant mothers that carries the child and it is the expectant mother they take a blood sample from. But the prospective father must also be important?	1312	9.01
		• How do you find your way in the jungle of stroller manufacturers and retailers? Everyone says their stroller is the best.	1313	10.06
• Participant quote regarding upcoming delivery "Nervousness is like a stone in the chest. It grows stronger every day. It's like eating from a buffet and being unable to stop. It increases all the time. "		1314	2.01	
Descriptions reported by study:				
• They feel powerless as they stand next to the woman without being able to help.		1312	2.05	
• ... hope that the baby will be well, but they have to deal with the stress of not knowing.		1313	3.01	
• Towards the end of the pregnancy, several men describe having conflicting emotions. They are longing for the child and are prepared to take care of it, but at the same time, they express a feeling of wanting to escape.		1313	8.01	
• The men also imagine the first time at home with the child. They mention that they are afraid of not being able to comfort their child and of misinterpreting the child's signals		1314	8.06	
• ... concerns about the birth and the complications that can happen.		1314	1.01	
• They describe a sense of fear and are insecure about their role in the delivery room.	1314	2.04		
• However, one man wonders whether it is really possible to prepare to be a father.	1314	8.02		

Author(s) (year)	Participant quotes and descriptions reported by studies	Page no.	Concern codes(see Table 1)
Bäckström, C., Thorstensson, S., Mårtensson, L. B., Grimming, R., Nyblin, Y., & Golsäter, M. (2017)	Participant quotes:		
	• ... she might not want it like that right then, but in two minutes she might want it ... and then I think that it's best for me to just ... not push it, but to do the right thing for her, even though she thinks it's not so good ...	4	2.04
	• [I wanted to know] a little about what happens afterwards ... how to act at home and ... how often [the baby] should be bathed, and ... things like that that we haven't discussed.... I don't know, I feel very uncertain about it ... it's more like you have to ask your parents ... because I don't feel prepared ... about [what happens] afterwards, when the baby has been born and you're at home ... I feel like: 'How will I do?'	4	8.06
	• ... the everyday love life perhaps... [how to] make it bloom even though you have a little baby. That you do not spend all your love just at the baby and risk losing contact... That you do things together, even when the baby is with you... that you do not just stop living when you have a child. I think that's very important.	4	6.02
	• You don't get any help or anything from the antenatal unit ... except for the controls, because then they do it ... you have to manage very much on your own ... you feel very excluded sometimes.	6	9.01
	• If I am to be supportive and serve as a source of security for my partner, I must feel calm and safe, too.	6	5.07
	• If I am to be supportive and serve as a source of security for my partner, I must feel calm and safe, too.	4	10.06
Descriptions reported by study:			
• They wished to have more information about economic issues, parental leave, insurance and baby-related items that they needed to purchase.			
Baldwin, S., Malone, M., Sandall, J., & Bick, D. (2019)	Participant quotes:		
	• Excitement was probably the first thing that I felt ... it was a little bit of, kind of, apprehension, as in how - what will I need to, kind of, do in terms of being a dad, and will I be able to, kind of, cut the mustard, in terms of being a dad, and that type of thing.	5	8.02 8.03
	Descriptions reported by study:		
• Feelings of apprehension and nervousness appeared to be related to the 'unknown' about becoming a father and worries about their partner and baby's health and wellbeing, which one man described as being 'pretty scary, overwhelming, life-changing'.	5	8.04 3.01 5.01	
Barclay, L., Donovan, J., & Genovese, A. (1996)	Participant quotes:		
	• The feeling of responsibility, you know ... all of a sudden it's there.	14	8.01
	• ... Our doctor tends to be ... a little blasé ... It's an everyday occurrence to him but it's not for us ... I actually rang him up and sort of had a go at him ... I just want to make sure there's no complacency ...	14	9.02 1.01
	• ... And you don't, you don't know how long it's going to take and you don't know if there's going to be complications (and if) you are going to be able to support her all the way through."	16	1.02 2.04
	• ... I know that it's quite acceptable to have sex when you're pregnant but it's just I don't know ..		
	• ... It costs, you know, the cost of things like a pair of shoes for a baby or you know, not so much for a baby but when they get to one or two ... there's plenty of initial outlay...	16	3.06
	• ... It's a re-focussing of the relationship to the new third party. It's going to be 20 years or 25 years before your partner is an individual again ... that's what I see as something to be conscious of - to be careful that I don't completely deny the other one while focussing on the child ...	16	10.03
	• ... That's one thing that I'm not looking forward to is being there, seeing her in so much pain and not being able to do anything about it...	18	6.02
	• ... Feel like we've been forgotten at times ... they don't usually worry about us ...		
	• ... People said to me, "Oh, it's not that bad you know, you don't know what you're in for ... " That's what they say to ya ... , and as soon as you say, "Well, I'm prepared to have no sleep um, constantly change nappies, constantly try to wash nappies because the missus is gonna have to feed the kid" and they're going, "Oh, it's not that bad." So, I don't know. Maybe I'm blowing it out of proportion. Pretty scared now that I'm talking about it...	18	2.02 1.03 2.05
	• ... Actually, I heard someone said that um you know one of my wife's friends said that he, her husband, when he watched the baby being delivered actually got round there and after that he couldn't look at her properly again ..."	19	8.02
	• The thing that annoys me is all the advice you get from people who have had children before ... you just get sick of hearing it all the time ... and Everyone's different; people tell you things, but they only remember certain parts of it and it's different with everyone ... there's no normal ..."	19	2.07 7.09
	• ... As soon as they find out your wife's pregnant they say well sit down and I'll give you three hours advice ..."	19	7.09
	Descriptions reported by study:		
	• Separation exacerbated the anxiety of men who became frustrated by not knowing how to meet their partner's and others' expectations about becoming a father and resented the fact that their own fears were not being addressed	18	9.01 7.03

Author(s) (year)	Participant quotes and descriptions reported by studies	Page no.	Concern codes (see Table 1)
Brennan, A., Marshall-Lucette, S., Ayers, S., & Ahmed, H. (2007)	Participant quotes:		
	• There was definitely 'a shortness', an anger, a lack of patience and irritation because there's too many things that I was thinking that I had to do for her ...	27	5.07
	• I was worried 'cos I thought he wasn't right he might be ... what ya' call it ... a Mongol or something ...	27	3.02
	• The focus of antenatal classes in my view is always on the woman and not on the man ... I did feel a bit of an outsider at the time ... I mean it's not as if I felt I should be the centre of things then but I sometimes wondered if people really know what it's like for the other half when a baby comes along	28	9.01
	• Well I guess I was worried about becoming a dad ... it's a lot of responsibility ya' know what I'm sayin'.	28	8.01
	Descriptions reported by study:		
	• Demands of pregnancy	27	5.07
	• Health of unborn child		3.01
	• Health of partner		5.01
	• Impact of pregnancy on relationship with partner		6.01
• Reaction of other siblings to newborn child		8.08	
• Financial commitments		10.01	
• Accommodation space		10.05	
• Overlooked in antenatal preparation		9.01	
• Responsibilities of parenthood		8.01	
• Maternal care		9.02	
• Whether pregnancy would go to term		3.05	
de Brito, R. S., Soares, J. D. D., de Carvalho, J. B. L., & dos Santos, D. L. A. (2013)	Participant quotes:		
	• Sometimes I think she's angry with me because of something I may have done. But I don't do anything to deserve that...	275	6.01
	• I know it is because of the pregnancy but if things don't change after the baby is born, I will have to do something about it.	275	6.02
	• Sometimes I feel unhappy, as my salary is not very good and I want to give her more, but I can't.	276	10.02
	• Now I have more responsibility, everything is for the house and for her.	276	10.04
	• I worry about the delay to receive results of tests requested by the doctor... And every now and then, there are not enough medicines in the health centre.	276	9.02
	Descriptions reported by study:		
	• Humour changes in pregnant woman.	275	5.04
• Alterations in financial lives.	276	10.04	
• Access to healthcare services.	276	9.02	
Deave, T., & Johnson, D. (2008)	Participant quotes:		
	• The classes are a great help, but if you're not involved in it, you're sort of put to the back of the class, so to speak.	629	9.01
	• They don't actually sort of involve you as a couple anywhere along the line...I felt very sort of left out...I felt sort of punished for working...	629	9.01
	• I would have, yeah, really struggled to have anyone to go to yeah, because...the care is, it is very much geared towards the women.	629	7.03
	• It's that initial baby thing. The fact you can't communicate, you can't talk, you can talk to them but obviously they can't understand you.	630	8.06
	• I would look now to wanting more information about what to do when I've actually got it...even little things like what clothing, when you put it to bed, getting into a routine, even the basics, really.	630	7.08
des Robert, M., Garbay, R., Gonnaud, F., Letrilliant, L., Iwaz, J., & Ecochard, R. (2020)	Participant quotes:		
	• "apprehension," "worries," "fear from having twins"	6	5.02
	• "fear from miscarriage"	7	3.03
	• "healthy?"	7	3.01
	• "risk of handicap"	7	3.02
	• "life is going to change; it is difficult to take the measure"	6	8.04
• "change in the rhythm of life"	7	7.06	
• "the apartment is small"	8	10.05	

Author(s) (year)	Participant quotes and descriptions reported by studies	Page no.	Concern codes (see Table 1)	
Dolan, A., & Coe, C. (2011)	Participant quotes:			
	• I've started going to the gym again ... I want to be there for them when they're older	1023	7.04	
	• I'm not one for boozing all the time But work has to come first now. I have another person to think about now... There's no two ways about it. You have to change	1023	10.04	
	• I have thought a lot more about it to be honest with you. I have thought a lot more about death. I have took out loads of (Life Assurance) policies ... It's not something you really think about before you have a family ...And now, I am thinking about it a lot ... I hope that will stop. I think it will stop once I get used to it	1024	7.04 10.04	
	• It could be a bit more directed towards fathers. As regards information ... There could be a bit more for fathers.	1024	7.08 9.01	
	• Regarding uncertainty surrounding childbirth: "I suppose a bit nervous and frightened. Because I don't know what to expect. Well I do and I don't. But it's the first time so I don't know really what to expect until it actually happens."	1025	1.01 1.02	
	• I'm a little worried I might faint or something ... I'm sure I'll be fine ... Lads I work with they've all had kids and they were all fine	1025	2.06	
	• I want to be up the head end ... I don't want to see any of that end at all because I don't like it, at all ...That's the only thing I'm worried about	1025	2.07	
	• First and foremost I hope I don't pass out. Because I don't like needles and all that sort of stuff... It just sends me a bit funny ... I'm hoping I won't pass out anyway. But you never know	1025	2.07	
	• I have concerns and worries about things ... But I don't have the right to share those because she's going through all this. She's going to have all this pain and everything else ... My little worries are not really that important in the light of things "	1026	9.03	
	• I want them to be worried about [partner] than myself... than about my worries	1026	9.02 9.03	
	Descriptions reported by study:	1023	7.04	
	• The reality of the pregnancy appeared to ignite certain anxieties related to the health of their partner and unborn child as well as their own health.	1023	5.01 3.01	
	Donovan, J. (1995)	Descriptions reported by study:		
		• He feels he needs support and help from his partner to manage the changes that are occurring in their lifestyle and relationship, but she is focusing on the growing fetus within and on her process of change. He believes that he has been left out and feels separate from her and the pregnancy. Relatives, health professionals and others contribute to this feeling of isolation with their comments about the pregnancy and the provision of health services which mainly focus on the mother and her fetus.	713	6.01 9.01
• There are many losses for the male during pregnancy and the gains are difficult to realize, especially in the first half of the pregnancy while the baby is still not real to him. There is also the loss of a previous role and lifestyle, and nothing is predictable any more. His partner expects him to be more involved but she is not communicating her needs in a direct or clear way, and he is unsure of how to respond. With his partner becoming 'more emotional,' their sexual relationship is diminishing and this adds to the feeling of distance occurring between the couple.		713	7.06 5.04 6.01 6.05 8.04	
• The man wants reassurance that everything in their relationship will return to normal once the baby is born.		714	6.02	
• Everyone else seems to expect him to take on a supportive and nurturing role without acknowledging his needs or giving him the support he needs.		714	7.03	
Draper, J. (2003)		Participant quotes:		
		• I'm maybe a little bit put off by the fact that Elizabeth is changing, size and shape. And that normally she's not, she's really slim. And she's got this big bump appearing and it's going to grow and that's not her normally to me. And that's obviously a physical change and maybe it's a bit off putting. I suppose it is a bit of a barrier. I'm surprised that it has affected me because I didn't think that it would.	757	6.06
	• It really is quite terrifying to think what Jane is going to have to go through. I mean, seeing the diagrams it just seems inconceivable that that (the baby) can come out of there (the birth canal). And things don't get ripped off or broken up.	758	1.06 1.10	
	• I imagine me being sort of affected by it. I guess it's sort of 'Oh gosh, look there's a person emerging from Hilary'. You know, maybe the blood and guts will just be sort of immaterial to, you know, what's happening, gosh, 'My son, my daughter'. Wow!	759	2.07	

Author(s) (year)	Participant quotes and descriptions reported by studies	Page no.	Concern codes (see Table 1)
Drobeck, B. (1990)	Participant quotes:		
	• Yeah, its just the idea that you are going to have your own baby and just realise that its going to be 18 years or so or more of responsibilities and guardianship.	34	8.01
	• You just think that everything in your life is going to change like that in one instant. I went through times that I thought that this is the end of my life.	35	7.06
	• I think its change me, the outlook I have taken on work.... I've just realised that I need to one, just not work that amount of overtime, or two, just find a job elsewhere.	40	10.07
	• I got all these books from the library and read them... I was going to becoe the book authority on how to be a dad. And then I was going to watch other dads and see that I don't make the same mistakes.	43	8.03 7.08
	• Its scary going into fatherhood. At least, the first few years won't be bad. Its when they go to school, that's going to be the biggest fear: not being able to communicate with my child on drugs. It worries me.	47	8.02
	• Its going to take awhile to get used to it... There are some things I probably can't do, but I don't know what they are. Its hard for me to see myself changing a diaper now.	47	8.06
Ekström, A., Arvidsson, K., Falkenström, M., Thorstensson, S. (2013)	Participant quotes:		
	• I felt pressure to fix all practical stuff such as larger apartment, car and so on.	2	10.06
	• I had some waking nightmares about what it might mean for my partner to give birth.	3	10.05
	• Thoughts about childbirth were often about uncertainty of when it would begin.	3	2.01
	• Even to focus on motivation for my wife, from many I have heard that they want to leave right in the middle of everything, to pack up and go home, I saw it as a challenge that we would not end up there.	2	2.04
	Descriptions reported by study:		
	• The fathers had to take more responsibility for the chores at home and they felt frustrated when this affected their work.	3	10.07 3.01
	• One strong feeling that was described was fear, and the fathers revealed fear that their babies would be or become ill, and fear of what may happen if the baby was malformed or ill. If their partner was ill during pregnancy, the fathers feared that the health of the baby might be affected. They also described fears for the act of childbirth itself and possible complications, even if they tried not to think about it.	3	3.02 3.04 1.01 2.01
	• The thought of not arriving at the delivery ward in time, and having to deliver the baby themselves was described as a feeling of insecurity. This sometimes imposed feelings of doubt about their own abilities and insecurity about their new roles.	3	1.09 2.04
	• They sometimes felt excluded and lonely during pregnancy and childbirth. Support from healthcare professionals was important for the fathers to be able to handle their feelings and to act supportive to the woman during pregnancy and childbirth.	3	9.01
Eriksson, C., Salander, P., & Hamberg, K. (2007)	Participant quotes:		
	• that something might happen during the birth that would result in my wife or child being seriously injured or dying	412	1.10 1.11 1.12
	• even though it was a child that we have wanted and been waiting for, I couldn't live without her	412	1.13
	• being left so totally to other people's judgments was what really scared me the most	412	9.02
	• that I had to watch the person I love suffer without being able to do anything about it		1.03
	• my greatest concern was that I wouldn't be as calm as I thought I had to be, that I might flip out, faint, or wet myself	412	2.05 2.07
	• I was also afraid that I would be disgusted, that the things I would see during the birth would ruin my desire for sex	412	2.04 2.07
	• I probably thought about it several times a day, sometimes more; it was always in the back of my mind	412	6.07 7.01
	• when the phone rang at work, I would immediately think that something bad had happened	412	
	• I questioned my partner very carefully about what she expected of me, and how she wanted me to be during the birth	413	7.02 2.04
	• there was no reason to bring it up with her, and maybe cause her to start feeling the same way	413	
	• you realize that the woman has enough on her plate as it is, and you don't want to bother her with that sort of thing, because then she might feel like she had to take care of me as well	413	5.06
	• I believe that in that situation she wanted me to be strong, and if I had said that I was afraid, she would no doubt have felt abandoned	414	5.06 2.04
	• I don't remember being asked at the antenatal care clinic or anywhere else whether I was afraid	414	5.06
	• as a man, you're expected to be strong and support your woman, and in that situation it doesn't really seem appropriate to start talking about your own fears	414	7.03 9.01
	• I told the midwife at the antenatal care clinic that I was the one who was afraid, not her, and I noted that there were no routines for dealing with the man's fears	414	2.04 9.01

Author(s) (year)	Participant quotes and descriptions reported by studies	Page no.	Concern codes (see Table 1)
Eriksson, C., Westman, G., Hamberg, K. (2006)	Descriptions reported by study (available participant quotes in parentheses)		
	Concerns for the health and life of the baby		3.01
	• Having a diseased or handicapped child ("the child having a defect or disability," "something being wrong with the child")	114	3.02
	• Child being injured during childbirth	114	1.11
	• Losing the child during childbirth	114	1.13
	Health and life of the woman		
	• Partner would be injured during childbirth ("injurious complications")	114	1.10
	• Losing the woman during childbirth	114	1.12
	Fear related to the labour and delivery process		
	• The unknown or unpredictable course of labour and delivery	114	1.02
	• The woman experiencing pain	114	1.03
	• Fear of a prolonged childbirth ("that it should last for a long time")	114	1.01
	• Interventions during labour and delivery	114	1.08
	• Rapid childbirth	114	1.01
	Own Capacities and Reactions		
	• Not being able to give help and support ("that I would be standing there helpless and just looking on")	114	2.04
	• Not being able to endure the situation ("that I would experience the childbirth disgusting")	114	2.06
	The woman's capabilities and reactions		2.07
	• Fear of the woman not being able to "cope" with the situation ("how my partner should react and behave")	114	1.05
	• The woman not having enough physical strength		1.01
The professionals' competence and behavior	114	9.02	
• Fear of not receiving sufficient medical care	114	9.01	
• Not being treated respectfully by professionals			
Fenwick, J., Bayes, S., & Johansson, M. (2012)	Participant quotes:		
	• I felt rather guilty about being a little shocked and maybe even worried and upset at finding out that we were pregnant because that sort of seemed an unworthy thing to think but an honest emotion at the time.	5	4.01
	• I was sort of looking at it thinking alright yeah you've had the best part of four, five, six months to get organised and get your shit together and you haven't.	5	10.06
	• I was worried 'cause I actually find children quite irritating... lots of thoughts during the last three weeks. I don't actually want this to happen anymore. I like my life. I like where my priorities are. We're building this great garden and renovating our house and we actually really like our life... everyone said "your life's going to change" and I was so sick of people telling me that... it's like you know shut up, piss off and leave me alone.	6	7.06
	• We've had a few blow ups, just due to my irresponsibility. I've been sailing a bit. Sometimes she thinks I'm putting the yacht before her. I try to (sail) as much as I possibly can because surely I won't be able to do it at all. So I've been a bit selfish, I don't know if that's a primal thing or whatever. Maybe I'm a bit ape man about it, getting as much in as I can before crunch time.	6	7.07
	• Well obviously you're not the priority and that's fair enough but sometimes you feel like you're just sort of like barely even in the room.	6	9.01
	• I don't know from a male perspective it is like you always feel it's got nothing to do with you at all. You feel left out. You know you can't carry the child or birth the child but you go in there and you just sit on the side and that's it. They don't really tell you what's going on unless you ask. I don't know, it's just not really set up for a bloke at all. It was pretty much like I didn't exist. It was insulting.	6	9.01
	• yeap she wants a natural birth again. I think she just wants a complication free, natural as you can get birth. I wish she would at least have gas this time, just anything... but she won't.	7	1.01
	• I squirm at the operations... Barbara's really concerned about all that. She's starting to feel that she needs a backup person and that hurts me as well....	7	1.03
	• I squirm at the operations... Barbara's really concerned about all that. She's starting to feel that she needs a backup person and that hurts me as well....	7	2.04
	• I squirm at the operations... Barbara's really concerned about all that. She's starting to feel that she needs a backup person and that hurts me as well....	7	2.06
	Descriptions reported by study:		
	• Men articulated how career, house and travel plans were disrupted.	5	7.06
	• Concerns about how a pregnancy would affect their relationship with their partner and threats to financial security were also responsible for generating 'mixed feelings.'	5	6.01
	• The 'looming' birth resulted in the re-emergence of mixed feelings and/or a sense of anxiety. For some men this was related to their sense of lost freedom and overwhelming feelings that their life would never be their own again.	6	10.01
	• Having a healthy baby was a priority as was a complication free labour.	6	7.07
	• The 'looming' birth resulted in the re-emergence of mixed feelings and/or a sense of anxiety. For some men this was related to their sense of lost freedom and overwhelming feelings that their life would never be their own again.	7	3.01
• Having a healthy baby was a priority as was a complication free labour.	7	1.01	

Author(s) (year)	Participant quotes and descriptions reported by studies	Page no.	Concern codes (see Table 1)	
Finnbogadóttir, H., Svalenius, E., & Persson, E. K. (2003)	Participant quotes:			
	• ... for me it has been enormous, hard to realize that now, that whatever I do it isn't good enough. I can't predict anything because my wife is changing every day. I can't predict. It's absolutely impossible -- it has created some kind of chaos for me.	99	5.07 5.04	
	• of course it's hard, it influences one's sexual life. Our life together is not the same now at the end of the pregnancy. It feels strange. Then it's me, I don't really feel it's fun.	99	6.05	
	• but, because I want to relieve her, both physically and psychologically, in the end it will mean a lot of responsibility for me. I feel, sometimes, that I'm inadequate, that I must put the brakes on a little bit ...maybe I should slow down with my physical training to take more care of my woman so she doesn't think that I disappear too much I really don't know how to tackle it, I have felt, partly due to my father and my father-in-law, that there is a big generation gap, that I can't really feel like I can communicate with them about my problems. Oneself, strength and male responsibility would be questioned, I haven't, you know, wanted to touch this.	99	5.07 7.03 7.07	
	• but, then you can't get away from these small nervous elements which come the whole time, I mean the moments of insecurity in the matter about exactly how one should deal with it, partly my woman's fear, on different occasions, about the pregnancy itself, but also about what is coming. How one should practically manage everything that will come afterwards and will be for the rest of my life.	100	7.01 8.02 8.04	
	• then I got such a suffocating feeling about becoming a father. I got it continuously. I got a feeling that I would always have a bad conscience. If I'm doing something just for myself.... This is a scary thought I can't live that way, I can't give up MY life.	100	7.07	
	• I feel that there is maybe not so much cuddling in bed as there was before....She hasn't as much desire now and then she is often tired.	100	6.05	
	• she said hallo to my wife and turned her back on me so I had to push myself forward, in front of her, so that I could shake hands with her as well. For the first five minutes she only looked at my wife and spoke to her alone 'What do you (singular) think?	100	9.01	
	• I have noticed that my friends and I have drifted so incredibly far apart from one another during these nine or eight months, yes it actually happens, it's tedious, but they will come back when they are in the same situation hopefully.	101	8.09	
	• there was something in the breadwinner factor that made me feel that I should change my priorities. It happens even before the baby is born. We are building our 'nest' and making more rational decisions then before.	101	8.01 10.04 10.06	
	• But I have to say that one's alcohol consumption has drastically decreased, because you don't share a bottle of wine with oneself.... but what I'm more worried about are these external things which one can't influence, like society is the whole time what it is..... Now we must have a station wagon with, yes a baby-pillow and space for a dog and it must be collision reinforced and everything else	101	7.04 8.01 10.06	
	Descriptions reported by study:			
	• During the pregnancy it was usual that the men were anxious about both the mother's and the baby's health.	101	3.01 5.01	
	Gage, J. D., & Kirk, R. (2002)	Participant quotes:		
		• I went down to the store the other night and I thought, shit. I didn't have my seatbelt on, and I thought; hell, if I was to go through the window... that's your father gone; that kid would grow up without a father.	18	7.04
• I've had the room set up for months.		18	10.06	
• Made "trial runs" to the hospital.		18	10.06	
• We've been too busy getting all the physical stuff done ... and haven't thought much about actually being a dad ... past the labour and the birth.		19	8.02	
• I don't remember my father saying, "I love you"... I hope to show a bit more of my emotions, like saying to a son, "Hey, man, I love you."		19	8.03	
• We saved as much of my wife's wage as we could in preparation before she finished work.		19	10.02	
• If you choose to breastfeed, it really only leaves one person left to work.		20	10.02	
• I put my foot down and I said, "Excuse me, I'm the father. I'll be choosing the name ... me and my wife.		20,21	8.09	
• Every professional has good advice that slightly conflicts ... It's amazing ... the pregnancy police are everywhere, every corner - it's incredible"			7.09	

Author(s) (year)	Participant quotes and descriptions reported by studies	Page no.	Concern codes (see Table 1)
Gervais, C., de Montigny, F., St-Arneault, K., & Lacharité, C. (2015)	Participant quotes:		
	• What she expects me to do... And me, what should I expect, when she gives birth... What is my place there? Where is the line I should not cross, what should I do, and what shouldn't I do [for her]?	130	2.04
	• He [the doctor] has no time to waste. You can see that the office is full. You can feel it. You do not want to waste his time. And Lucie, given what she is experiencing, I want him to take care of her needs.	130	9.03
	• The father, they do not look at him...if you do not ask them any questions, they will not speak to you.	131	9.01
	• For sure, we have a background role. The mother is primordial and that's normal. But we still have a supporting role, and sometimes I think we do not do a very good job of it.	131	5.07
Gerzi, S., & Berman, E. (1981)	Descriptions reported by study (available participant quote in parentheses):		3.02
	• Fears of the birth of a defective or retarded child.	263	1.10
	• Damage to wife or child during delivery.	263	1.11
	• Doubts whether this was the right timing to have a child.	263	4.01
	• Feeling that 'children are not man's area'.	263	8.02
	• Wife's irritability and demandingness.	263	8.06
	• Sexual distancing between him and his pregnant wife.	263	5.04
	• Discomfort with medical nature of childbirth ("Anything related to disease bothers me").	263	6.05
Gottfredsdóttir, H. (2005)	Participant quotes:		
	• When you are going through this for the first time then you are a bit focused on, you know... what can go wrong, you need to, or anyway I do, always prepare myself for the worst... although it is not a pleasant thought... well you never know what to expect...	131	7.01
	• When you come home with the baby ... you know, do I take it out for a walk in the pram? ... which do I use, a shower or a bath? ... I mean, I have read a lot about how the newborn senses the world and all that but this practical information ... you know, is it okay to keep it in your bed? Is it supposed to be fed ten times a day of five times? ... I don't know ... I have spent a lot of time listening to information concerning pregnancy ... I am becoming a specialist in pregnancy care but I know nothing about what to do...	131	7.02
	• I always find that it is taken for granted that you will attend the birth ... it's never a choice ... I myself have been very ambivalent whether I wish to attend. Just because I am not sure that I will be able to manage...	131	7.08
	• It is becoming larger ... the family ... that is permanent. You feel that you are ... yes, as if you are no longer the head of the family ... you feel that your importance is decreasing ... even my friends, they will now come and visit her ... and the baby, of course.	131	8.06
	• I always find that it is taken for granted that you will attend the birth ... it's never a choice ... I myself have been very ambivalent whether I wish to attend. Just because I am not sure that I will be able to manage...	131	2.02
	• It is becoming larger ... the family ... that is permanent. You feel that you are ... yes, as if you are no longer the head of the family ... you feel that your importance is decreasing ... even my friends, they will now come and visit her ... and the baby, of course.	132	2.06
	• It is becoming larger ... the family ... that is permanent. You feel that you are ... yes, as if you are no longer the head of the family ... you feel that your importance is decreasing ... even my friends, they will now come and visit her ... and the baby, of course.	132	6.02
	• It is becoming larger ... the family ... that is permanent. You feel that you are ... yes, as if you are no longer the head of the family ... you feel that your importance is decreasing ... even my friends, they will now come and visit her ... and the baby, of course.	132	8.02
	• It is becoming larger ... the family ... that is permanent. You feel that you are ... yes, as if you are no longer the head of the family ... you feel that your importance is decreasing ... even my friends, they will now come and visit her ... and the baby, of course.	132	8.02
	• It is becoming larger ... the family ... that is permanent. You feel that you are ... yes, as if you are no longer the head of the family ... you feel that your importance is decreasing ... even my friends, they will now come and visit her ... and the baby, of course.	131	3.01
	• It is becoming larger ... the family ... that is permanent. You feel that you are ... yes, as if you are no longer the head of the family ... you feel that your importance is decreasing ... even my friends, they will now come and visit her ... and the baby, of course.	131	5.01
	• It is becoming larger ... the family ... that is permanent. You feel that you are ... yes, as if you are no longer the head of the family ... you feel that your importance is decreasing ... even my friends, they will now come and visit her ... and the baby, of course.	131	8.01
• It is becoming larger ... the family ... that is permanent. You feel that you are ... yes, as if you are no longer the head of the family ... you feel that your importance is decreasing ... even my friends, they will now come and visit her ... and the baby, of course.	131	10.03	
• It is becoming larger ... the family ... that is permanent. You feel that you are ... yes, as if you are no longer the head of the family ... you feel that your importance is decreasing ... even my friends, they will now come and visit her ... and the baby, of course.	131	9.01	
• It is becoming larger ... the family ... that is permanent. You feel that you are ... yes, as if you are no longer the head of the family ... you feel that your importance is decreasing ... even my friends, they will now come and visit her ... and the baby, of course.	131	5.07	

Author(s) (year)	Participant quotes and descriptions reported by studies	Page no.	Concern codes (see Table 1)
Grand, R. (2015)	Participant quotes:		8.04
	• Well I think just the fear of the unknown, never been a dad before, and you see these things on the television with all the stress with kids, and will my relationship with my wife change, the most terrifying thing for me would be am I capable of being a good father.	77	6.02 8.03 8.02
	• I would describe those fears as fears as fears of uncertainty, and inadequacy, the baby's health, the wife's, health, and things out of my control really bothered me.	77	3.01 5.01
	• I do not do well with blood and surgery rooms.	77	2.06
	• I'm not sure I can handle this, I want to support my wife, but I am concerned that the sight of blood will make me pass out.	77	2.07 2.04
	• I do not want nurses making decisions if there is no doctor present.	77	9.02
	• You know in my point of view, I felt like I needed to read every book and take every class, we have taken fifteen classes, probably three or four of the classes had some overlap, but you needed to take the class before you took the class, but when it comes to it, intuition and instinct will be our best resource, so anything that helps to raise awareness would be helpful.	79	7.08
	• I think maybe I am a little bit of an over-preparer because I have been very anxious about getting everything ready, all the products that the baby needs, and just wanting to provide a safe environment for him. Like I said it's a little stressful getting that all together. I also think that worrying about how it's going to change my relationship with my wife kind of changed my approach. Soon it's not going to be us two, but us three.	79	10.05 6.02 10.05
	• getting ready for the baby is a bit challenging and overwhelming		
	• You never want to be like your parent, and also just bringing another human being into the world generates some fear.	80	8.03
	• Her family is very aggressive and told me they were coming whether you want us to or not; wild horses could not keep us away is what my mother in-law told me ... My wife's family made it more difficult for me because they are somewhat clannish.... I just think it contributed to my fears a little bit.	84	8.09 7.06
	• What's interesting is some of the fears I can come up with is the life transition that happens, not being able to go out as much, or the sleep deprivation thing, or even just the differences of opinion with my wife, like circumcision, or other things that come that could potentially cause a rift between me and my wife. I guess I have fears about how my wife and I would agree about stuff.		7.05 6.02
	• I am concerned about my wife changing her feelings about me, will she focus solely on the baby.	85	6.02 5.04
	• My wife has always been extremely mellow, so mood swings really threw me off. • I would say the biggest fear we have is making sure we have a plan in case there is too much pain. She does not have high pain tolerance but she is wanting to have a natural childbirth and my concern is after researching there is no way you can do that without suffering through the process and feeling miserable so I just want to make sure that all of her needs are met. I mean that plan in place and that comfort for my wife; we have our own Doula picked out. The biggest concerns are whether or not we will have Cesarean birth or complications during the delivery.	85	1.03 1.07 1.01 5.03 2.04
	• My concerns about the childbirth are not sure how my wife is going to handle it. She does not have the highest pain tolerance, so I am not sure how she is going to handle that aspect of it. She can get stressed out little bit, and when a I try to help her when she is stressed out I get a little anxious, too. That's why I am kind of fearful we are going to have a Doula; that should help, The Doula is a kind of advocate for both of us. My fear is more for my wife's stress or anxiety. I just want to be able to calm her down.	86 86 87 92 93 93	3.03 3.02
	• I am especially afraid my wife miscarrying.		
	• My fears were generated from family heredity, conditions that are passed on to the baby.		

Author(s) (year)	Participant quotes and descriptions reported by studies	Page no.	Concern codes (see Table 1)
Greer, J., Lazenbatt, A., & Dunne, L. (2014)	Participant quotes:		
	• ...that's what this whole thing is all about, isn't it. Nobody knows what'll happen or how it will go.	97	1.02
	• My first relationship broke up because of the birth... and [led to] parenting difficulties and postnatal depression.	97	6.01
	• I'm going to stand like a spare tyre at the side of the bed... you know. Holding her hand like but there's nothing much I can do for her.	97	5.03
	• Yes... there is more pain after a caesarean and then I can help her all the time... shopping and cooking... with the baby and get her to rest plenty. I have not to go to work for four weeks and I can help her very much... but I can't help her with the pains before the baby comes.	97	2.04
	• Everybody tells you something different... and you don't know what to follow... it's all conflicting sort of stuff... and you sort of sit and go... what do I do here.	98	2.05
	Descriptions reported by study:		1.03
	• Partner's mental health would suffer as a result of a traumatic birth.		7.09
	• More than half of the men (58%) feared they would be unable to provide adequate support.	97	5.03
	• All participants were motivated by a desire for a safe birth, a good birth experience and to be good parents. Fears associated with this dimension were related to uncertainty about the best way to achieve this and fear of making a wrong choice.	98	1.04
	• Partner or baby would be injured as a result of the birth.		2.04
	• Men feared that their baby was too big to be born vaginally.		9.02
	Hallgren, A., Kihlgren, M., Forslin, L., & Norberg, A. (1999)	Participant quotes:	
• I want to be as big a support as possible for her.		9	2.04
• You don't know how you will behave, you might get absolutely crazy.		9	2.06
• You want to be the best daddy in the world, that's how you think, but if you are not that kind of person now, what says I'll become such a one later?		11	2.07
Condensed statements:			8.03
• Unknown. Unpredictable process		10	1.02
• Questions own ability. Questions own competence. Worry about own competence. Some worry about supporting competence.		10	2.04
• Worry about complications		10	1.01
• Helpless supporter		10	2.05
• Hide feelings important		10	5.06
Descriptions reported by study:			2.02
• Men expressed wishes of involvement in the coming childbirth as well as fear of participating.		12	2.01
• For one participant, childbirth was not expected to be possible to manage, neither before nor after childbirth preparation and feelings of worry, mistrust and expectations of helplessness were expressed.			2.05
• Worrying thoughts about the death of the baby.	12	2.06	
• Restricted freedom in the future.	12	1.13	
Johansson, M., Edwardsson, C., & Hildingsson, I. (2015)	Participant quotes:		7.07
	• [I'm] not sure I wanted this	15	4.01
	• My Partner's wellbeing	15	5.01
	• Very demanding [because of] my partner's hormonal changes—certainly normal, but much more than I could have imagined.	15	5.04
	• We are not alone any longer, [and I have a] bigger responsibility; I'm more aware of my partner's safety	15	8.01
	• I realize now that I'm going to be a father, and I have both good and bad feelings about it; how will this influence my life?	16	4.01
	Descriptions reported by study:		8.04
	• Loss of control was also experienced alongside feelings of confusion, not understanding, impatience, indecision, and not being prepared for the pregnancy and fatherhood.		4.02
	• Worry about partner and baby, expressing this in terms of concerns about a miscarriage or that there will be something wrong with the baby and worry about partner wellbeing.	15	8.02
			5.01

Author(s) (year)	Participant quotes and descriptions reported by studies	Page no.	Concern codes (see Table 1)
Johnsen, H., Stenback, P., Halldén, B-M., Crang Svalenius, E., & Persson, E. K. (2017)	Participant quotes:		
	• You feel anything can happen despite all the preparations.	228	7.02
	Descriptions reported by study:		
	• The fathers expressed the need for control during the pregnancy, which they did not always have. If their partner has suffered physically because of the pregnancy, they could not necessarily alleviate their suffering, nor could they always alleviate emotional distress. These situations produced feelings of inadequacy.	228	5.03 5.07
	• Fathers expressed concern about the baby being normal and the risk of external factors affecting the pregnancy.		3.01 5.02
	• Although being given information was considered to be an effective coping strategy for reducing insecurity, the fathers also expressed feelings of anxiety caused by potential risks.	228	7.01
Joy, R., & Paul, S. (2012)	Participant quotes:		
	• Too much expense is there now... for scan and all... but I do my maximum.	87	10.01
	• My wife has so much difficulty now... I'm feeling very sad...while... seeing her difficulties now I can't sleep properly, I get irritated easily now...	87	5.01
	Descriptions reported by study		
• The tension is mainly about financial matters, health of the mother and the baby and about the outcome of the pregnancy.	87	3.01	
Kao, C-H., & Long, A. (2004)	Participant quotes:		
	• I don't know how to interact with my child when she's born. ...I've never been a father, so I feel quite terrified.	64	8.06 2.04
	• I feel so panicky because I don't know what to do during the labour and delivery. I have no idea what kinds of situations I am going to meet...	64	1.02 2.05
	• I work all day, and probably, when the baby arrives, I will be up and awake two or three times at nights. From others' experiences, I will have to get up to feed the baby during the night. Also, I'm afraid of the baby crying and don't understand the reasons for their crying. So, I'm worried and afraid too...	64	8.06 10.07
	• If the baby isn't healthy, I'll be worried because I don't know if it's good for a baby to grow like that.	64	3.01
	• She became angry very easily.... I feel bad when she keeps going on at me about this. I just go outside and have a smoke.		6.01
	• I think of the child's future most of the time. I wonder what I could do to add to her life. I'm talking about her education and material things...I should plan beforehand. I'm actually my own mirror in the sense that we didn't have pleasant environment in our childhood, so we don't want to impose such pressures on my kid just like the parents in the past.	65	5.04
	• Money is also very important. We therefore have to save as much as we can. I need to work as hard as possible. Maybe I'll need some investments as well.	66	8.03
	Descriptions reported by study:	66	10.04 7.01
	• The expectant fathers had many worries and were driven by many negative emotions, such as nervousness and confused thoughts and feelings.		3.01 5.01
	• Health of wife and fetus: being powerless to control these unknown situations...	64	5.07
	• They had certain expectations about the role they would play in relation to being a first time father and also a different type of husband to their wife who was soon to become a new mother. They doubted their abilities to carry out both of these functions successfully.	64	6.02
	• For many, a conflict existed between wanting to accompany their wives (especially if their wives longed for their companionship), and fearing ramifications of observing birthing process.	64	6.04 2.02
	• Less time to communicate with wives. They feared that this would affect interaction between themselves and their wives and, ultimately have a negative influence on their relationship.	64	2.07 6.02
• With the extra responsibilities they would lose their individual freedom	64	6.03 8.01 7.07	

Author(s) (year)	Participant quotes and descriptions reported by studies	Page no.	Concern codes (see Table 1)
Kulpa, D. W. (1992)	Participant quotes:		4.01
	• I was happy but shocked. I was a husband, and now soon-to-be father. I didn't know if I was ready for all this responsibility.	86	8.01 8.02
	• I am not the type to worry, but during her pregnancy I worried about everything.	88	7.01
	• I didn't know what to expect. I never did this before.	88	1.02
	• I was scared as hell that she would fall or get really sick.	88	5.01
	• I thought about our baby being handicapped.	88	3.02
	• I was her Rock of Gibraltar.... At times I felt extremely frightened and worried, but I would tell her very little.	81	5.06
	• I worried a great deal, but I never shared my feelings with her because I didn't want her to worry.	90	5.06
	• I wish in our birthing classes we had an opportunity to share without our wives.	91	7.03
	Levenstein, A. (1992)	Participant quotes:	
• There's a good deal of stress and anxiety wondering about a lot of things: the change in our lifestyle, economic matters, our changing roles, who's going to be responsible for what, whether anybody is going to be responsible. There's also concern regarding the baby's health, what problems might come about, whether the condo will be big enough, and do we have to look for a new house.		44	10.01 6.04 3.01 10.05
• I'm feeling a lot of pressure as far as finances. I'd say right now, that's the major concern. Without my wife's income for those three months or whatever she takes off, I wonder what I'm going to do			10.02
• The responsibilities are a lot. We understand what is expected of us.		47	10.03
• I just have to be more careful and try to change my ways to keep us both happy. However, I don't like to hurt her. It doesn't make me feel good when I do. It doesn't matter where I touch her, I'm going to touch her the wrong way. She's more sensitive. Even if I hug her sometimes it's too hard. I don't do it on purpose but it just happens. We both understand that changes are going on and we just have to learn how to live with that. Cope. That's about it.		51	10.04 8.01
• I wouldn't want to contribute to any problems by over doing sexually or any other way. Caution is the word.			6.05
• I really didn't enjoy sex after about the middle of the seventh month; to me it wasn't what it should be. I didn't feel as aroused with my wife who has gotten quite big.		63	3.06
• I'm always concerned that I have enough time to spend with my wife, let alone now to spend with her and the baby. I'm worried about fitting more into less time.		64	6.06
• I was looking forward to more vacations like our honeymoon. But you can't have those when you have a little tyke to worry about. You can't go rock climbing with a baby on your back. Well, I could, but my wife wouldn't let me. And then I'm thinking about getting a bigger motorcycle so we could... well, I have to do some changing - just enough to accommodate the baby.		65	6.03
• We are getting into issues that we never had before. I think Jane should try breastfeeding. But she doesn't want to be tied to the baby 24 hours a day. To which she replied, "I don't have to do anything." But it's something I feel strongly about. The marriage is changing because we are now becoming parents.		65	7.06
• I've lost my bachelorhood in going from couplehood to parenthood. It's got its ups; its going to have its downs		66	6.01
• If you are taking care of your wife, taking on the responsibilities and burdens of things as well as living your own life, it does tend to be draining		66	7.07
• Probably I'll turn out like my Dad. So I get this feeling the poor kid is going to be hiding behind Mom saying, "Keep Dad away from me."		68	5.07
• She said when the baby comes I'm not going to get as much of her attention as now but I shouldn't take it personally. That's happening already.		75	8.03
• There is always the chance that something is wrong or could go wrong. It happens all the time (referring to having a physically or mentally impaired baby).		78	6.02 3.02
• I'm worrying about being careful with the kid; that I am going to break him or something. I could start getting rough, I guess.		87	7.02 8.06
• (My parents) suggested my sister, who is out of work and needs a place to live, spend a few months with us. My response was, "NO! I would mind." We're going to have a baby. We've got a lot going on. My parents were very disappointed in me.		97	8.09 1.02
• This is a situation where you have no control. You can go and prepare with each other for the delivery. But you cannot possibly foresee how it will be.		104	1.01
• I worry about the event of giving birth; the safety of my partner and the baby, and that the baby is healthy and my partner remains healthy.		108	1.10 1.11
• I'm not sure I'm cut out to be of much help there at the delivery. But I'll try.		108	3.01 5.01
• I resented that the doctor docused totally on my wife when I went with her to the doctor. He only seemed interested in talking with her.		110	2.04 9.01

Author(s) (year)	Participant quotes and descriptions reported by studies	Page no.	Concern codes (see Table 1)
May, K. A. (1982)	Participant quote:	340	7.01
	<ul style="list-style-type: none"> • There are so many other things playing along, too many other issues. You will be sitting there thinking, "how is this child going to be?" Then all of a sudden you're thinking, 'what about the mortgage?' "how is this class going to be?' How's this job going to be a year down the line?' You're preoccupied with all these things. 		8.04
			10.01
			10.08
Pilkington, P. D., & Rominov, H. (2017)	Participant quotes:	211	3.03
	<ul style="list-style-type: none"> • The fear of miscarriage has really put a major buzz kill on the whole thought of bringing a little 'us' into the world. 	211	2.01
	<ul style="list-style-type: none"> • I'm nervous, I should probably be sleeping but my mind is racing, my wife is 39 weeks and we are getting induced in the morning around 7 . . . Wish me luck guys. 	211	8.05
	<ul style="list-style-type: none"> • I'm getting fixated on the thought that someone's going to just walk by and smack our baby on the top of the head. I will do my best to protect him or her, but there's only so much I can do, and I can't be there all the time . . . I don't know how to shake this feeling . . . I'm increasingly unable to stop worrying about it. 	211	3.07
	<ul style="list-style-type: none"> • Now that I know it's a girl, I'm nervous as can be. Boys are easy, girls are terrifying. My wife couldn't be more excited (she's one of 4 girls) but I feel lost (one of 4 boys). . . . 	211	3.02
	<ul style="list-style-type: none"> • Our genetic counselor came in after the test saying everything was good." She didn't lead us to believe anything was wrong or there was anything to worry about. However, after doing some research online, I can't help but be a tad bit paranoid." 	211	9.04
	<ul style="list-style-type: none"> • I've read up through month 3 in all the books, watched a ton of videos on what the first appointments are like, but was hoping to get some reassuring/calming words from actual people who have been through it. . . 	211	8.03
	<ul style="list-style-type: none"> • I don't know how to raise a child! My biggest fear my entire life is I wouldn't be a good father and my child would have to go through some experiences I did. 	211	10.06
	<ul style="list-style-type: none"> • The thing that's making me nervous right now is just trying to get the house in order. 	211	7.06
	<ul style="list-style-type: none"> • Most of what worries me are practical things, and questions like 'Will I ever have the time to do . . .again' . . . I'm afraid of having the rug pulled away from under me, just when I have a good thing going. 	211	8.09
	<ul style="list-style-type: none"> • told the first family member-her mum. It was at 9 weeks. It went pretty good but now I just realized I'm nervous about them jumping into our lives too much. 	211	10.05
	<ul style="list-style-type: none"> • We're going to find a place together ASAP although we are getting a little bit worried about money. 	211	10.07
	<ul style="list-style-type: none"> • I had a lot of anxiety about telling the boss but I was just being paranoid. He's really excited and supportive. 	211	8.10
	<ul style="list-style-type: none"> • I'm an expecting dad here, and I'm a little worried about my dog once the baby comes. In the past, every toddler my dog has come in contact with has attacked her and she's become very skittish towards them . . . Has anyone had a similar experience with the family dog, and how did the dog react once the baby was born? 	211	3.06
	<ul style="list-style-type: none"> • The whole first trimester, we have been terrified to have sex, we're worried about knocking something loose. I think it's because it took us so long to get pregnant. Anyone else go through this? 	211	4.02
	<ul style="list-style-type: none"> • Not scared of having a kid, although I am terrified, I'm scared of her hating me. We are both 20 years old and not ready. She is being incredibly distant so I'm attempting to give her the space she needs. 	211	6.01
	<ul style="list-style-type: none"> • I can't stop worrying about my wife. She is 12 weeks along. Smooth pregnancy so far but everything is getting to me. I don't want to put any pressure on her so I just keep it to myself. 	211	5.01
			5.06
			5.02

Author(s) (year)	Participant quotes and descriptions reported by studies	Page no.	Concern codes (see Table 1)
Rominov, H., Giallo, R., Pilkington, P. D., & Whelan, T. A. (2018)	Participant quotes:		
	• The doctors and nurses aren't necessarily keyed toward you as a dad . . . Maybe that's partly a social stereotype that you're not going to be the main caregiver.	460	9.01
	• . . . when you first find out that you're pregnant, what sort of information and support is available? People do not talk about it, you're not meant to say anything. That was a struggle for me.	462	7.03
	• My wife has that severe morning sickness. For me, it probably would be worthwhile having some support, especially going through a really tough pregnancy. I know there are people who love being pregnant and the whole family loves it, but not us! It's great that we know there is a baby coming, obviously, but during it, it's pretty brutal.	462	7.03
	• There are just so many things out there, which is a good thing, but also there is so much out there that you are like, "Which ones do I go to? Which ones are reputable?" For a first-time parent, it can be a little bit overwhelming.	462	7.09
	• I guess if you're attending them [antenatal appointments] as a couple ...it would be good if it was more of an inclusive thing, if I mattered too.	463	9.01
	• One of the things that sits in my mind... potential for problems during birth, and potential for problems straight after birth with the newborn child... that's the information that I find is lacking in the prebirth phase.	464	1.01 3.01
	Descriptions reported by study:		
	• For several fathers, finding out that their partner was pregnant was a time of excitement, but also a time fraught with worry. Fathers discussed wanting more information about this stage of pregnancy, as well as additional support for their emotional wellbeing, due to the sense of uncertainty in the first trimester.	462	7.01 7.03
	Sartori, J., Petersen, R., Coall, D. A., & Quinlivan, J. (2018)	Participant quotes:	
• She seemed to be sick forever, throwing up all day, every day. I guess I was sympathetic (sic) at first but then had enough. I'm working hard and when I'm home need to rest.		255	10.07 5.07
• I had to work and she kept asking me to stay with her but I can't.		255	10.07
• I felt kind of helpless watching her being so sick all the time.		255	5.07
• She became really clingy and depressed. She wasn't the same. I'm hoping she (sic) go back to how she was before. But now she seems to cry all the time.		255	5.03
• I was very worried because she was unwell so nearly three months and not eating and worried it could harm the baby.		256	3.04
Sercekus, P., Vardar, O., Goral Turkcu, S., & Ozkan, S. (2020)	Participant quotes:		
	• If she has bleeding, will they be able to stop the bleeding? Will something happen to my wife because of this? I am afraid of these.	232	1.01 1.10 1.11
	• In fact, the thing I am most afraid of is, how should I know, that when my infant is born, will he/she have normal hands and feet? Would there be abnormal situation.	232	1.12 1.13
	• I am thinking that my wife could not overcome a painful process. I am afraid that she would not be able to stand the pain.	233	1.07 3.02
	• They said that nurses press down thoroughly on a woman's abdomen during childbirth. In short, I am afraid due to this. I am afraid that they would torture my wife	233	1.03 9.02
	• I am inexperienced. I do not know what I would do there. If I engage in a behavior outside of my own wishes or if I do something wrong, I could damage even more rather than being a support.	233	2.07 2.04
	• There is fear since it is our first child and we do not know what will happen. however, we do not know why we are afraid.	233	1.02

Author(s) (year)	Participant quotes and descriptions reported by studies	Page no.	Concern codes (see Table 1)	
Spektor, D. J (2007)	Participant quotes:			
	<ul style="list-style-type: none"> • Slightly scared, I mean we had been preparing for, for a long time. But um, but when it finally happens then it's like suddenly oh wow kind of there's no going back now um, so yeah I think excited but apprehensive, anxious um, and certainly that that kind of sense of urgency that sort of now things must be done 	38	4.01 10.06	
	<ul style="list-style-type: none"> • It was a stressful time... I wanted to help my wife when she was going through, through that, that early symptoms of vomitings, and other things and uh, but yeah, I want to comfort her, and I was going to comfort her, but she was uncomfortable, but she wasn't... accepting my sympathy or anything, so it's like two things, it's like... she's happy I'm there but in a way she would rather I'm, I'm not there, just that kind of feeling. 	41	5.07	
	<ul style="list-style-type: none"> • A lot of sensitivity in everything because of her emotions which is like a rollercoaster, just up and down, and not being able to understand the new person like this, seeing that she is changing and you have to adjust and I have to act like a person who has had this experience, and say look just give her time... it was quite a very stressful time. 	41	5.04 3.01	
	<ul style="list-style-type: none"> • You know being afraid of what would have happened to the baby, being afraid about our financial situation, being afraid about whether I was going to be a good father or not. 	42	10.01 8.03	
	<ul style="list-style-type: none"> • There was quite a few anxieties there, it's it's like uh, oh my God, another person to look after, what if, what if I don't do it right, um will I be a good Dad, you know there's there's all those questions... I'm gonna become a Dad, and how do I feel about it? 	42	8.01 8.03 8.02	
	<ul style="list-style-type: none"> • So all these mad thoughts. Would she be in hospital for like 72 hours or three or four days and just be in a lot of pain, and I wouldn't be able to deal with, and she'd be dis• robed and I wouldn't be able to cope with that and there would be lots of people around looking at her. I just, would feel completely helpless, and I was just thinking I want to avoid that... I don't want to be there. 	42	1.02 1.03 2.06 2.05	
	<ul style="list-style-type: none"> • We are not getting any support when it comes to the, the crunch and the crunch is that we are making contributions, unfortunately it is not being shown, because men don't complain, and if you complain then they will say you are weak, so as a result, men don't just, they just get on with it... the pressure is there, it is the only voice that isn't heard. 	45	7.03	
	<ul style="list-style-type: none"> • I forgot about myself, I was more interested in what is going on... I worked late, I was, um actually sort of um lose weight, I lost weight over that period. It was sleepless night... I rarely had any sleep throughout. 	46	5.07	
	<ul style="list-style-type: none"> • Certainly my anxieties had built up, and it would have been nice to have had a forum, an opportunity to express some of them. 	48	7.03	
	<ul style="list-style-type: none"> • Midwives and health people and Doctors, I always had the feeling they were talking to my wife, all the time we was talking to them, even though I attended every single appointment with my wife. I didn't miss any of them. I was there, we were talking about it... They were always talking to my wife, they were looking at her, I would ask a question and they would turn their head towards my wife and answer it to her 	51	9.01	
	Talley, L. M. (2017)	Participant quotes:		
		<ul style="list-style-type: none"> • You've got the normal parental things that go through your head so...it was like...ok...am I going to do this right, am I going to do this wrong. 	82	8.03
		<ul style="list-style-type: none"> • Initially she had a lot of trouble with morning sickness, and so it made me have to step up big time, doing things around the house that she normally handled, and it was just very hard. So, I guess that made me a little bit, ya know, frustrated. 	83	5.07
<ul style="list-style-type: none"> • I was a little nervous. Well, I was looking for a boy, and then I got hit with a girl, and then it changed my whole world, and...it is still changing my whole world. 		84	3.07	
<ul style="list-style-type: none"> • What concerned me? Ummmm... her health and his health. That is point blank period. Making sure they are both going to be healthy. 		85	5.01 3.01	
<ul style="list-style-type: none"> • a miscarriage concerns me. Ummm... and if there was no doubt, I would definitely say something happening to lose the baby and her. 		85	3.03 1.12	
<ul style="list-style-type: none"> • Number 1 was having a complication, or just having a child with a disability, or something...ya know happening during the delivery. Ummm...I was a nervous wreck until he was born, ya know...just the fact that something could go wrong. That was the biggest concern... yeah that still bothers me...Straight across the board. 		85	1.01 3.02 1.02	
<ul style="list-style-type: none"> • The hormones...the hormones...ya know just...she ummm.... she would go from being the sweet loving wife to where I would say something and it would just get on her nerves 		85	5.04	
<ul style="list-style-type: none"> • she was not interested in sex, especially as her body started to change. The whole mental self-image deal, she just didn't feel attractive, and despite whatever I said...ya know... just kind of ticked her off a little bit, but ya know that is part of it I think. 		86	6.05	

Author(s) (year)	Participant quotes and descriptions reported by studies	Page no.	Concern codes (see Table 1)
Taylor, M. K. (1992)	Participant quotes:		
	• Anybody who doesn't tell you they feel panic, fear and uncertainty is lying.	53	1.02
	• The part about my wife being in pain through the process, that bothers me... I don't like to see anybody in pain, especially my wife... I guess I feel in a way helpless. I would like if there was something I could do to ease her pain... but I guess there's not really much you can do, just to go through it the best you can.	53	1.03 2.04 2.05
	• I figure by the time it's over I'm going to be a basket case... I'm looking forward to it, but I'm not looking forward to it because I don't know how I'm going to react. It's kind of trial by ordeal for me.	54	2.02 2.07
	• Concern about being able to "handle the blood and gore" associated with childbirth.	66	2.06
	Tehrani, S. G., Bazzazian, S., & Nayeri, N. D. (2015)	Participant quotes:	
• I worry and stress about my child and wife health status		2	5.01
• have to work and try doing extra hours		3	10.04
• During the pregnancy period my wife is really touchy and we must really consider it		3	5.04 6.01
Widarsson, M., Engström, G., Tydén, T., & Lundberg, P. Hammar, L. M. (2015)	Participant quotes:		
	• This inner anxiety about am I doing enough for my child, am I adequately prepared, am I searching for too little information, or too much information, is it good information, what do I think of all this? To sift through it all and arrive at something that suits me, or us.	1064	7.08 7.09 8.02
	• Reducing anxiety, calming things down. Because in most cases things work out well. On such forums, they don't say that things go well for 1000 and then that they go badly for one, they talk about the times things go badly, or about complications. I'm more of a reducer of anxiety.	1064	5.03
	• I try to take as much responsibility as I can concerning both her career, her working life, her social life, and as a parent, I try to help her and make things easier for her as much as possible . . . it's always a matter of a compromise.	1064	5.07 10.04 10.07
	Descriptions reported by study:		
	• Fathers, who themselves were worrying, tried not to show this to the mother, even when she was aware of his anxiety	1064	5.06

Appendix H (Systematic Review Supplementary Table 4): Detailed Methodology, Study Themes, and Fathers' Concerns Reported by Qualitative Studies (n = 41)

Author(s) (year), country	Study aim	Methodology	Participants	Study themes and fathers' concerns	Concern codes (see Table 3)		CASP R1 R2
Aponte, N (1991) Dissertation USA	To explore how prospective fatherhood represents an important transitional moment in men's normative psychological and emotional development - using object relational framework.	Qualitative descriptive. Framework analysis of semi-structured interviews (1.5 to 2.5 hours). Interviews in 3rd trimester addressed experiences of current pregnancy and questions regarding family of origin.	20 first-time expectant fathers were recruited from childbirth education classes. Age range of 19 fathers: 20 to 39 years 79% married, 21% committed relationship 100% employed	Prospective fatherhood affected men in two ways: 1) engendered an internal dialogue between self as adolescent and self as adult; and 2) intensified emotional dependence on partners, generated awe towards partner's body, and produced feelings of helplessness about being responsible for their infants. Fathers' concerns: Impact on lifestyle, loss of freedom, parental responsibilities, ability to care for infant, being a good parent, relationship with partner post birth.	6.02 6.07 7.05 7.06	7.07 8.01 8.03 8.06	8 8.5
Åsenhed, L., Kilstam, J., Alehagen, S., & Baggens, C. (2013) Sweden	To identify and describe the process of fatherhood during pregnancy among expectant, first-time fathers.	Qualitative descriptive. Content analysis of 11 online written blogs. Google search: "father blogs." Blogs were included if they had been started while fathers were expecting their first baby.	11 blogs written by first-time expectant fathers. Age range of 6 fathers: 22 to 34 years	"Becoming a father for the first time is an emotional roller coaster where the role of the expectant father is not obvious." (p. 1312) This theme was illustrated in 5 categories: 1) pregnancy, 2) new life, 3) to make the child real, 4) preparations for delivery and arrival of child*, and 5) a new role in life. Fathers' concerns: Feeling excluded from professional support during pregnancy, feeling powerless as they support their partners through pregnancy and childbirth, hoping for healthy baby, and preparing for parenthood.	1.01 2.04 2.05 3.01 8.01	8.02 8.06 9.01 10.06	9 9.5
Bäckström, C., Thorstensson, S., Mårtensson, L. B., Grimming, R., Nyblin, Y., & Golsäter, M. (2017) Sweden	To explore pregnant women's partners' perceptions of professional support during pregnancy.	Phenomenography. Semi-structured telephone interviews (30 to 60 minutes) were conducted in 3rd trimester. Open-ended questions: "What type of professional support have you received for childbirth and parenting?" "How have you perceived the support?" "What has the support meant to you?"	14 partners (including expectant fathers and co-mothers) of primiparous pregnant women were recruited by midwives in antenatal units. Among partners who agreed to participate, strategic sampling was used to ensure variation. Age range: 26 to 39 years Descriptive statistics for gender, relationship status, and employment not reported.	When partners received professional support during the pregnancy: 1) they received helpful information about supporting pregnant women and caring for babies; 2) they gained opportunities to meet other expectant parents; 3) their sense of importance was confirmed; and 4) the couple relationship was positively affected. Partners' concerns: Concerns arose when inadequate support was received by partners, or they felt excluded by professionals. Concerns also included knowing how to support their partner during pregnancy and childbirth, future impact of baby on couple relationship, making practical and economic preparations for baby, and ability to care for baby.	2.04 5.07 6.02	8.06 9.01 10.06	9.5 10

Author(s) (year), country	Study aim	Methodology	Participants	Study themes and fathers' concerns	Concern codes (see Table 3)	CASP R1 R2
Baldwin, S., Malone, M., Sandall, J., & Bick, D. (2019) UK	To develop an understanding of men's experiences of first-time fatherhood, their mental health and wellbeing needs.	Qualitative descriptive. Framework analysis of semi-structured interviews (12 to 52 minutes), using an interview guide (example questions not reported).	21 first-time fathers with children under 12 months. Study was advertised in local father's groups, medical practices, health centres, and children's centres. Contact was made by health nurses making home visits. Age range: 30 to 44 years (one father: 20 - 24 years, another: over 60 years). 90% cohabiting/married 10% not residing with partner and baby at time of interview. Employment: 90% Full-time, 10% Part-time.	Nine categories pertaining to fathers' experiences and perceived mental health and wellbeing needs were identified: 1) preparation for fatherhood; 2) rollercoaster of feelings; 3) new identity; 4) challenges and impact; 5) changed relationship; 6) coping and support; 7) health professionals and services: experience, provision, and support; 8) barriers to accessing support; and 9) men's perceived needs. Fathers' concerns: Apprehension and nervousness related to the "unknown" about becoming a father, being a good father, and worries about their partner and baby's health and wellbeing.	3.01 8.03 5.01 8.04 8.02	10 9.5
Barclay, L., Donovan, J., & Genovese, A. (1996) Australia	To identify and explore the social and relationship changes that Australian men experience during their partner's first pregnancy.	Grounded theory. Focus groups (30 to 45 minutes) conducted in 3rd trimester. Discussions were run by male midwives who were also fathers. Open-ended questions were used to encourage the men to talk about social, sexual and emotional changes in pregnancy.	53 men attending antenatal classes held by two Sydney hospitals and one community health centre. All pregnancies were the first in current relationship (one father had a child from a previous relationship). Age range 19 to 51 years Employment status not reported.	Fathers felt confused as their relationship with their partner changed and their roles in relation to the baby and other people were unclear. Their experiences were described across six categories: 1) anxiety, 2) ambivalence, 3) adjustment, 4) separation, 5) need to know, and 6) development. Fathers' concerns: Fear and concern about financial, relationship, sexual, social, and parenting issues. Sense of exclusion by antenatal staff; handling conflicting information received; worry about health of baby and mother, complications or unforeseen events in childbirth; feeling powerless to help their partner in childbirth; and seeking good medical care from professionals for partner.	1.01 7.03 1.02 7.09 1.03 8.01 2.02 8.02 2.04 9.01 2.05 9.02 2.07 10.01 3.06 10.03 6.01 6.02 6.05	9.5 9

(table continues)

Author(s) (year), country	Study aim	Methodology	Participants	Study themes and fathers' concerns	Concern codes (see Table 3)	CASP R1 R2	
Brennan, A., Marshall-Lucette, S., Ayers, S., & Ahmed, H. (2007) UK	To explore the emotional, physical, and psychological characteristics of couvade syndrome, and their explanations as perceived by men with pregnant partners.	Phenomenology. Inductive approach to thematic content analysis of individual interviews (60 to 90 minutes), conducted in participants' homes. Interview topics addressed feelings and emotions in response to pregnancy, men's experience of physical and psychological symptoms during their partner's pregnancy, and men's explanations and meanings for symptoms.	14 expectant fathers (60% first-time fathers) were recruited from the foetal medicine unit of a London teaching hospital and through a website associated with the project. Men were included if they had experienced a minimum of 4 physical or psychological symptoms of couvade. Age range 19 to 48 years 86% married, 14% cohabiting 86% employed	Three themes: 1) emotional diversity in response to pregnancy; 2) nature, management, and duration of couvade symptoms; and 3) explanatory attempts for couvade symptoms. Fathers' concerns: The demands of pregnancy (adequately supporting partner), the impact of pregnancy on relationship with partner, reaction of other siblings to newborn, financial commitments, accommodation space, responsibilities of parenthood, being overlooked in antenatal preparation, seeking good maternal care for partner, the health of partner and baby, and whether the pregnancy would go to term.	3.01	8.01	9
					3.02	8.08	9
					3.05	9.01	
					5.01	9.02	
				5.07	10.01		
				6.01	10.05		
de Brito, R. S., Soares, J. D. D., de Carvalho, J. B. L., & dos Santos, D. L. A. (2013) Brazil	To investigate the difficulties experienced by men during pregnancy, describing their reactions when facing such difficulties.	Qualitative descriptive. Thematic analysis of semi-structured interviews (interview guide and length not reported). Interviews were conducted during the 2nd or 3rd trimester.	27 expectant fathers (parity not reported) were recruited from pre-natal assistance programs of four health units. Age range 22 to 36 years 100% cohabiting with partners Employment status not reported.	The main theme was "experiencing difficulties during the partner's pregnancy." Difficulties included: mood changes in pregnant women, alterations in marital life, financial hardship, and access to health services. Fathers' concerns: Humour changes in pregnant partner (fluctuating emotions), concern about present and future relationship with partner, constrained finances, financial responsibility to support family, and concern for partner to receive good medical care.	5.04	9.02	5
					6.01	10.02	
					6.02	10.04	6
Deave, T., & Johnson, D. (2008) UK	To explore the needs of first-time fathers in relation to the care, support and education provided by healthcare professionals during the antenatal period.	Qualitative descriptive. Content analysis of semi-structured interviews (25 to 80 minutes). Men interviewed in 3rd trimester, then 3 to 4 months post-birth. An interview guide covered subjects such as men's experience of antenatal care, their avenues of support and their sources of information.	20 first-time expectant fathers were recruited by community midwives in two healthcare organisations after they identified women with uncomplicated pregnancies and provided study information for their partners. Age range 19 to 37 years Relationship status not reported. 85% employed (one student, one unemployed, and another receiving state incapacity benefit).	Themes emerging from antenatal interviews were: support, both received and available; the sources and quality of information received; and experiences of antenatal healthcare provision and lack of involvement in it. Fathers' concerns: Frustration regarding a lack of information, feeling left out of antenatal care, lacking support for oneself, and wanting better preparation for parenting an infant.	7.03		8
				7.08			
				8.06		8.5	
				9.01			

(table continues)

Author(s) (year), country	Study aim	Methodology	Participants	Study themes and fathers' concerns	Concern codes (see Table 3)	CASP R1 R2
des Robert, M., Garbay, R., Gonnaud, F., Letrilliart, L., Iwaz, J., & Ecochard, R. (2020) France	To explore first-time fathers' experiences at the announcement of intended or unintended pregnancy. Focus was on the realisation of pregnancy.	Qualitative descriptive. Retrospective study using hierarchical evocation to analyse associative networks. Men responded to the written statement: "I have just learned that my partner is pregnant - In the first few days after pregnancy announcement . . ." Men's responses involved the following steps: (i) listing words or expressions ("verbatim") evoked by the stimulus sentence, (ii) assigning numbers to verbatims reflecting order of evocation, (iii) ranking verbatims according to personal importance, iv) identifying feelings associated with verbatims as positive, negative, or neutral, and (v) connecting verbatims with lines to create networks.	44 men retrospectively described their experiences at the announcement of their partner's first pregnancy (mean delay between pregnancy announcement and interview was 8 years, maximum was 32 years). General practitioners introduced the study at the end of consultations. Age range at announcement of pregnancy: 18 to 40 years Relationship status: 27% married, 45% cohabiting, 18% living apart, and 9% civil union. 89% employed at time of pregnancy.	Five meta-themes (with 19 themes in parentheses): 1) medical (physiology, medical follow-up, pathology); 2) relational (parenthood, family, relationship with partner, child, and others); 3) cognitive (pregnancy project, personal advancement, choice, projections, uncertainty, change); 4) emotional (primary emotions, complex emotions); and 5) contextual (logistics, discovery context, temporality). Fathers' concerns (common to planned and unintended pregnancies): apprehension and worries concerning pregnancy complications, baby health, risk of handicap and miscarriage; uncertainty about future; and concerns about impact on lifestyle and housing needs.	3.01 7.06 3.02 8.04 3.03 10.05 5.02	6 8
Dolan, A., & Coe, C. (2011) UK	To explore how men construct masculine identities within the context of pregnancy and childbirth.	Qualitative descriptive. Semi-structured interviews (average length 1.5 hours) were analysed using inductively derived categories based on commonalities and themes. Participants were interviewed 4 to 8 weeks before and after the birth. Antenatal interviews began by asking about the pregnancy and reactions to becoming fathers, then discussing views about childbirth and experiences of antenatal care. Finally, concerns and hopes regarding the forthcoming birth were discussed.	5 first-time expectant fathers were recruited in 3rd trimester while attending antenatal appointments with their partners at the research site. Age range 28 to 33 years 100% in stable relationship with partner 100% employed	First-time fathers tended to concede power and control, and found themselves marginalised in the following contexts: (a) pregnancy and antenatal care, and (b) labour and birth. However, they successfully constructed masculine identities by being stoical and self-reliant in the face of adversity. Fathers' concerns: Personal physical health to meet demands of pregnancy and parenthood, increased sense of responsibility, needing more information and support, childbirth concerns, and keeping personal worries to themselves to ensure that medical professionals properly attend to partners.	1.01 7.04 1.02 7.08 2.06 9.01 2.07 9.02 3.01 9.03 5.01 10.04	9 8

(table continues)

Author(s) (year), country	Study aim	Methodology	Participants	Study themes and fathers' concerns	Concern codes (see Table 3)	CASP R1 R2
Donovan, J. (1995) Australia	To explore the social and emotional experiences of men during their partners' pregnancies. To systematically develop a substantive grounded theory, drawn from the experiences of the men during this transitional period in their lives.	Grounded theory. Four meetings (2 to 3 hours) held over 8 weeks and additional meeting post-birth. Individual interviews occurred after final meeting to consolidate the analysis and confirm accuracy of researcher's interpretations. The researchers attended other antenatal classes for men and women to gain additional data.	6 expectant fathers were recruited for the group from a general medical practice. Partners were in 2nd trimester of pregnancy (parity not reported). Meetings took place in the rooms of the medical practice. Participant ages, relationship status and employment status not reported.	Five theoretical constructs emerged: 1) ambivalence in the early stages of pregnancy, 2) relationship with baby not real, 3) how should I be as a father? 4) coping with changing roles and lifestyle, and 5) disequilibrium in relationship with female partner. Fathers' concerns: Sense of exclusion from pregnancy, not receiving sufficient support, and sense of uncertainty about future. Concerns about changes to lifestyle, partner's fluctuating emotions, and impact of pregnancy on current and future relationship including sexual relationship.	5.04 7.06 6.01 8.04 6.02 9.01 6.05	7.5 6
Draper, J. (2003) UK	To explore men's experiences of the transition to fatherhood. To explore expectant fathers' encounters with the pregnant and labouring body.	Ethnography. Theoretical analysis of descriptive categories of "pregnancy," "birth," and "early days." Semi-structured interviews were conducted twice during pregnancy and once post-birth. Data was also collected from 3 preliminary pilot focus groups (duration of interviews and focus groups not reported).	18 expectant fathers (33% first-time fathers) with partners in 2nd and 3rd trimester of pregnancy. Men were recruited from antenatal classes. Other participants were recruited by men already involved in the study. Age range: early 20s to early 50s. 100% stable relationship with partners Employment status not reported.	Men's experiences of pregnancy and birth were described as a disembodied narrative, indicating a sense of distance from the pregnancy and difficulty engaging with its reality. Pregnancy and birth experiences involved alterations in body boundaries in 3 ways: 1) boundaries blurring: two yet one; 2) boundaries moving: the growing body; and 3) boundaries broken: the labouring body. Fathers' concerns: Ambivalence to partner's changing shape, potential damage to partner's body in childbirth, and concerns about personal reactions when coping with the messy aspects of childbirth.	1.06 2.07 1.1 6.06	5 8
Drobeck, B. (1990) Dissertation USA	To investigate the impact on men of the transition to fatherhood. Study focused on first-time fathers' subjective experience of the pre- to postpartum transition to fatherhood and their interpretation of this experience.	Phenomenology. A qualitative, exploratory approach was used to gather data from two in-depth open-ended interviews (1 to 2 hours) conducted in 3rd trimester and 12 to 16 weeks post-birth. Prepartum questions addressed how becoming a father affected men personally and in their work and career; and what kind of father they wanted to be.	30 first-time expectant fathers with partners in 3rd trimester were recruited from childbirth education classes. Age range 22 to 42 years 100% married Employment status not reported.	Five major conclusions: 1) men perceived themselves as taking on more responsibility and maturing in the process of becoming fathers, 2) men took their work more seriously but also sought to balance work and family demands, 3) men developed an image of themselves as fathers during the transition, 4) the men's bond with their children strengthened over time, and 5) men gained a sense of fulfillment and purpose in life. Fathers' concerns: Taking on more responsibility, impact on lifestyle, balancing work and family, developing a fathering image (worried about whether they will be good parents), feeling unprepared for parenthood, lack of confidence performing caretaking tasks (caring for infant).	7.06 8.03 7.08 8.06 8.01 10.07 8.02	9.5 9

(table continues)

Author(s) (year), country	Study aim	Methodology	Participants	Study themes and fathers' concerns	Concern codes (see Table 3)	CASP R1 R2
Ekström, A., Arvidsson, K., Falkenström, M., Thorstensson, S. (2013) Sweden	To explore fathers' feelings and experiences during pregnancy and childbirth.	Qualitative descriptive. Written interviews were analysed using content analysis. Fathers responded to two questions: "Describe your thoughts and feelings before childbirth." And "Describe your experience from childbirth."	8 fathers (63% first-time fathers) were recruited post-birth from two maternity wards. Age range 30 to 36 years. Relationship status and employment status not reported.	Fathers have strong, mixed feelings while striving to become prepared and to participate during pregnancy and childbirth. During the pregnancy, fathers experienced desire, excitement, and joy, along with fear, frustration, and uncertainty. Being prepared gave fathers a sense of security, and feeling needed meant that fathers believed they had an important role to play. Fathers' concerns: The need to arrange many practical things, housing needs, balancing work with home responsibilities, not arriving to hospital in time for delivery, ability to support partner in childbirth, complications in childbirth, health of baby, partner's illness in pregnancy affecting baby, what might happen if baby was malformed, and need for support from health professionals.	1.01 3.04 1.09 9.01 2.01 10.05 2.04 10.06 3.01 10.07 3.02	7 6.5
Eriksson, C., Salander, P., & Hamberg, K. (2007) Sweden	To investigate and describe the implications, from a father's perspective, of experiencing intense fear related to childbirth.	Qualitative descriptive. Retrospective study using an approach based on the similarity-difference method in grounded theory to analyse interviews (approximately 1.5 hours). An open approach was used in interviews, beginning with the same question, "Please tell me what experiencing fear related to childbirth has meant to you." This study formed part of a larger population-based study.	One to two years after birth, parents with healthy babies born at a university hospital completed surveys assessing childbirth-related fear for a larger study. Fathers with survey responses indicating intense childbirth-related fear were invited to participate in interviews for this qualitative study. 20 fathers participated (35% had experienced previous birth complications and 30% were first-time fathers). Age range 28 to 57 years. 90% married or cohabiting. Employment status not reported.	Information from interviews fell into 4 categories: 1) dimensions of fear, 2) ways of dealing with fear, 3) reasons for keeping the fear to oneself, and 4) motives for attending childbirth. Fathers' concerns: Fear was primarily related to the health and life of partner and child. Some men became preoccupied with worry and were always prepared for the worst. Childbirth concerns included: partner or baby being injured; being reliant on the judgements of other people for care of partner; being unable to do anything about partner's suffering; being unable to remain calm; being disgusted by childbirth, affecting sex after birth; not being able to fulfill support role well; attempting to protect partner from personal worries; and not being able to access support to deal with own fears.	1.03 5.06 1.1 6.07 1.11 7.01 1.12 7.02 1.13 7.03 2.04 9.01 2.05 9.02 2.07	7.5 7.5

(table continues)

Author(s) (year), country	Study aim	Methodology	Participants	Study themes and fathers' concerns	Concern codes (see Table 3)	CASP R1 R2
Eriksson, C., Westman, G., Hamberg, K. (2006)	To analyse the content of childbirth-related fear.	Qualitative descriptive. Mixed methods study using content analysis of written responses to an open-ended question.	194 fathers (41% first-time fathers) answered the open- ended question (a total of 410 women and 329 men had completed the questionnaire).	Six categories of child-birth related fear were expressed by the following percentages of fathers: 1) the health and life of the baby (78%), 2) the health and life of the woman (49%), 3) the labour and delivery process (37%), 4) own capabilities and reactions (24%), 5) the woman's capabilities and reactions (8%), and 6) the professionals' competence and behaviour (5%).	1.01 1.13 1.02 2.04 1.03 2.06 1.05 2.07 1.08 3.01 1.10 3.02 1.11 9.01 1.12 9.02	7 7
Sweden		Questionnaires addressing childbirth and childbirth-related fear were completed 14 to 25 months post-birth. Open-ended question: "Please give a short description of what worried you or what you feared in the face of childbirth."	Participants were parents who had a baby born at a university hospital. Age range 22 to 57 years 95% married/cohabiting Employment status not reported.	Fathers' concerns: Having a diseased or handicapped child, the woman or child being injured during childbirth, losing the woman or child during childbirth, the unknown or unpredictable course of labour and delivery, the woman experiencing pain, a prolonged or rapid childbirth, interventions, not being able to give help and support to partner, not being able to endure the situation, the woman not being able to cope with it all, the woman not having enough physical strength, not receiving sufficient medical care from professionals, and not being treated respectfully by professionals.		
Fenwick, J., Bayes, S., & Johansson, M. (2012)	To describe expectant fathers' experiences of pregnancy and their childbirth expectations.	Grounded theory. Thematic analysis of data collected from men's interviews and diaries. Participants were interviewed (30 to 90 minutes) three times: in 2nd trimester, 3rd trimester, and approximately 8 weeks post-birth. The unstructured interviews commenced by asking men to describe their feelings about the current pregnancy.	12 expectant fathers (42% first- time fathers) were recruited from a teaching hospital when attending antenatal appointments or immediately before attending antenatal education classes. 75% aged over 30 years 100% employed	Men's experiences of pregnancy were described by three themes: 1) pregnancy news: heralds profound change; 2) adjusting to pregnancy and working to see things differently; and 3) birth looming. Men's experiences of antenatal care and feelings of isolation, was described by a fourth theme: 4) feeling sidelined. A fifth theme was: 5) men's childbirth expectations.	1.01 6.01 1.03 7.06 2.04 7.07 2.06 9.01 3.01 10.01 4.01 10.06	9 8.5
Australia				Fathers' concerns: Concerns about feelings of ambivalence and how pregnancy would affect the couple's relationship and their financial security. Concerns also included adjusting to changes in lifestyle, losing independence, needing to prepare in practical ways, childbirth complications, partner's pain in childbirth, the health of baby, not coping during childbirth as they attempt to support their partner, and being excluded from antenatal care.		

(table continues)

Author(s) (year), country	Study aim	Methodology	Participants	Study themes and fathers' concerns	Concern codes (see Table 3)	CASP R1 R2
Finnbogadóttir, H., Svalenius, E., & Persson, E. K. (2003)	To describe first-time expectant fathers' experiences of pregnancy.	Qualitative descriptive. Interview data was analysed by qualitative content text analysis using an inductive method. Interviews (30 to 60 minutes) were conducted between week 38 and 39 (fathers would have experienced most of the pregnancy and attended antenatal classes). Narrative method allowed fathers to talk freely about experiences. Opening question: "Can you tell me about your own experiences of the pregnancy?" Interview guide covered psychological, emotional, social, and physical experiences.	7 first-time expectant fathers were recruited after being invited by a midwife during a visit to an antenatal clinic. Age range 28 to 37 years. 100% cohabiting with partner 100% employed or studying	Fathers experienced a range of psychological, emotional, social, and physical changes during their partner's pregnancy, encompassed by a main category, "time of transition," comprised of 8 categories: 1) unreality, 2) insufficiency and inadequacy, 3) exclusion, 4) reality, 5) social changes, 6) physical changes, 7) responsibility, and 8) development. Fathers' concerns: Some men became preoccupied with worry. Concerns included ability to adequately support partner, feeling unprepared for parenthood, responsibility of parenthood, losing independence, impact on sexual relationship with partner, financial responsibility, practical readiness for baby, uncertainty about future, partner and baby health, personal physical health, impact on friendships, having little support for oneself, and being excluded from antenatal care.	3.01 7.07 5.01 8.01 5.04 8.02 5.07 8.09 6.05 9.01 7.01 10.04 7.03 10.06 7.04	9 8
Gage, J. D., & Kirk, R. (2002)	To describe first-time expectant fathers' perceptions of preparedness for and the transition to parenthood.	Phenomenology. Thematic analysis of semi- structured focus groups: 2 groups with prospective first-time fathers, and 2 with recent first-time fathers (infants 3-6 months). Discussion based on 6 core questions about fathering relating to the meaning of becoming a father, preparing for the birth, preparedness to become a father, learning to be a good father, change of relationships after the birth, and things that make it difficult or easier to be a father.	19 first-time fathers. Prospective and recent first-time fathers who had enrolled in prenatal education classes were invited by letter to participate. Age range 25 to 44 years 95% married 90% employed full-time, 10% part- time.	The transition to fatherhood is influenced by multiple preparation strategies and relationships. Men actively prepared for parenting physically, financially, and emotionally. The men's relationships with their friends, their parents-in-law, and health professionals also influenced their transition to fatherhood. Fathers' concerns: Ensuring personal health and safety, being prepared in practical ways for the baby, feeling unprepared for parenthood, being a good parent, loss of partner's income, maintaining boundaries with extended family, and dealing with conflicting advice/information.	7.04 8.09 7.09 10.02 8.02 10.06 8.03	9 5.5

(table continues)

Author(s) (year), country	Study aim	Methodology	Participants	Study themes and fathers' concerns	Concern codes (see Table 3)	CASP R1 R2
Gervais, C., de Montigny, F., St-Arneault, K., & Lacharité, C. (2015) Canada	To describe fathers' current situation with regard to services in order to determine their needs as expectant parents.	Qualitative descriptive. Thematic analysis of semi-structured interviews (60 to 90 minutes) with both parents in their home. Interviews focused on the father's needs during the perinatal period, the practices used by professionals to support the father's involvement, and the couple's satisfaction with the services received.	17 couples including expectant and new parents (child under 2 years). Parents who had received services for the pregnancy or for the child in the preceding six months were invited to participate (proportion of expectant/new parents not reported). Age range of fathers: 22 to 46 years. Employment status not reported.	Results outlined the place which fathers occupy within the couple's relationship, within their relationships with health care providers, and within the context of perinatal services. Mothers expected their partner to support them during the perinatal period with little consideration for helping their partner adapt. Some fathers also felt excluded by health care providers. Fathers' concerns: Adequately supporting their partner during the pregnancy or childbirth while feeling excluded by health care providers. Feeling that they were not entitled to disclosing worries to professionals to ensure their partner would receive better medical attention.	2.04 9.01 5.07 9.03	9 8
Gerzi, S., & Berman, E. (1981) Israel	To investigate the emotions of the expectant father during the first pregnancy of his wife.	Qualitative descriptive. Mixed methods study comparing anxiety levels in a group of 51 primiparous expectant fathers with matched controls. Semi-structured clinical interviews were added to the study to gain a fuller understanding of the findings. The interviews allowed the fathers to freely express their feelings, thoughts, and associations related to their wives' pregnancy.	6 first-time expectant fathers were chosen at random from the full sample of 51 and interviewed in 3rd trimester. Fathers were invited to participate using the contact details of pregnant married women known to various Centres for Family Health in Haifa. Age range 22 to 27 years 100% married Employment status not reported.	The pregnancy aroused intense ambivalent feelings in all the fathers. On the positive side, they expressed feelings of joy and talked of self-fulfilment and greater maturity and stability. On the other hand, the fathers expressed anxiety and fear. Fathers' concerns: Birth of a child with disability, damage to wife or child during delivery, whether this was the right time to have a child, ability to care for a child, the wife's irritability and demandingness, sexual distancing from wife, coping during childbirth, and anxiety about attending labour and delivery.	1.1 5.04 1.11 6.05 2.06 8.02 3.02 8.06 4.01	4.5 5.5
Gottfredsdóttir, H. (2005) Iceland	To explore prospective first-time fathers' views concerning fatherhood in relation to new legislation on parental leave in Iceland; and to describe their educational needs before the birth of their child.	Qualitative descriptive. Thematic content analysis of semi-structured focus groups (60 to 90 minutes). Participants were divided into 3 groups in 3rd trimester. Discussion questions related to feelings experienced as prospective fathers, challenges associated with new role, information available for prospective fathers in antenatal care, and new parental leave policy in Iceland.	15 first-time expectant fathers were recruited after having their names randomly selected from a list of prospective parents attending an antenatal clinic. Partners were 27 to 37 weeks pregnant. Mean age 24.2 years Relationship and employment status not reported.	Dominant themes: anxiety and concern, searching for role, happiness and excitement, lack of control, and helplessness. Fathers' concerns: Worry that something might go wrong concerning health of mother or baby, being prepared for the worst, change in financial situation, increased responsibility and demands placed on fathers, helplessness concerning place in process of pregnancy and birth, ability to care for newborn, feeling unprepared for parenthood, acquiring sufficient information to feel prepared, sense of exclusion, ambivalence about attending the birth, coping during childbirth, adequately supporting partner, and changes to relationship with partner post-birth.	2.02 7.02 2.06 7.08 3.01 8.01 5.01 8.02 5.07 8.06 6.02 9.01 7.01 10.03	7.5 7.5

(table continues)

Author(s) (year), country	Study aim	Methodology	Participants	Study themes and fathers' concerns	Concern codes (see Table 3)	CASP R1 R2
Grand, R. (2015) Dissertation USA	To provide an explanation for the fears in expectant fathers and understand how prenatal education can help fathers to cope with their fears.	Qualitative descriptive. Collective case study design (using thematic analysis) comprised of semi-structured interviews with each father (20 to 30 minutes) and two focus groups (each attended by 5 and 3 fathers respectively). The 10-item interview guide included questions addressing fears during pregnancy, challenges encountered, excitement experienced, and benefits of the antenatal workshop. The 7-item group discussion guide included questions addressing past experiences, impact of fears and excitements on partner, and ways of coping with fears.	Participants were 16 first-time fathers. Expectant fathers who attended a 3-hour men's antenatal workshop across 3 sites, were invited to participate. Age range 25 - 45 years. Relationship and employment status not reported.	Five themes related to the fear of the unknown and relational experiences: 1) Am I prepared for fatherhood?, 2) Will mum and baby be in good health?, 3) Will I ever get my wife back?, 4) I am not alone, and 5) If veteran dads can do this, so can I. Fathers' concerns: Fear of the unknown, handling the delivery, personal reactions during delivery, ability to support partner in childbirth, childbirth complications, partner's pain and suffering in childbirth, partner requiring emergency caesarean, ensuring partner receives good medical care, health of partner and baby, fear of miscarriage, heredity conditions passed on to baby, acquiring sufficient information to feel prepared, making preparations, suitable housing, relationship with partner post-birth, relationship with extended family, mood changes in partner, mental health of partner, reduced sleep post-birth, impact on lifestyle, feeling unprepared for parenting, and being a good parent.	1.01 6.02 1.03 7.05 1.07 7.06 2.04 7.08 2.06 8.02 2.07 8.03 3.01 8.04 3.02 8.09 3.03 9.02 5.01 10.05 5.03 5.04	9 9.5
Greer, J., Lazenbatt, A., & Dunne, L. (2014) Northern Ireland	To explore "fear of childbirth" and its impact on birth choices among women and their partners.	Qualitative descriptive. Thematic analysis within the Sense of Coherence (SOC) theoretical framework was used to explore participant fears and coping around the birthing process, by exploring comprehensibility, manageability, and meaningfulness described by participants. Semi-structured interviews (approximately 1-hour) were conducted separately with each member of the couple. Initial question: "Will you tell me about any anxieties or fears you have about childbirth?"	19 expectant fathers (and their pregnant partners of mixed parity) were recruited after being introduced to the study by midwifery staff during routine antenatal visits at a large maternity hospital. Descriptive statistics for age, relationship status, and employment not reported.	1) Comprehensibility: assessment of risks and uncertainties associated with birth. 47% of men considered that labour and vaginal delivery poses considerable risk to the physical health of mother and baby. 2) Manageability: perception of ability to access resources needed to cope with the birthing process. While all women anticipated they would have their partner's support during labour, 58% of men feared they would be unable to provide adequate support. 3) Meaningfulness: men expressed high motivation and desire for a safe birth, a good birth experience, and to be good parents. Fathers' concerns: Risks associated with vaginal birth, unforeseen events in childbirth, impact of pain during childbirth, partner traumatised by childbirth, mother or child injured during the birth process, concern for partner to receive good medical care, ability to support partner in childbirth, feeling powerless, mental health of partner, impact on relationship, dealing with conflicting information, and being a good parent.	1.01 2.05 1.02 5.03 1.03 6.01 1.04 7.09 1.1 8.03 1.11 9.02 2.04	8 7

(table continues)

Author(s) (year), country	Study aim	Methodology	Participants	Study themes and fathers' concerns	Concern codes (see Table 3)	CASP R1 R2
Hallgren, A., Kihlgren, M., Forslin, L., & Norberg, A. (1999) Sweden	To discover the expectations and experiences of childbirth preparation and childbirth of Swedish men in order to contribute to a basis of reflections in the midwifery profession.	Hermeneutic phenomenology. Interviews were interpreted based on concept of "vital involvement" (a mutually shared experience). Three interviews (20-60 minutes) were conducted before childbirth preparation, after childbirth preparation, and approximately 1 to 3 weeks post-birth. The men were asked to talk about expectations and experiences of childbirth preparation and childbirth.	11 men with pregnant partners (100% primiparous) in 3rd trimester, recruited from antenatal classes by midwives. All men were first-time fathers except one, with two children from a previous relationship. Age range 21 to 49 years 100% cohabiting Employment status not reported.	The 11 participants demonstrated varying experiences of vital involvement. Five were vitally involved for the entire study period. Three began with a self-chosen distance, becoming vitally involved as pregnancy progressed. One began with vital involvement but experienced disappointment with childbirth preparation because of exclusion. Another father remained peripherally involved throughout the study period. And another father, who experienced many worrying thoughts, was described as having ambivalent feelings of over involvement without hope. Fathers' concerns: Anxiety about childbirth, coping with childbirth, feeling helpless in childbirth, competence to support partner, worry about complications, unpredictable events in childbirth, death of baby, being a good father, loss of freedom because of parenthood, and being concerned about hiding feelings from partner to fulfil support role.	1.01 2.05 1.02 2.06 1.13 2.07 2.02 5.06 2.01 7.07 2.04 8.03	7 8
Johansson, M., Edwardsson, C., & Hildingsson, I. (2015) Sweden	To describe how expectant fathers experienced physical and emotional changes during partner's pregnancy.	Qualitative descriptive. Longitudinal study using mixed-method approach, with questionnaires completed in 2nd trimester, and 3rd trimester. Responses to open-ended questions about physical and emotional changes experienced by the fathers were analysed using content analysis. Written responses regarding emotional changes highlighted men's concerns and worries. Question: "Do you feel any emotional changes since your partner became pregnant? If you have experienced any emotional changes, what are they?"	871 expectant fathers and their pregnant partners (47.1% primiparous) were invited to participate in the study for one year. They were recruited from a catchment area with three hospitals. Age range 15 to 66 years 98% cohabiting/married Employment status not reported.	59.6% experienced emotional changes mid-pregnancy. In late pregnancy, 47.1% experienced emotional changes. These men were more likely to be first time fathers and to have negative expectations and greater fear about childbirth than fathers who did not experience emotional changes. The qualitative data analysis explored four categories of emotional experiences: 1) positive impacts on mental health, 2) negative impacts on mental health (including worries and emotional unbalance), 3) emotional relationship developed with the partner and baby, and 4) reflections on fatherhood. Fathers' concerns: Feeling ambivalent and unprepared for the pregnancy and parenthood, partner's hormonal changes, bigger responsibility, fear of miscarriage, worry about partner and baby health, and uncertainty about the future.	3.01 5.04 3.03 8.01 4.01 8.02 4.02 8.04 5.01	6 7.5

(table continues)

Author(s) (year), country	Study aim	Methodology	Participants	Study themes and fathers' concerns	Concern codes (see Table 3)	CASP R1 R2
Johnsen, H., Stenback, P., Halldén, B-M., Crang Svalenius, E., & Persson, E. K. (2017)	To illuminate expectant first-time fathers' experiences of participation during pregnancy in three Nordic countries.	Qualitative descriptive. Content analysis of semi- structured interviews (20 to 60 minutes) conducted when partner was pregnant 30 weeks or more. Fathers were encouraged to describe what participation meant to them and how they participated in different situations during the pregnancy period.	31 first-time expectant fathers were invited by midwives at antenatal care facilities or parental classes to participate. Age range 24 to 43 years Relationship status not reported 100% employed	Data analysis resulted in a main category, "Willingness to participate," indicating that fathers are more than willing to participate and be included in all aspects of the pregnancy, however, they sometimes feel excluded. Two generic categories emerged (with subcategories in parentheses): 1) Being beside the "bump" (visualising the unborn child, being included in the rites of motherhood, lacking full control, compensating for lack of embodiment, adopting an active father role); 2) Cementing the partnership (strengthening the partner relationship, meeting professionals, sharing experiences with peers, protecting their child and their partner). Fathers' concerns: Feeling that anything can happen despite preparations, inadequacy to support partner, risk of external factors affecting pregnancy, health of baby, partner's emotional distress, and concealing personal worries from partner and health care professionals to protect partner and ensure professional care is not diverted away from partner.	3.01 5.07 5.02 7.01 5.03 7.02 5.06 9.03	7.5 8.5
Sweden (n = 18) Denmark (n = 8) Finland (n = 5)						
Joy, R., & Paul, S. (2012)	To explore the unique experiences of expectant fathers.	Phenomenology. In-depth interviews (10 to 20 minutes) were conducted during scheduled visit at antenatal clinic. Interviews began with an open- ended question such as, "could you share with me your responses when you heard that your wife is pregnant?"	6 expectant fathers were recruited from a hospital outpatient department and a private antenatal clinic. Most partners (4 out of 6) were 6 to 9 months pregnant (parity not reported). 50% aged between 31 to 35 years 100% married 50% businessmen	Five themes emerged from the experiences of expectant fathers: 1) happiness and satisfaction - the response to pregnancy, 2) relationship with wife - physically and emotionally, 3) a change in social life, 4) coping with pregnancy, and 5) expectations about the baby. Fathers' concerns: Concern about financial matters and health of mother and baby.	3.01 5.01 10.01	5 4.5
India						

(table continues)

Author(s) (year), country	Study aim	Methodology	Participants	Study themes and fathers' concerns	Concern codes (see Table 3)	CASP R1 R2
Kao, C-H., & Long, A. (2004) Taiwan	To explore the life experiences of Taiwanese first-time expectant fathers while their wives were in the third trimester of pregnancy.	Husserlian phenomenology. Content analysis of unstructured interviews (duration not reported). Fathers were interviewed in 3rd trimester (34 - 36 weeks) of partner's pregnancy. Example opening question, "Your wife has been pregnant for more than eight months; please tell me your thoughts or feelings now."	14 first-time expectant fathers with wives in the 3rd trimester were invited to participate through contact made to their wives. Age range 20 to 43 years 100% married 100% employed	Eight key themes: 1) jubilation, 2) feelings of uncertainty, 3) adjustment, 4) preparation for fatherhood, 5) engagement, 6) gender concerns, 7) the wonder of foetal movement, and 8) expanded vision. Fathers' concerns: Health of baby and partner, adequately supporting partner in pregnancy and labour, whether to attend childbirth, personal reactions to the childbirth process, experiencing unforeseen situations in childbirth, feeling powerless in childbirth, coping with partner's fluctuating emotions during pregnancy, relationship with partner during pregnancy and after birth, adjustments to roles in relationship, having time for relationship after birth, how to care for infant, balancing employment with caring for infant in evenings, being a good parent, responsibility of parenthood, financial responsibility for the family, and losing freedom because of parenthood.	1.02 6.02 2.02 6.03 2.04 6.04 2.05 7.01 2.07 7.07 3.01 8.01 5.01 8.03 5.04 8.06 5.07 10.04 6.01 10.07	9 8.5
Kulpa, D. W. (1992) Dissertation USA	To explore the father's experience of childbirth, encompassed by pregnancy, labour, and delivery.	Qualitative descriptive. Heuristic model of research exploring the researcher's own experiences along with the personal experiences of co-researchers (participants). Interviews (1 to 2 hours) were conducted 6 months to 2 years post-birth and explored fathers' experiences of pregnancy, labour, and delivery. Out of nine interview questions, two related to pregnancy: "How did you feel during the pregnancy?" and "What sensations and emotions did you experience during pregnancy?"	10 fathers (50% first-time) included personal acquaintances of the researcher and other men sourced through referrals. Age range Mid 20's to Late 30's 100% married 100% employed	Eight core themes: 1) pregnancy is often mentally, physically, and emotionally demanding on the father, 2) the father experiences some difficulty accepting the reality of the pregnancy, 3) the father often conceals negative feelings and thoughts, 4) strengthening of the marital relationship, 5) the father experiences a sense of powerlessness, emotional and physical stress, and a feeling of uncertainty during labour and birth, 6) there is an overwhelming sense of relief almost immediately after the birth, 7) the father is often the first to hold or acknowledge their child, and 8) childbirth is an extremely powerful and often spiritual event. Fathers' concerns: Preoccupation with worry, ambivalence about the pregnancy, feeling unprepared for parenthood, responsibility of parenthood, uncertainty about future, baby being handicapped, health of partner during pregnancy, need for support for oneself, and concern that their negative feelings and worry would adversely impact their wives.	1.02 7.01 3.02 7.03 4.01 8.01 5.01 8.02 5.06	9.5 9.5

(table continues)

Author(s) (year), country	Study aim	Methodology	Participants	Study themes and fathers' concerns	Concern codes (see Table 3)	CASP R1 R2
Levenstein, A. (1992) Dissertation USA	To construct a theory of the experience of men becoming fathers for the first time.	Grounded theory. The researcher, as a participant observer, interviewed men expecting a child for the first time. Men were interviewed once in 1st or 2nd trimester, a second time in 3rd trimester, and a third time one-month post-birth. The basic question for the first interview was, "what are you thinking about and feeling in becoming a father?"	17 first-time expectant fathers were sourced through contacts made by personal acquaintances of the researcher and other study participants. Age range 16-37 years 88% married, 12% committed relationship One student (6%), 94% employed	Ten distinct areas of reported experience: 1) gearing up (after pregnancy has been confirmed), 2) coming to grips with it (physical manifestations of pregnancy), 3) entering the Daddy track (men conceptualise themselves becoming a parent), 4) picturing a real child (representations reported of the baby in utero), 5) anticipating a kid (thinking about caring for child while reflecting on childhood memories), 6) contemplating the big unknown (labour and childbirth concerns), 7) meeting baby (the moment the child appears), 8) coping and connecting (interactions with child in first weeks), 9) establishing the turf (settling in as new family unit), and 10) linking the thinking (summary of interview). Fathers' concerns: Shifts in lifestyle, loss of independence, caring for infant, economic matters, financial responsibility for the family, constrained finances, added cost of baby, housing needs, responsibility of parenthood, changing roles within the couple, sex harming the baby, impact of pregnancy on sexual relationship, changing shape of pregnant partner, not having enough time to spend with wife post-birth, adequately supporting partner during pregnancy, childbirth complications or unforeseen events, partner and baby health, baby with disability, risk of injury to partner and baby in childbirth, ability to support partner in childbirth, and sense of being excluded by health care professionals.	1.01 6.06 1.02 7.02 1.1 7.06 1.11 7.07 2.04 8.01 3.01 8.03 3.02 8.06 3.06 8.09 5.01 9.01 5.07 10.01 6.01 10.02 6.02 10.03 6.03 10.04 6.04 10.05 6.05	8 7.5
May, K. A. (1982) USA	To examine the social-psychological experience of first-time expectant fatherhood, and the progression of pregnancy from the father's perspective.	Naturalistic enquiry. Data was analysed for recurrent themes and emergent concepts using comparative analytic techniques. 11 fathers were interviewed 2 to 4 times during the pregnancy, and 9 fathers were intensively interviewed once. Semi-structured interviews focused on the man's perception of the impact of the pregnancy on his life and his subjective experience as the pregnancy progressed. Additional data was gathered from brief interviews with 80 other men.	20 first-time expectant fathers and 80 short field interviews with additional men at various stages of their partners' pregnancies. Childbirth educators and nursing personnel in clinics and private offices recruited potential participants. 100% married or cohabiting. Descriptive statistics for age and employment status not reported.	Father involvement in pregnancy referred to how close to or emotionally invested the father felt in the experience of pregnancy. Three phases of father involvement were identified: 1) the announcement phase (period during which pregnancy was first suspected and then confirmed), 2) the moratorium (putting conscious thought about pregnancy aside for a time while adjusting to the reality of the pregnancy), and 3) the focusing phase (near the end of the second trimester, the man shows he perceives the pregnancy as real and important in his life). Fathers' concerns: Preoccupation with worry, uncertainty about the future, financial concerns, and worry about their work.	7.01 10.01 8.04 10.08	5.5 6.5

Author(s) (year), country	Study aim	Methodology	Participants	Study themes and fathers' concerns	Concern codes (see Table 3)	CASP R1 R2
Pilkington, P. D., & Rominov, H. (2017) Australia	To identify the types of worries and concerns that men report during pregnancy by conducting a qualitative analysis of an online community of expectant fathers.	Qualitative descriptive. All posts submitted to the Reddit community, "PreDaddit," since its inception were examined for inclusion in the qualitative content analysis. The posts were filtered to those containing one or more of the following words: anxiety, anxious, nervous, scared, terrified, fear, worry, worries, and worried. Posts were included if they were written by a male who was currently expecting a baby and referred to a specific worry or concern in the post.	A total of 535 posts written by 426 unique users were included in the analysis. Posts were written by first-time and multiparous fathers at various stages of their partner's pregnancy.	The following content themes were identified (subthemes in parentheses): 1) 50.8% of posts referred to fears and worries centred on infant factors (perinatal loss, childbirth, well-being of infant following birth, gender of infant, genetic or chromosomal abnormalities, appointments, and naming the child), 2) 17.0% of posts referred to concerns about partner factors (maternal well-being, partner relationship problems, and sexual relationship), 3) 15.9% of posts related to situational factors (financial pressure, concerns regarding family and friends, work–family conflict, and pets), and 4) 16.3% of posts related to individual factors (father role, feeling unprepared, and changes to daily life following childbirth). Fathers' concerns: As described by study themes listed above.	2.01 7.06 3.02 8.03 3.03 8.05 3.07 8.09 3.06 8.1 4.02 9.04 5.01 10.01 5.02 10.05 5.06 10.06 6.01 10.07 7.01	9.5 10
Rominov, H., Giallo, R., Pilkington, P. D., & Whelan, T. A. (2018) Australia	To explore men's experiences of seeking support for their mental health and parenting in the perinatal period, and identify their specific support needs during this time.	Qualitative descriptive. Semantic thematic analysis of semi-structured interviews (30 minutes) conducted in-person with 4 participants and by telephone with 16 participants. An 11-item interview guide included questions addressing the types of resource/support accessed for parenting and/or mental health previously, current support needs, factors which would facilitate access to support, barriers to accessing support, and timing for access to support for parenting and/or emotional health.	20 men including 5 first-time expectant fathers, 7 multiparous expectant fathers, and 8 fathers with an infant aged under 24 months. Fathers were recruited via snowball sampling, utilising word of mouth and online advertising. Age range 30 to 42 years. 100% married or cohabiting 100% employed	Seeking support for parenting and mental health in the perinatal period was described by 5 themes (subthemes in parentheses): 1) experiences of support (marginalisation from formal supports, informal supports, partner as gateway to information), 2) support needs (preparation, multiple formats), 3) barriers to support (stigma and help-seeking, work), 4) facilitators of support (inclusion, awareness), and 5) timing of support (perinatal stages, winging it). Fathers' concerns: Lack of helpful information, handling conflicting information, lack of support for oneself, feeling excluded from antenatal care, childbirth complications, health of baby at birth, and preoccupation with worry.	1.01 7.03 3.01 7.09 7.01 9.01	10 10

(table continues)

Author(s) (year), country	Study aim	Methodology	Participants	Study themes and fathers' concerns	Concern codes (see Table 3)	CASP R1 R2
Sartori, J., Petersen, R., Coall, D. A., & Quinlivan, J. (2018)	To evaluate the impact of maternal nausea and vomiting in pregnancy on expectant fathers.	Qualitative descriptive. Mixed methods sub-study within longitudinal study, using inductive content analysis to examine written comments on questionnaires. The antenatal questionnaire was completed in the 3rd trimester. Fathers were asked whether their partners experienced symptoms of nausea and vomiting, and if so, to comment on the impact on themselves. Anxiety and depressive symptoms were also assessed.	77 participants out of the full sample of 300 expectant fathers wrote detailed comments about their partner's nausea and vomiting. Fathers were recruited from antenatal clinics and community settings through the pregnant mother. Descriptive statistics for full sample: Mean age 30.5 years 49% first-time fathers 89% married 91% employed	Five major themes emerged from the detailed comments written about the partners' nausea and vomiting: 1) disruption to the father's work, 2) feelings of frustration and helplessness, 3) concern over depression in their partner, 4) concern for the developing baby, and 5) sense of being manipulated. Fathers' concerns: Partner's morning sickness adversely affecting the baby, mental health of partner, work-family balance, and ability to adequately support partner.	3.04 5.07 5.03 10.07	7 7.5
Australia						
Sercekus, P., Vardar, O., Goral Turkcu, S., & Ozkan, S. (2020)	To determine the fears associated with childbirth among first time expectant fathers and the reasons for these fears.	Phenomenology. Content analysis of semi- structured interviews (21 to 37 minutes) conducted in 3rd trimester. Three questions were asked: "What are you thinking about the approaching childbirth?" "What are your fears associated with childbirth?" "What are the reasons for your fears?"	16 first-time expectant fathers. The study was held at an obstetric outpatient clinic of a university hospital. Before the interviews, fathers were asked whether they had fear of childbirth. The fathers who stated they had fears and agreed to participate in the study were included. Age range 22 to 38 years 100% married 100% employed	Two main themes (subthemes in parentheses): 1) fears about childbirth (childbirth complications, labour pain, and support), and 2) reasons for fears (information about childbirth, belief, lack of confidence in health personnel, health issues and personal experiences, and fear of childbirth by the pregnant partner). Fathers' concerns: Childbirth complications, death or damage to partner or baby, need for emergency caesarean, baby with abnormality or disability, partner suffering from a lot of pain, partner not coping with labour pains, health personnel making a mistake or providing inadequate care, not being able to give enough support to partner, personal emotional reactions during childbirth, and uncertainty about childbirth creating fear.	1.01 1.12 1.02 1.13 1.03 2.04 1.07 2.07 1.1 3.02 1.11 9.02	8 6
Turkey						

(table continues)

Author(s) (year), country	Study aim	Methodology	Participants	Study themes and fathers' concerns	Concern codes (see Table 3)	CASP R1 R2
Spektor, D. J (2007) Dissertation/Thesis UK	To explore the experiences of first-time fathers during pregnancy, birth and the post-natal period.	Phenomenology. Semi-structured interviews (45 to 90 minutes) were conducted with fathers 9 months to 3 years after birth of first child. Interviews were structured around the following topics: finding out about the pregnancy, the pregnancy, the birth, transition to fatherhood, masculinity, the concept of post-natal depression, and the interview experience itself.	9 first-time fathers involved in the care of their children were recruited through a parenting service offering programmes to fathers following the birth of a child. Age range 28-43 years At time of interview, one father had separated, but was equally sharing childcare responsibilities. 66% employed, 33% primary caregiver	Five super-ordinate themes (subordinate themes in parentheses): 1) transitions (excitement and apprehension, conflict, uncertainty and lack of control), 2) "what about me?" - recognition (fulfilling the prescribed role, isolation), 3) It's a "no-man's-land" (neglect, exclusion, separation), 4) becoming a father (role, adjustment, transformations), and 5) Losses (relationship to self and partner, post-natal frustration or stress). Fathers' concerns: Ambivalence about pregnancy, practical readiness for the baby, being at a loss to know how to support partner, fluctuating emotions in partner, health of baby, afraid of financial situation, being a good father, feeling unprepared for parenthood, responsibility to take care of another person, coping during childbirth, feeling helpless in childbirth, unforeseen events in childbirth, partner's pain and suffering in childbirth, lack of support for oneself, and feeling excluded from antenatal care.	1.02 7.03 1.03 8.01 2.05 8.02 2.06 8.03 3.01 9.01 4.01 10.01 5.04 10.06 5.07	9.5 9.5
Talley, L. M. (2017) Dissertation/Thesis USA	To understand how first-time fathers perceive or experience pregnancy, childbirth, and fatherhood.	Phenomenology. Interpretive phenomenological analysis was used within the contextual framework of the biopsychosocial model. Semi-structured interviews were conducted within 6 months after birth of first child. Interview guide included 24 open-ended questions. Example items: "How did pregnancy affect you as a couple?" "what concerned you the most about pregnancy?" "What were you looking forward to in the future?" "What concerned you most about birth?" "Has becoming a father been what you expected?"	12 men who had become first-time fathers within the last 6 months after a normal pregnancy and complication free vaginal childbirth. The study was advertised by flyers posted in obstetrician offices. Age range 18 to 34 years 100% married or cohabiting 84% employed, 8% fulltime student, 8% unemployed	All participants expressed both positive and adverse perceptions of pregnancy and childbirth. Childbirth was overall a positive experience with periods of time when fathers felt afraid or worried about the safety of the mother and baby. All participants described fatherhood as rewarding and overall enjoyable. Several described that fatherhood is much harder than they thought it would be. Fathers' concerns (during pregnancy): Being a good parent, adequately supporting partner during pregnancy, sex of baby, health of mother and baby, fear of miscarriage, death of partner in childbirth, having a child with a disability, childbirth complications, unforeseen events in childbirth, handling the pregnant partner's mood swings, and impact of pregnancy on sexual relationship.	1.01 3.07 1.02 5.01 1.12 5.04 3.01 5.07 3.02 6.05 3.03 8.03	9.5 9.5

(table continues)

Author(s) (year), country	Study aim	Methodology	Participants	Study themes and fathers' concerns	Concern codes (see Table 3)	CASP R1 R2
Taylor, M. K. (1992) Dissertation/Thesis Canada	To explore and describe expectations for childbirth from the perspective of the expectant father.	Qualitative descriptive. Latent content analysis of in-depth, open-ended interviews (1 to 1.5 hours) conducted with fathers in 3rd trimester. Questions related to thoughts and feelings during pregnancy, and thoughts and ideas about childbirth.	10 expectant fathers (80% first-time fathers) were recruited through prenatal classes and word of mouth. Age range 23 to 36 years 100% married 90% full-time employment, 10% part-time employment	Fathers' expectations regarding the childbirth experience fell into three categories: 1) fathers' expectations for themselves, 2) fathers' expectations for significant others, and 3) fathers' expectations regarding the childbirth process. Five factors appeared to influence the development of fathers' childbirth expectations: 1) experience, 2) timing, 3) perception of self, 4) meaning attached to the childbirth experience, and 5) normative expectations. Fathers' concerns: Unforeseen events in childbirth, partner's pain in childbirth, inability to support partner in childbirth, feeling powerless in childbirth, ambivalence about being present for the childbirth, how they would react to childbirth, and coping during childbirth.	1.02 2.05 1.03 2.06 2.02 2.07 2.04	10 9.5
Tehrani, S. G., Bazzazian, S., & Nayeri, N. D. (2015) Iran	To explore how first-time fathers describe their experiences of pregnancy.	Qualitative descriptive. Content text analysis of open-ended interviews (19 to 32 minutes) conducted with fathers in 3rd trimester. A flexible interview guide was used, beginning with the following questions: "How did you feel the first time you heard that your wife is pregnant? What changes does this experience create in you?"	26 first-time expectant fathers. Five public health prenatal care clinics were selected randomly, and husbands attending routine appointments with their pregnant partners in the 3rd trimester were invited to participate. Age range 23 to 34 years 100% married 100% employed	The phenomenon of "transition to fatherhood" was comprised of 4 categories (subcategories in parentheses): 1) emotional responses to pregnancy (wonder and disbelief, from comfort to anxiety, Happiness), 2) feeling of change (internal changes, external changes), 3) accepting the reality and satisfaction (the sense of belonging, pay attention, satisfaction, hope), and 4) developing identity as a father (initiation of fatherhood feeling, development, attitude toward father's role). Fathers' concerns: Worry about health of baby and partner; concerned about relationship with partner in light of emotional fluctuations; and financial responsibility to support family (e.g., having to work extra hours).	3.01 6.01 5.01 10.04 5.04	7 7.5

(table continues)

Author(s) (year), country	Study aim	Methodology	Participants	Study themes and fathers' concerns	Concern codes (see Table 3)	CASP R1 R2
Widarsson, M., Engström, G., Tydén, T., & Lundberg, P. Hammar, L. M. (2015) Sweden	To describe the perspectives of expectant mothers and fathers on fathers' involvement during pregnancy.	Qualitative descriptive. Content analysis of interview transcripts. 60% of fathers were interviewed within focus groups (across 4 groups, duration 71 to 109 minutes). 40% were interviewed individually (31 to 61 minutes). Opening question in focus groups and individual interviews was: "Please tell us about your experiences becoming a father/mother."	10 Expectant fathers (and 20 pregnant women) in the 2nd or 3rd trimester were recruited through an open hospital lecture describing obstetric facilities, or recruited by midwives at maternity care units or serving newly arrived immigrants. 80% of men were first-time expectant fathers. Age range 21 to 56 years 100% married or cohabiting employment status not reported	"Paddling upstream" described paternal involvement during pregnancy. This theme was comprised of 5 sub-themes: 1) trying to participate, 2) trying to be understanding, 3) trying to learn, 4) trying to be a calming influence, and 5) trying to find a balanced life. Fathers' concerns: Not being prepared for parenthood, acquiring reliable sources of information, making sense of conflicting information, mental health/wellbeing of pregnant partner, adequately supporting partner, attempting to protect partner from own anxieties, financial responsibility to support family, and work-family balance.	5.03 7.09 5.06 8.02 5.07 10.04 7.08 10.07	7 8

Note. Concern codes relate to fathers' concerns according to category as shown in Table 3. CASP = Critical Appraisal Skills Program quality appraisal checklist for qualitative studies. Maximum CASP score = 10. R1 and R2 = CASP score rating by reviewer 1 and reviewer 2, respectively.

**Appendix I: Initial Item Pool (113 items), Listed According to the Pregnancy-Related
Concerns of Expectant Fathers**

Fathers' Concerns During Pregnancy	Potential Items for New Scale
1. Childbirth Concerns	
1.01 Childbirth complications	I worry about complications happening during childbirth
1.02 Unforeseen events in childbirth	I'm afraid that unexpected events may happen during childbirth
1.03 Partner's pain and suffering in childbirth	I worry about my partner experiencing unbearable pain and suffering in childbirth
1.04 Partner being traumatised by childbirth	I worry about my partner's condition during childbirth I worry that my partner will be traumatised by childbirth
1.05 Partner not coping during labour and childbirth	I worry about my partner losing control during labour
1.06 Partner being torn or needing to be cut during childbirth	I worry that my partner will tear or need to be cut during the birth
1.07 Partner requiring emergency caesarian	I worry about my partner requiring an emergency caesarian
1.08 Medical interventions (e.g., medication or forceps)	I worry about the use of interventions during delivery, such as forceps or vacuum extraction
1.09 Not arriving to hospital in time for birth	
1.10 Partner injured during childbirth	I fear that my partner may be harmed during the birth
1.11 Baby injured during childbirth	I worry about my baby being injured in childbirth
1.12 Death of partner in childbirth	I fear that my partner may die in childbirth
1.13 Death of baby in childbirth	I am afraid of losing the baby in childbirth
2. Attitudes Towards Childbirth	
2.01 Anxiety about childbirth	I do not feel prepared for childbirth
2.02 Ambivalence about being present during childbirth	I am anxious about being present for the birth
2.03 Being absent or excluded from delivery	
2.04 Ability to fulfil support role during labour and delivery	I worry about not being able to help my partner in childbirth I worry I will not be able to calm my partner if they experience fear and anxiety in childbirth
2.05 Feeling helpless to ease partner's suffering	I worry about feeling helpless during labour and childbirth
2.06 Being unable to cope with labour and delivery	I worry that I won't be able to cope during childbirth
2.07 Experiencing unpleasant reactions (e.g., feeling faint, sick, or disgusted)	I worry that I may pass out or not be able to cope with aspects of labour and birth I worry that the messiness of childbirth will be too unpleasant for me I do not do well with blood and surgery rooms

Fathers' Concerns During Pregnancy	Potential Items for New Scale
3. Baby Concerns	
3.01 Baby health	<p>I worry about whether my baby will be healthy and normal</p> <p>I worry about having a sick or disabled baby</p> <p>I constantly worry that something will be physically wrong with my baby</p>
3.02 Baby with genetic abnormality or disability	<p>I'm worried about my child having a genetic problem</p> <p>I worry about what I will do if my baby is not normal</p>
3.03 Partner having miscarriage	<p>I constantly worry about my partner having a miscarriage</p>
3.04 Partner's morning sickness affecting baby's development	<p>I'm afraid that my partner's vomiting due to pregnancy will affect the baby's development</p>
3.05 Baby born prematurely or overdue	<p>I worry about my baby being premature</p> <p>I worry about my baby being overdue</p>
3.06 Sex during pregnancy harming the baby	<p>I worry that sex during pregnancy may hurt the baby</p>
3.07 Sex of baby	
4. Acceptance of Pregnancy	
4.01 Ambivalence about pregnancy	<p>Having mixed feelings about the pregnancy makes me anxious</p> <p>I am not looking forward to this baby</p>
4.02 Feeling unprepared for the pregnancy	<p>This is not an ideal time in my life to be expecting a baby</p> <p>I felt unprepared for this pregnancy</p> <p>I did not want this pregnancy at this time</p>
5. Partner Concerns	
5.01 Partner health	<p>I worry about my partner's health</p>
5.02 Pregnancy complications	<p>I worry that my partner might experience pregnancy complications</p>
5.03 Mental health/or wellbeing of partner	<p>I worry about my partner's emotional well-being during pregnancy</p> <p>I worry about my partner having postnatal depression after childbirth</p>
5.04 Fluctuating emotions in pregnant partner	<p>I worry that my partner's mood swings will not improve after the birth</p>
5.05 Partner's feelings towards pregnancy	
5.06 Concealing personal worries from partner to protect them	<p>I am concerned about trying to keep my worries to myself so I can support my partner</p>
5.07 Adequately supporting partner during the pregnancy	<p>I worry about being able to support my partner when I am feeling a lack of control myself</p> <p>I feel anxious by all the things I need to do for my partner</p> <p>I worry about whether I am doing enough to support my partner</p>

Fathers' Concerns During Pregnancy	Potential Items for New Scale
6. Relationship Concerns	
6.01 Relationship concerns during pregnancy	I worry about my relationship with my partner I am concerned that the pregnancy is negatively affecting our relationship
6.02 Changes to relationship with partner post-birth	The pregnancy has put a strain on our relationship, and I worry that this will be ongoing I worry that our relationship will never return to normal I am concerned that having this baby will negatively affect the stability of our relationship I'm afraid that my partner may change their feelings about me after our baby is born I worry that my partner will focus solely on the baby after the birth I worry about feeling distanced from my partner as they focus on caring for our baby I'm worried about the baby changing my relationship with my partner I am concerned that parenthood will negatively affect our relationship
6.03 Finding time for the relationship post-birth	I am concerned that my partner and I won't have time for each other once the baby is born
6.04 Changing roles within the couple	I am worried that I will not adapt to my new role as a parent I am worried that my partner will not adapt to their new role as a parent
6.05 Changes to sexual relationship during pregnancy	I worry about changes to our sexual relationship during pregnancy
6.06 Changing shape of pregnant partner	I am worried that I will no longer feel attracted to my partner because of changes to their body I am worried that my partner's body will not return to how they looked before pregnancy
6.07 Sexual relationship post-birth	I worry about changes to our sexual relationship following childbirth I am concerned that parenthood will negatively affect the intimacy in our relationship

Fathers' Concerns During Pregnancy	Potential Items for New Scale
7. Worry About Self	
7.01 Preoccupation with worry	At times, my worries seem to snowball My worries interfere with my daily activities My concerns are keeping me awake at night My worries and concerns are causing me anxiety A sense of things being out of control is really bothering me
7.02 Constantly prepared for the worst	I feel concerned that there is a lack of support available to me
7.03 Lack of support for oneself	I worry that I can't support my partner well when I am not receiving enough support for myself
7.04 Personal physical health	I worry more about my health because I want to be around for my child when they are older
7.05 Managing on reduced sleep post birth	I am concerned about how I will manage with less sleep once the baby is born
7.06 Impact on lifestyle	I am concerned about the coming changes to my way of living
7.07 Loss of independence	I worry about experiencing a loss of independence I worry about losing my freedom when we have the baby
7.08 Acquiring sufficient information to feel prepared	I'm afraid I'll always feel guilty if I'm doing something just for myself once the baby arrives
7.09 Managing conflicting advice/information	I worry that I don't have all the information I need to be prepared
	Not knowing which sources of information I can trust makes me worried
	I feel anxious about how to handle conflicting or unwanted advice from people
8. Transition to Parenthood	
8.01 Responsibility of parenthood	The feeling of responsibility makes me feel anxious I feel the extra weight of responsibility from parenthood I worry about the responsibility that goes with becoming a parent
8.02 Feeling unprepared for parenthood	I feel unprepared for parenthood I am anxious about not being properly prepared for the new baby Thinking about the imminent arrival of my baby makes me feel stressed
8.03 Being a good parent	I worry about whether I am capable of being a good parent I worry that I won't do a good job as a parent I worry about whether I have what it takes to be a good parent

Fathers' Concerns During Pregnancy	Potential Items for New Scale
8.04 Uncertainty about future	I have concerns about the unknown in relation to parenthood I worry that nothing will be predictable any more once the baby arrives I worry that I have no idea what life will be like with the new baby
8.05 Protecting child after birth	I worry about not being able to protect my child through life
8.06 Caring for infant	I worry about caring for the baby I am worried that I will not understand what the baby needs when they cry
8.07 Bonding with baby	I am afraid of not being able to comfort my baby
8.08 Impact on other siblings	I worry I will find it hard to love the baby
8.09 Concerns regarding family and friends	I'm worried about becoming isolated from friends once we have the baby I am worried about how I will manage extended family
8.10 Safety of infant with pets	
9. Attitudes Towards Health Care Professionals	
9.01 Feeling excluded from antenatal care	I often feel overlooked by the medical staff
9.02 Concern for partner to receive good medical care	I do not feel supported by health care professionals I worry that the medical staff are too complacent in their care of my partner I am worried about whether the medical staff will give my partner good care
9.03 Not disclosing worries to professionals so partner receives optimal care	I don't feel I can ask midwives/doctors anything because my partner's needs should have priority
9.04 Prenatal appointments	
10. Practical and Financial Concerns	
10.01 Financial concerns	I am concerned about maintaining our financial security
10.02 Constrained finances/Loss of partner income	I worry about the loss of my partner's income
10.03 Added cost of having child	I worry about managing the added cost of having a child I am concerned about buying or affording the things we need for the new baby
10.04 Financial responsibility to support family	I am anxious about my responsibility to financially support the family
10.05 Housing	I am concerned about not having enough space for a growing family
10.06 Practical readiness for baby	Getting everything ready for the baby's arrival is overwhelming
10.07 Work-Family balance	I am concerned about balancing my work responsibilities with family commitments
10.08 Work or education stress	I worry about my job
10.09 Housekeeping	

Appendix J: Online Questionnaire used with Expert Review Panel (ERP)

I have read the Participant Information Letter and I consent to participate as a member of the Expert Review Panel (ERP):

_____ Yes

_____ No*

*(Questionnaire ended with the following message, “Thank you for taking the time to read about this project. We acknowledge that you do not wish to participate. Please close your browser window.”)

I consent to being acknowledged for my advice and guidance in the development of the scale, in any publication arising from this project.

_____ Yes,

Please state my name and qualifications in any acknowledgement as follows _____

_____ No, Although I consent to participate, I do not wish to be acknowledged

Demographic Questions

What is your age? _____

What is your gender? _____ Male

_____ Female

_____ Another term

Country of Residence _____

What is your qualification? _____

What is/are your affiliation(s)? _____

What is your profession? _____

How many years have you been practising in your profession? _____

Questionnaire Instructions for Expert Review Panel

Thank you for agreeing to participate in the Expert Review Panel. As you are aware, the purpose of the Expert Review Panel is to provide a means for panel members to review an item pool of potential items for a new scale assessing pregnancy-related anxiety in partners of pregnant women. Your responses will help improve the wording of items and reduce the number of items in the item pool, before the next stage of scale development.

A review of the literature has identified that partners of pregnant women experience pregnancy-related concerns and worries across ten categories, including: childbirth concerns, attitudes towards childbirth, baby concerns, acceptance of pregnancy, partner concerns, relationship concerns, worry about self, transition to parenthood, attitudes towards medical staff, and practical and financial concerns.

The items included in the item pool will be presented to you within these categories of concerns. The items are designed to be broader and more comprehensive than the final items to be included in the scale.

You will be asked to rate the items for relevance on a scale from 1 to 4:

1 = Redundant/Not important to include

4 = Extremely Relevant/Extremely important to include

Following this, you will be asked to rate each item on the following characteristics:

Clarity: Is the meaning of the item clear, with unambiguous wording?

Language: Is the language simple, unbiased, and acultural (avoiding fashionable expressions or colloquialisms)?

Conciseness: Does the item convey meaning without wordiness?

1 = poor

2 = fair

3 = good

4 = excellent

Finally, you will have the opportunity to make any additional comments or suggestions.

The following items relate to concerns partners may have about childbirth. Please rate the items for relevance from 1 to 4: 1 = Redundant/Not important to include 4 = Extremely Relevant/Extremely important to include					
I worry about complications happening during childbirth		1	2	3	4
I'm afraid that unexpected events may happen during childbirth		1	2	3	4
I worry about my partner experiencing unbearable pain and suffering in childbirth		1	2	3	4
I worry that my partner will be traumatised by childbirth		1	2	3	4
I worry about my partner's condition during childbirth		1	2	3	4
I worry about my partner losing control during labour		1	2	3	4
I worry that my partner will tear or need to be cut during the birth		1	2	3	4
I worry about my partner requiring an emergency caesarian		1	2	3	4
I worry about the use of interventions during delivery, such as forceps or vacuum extraction		1	2	3	4
I fear that my partner may be harmed during the birth		1	2	3	4
I worry about my baby being injured in childbirth		1	2	3	4
I fear that my partner may die in childbirth		1	2	3	4
I am afraid of losing the baby in childbirth		1	2	3	4
Please rate the items for clarity, language and conciseness.					
Clarity: Is the meaning of the item clear, with unambiguous wording? Language: Is the language simple, unbiased, and acultural (avoiding fashionable expressions or colloquialisms)? Conciseness: Does the item convey meaning without wordiness?		Poor	Fair	Good	Excellent
I worry about complications happening during childbirth	Clarity	1	2	3	4
	Language	1	2	3	4
	Conciseness	1	2	3	4
I'm afraid that unexpected events may happen during childbirth	Clarity	1	2	3	4
	Language	1	2	3	4
	Conciseness	1	2	3	4
I worry about my partner experiencing unbearable pain and suffering in childbirth	Clarity	1	2	3	4
	Language	1	2	3	4
	Conciseness	1	2	3	4

I worry that my partner will be traumatised by childbirth	Clarity	1	2	3	4
	Language	1	2	3	4
	Conciseness	1	2	3	4
I worry about my partner's condition during childbirth	Clarity	1	2	3	4
	Language	1	2	3	4
	Conciseness	1	2	3	4
I worry about my partner losing control during labour	Clarity	1	2	3	4
	Language	1	2	3	4
	Conciseness	1	2	3	4
I worry that my partner will tear or need to be cut during the birth	Clarity	1	2	3	4
	Language	1	2	3	4
	Conciseness	1	2	3	4
I worry about my partner requiring an emergency caesarian	Clarity	1	2	3	4
	Language	1	2	3	4
	Conciseness	1	2	3	4
I worry about the use of interventions during delivery, such as forceps or vacuum extraction	Clarity	1	2	3	4
	Language	1	2	3	4
	Conciseness	1	2	3	4
I fear that my partner may be harmed during the birth	Clarity	1	2	3	4
	Language	1	2	3	4
	Conciseness	1	2	3	4
I worry about my baby being injured in childbirth	Clarity	1	2	3	4
	Language	1	2	3	4
	Conciseness	1	2	3	4
I fear that my partner may die in childbirth	Clarity	1	2	3	4
	Language	1	2	3	4
	Conciseness	1	2	3	4
I am afraid of losing the baby in childbirth	Clarity	1	2	3	4
	Language	1	2	3	4
	Conciseness	1	2	3	4

The following items relate to attitudes towards childbirth. Please rate the items for relevance from 1 to 4: 1 = Redundant/Not important to include 4 = Extremely Relevant/Extremely important to include					
I am anxious about being present for the birth		1	2	3	4
I worry about not being able to help my partner in childbirth		1	2	3	4
I worry I will not be able to calm my partner if they experience fear and anxiety in childbirth		1	2	3	4
I worry about feeling helpless during labour and childbirth		1	2	3	4
I worry that I won't be able to cope during childbirth		1	2	3	4
I worry that I may pass out or not be able to cope with aspects of labour and birth		1	2	3	4
I worry that the messiness of childbirth will be too unpleasant for me		1	2	3	4
I do not do well with blood and surgery rooms		1	2	3	4
I do not feel prepared for childbirth		1	2	3	4
Please rate the items for clarity, language and conciseness.					
Clarity: Is the meaning of the item clear, with unambiguous wording?					
Language: Is the language simple, unbiased, and acultural (avoiding fashionable expressions or colloquialisms)?					
Conciseness: Does the item convey meaning without wordiness?					
		Poor	Fair	Good	Excellent
I am anxious about being present for the birth	Clarity	1	2	3	4
	Language	1	2	3	4
	Conciseness	1	2	3	4
I worry about not being able to help my partner in childbirth	Clarity	1	2	3	4
	Language	1	2	3	4
	Conciseness	1	2	3	4
I worry I will not be able to calm my partner if they experience fear and anxiety in childbirth	Clarity	1	2	3	4
	Language	1	2	3	4
	Conciseness	1	2	3	4
I worry about feeling helpless during labour and childbirth	Clarity	1	2	3	4
	Language	1	2	3	4
	Conciseness	1	2	3	4
I worry that I won't be able to cope during childbirth	Clarity	1	2	3	4
	Language	1	2	3	4
	Conciseness	1	2	3	4

I worry that I may pass out or not be able to cope with aspects of labour and birth	Clarity	1	2	3	4
	Language	1	2	3	4
	Conciseness	1	2	3	4
I worry that the messiness of childbirth will be too unpleasant for me	Clarity	1	2	3	4
	Language	1	2	3	4
	Conciseness	1	2	3	4
I do not do well with blood and surgery rooms	Clarity	1	2	3	4
	Language	1	2	3	4
	Conciseness	1	2	3	4
I do not feel prepared for childbirth	Clarity	1	2	3	4
	Language	1	2	3	4
	Conciseness	1	2	3	4
<p>The following items relate to concerns about the baby. Please rate the items for relevance from 1 to 4: 1 = Redundant/Not important to include 4 = Extremely Relevant/Extremely important to include</p>					
I worry about whether my baby will be healthy and normal		1	2	3	4
I worry about what I will do if my baby is not normal		1	2	3	4
I worry about having a sick or disabled baby		1	2	3	4
I'm worried about my child having a genetic problem		1	2	3	4
I constantly worry that something will be physically wrong with my baby		1	2	3	4
I'm afraid that my partner's vomiting due to pregnancy will affect the baby's development		1	2	3	4
I worry about my baby being premature		1	2	3	4
I worry about my baby being overdue		1	2	3	4
I constantly worry about my partner having a miscarriage		1	2	3	4

Please rate the items for clarity, language and conciseness.					
Clarity: Is the meaning of the item clear, with unambiguous wording?		Poor	Fair	Good	Excellent
Language: Is the language simple, unbiased, and acultural (avoiding fashionable expressions or colloquialisms)?					
Conciseness: Does the item convey meaning without wordiness?					
I worry about whether my baby will be healthy and normal	Clarity	1	2	3	4
	Language	1	2	3	4
	Conciseness	1	2	3	4
I worry about what I will do if my baby is not normal	Clarity	1	2	3	4
	Language	1	2	3	4
	Conciseness	1	2	3	4
I worry about having a sick or disabled baby	Clarity	1	2	3	4
	Language	1	2	3	4
	Conciseness	1	2	3	4
I'm worried about my child having a genetic problem	Clarity	1	2	3	4
	Language	1	2	3	4
	Conciseness	1	2	3	4
I constantly worry that something will be physically wrong with my baby	Clarity	1	2	3	4
	Language	1	2	3	4
	Conciseness	1	2	3	4
I'm afraid that my partner's vomiting due to pregnancy will affect the baby's development	Clarity	1	2	3	4
	Language	1	2	3	4
	Conciseness	1	2	3	4
I worry about my baby being premature	Clarity	1	2	3	4
	Language	1	2	3	4
	Conciseness	1	2	3	4
I worry about my baby being overdue	Clarity	1	2	3	4
	Language	1	2	3	4
	Conciseness	1	2	3	4
I constantly worry about my partner having a miscarriage	Clarity	1	2	3	4
	Language	1	2	3	4
	Conciseness	1	2	3	4

The following items relate to acceptance of the pregnancy. Please rate the items for relevance from 1 to 4: 1 = Redundant/Not important to include 4 = Extremely Relevant/Extremely important to include					
Having mixed feelings about the pregnancy makes me anxious		1	2	3	4
I did not want this pregnancy at this time		1	2	3	4
I am not looking forward to this baby		1	2	3	4
This is not an ideal time in my life to be expecting a baby		1	2	3	4
I felt unprepared for this pregnancy		1	2	3	4
Please rate the items for clarity, language and conciseness.					
Clarity: Is the meaning of the item clear, with unambiguous wording? Language: Is the language simple, unbiased, and acultural (avoiding fashionable expressions or colloquialisms)? Conciseness: Does the item convey meaning without wordiness?		Poor	Fair	Good	Excellent
Having mixed feelings about the pregnancy makes me anxious	Clarity	1	2	3	4
	Language	1	2	3	4
	Conciseness	1	2	3	4
I did not want this pregnancy at this time	Clarity	1	2	3	4
	Language	1	2	3	4
	Conciseness	1	2	3	4
I am not looking forward to this baby	Clarity	1	2	3	4
	Language	1	2	3	4
	Conciseness	1	2	3	4
This is not an ideal time in my life to be expecting a baby	Clarity	1	2	3	4
	Language	1	2	3	4
	Conciseness	1	2	3	4
I felt unprepared for this pregnancy	Clarity	1	2	3	4
	Language	1	2	3	4
	Conciseness	1	2	3	4

The following items relate to concerns about the pregnant partner. Please rate the items for relevance from 1 to 4: 1 = Redundant/Not important to include 4 = Extremely Relevant/Extremely important to include					
I worry about my partner's health		1	2	3	4
I worry that my partner might experience pregnancy complications		1	2	3	4
I worry about my partner's emotional well-being during pregnancy		1	2	3	4
I worry about my partner having postnatal depression after childbirth		1	2	3	4
I worry that my partner's mood swings will not improve after the birth		1	2	3	4
I am concerned about trying to keep my worries to myself so I can support my partner		1	2	3	4
I worry about being able to support my partner when I am feeling a lack of control myself		1	2	3	4
I feel anxious by all the things I need to do for my partner		1	2	3	4
I worry about whether I am doing enough to support my partner		1	2	3	4
Please rate the items for clarity, language and conciseness.					
Clarity: Is the meaning of the item clear, with unambiguous wording?		Poor	Fair	Good	Excellent
Language: Is the language simple, unbiased, and acultural (avoiding fashionable expressions or colloquialisms)?					
Conciseness: Does the item convey meaning without wordiness?					
I worry about my partner's health	Clarity	1	2	3	4
	Language	1	2	3	4
	Conciseness	1	2	3	4
I worry that my partner might experience pregnancy complications	Clarity	1	2	3	4
	Language	1	2	3	4
	Conciseness	1	2	3	4
I worry about my partner's emotional well-being during pregnancy	Clarity	1	2	3	4
	Language	1	2	3	4
	Conciseness	1	2	3	4
I worry about my partner having postnatal depression after childbirth	Clarity	1	2	3	4
	Language	1	2	3	4
	Conciseness	1	2	3	4
I worry that my partner's mood swings will not improve after the birth	Clarity	1	2	3	4
	Language	1	2	3	4
	Conciseness	1	2	3	4

I am concerned about trying to keep my worries to myself so I can support my partner	Clarity	1	2	3	4
	Language	1	2	3	4
	Conciseness	1	2	3	4
I worry about being able to support my partner when I am feeling a lack of control myself	Clarity	1	2	3	4
	Language	1	2	3	4
	Conciseness	1	2	3	4
I feel anxious by all the things I need to do for my partner	Clarity	1	2	3	4
	Language	1	2	3	4
	Conciseness	1	2	3	4
I worry about whether I am doing enough to support my partner	Clarity	1	2	3	4
	Language	1	2	3	4
	Conciseness	1	2	3	4
The following items relate to concerns about the relationship.					
Please rate the items for relevance from 1 to 4:					
1 = Redundant/Not important to include					
4 = Extremely Relevant/Extremely important to include					
I worry about my relationship with my partner		1	2	3	4
I am concerned that the pregnancy is negatively affecting our relationship		1	2	3	4
The pregnancy has put a strain on our relationship, and I worry that this will be ongoing		1	2	3	4
I worry that our relationship will never return to normal		1	2	3	4
I am concerned that having this baby will negatively affect the stability of our relationship		1	2	3	4
I'm afraid that my partner may change their feelings about me after our baby is born		1	2	3	4
I worry that my partner will focus solely on the baby after the birth		1	2	3	4
I worry about feeling distanced from my partner as they focus on caring for our baby		1	2	3	4
I'm worried about the baby changing my relationship with my partner		1	2	3	4
I am concerned that parenthood will negatively affect our relationship		1	2	3	4
I am concerned that my partner and I won't have time for each other once the baby is born		1	2	3	4
I am concerned that parenthood will negatively affect the intimacy in our relationship		1	2	3	4
I worry that sex during pregnancy may hurt the baby		1	2	3	4
I worry about changes to our sexual relationship during pregnancy		1	2	3	4
I worry about changes to our sexual relationship following childbirth		1	2	3	4
I am worried that I will no longer feel attracted to my partner because of changes to their body		1	2	3	4
I am worried that my partner's body will not return to how they looked before pregnancy		1	2	3	4

Please rate the items for clarity, language and conciseness.					
Clarity: Is the meaning of the item clear, with unambiguous wording? Language: Is the language simple, unbiased, and acultural (avoiding fashionable expressions or colloquialisms)? Conciseness: Does the item convey meaning without wordiness?		Poor	Fair	Good	Excellent
I worry about my relationship with my partner	Clarity	1	2	3	4
	Language	1	2	3	4
	Conciseness	1	2	3	4
I am concerned that the pregnancy is negatively affecting our relationship	Clarity	1	2	3	4
	Language	1	2	3	4
	Conciseness	1	2	3	4
The pregnancy has put a strain on our relationship, and I worry that this will be ongoing	Clarity	1	2	3	4
	Language	1	2	3	4
	Conciseness	1	2	3	4
I worry that our relationship will never return to normal	Clarity	1	2	3	4
	Language	1	2	3	4
	Conciseness	1	2	3	4
I am concerned that having this baby will negatively affect the stability of our relationship	Clarity	1	2	3	4
	Language	1	2	3	4
	Conciseness	1	2	3	4
I'm afraid that my partner may change their feelings about me after our baby is born	Clarity	1	2	3	4
	Language	1	2	3	4
	Conciseness	1	2	3	4
I worry that my partner will focus solely on the baby after the birth	Clarity	1	2	3	4
	Language	1	2	3	4
	Conciseness	1	2	3	4
I worry about feeling distanced from my partner as they focus on caring for our baby	Clarity	1	2	3	4
	Language	1	2	3	4
	Conciseness	1	2	3	4

I'm worried about the baby changing my relationship with my partner	Clarity	1	2	3	4
	Language	1	2	3	4
	Conciseness	1	2	3	4
I am concerned that parenthood will negatively affect our relationship	Clarity	1	2	3	4
	Language	1	2	3	4
	Conciseness	1	2	3	4
I am concerned that my partner and I won't have time for each other once the baby is born	Clarity	1	2	3	4
	Language	1	2	3	4
	Conciseness	1	2	3	4
I am concerned that parenthood will negatively affect the intimacy in our relationship	Clarity	1	2	3	4
	Language	1	2	3	4
	Conciseness	1	2	3	4
I worry that sex during pregnancy may hurt the baby	Clarity	1	2	3	4
	Language	1	2	3	4
	Conciseness	1	2	3	4
I worry about changes to our sexual relationship during pregnancy	Clarity	1	2	3	4
	Language	1	2	3	4
	Conciseness	1	2	3	4
I worry about changes to our sexual relationship following childbirth	Clarity	1	2	3	4
	Language	1	2	3	4
	Conciseness	1	2	3	4
I am worried that I will no longer feel attracted to my partner because of changes to their body	Clarity	1	2	3	4
	Language	1	2	3	4
	Conciseness	1	2	3	4
I am worried that my partner's body will not return to how they looked before pregnancy	Clarity	1	2	3	4
	Language	1	2	3	4
	Conciseness	1	2	3	4

The following items relate to concerns about self. Please rate the items for relevance from 1 to 4: 1 = Redundant/Not important to include 4 = Extremely Relevant/Extremely important to include					
At times, my worries seem to snowball		1	2	3	4
My worries interfere with my daily activities		1	2	3	4
My concerns are keeping me awake at night		1	2	3	4
My worries and concerns are causing me anxiety		1	2	3	4
A sense of things being out of control is really bothering me		1	2	3	4
I feel concerned that there is a lack of support available to me		1	2	3	4
I worry that I can't support my partner well when I am not receiving enough support for myself		1	2	3	4
I worry more about my health because I want to be around for my child when they are older		1	2	3	4
I am concerned about how I will manage with less sleep once the baby is born		1	2	3	4
I am concerned about the coming changes to my way of living		1	2	3	4
I worry about experiencing a loss of independence		1	2	3	4
I worry about losing my freedom when we have the baby		1	2	3	4
I'm afraid I'll always feel guilty if I'm doing something just for myself once the baby arrives		1	2	3	4
I worry that I don't have all the information I need to be prepared		1	2	3	4
Not knowing which sources of information I can trust makes me worried		1	2	3	4
I feel anxious about how to handle conflicting or unwanted advice from people		1	2	3	4
Please rate the items for clarity, language and conciseness.					
Clarity: Is the meaning of the item clear, with unambiguous wording?					
Language: Is the language simple, unbiased, and acultural (avoiding fashionable expressions or colloquialisms)?					
Conciseness: Does the item convey meaning without wordiness?					
		Poor	Fair	Good	Excellent
At times, my worries seem to snowball	Clarity	1	2	3	4
	Language	1	2	3	4
	Conciseness	1	2	3	4
My worries interfere with my daily activities	Clarity	1	2	3	4
	Language	1	2	3	4
	Conciseness	1	2	3	4
My concerns are keeping me awake at night	Clarity	1	2	3	4
	Language	1	2	3	4
	Conciseness	1	2	3	4
My worries and concerns are causing me anxiety	Clarity	1	2	3	4
	Language	1	2	3	4
	Conciseness	1	2	3	4

A sense of things being out of control is really bothering me	Clarity	1	2	3	4
	Language	1	2	3	4
	Conciseness	1	2	3	4
I feel concerned that there is a lack of support available to me	Clarity	1	2	3	4
	Language	1	2	3	4
	Conciseness	1	2	3	4
I worry that I can't support my partner well when I am not receiving enough support for myself	Clarity	1	2	3	4
	Language	1	2	3	4
	Conciseness	1	2	3	4
I worry more about my health because I want to be around for my child when they are older	Clarity	1	2	3	4
	Language	1	2	3	4
	Conciseness	1	2	3	4
I am concerned about how I will manage with less sleep once the baby is born	Clarity	1	2	3	4
	Language	1	2	3	4
	Conciseness	1	2	3	4
I am concerned about the coming changes to my way of living	Clarity	1	2	3	4
	Language	1	2	3	4
	Conciseness	1	2	3	4
I worry about experiencing a loss of independence	Clarity	1	2	3	4
	Language	1	2	3	4
	Conciseness	1	2	3	4
I worry about losing my freedom when we have the baby	Clarity	1	2	3	4
	Language	1	2	3	4
	Conciseness	1	2	3	4
I'm afraid I'll always feel guilty if I'm doing something just for myself once the baby arrives	Clarity	1	2	3	4
	Language	1	2	3	4
	Conciseness	1	2	3	4
I worry that I don't have all the information I need to be prepared	Clarity	1	2	3	4
	Language	1	2	3	4
	Conciseness	1	2	3	4

Not knowing which sources of information I can trust makes me worried	Clarity	1	2	3	4
	Language	1	2	3	4
	Conciseness	1	2	3	4
I feel anxious about how to handle conflicting or unwanted advice from people	Clarity	1	2	3	4
	Language	1	2	3	4
	Conciseness	1	2	3	4
The following items relate to concerns about the transition to parenthood.					
Please rate the items for relevance from 1 to 4:					
1 = Redundant/Not important to include					
4 = Extremely Relevant/Extremely important to include					
The feeling of responsibility makes me feel anxious		1	2	3	4
I feel the extra weight of responsibility from parenthood		1	2	3	4
I worry about the responsibility that goes with becoming a parent		1	2	3	4
I feel unprepared for parenthood		1	2	3	4
I am anxious about not being properly prepared for the new baby		1	2	3	4
Thinking about the imminent arrival of my baby makes me feel stressed		1	2	3	4
I am worried that I will not adapt to my new role as a parent		1	2	3	4
I am worried that my partner will not adapt to their new role as a parent		1	2	3	4
I worry about whether I am capable of being a good parent		1	2	3	4
I worry that I won't do a good job as a parent		1	2	3	4
I worry about whether I have what it takes to be a good parent		1	2	3	4
I have concerns about the unknown in relation to parenthood		1	2	3	4
I worry that nothing will be predictable any more once the baby arrives		1	2	3	4
I worry that I have no idea what life will be like with the new baby		1	2	3	4
I worry about not being able to protect my child through life		1	2	3	4
I worry about caring for the baby		1	2	3	4
I am worried that I will not understand what the baby needs when they cry		1	2	3	4
I am afraid of not being able to comfort my baby		1	2	3	4
I worry I will find it hard to love the baby		1	2	3	4
I'm worried about becoming isolated from friends once we have the baby		1	2	3	4
I am worried about how I will manage extended family		1	2	3	4

Please rate the items for clarity, language and conciseness.					
Clarity: Is the meaning of the item clear, with unambiguous wording? Language: Is the language simple, unbiased, and acultural (avoiding fashionable expressions or colloquialisms)? Conciseness: Does the item convey meaning without wordiness?		Poor	Fair	Good	Excellent
The feeling of responsibility makes me feel anxious	Clarity	1	2	3	4
	Language	1	2	3	4
	Conciseness	1	2	3	4
I feel the extra weight of responsibility from parenthood	Clarity	1	2	3	4
	Language	1	2	3	4
	Conciseness	1	2	3	4
I worry about the responsibility that goes with becoming a parent	Clarity	1	2	3	4
	Language	1	2	3	4
	Conciseness	1	2	3	4
I feel unprepared for parenthood	Clarity	1	2	3	4
	Language	1	2	3	4
	Conciseness	1	2	3	4
I am anxious about not being properly prepared for the new baby	Clarity	1	2	3	4
	Language	1	2	3	4
	Conciseness	1	2	3	4
Thinking about the imminent arrival of my baby makes me feel stressed	Clarity	1	2	3	4
	Language	1	2	3	4
	Conciseness	1	2	3	4
I am worried that I will not adapt to my new role as a parent	Clarity	1	2	3	4
	Language	1	2	3	4
	Conciseness	1	2	3	4
I am worried that my partner will not adapt to their new role as a parent	Clarity	1	2	3	4
	Language	1	2	3	4
	Conciseness	1	2	3	4
I worry about whether I am capable of being a good parent	Clarity	1	2	3	4
	Language	1	2	3	4
	Conciseness	1	2	3	4

I worry that I won't do a good job as a parent	Clarity	1	2	3	4
	Language	1	2	3	4
	Conciseness	1	2	3	4
I worry about whether I have what it takes to be a good parent	Clarity	1	2	3	4
	Language	1	2	3	4
	Conciseness	1	2	3	4
I have concerns about the unknown in relation to parenthood	Clarity	1	2	3	4
	Language	1	2	3	4
	Conciseness	1	2	3	4
I worry that nothing will be predictable any more once the baby arrives	Clarity	1	2	3	4
	Language	1	2	3	4
	Conciseness	1	2	3	4
I worry that I have no idea what life will be like with the new baby	Clarity	1	2	3	4
	Language	1	2	3	4
	Conciseness	1	2	3	4
I worry about not being able to protect my child through life	Clarity	1	2	3	4
	Language	1	2	3	4
	Conciseness	1	2	3	4
I worry about caring for the baby	Clarity	1	2	3	4
	Language	1	2	3	4
	Conciseness	1	2	3	4
I am worried that I will not understand what the baby needs when they cry	Clarity	1	2	3	4
	Language	1	2	3	4
	Conciseness	1	2	3	4
I am afraid of not being able to comfort my baby	Clarity	1	2	3	4
	Language	1	2	3	4
	Conciseness	1	2	3	4
I worry I will find it hard to love the baby	Clarity	1	2	3	4
	Language	1	2	3	4
	Conciseness	1	2	3	4

I'm worried about becoming isolated from friends once we have the baby	Clarity	1	2	3	4
	Language	1	2	3	4
	Conciseness	1	2	3	4
I am worried about how I will manage extended family	Clarity	1	2	3	4
	Language	1	2	3	4
	Conciseness	1	2	3	4
The following items relate to attitudes towards medical staff.					
Please rate the items for relevance from 1 to 4:					
1 = Redundant/Not important to include					
4 = Extremely Relevant/Extremely important to include					
I often feel overlooked by the medical staff		1	2	3	4
I do not feel supported by health care professionals		1	2	3	4
I worry that the medical staff are too complacent in their care of my partner		1	2	3	4
I am worried about whether the medical staff will give my partner good care		1	2	3	4
I don't feel I can ask midwives/doctors anything because my partner's needs should have priority		1	2	3	4
Please rate the items for clarity, language and conciseness.					
Clarity: Is the meaning of the item clear, with unambiguous wording?					
Language: Is the language simple, unbiased, and acultural (avoiding fashionable expressions or colloquialisms)?					
Conciseness: Does the item convey meaning without wordiness?					
		Poor	Fair	Good	Excellent
I often feel overlooked by the medical staff	Clarity	1	2	3	4
	Language	1	2	3	4
	Conciseness	1	2	3	4
I do not feel supported by health care professionals	Clarity	1	2	3	4
	Language	1	2	3	4
	Conciseness	1	2	3	4
I worry that the medical staff are too complacent in their care of my partner	Clarity	1	2	3	4
	Language	1	2	3	4
	Conciseness	1	2	3	4

I am worried about whether the medical staff will give my partner good care	Clarity	1	2	3	4
	Language	1	2	3	4
	Conciseness	1	2	3	4
I don't feel I can ask midwives/doctors anything because my partner's needs should have priority	Clarity	1	2	3	4
	Language	1	2	3	4
	Conciseness	1	2	3	4
The following items relate to practical and financial concerns.					
Please rate the items for relevance from 1 to 4:					
1 = Redundant/Not important to include					
4 = Extremely Relevant/Extremely important to include					
I am concerned about maintaining our financial security		1	2	3	4
I worry about the loss of my partner's income		1	2	3	4
I worry about managing the added cost of having a child		1	2	3	4
I am concerned about buying or affording the things we need for the new baby		1	2	3	4
I am anxious about my responsibility to financially support the family		1	2	3	4
I am concerned about not having enough space for a growing family		1	2	3	4
Getting everything ready for the baby's arrival is overwhelming		1	2	3	4
I am concerned about balancing my work responsibilities with family commitments		1	2	3	4
I worry about my job		1	2	3	4
Please rate the items for clarity, language and conciseness.					
Clarity: Is the meaning of the item clear, with unambiguous wording?					
Language: Is the language simple, unbiased, and acultural (avoiding fashionable expressions or colloquialisms)?					
Conciseness: Does the item convey meaning without wordiness?					
		Poor	Fair	Good	Excellent
I am concerned about maintaining our financial security	Clarity	1	2	3	4
	Language	1	2	3	4
	Conciseness	1	2	3	4
I worry about the loss of my partner's income	Clarity	1	2	3	4
	Language	1	2	3	4
	Conciseness	1	2	3	4
I worry about managing the added cost of having a child	Clarity	1	2	3	4
	Language	1	2	3	4
	Conciseness	1	2	3	4

I am concerned about buying or affording the things we need for the new baby	Clarity	1	2	3	4
	Language	1	2	3	4
	Conciseness	1	2	3	4
I am anxious about my responsibility to financially support the family	Clarity	1	2	3	4
	Language	1	2	3	4
	Conciseness	1	2	3	4
I am concerned about not having enough space for a growing family	Clarity	1	2	3	4
	Language	1	2	3	4
	Conciseness	1	2	3	4
Getting everything ready for the baby's arrival is overwhelming	Clarity	1	2	3	4
	Language	1	2	3	4
	Conciseness	1	2	3	4
I am concerned about balancing my work responsibilities with family commitments	Clarity	1	2	3	4
	Language	1	2	3	4
	Conciseness	1	2	3	4
I worry about my job	Clarity	1	2	3	4
	Language	1	2	3	4
	Conciseness	1	2	3	4
Please make any additional comments or suggestions for the improvement of this scale in the space provided below					

Appendix K: Revised Item Pool (95 items), After Evaluation by ERP

Revised Item Pool

- 1 I'm afraid of complications happening during childbirth
 - 2 I am afraid that my partner will experience unbearable pain during childbirth
 - 3 I am concerned about my partner being traumatised by childbirth
 - 4 I worry that my partner will tear or need to be cut during the birth
 - 5 I am concerned about my partner requiring an emergency caesarean
 - 6 I'm afraid that my partner may be harmed during childbirth
 - 7 I worry about my baby being harmed during childbirth
 - 8 I fear that my partner may die in childbirth
 - 9 I am afraid of losing the baby in childbirth
 - 10 I am concerned about not being able to help my partner in childbirth
 - 11 I worry I will not be able to calm my partner if they become afraid during childbirth
 - 12 I worry about feeling helpless during labour and childbirth
 - 13 I'm afraid I will not cope during childbirth
 - 14 I am concerned about seeing blood or body fluids during childbirth
 - 15 I do not feel prepared for childbirth
 - 16 I am afraid that my baby will not be healthy
 - 17 I worry about what I will do if my baby has a disability
 - 18 I am afraid that my child will have a genetic problem
 - 19 I'm afraid of having a baby with a disability
 - 20 I am afraid of my baby being premature
 - 21 I constantly worry about my partner having a miscarriage
 - 22 My mixed feelings about this pregnancy bother me
 - 23 I do not want this pregnancy at this time
 - 24 I am not looking forward to this baby
 - 25 I felt unprepared for this pregnancy
 - 26 I am concerned about my partner's health
 - 27 I worry that my partner might experience pregnancy complications
 - 28 I am concerned about my partner's emotional well-being during pregnancy
 - 29 I worry about my partner having postnatal depression after the birth
 - 30 I'm afraid that my partner's pregnancy-related mood changes will continue after the birth
 - 31 I worry about my ability to emotionally support my partner
 - 32 I am worried about all the things I need to do for my partner
 - 33 I am concerned about whether I am doing enough to support my partner
 - 34 I am concerned about my relationship with my partner
 - 35 I am concerned that the pregnancy is negatively affecting our relationship
 - 36 I'm afraid that our relationship will never go back to the way it was
 - 37 I am concerned that having this baby will negatively affect the stability of our relationship
 - 38 I'm afraid that my partner may change their feelings about me after our baby is born
-

Revised Item Pool

- 39 I worry that my partner will focus solely on the baby after the birth
 - 40 I am concerned that the care of the baby will create distance in the relationship
 - 41 I'm worried about the baby changing my relationship with my partner
 - 42 I am concerned that parenthood will negatively affect our relationship
 - 43 I am concerned that my partner and I won't have time for each other once the baby is born
 - 44 I am concerned that parenthood will negatively affect the intimacy in our relationship
 - 45 I am afraid that sex during pregnancy may hurt the baby
 - 46 I worry about changes to our sexual relationship during pregnancy
 - 47 I worry about changes to our sexual relationship following childbirth
 - 48 I am worried that I will no longer feel attracted to my partner because of changes to their body
 - 49 I am worried that my partner's body will not return to how they looked before pregnancy
 - 50 My worries sometimes overwhelm me
 - 51 My fears and concerns interfere with my daily activities
 - 52 My concerns are keeping me awake at night
 - 53 My worries and concerns are causing me anxiety
 - 54 I fear feeling out of control
 - 55 I worry about the pregnancy because there is so much I cannot control
 - 56 I am afraid because I cannot control what will happen in childbirth
 - 57 I feel concerned that there is a lack of support available to me
 - 58 I am feeling unsupported during my partner's pregnancy
 - 59 I am more concerned about my health because I want to be around for my child
 - 60 I am concerned about how I will manage with less sleep once the baby is born
 - 61 I am concerned about the coming changes to my way of living
 - 62 I worry about experiencing a loss of independence
 - 63 I fear I will lose my freedom when we have the baby
 - 64 I am afraid I won't have time for my own activities once the baby is born
 - 65 I worry I will feel guilty doing things just for myself after the baby is born
 - 66 I worry that I don't have all the information I need to be prepared
 - 67 Not knowing which sources of information I can trust makes me afraid
 - 68 I worry about the extra responsibility of parenthood
 - 69 I feel unprepared for parenthood
 - 70 I am worried about not being properly prepared for the new baby
 - 71 Thinking about the imminent arrival of my baby makes me feel stressed
 - 72 I'm afraid that I will not adapt to my new role as a parent
 - 73 I am concerned that my partner will not adapt to their new role as a parent
 - 74 I worry about whether I am capable of being a good parent
 - 75 I'm afraid that I won't do a good job as a parent
 - 76 I'm afraid I don't have the ability to be a good parent
 - 77 I worry that nothing will be predictable any more once the baby arrives
-

Revised Item Pool

- 78 I am worried because I have no idea what life will be like with the new baby
 - 79 I fear that I won't be able to protect my child through life
 - 80 I worry about caring for the baby
 - 81 I am worried that I will not understand what the baby needs when they cry
 - 82 I am afraid of not being able to comfort my baby
 - 83 I am afraid that I will find it hard to love the baby
 - 84 I'm worried about becoming isolated from friends once we have the baby
 - 85 I am worried about how I will manage extended family
 - 86 I do not feel supported by the health care professionals
 - 87 I'm afraid that my partner will not receive good care from the health care professionals
 - 88 I am concerned about maintaining our financial security
 - 89 I worry about the loss of my partner's income
 - 90 I am concerned about the added cost of a child
 - 91 I am concerned about buying or affording the things we need for the new baby
 - 92 I worry about being responsible to financially support the family
 - 93 I am concerned about not having enough space for a growing family
 - 94 Getting everything ready for the baby's arrival is overwhelming
 - 95 I am worried about balancing my work responsibilities with family commitments
-

Appendix L: 33-Item Paternal Pregnancy-Related Anxiety Scale (PPrAS)

Items Retained in the Final Scale

- 1 I'm afraid of complications happening during childbirth
 - 2 I am concerned about my partner requiring an emergency caesarean
 - 3 I worry about my baby being harmed during childbirth
 - 4 I fear that my partner may die in childbirth
 - 5 I am concerned about not being able to help my partner in childbirth
 - 6 I am afraid because I cannot control what will happen in childbirth
 - 7 I do not feel prepared for childbirth
 - 8 I am afraid that my baby will not be healthy
 - 9 I am afraid that my child will have a genetic problem
 - 10 I'm afraid of having a baby with a disability
 - 11 I constantly worry about my partner having a miscarriage
 - 12 I am not looking forward to this baby
 - 13 I felt unprepared for this pregnancy
 - 14 I worry that my partner might experience pregnancy complications
 - 15 I worry about my partner having postnatal depression after the birth
 - 16 I worry about my ability to emotionally support my partner
 - 17 I am concerned about whether I am doing enough to support my partner
 - 18 I'm afraid that our relationship will never go back to the way it was
 - 19 I am concerned that my partner and I won't have time for each other once the baby is born
 - 20 I worry about changes to our sexual relationship during pregnancy
 - 21 I am worried that I will no longer feel attracted to my partner because of changes to their body
 - 22 My worries sometimes overwhelm me
 - 23 My fears and concerns interfere with my daily activities
 - 24 My concerns are keeping me awake at night
 - 25 I worry about experiencing a loss of independence
 - 26 I feel unprepared for parenthood
 - 27 I'm afraid I don't have the ability to be a good parent
 - 28 I am afraid that I will find it hard to love the baby
 - 29 I do not feel supported by the health care professionals
 - 30 I'm afraid that my partner will not receive good care from the health care professionals
 - 31 I worry about the loss of my partner's income
 - 32 I worry about being responsible to financially support the family
 - 33 I am worried about balancing my work responsibilities with family commitments
-

Appendix M: Ordinal-to-Interval Level Conversion Table for PPrAS Scores

Ordinal Scores	Interval		Ordinal Scores	Interval		Ordinal Scores	Interval	
	Logits	Scale		Logits	Scale		Logits	Scale
33	-5.72	33.00	73	-0.44	79.53	113	1.79	99.26
34	-4.92	40.02	74	-0.39	80.03	114	1.87	99.91
35	-4.38	44.78	75	-0.33	80.51	115	1.94	100.58
36	-4.02	48.00	76	-0.28	80.99	116	2.02	101.29
37	-3.74	50.47	77	-0.22	81.47	117	2.11	102.02
38	-3.51	52.50	78	-0.17	81.94	118	2.19	102.79
39	-3.31	54.23	79	-0.12	82.41	119	2.28	103.59
40	-3.14	55.75	80	-0.06	82.88	120	2.38	104.45
41	-2.98	57.12	81	-0.01	83.35	121	2.48	105.37
42	-2.84	58.35	82	0.04	83.81	122	2.59	106.34
43	-2.71	59.50	83	0.09	84.27	123	2.71	107.40
44	-2.59	60.57	84	0.15	84.72	124	2.85	108.55
45	-2.48	61.57	85	0.20	85.18	125	2.99	109.82
46	-2.37	62.51	86	0.25	85.64	126	3.15	111.25
47	-2.27	63.41	87	0.30	86.09	127	3.34	112.90
48	-2.17	64.27	88	0.35	86.55	128	3.56	114.84
49	-2.08	65.08	89	0.40	87.01	129	3.83	117.22
50	-1.99	65.87	90	0.46	87.47	130	4.18	120.36
51	-1.91	66.63	91	0.51	87.92	131	4.71	125.03
52	-1.82	67.36	92	0.56	88.38	132	5.50	132.00
53	-1.74	68.08	93	0.61	88.85			
54	-1.66	68.77	94	0.66	89.30			
55	-1.59	69.44	95	0.72	89.77			
56	-1.51	70.10	96	0.77	90.24			
57	-1.44	70.74	97	0.82	90.71			
58	-1.37	71.36	98	0.88	91.18			
59	-1.30	71.97	99	0.93	91.67			
60	-1.23	72.57	100	0.99	92.15			
61	-1.17	73.16	101	1.04	92.64			
62	-1.10	73.74	102	1.10	93.13			
63	-1.04	74.31	103	1.16	93.64			
64	-0.97	74.87	104	1.21	94.15			
65	-0.91	75.41	105	1.27	94.67			
66	-0.85	75.95	106	1.33	95.20			
67	-0.79	76.48	107	1.39	95.74			
68	-0.73	77.01	108	1.46	96.28			
69	-0.67	77.53	109	1.52	96.85			
70	-0.61	78.04	110	1.59	97.43			
71	-0.56	78.55	111	1.65	98.02			
72	-0.50	79.04	112	1.72	98.63			

Appendix N: SPSS Syntax to Convert PPrAS Scores to Rasch Interval Scores

Syntax Column 1	Syntax Column 2	Syntax Column 3
Compute PPrAS_Rasch = PPrAS_Total.	Do if PPrAS_Rasch=45. Compute PPrAS_Rasch=61.57. End if.	Do if PPrAS_Rasch=58. Compute PPrAS_Rasch=71.36. End if.
Do if PPrAS_Rasch=33. Compute PPrAS_Rasch=33. End if.	Do if PPrAS_Rasch=46. Compute PPrAS_Rasch=62.51. End if.	Do if PPrAS_Rasch=59. Compute PPrAS_Rasch=71.97. End if.
Do if PPrAS_Rasch=34. Compute PPrAS_Rasch=40.02. End if.	Do if PPrAS_Rasch=47. Compute PPrAS_Rasch=63.41. End if.	Do if PPrAS_Rasch=60. Compute PPrAS_Rasch=72.57. End if.
Do if PPrAS_Rasch=35. Compute PPrAS_Rasch=44.78. End if.	Do if PPrAS_Rasch=48. Compute PPrAS_Rasch=64.27. End if.	Do if PPrAS_Rasch=61. Compute PPrAS_Rasch=73.16. End if.
Do if PPrAS_Rasch=36. Compute PPrAS_Rasch=48.00. End if.	Do if PPrAS_Rasch=49. Compute PPrAS_Rasch=65.08. End if.	Do if PPrAS_Rasch=62. Compute PPrAS_Rasch=73.74. End if.
Do if PPrAS_Rasch=37. Compute PPrAS_Rasch=50.47. End if.	Do if PPrAS_Rasch=50. Compute PPrAS_Rasch=65.87. End if.	Do if PPrAS_Rasch=63. Compute PPrAS_Rasch=74.31. End if.
Do if PPrAS_Rasch=38. Compute PPrAS_Rasch=52.50. End if.	Do if PPrAS_Rasch=51. Compute PPrAS_Rasch=66.63. End if.	Do if PPrAS_Rasch=64. Compute PPrAS_Rasch=74.87. End if.
Do if PPrAS_Rasch=39. Compute PPrAS_Rasch=54.23. End if.	Do if PPrAS_Rasch=52. Compute PPrAS_Rasch=67.36. End if.	Do if PPrAS_Rasch=65. Compute PPrAS_Rasch=75.41. End if.
Do if PPrAS_Rasch=40. Compute PPrAS_Rasch=55.75. End if.	Do if PPrAS_Rasch=53. Compute PPrAS_Rasch=68.08. End if.	Do if PPrAS_Rasch=66. Compute PPrAS_Rasch=75.95. End if.
Do if PPrAS_Rasch=41. Compute PPrAS_Rasch=57.12. End if.	Do if PPrAS_Rasch=54. Compute PPrAS_Rasch=68.77. End if.	Do if PPrAS_Rasch=67. Compute PPrAS_Rasch=76.48. End if.
Do if PPrAS_Rasch=42. Compute PPrAS_Rasch=58.35. End if.	Do if PPrAS_Rasch=55. Compute PPrAS_Rasch=69.44. End if.	Do if PPrAS_Rasch=68. Compute PPrAS_Rasch=77.01. End if.
Do if PPrAS_Rasch=43. Compute PPrAS_Rasch=59.50. End if.	Do if PPrAS_Rasch=56. Compute PPrAS_Rasch=70.10. End if.	Do if PPrAS_Rasch=69. Compute PPrAS_Rasch=77.53. End if.
Do if PPrAS_Rasch=44. Compute PPrAS_Rasch=60.57. End if.	Do if PPrAS_Rasch=57. Compute PPrAS_Rasch=70.74. End if.	Do if PPrAS_Rasch=70. Compute PPrAS_Rasch=78.04. End if.

Syntax Column 4	Syntax Column 5	Syntax Column 6
Do if PPrAS_Rasch=71. Compute PPrAS_Rasch=78.55. End if.	Do if PPrAS_Rasch=84. Compute PPrAS_Rasch=84.72. End if.	Do if PPrAS_Rasch=97. Compute PPrAS_Rasch=90.71. End if.
Do if PPrAS_Rasch=72. Compute PPrAS_Rasch=79.04. End if.	Do if PPrAS_Rasch=85. Compute PPrAS_Rasch=85.18. End if.	Do if PPrAS_Rasch=98. Compute PPrAS_Rasch=91.18. End if.
Do if PPrAS_Rasch=73. Compute PPrAS_Rasch=79.53. End if.	Do if PPrAS_Rasch=86. Compute PPrAS_Rasch=85.64. End if.	Do if PPrAS_Rasch=99. Compute PPrAS_Rasch=91.67. End if.
Do if PPrAS_Rasch=74. Compute PPrAS_Rasch=80.03. End if.	Do if PPrAS_Rasch=87. Compute PPrAS_Rasch=86.09. End if.	Do if PPrAS_Rasch=100. Compute PPrAS_Rasch=92.15. End if.
Do if PPrAS_Rasch=75. Compute PPrAS_Rasch=80.51. End if.	Do if PPrAS_Rasch=88. Compute PPrAS_Rasch=86.55. End if.	Do if PPrAS_Rasch=101. Compute PPrAS_Rasch=92.64. End if.
Do if PPrAS_Rasch=76. Compute PPrAS_Rasch=80.99. End if.	Do if PPrAS_Rasch=89. Compute PPrAS_Rasch=87.01. End if.	Do if PPrAS_Rasch=102. Compute PPrAS_Rasch=93.13. End if.
Do if PPrAS_Rasch=77. Compute PPrAS_Rasch=81.47. End if.	Do if PPrAS_Rasch=90. Compute PPrAS_Rasch=87.47. End if.	Do if PPrAS_Rasch=103. Compute PPrAS_Rasch=93.64. End if.
Do if PPrAS_Rasch=78. Compute PPrAS_Rasch=81.94. End if.	Do if PPrAS_Rasch=91. Compute PPrAS_Rasch=87.92. End if.	Do if PPrAS_Rasch=104. Compute PPrAS_Rasch=94.15. End if.
Do if PPrAS_Rasch=79. Compute PPrAS_Rasch=82.41. End if.	Do if PPrAS_Rasch=92. Compute PPrAS_Rasch=88.38. End if.	Do if PPrAS_Rasch=105. Compute PPrAS_Rasch=94.67. End if.
Do if PPrAS_Rasch=80. Compute PPrAS_Rasch=82.88. End if.	Do if PPrAS_Rasch=93. Compute PPrAS_Rasch=88.85. End if.	Do if PPrAS_Rasch=106. Compute PPrAS_Rasch=95.20. End if.
Do if PPrAS_Rasch=81. Compute PPrAS_Rasch=83.35. End if.	Do if PPrAS_Rasch=94. Compute PPrAS_Rasch=89.30. End if.	Do if PPrAS_Rasch=107. Compute PPrAS_Rasch=95.74. End if.
Do if PPrAS_Rasch=82. Compute PPrAS_Rasch=83.81. End if.	Do if PPrAS_Rasch=95. Compute PPrAS_Rasch=89.77. End if.	Do if PPrAS_Rasch=108. Compute PPrAS_Rasch=96.28. End if.
Do if PPrAS_Rasch=83. Compute PPrAS_Rasch=84.27. End if.	Do if PPrAS_Rasch=96. Compute PPrAS_Rasch=90.24. End if.	Do if PPrAS_Rasch=109. Compute PPrAS_Rasch=96.85. End if.

Syntax Column 7	Syntax Column 8	Syntax Column 9
<u>Do if PPrAS_Rasch=110.</u> <u>Compute PPrAS_Rasch=97.43.</u> <u>End if.</u>	<u>Do if PPrAS_Rasch=118.</u> <u>Compute PPrAS_Rasch=102.79.</u> <u>End if.</u>	<u>Do if PPrAS_Rasch=126.</u> <u>Compute PPrAS_Rasch=111.25.</u> <u>End if.</u>
<u>Do if PPrAS_Rasch=111.</u> <u>Compute PPrAS_Rasch=98.02.</u> <u>End if.</u>	<u>Do if PPrAS_Rasch=119.</u> <u>Compute PPrAS_Rasch=103.59.</u> <u>End if.</u>	<u>Do if PPrAS_Rasch=127.</u> <u>Compute PPrAS_Rasch=112.90.</u> <u>End if.</u>
<u>Do if PPrAS_Rasch=112.</u> <u>Compute PPrAS_Rasch=98.63.</u> <u>End if.</u>	<u>Do if PPrAS_Rasch=120.</u> <u>Compute PPrAS_Rasch=104.45.</u> <u>End if.</u>	<u>Do if PPrAS_Rasch=128.</u> <u>Compute PPrAS_Rasch=114.84.</u> <u>End if.</u>
<u>Do if PPrAS_Rasch=113.</u> <u>Compute PPrAS_Rasch=99.26.</u> <u>End if.</u>	<u>Do if PPrAS_Rasch=121.</u> <u>Compute PPrAS_Rasch=105.37.</u> <u>End if.</u>	<u>Do if PPrAS_Rasch=129.</u> <u>Compute PPrAS_Rasch=117.22.</u> <u>End if.</u>
<u>Do if PPrAS_Rasch=114.</u> <u>Compute PPrAS_Rasch=99.91.</u> <u>End if.</u>	<u>Do if PPrAS_Rasch=122.</u> <u>Compute PPrAS_Rasch=106.34.</u> <u>End if.</u>	<u>Do if PPrAS_Rasch=130.</u> <u>Compute PPrAS_Rasch=120.36.</u> <u>End if.</u>
<u>Do if PPrAS_Rasch=115.</u> <u>Compute PPrAS_Rasch=100.58.</u> <u>End if.</u>	<u>Do if PPrAS_Rasch=123.</u> <u>Compute PPrAS_Rasch=107.40.</u> <u>End if.</u>	<u>Do if PPrAS_Rasch=131.</u> <u>Compute PPrAS_Rasch=125.03.</u> <u>End if.</u>
<u>Do if PPrAS_Rasch=116.</u> <u>Compute PPrAS_Rasch=101.29.</u> <u>End if.</u>	<u>Do if PPrAS_Rasch=124.</u> <u>Compute PPrAS_Rasch=108.55.</u> <u>End if.</u>	<u>Do if PPrAS_Rasch=132.</u> <u>Compute PPrAS_Rasch=132.</u> <u>End if.</u>
<u>Do if PPrAS_Rasch=117.</u> <u>Compute PPrAS_Rasch=102.02.</u> <u>End if.</u>	<u>Do if PPrAS_Rasch=125.</u> <u>Compute PPrAS_Rasch=109.82.</u> <u>End if.</u>	<u>Execute.</u>

Appendix O: Supplementary Analyses with Rasch-Converted PPrAS Scores

Appendix O Table 1

Sample 1: Spearman Correlations Between Rasch-Converted PPrAS Scores and Demographic Variables

Variable	1	2	3	4	5
1. PPrAS (Rasch-converted)	1				
2. Age	-.12	1			
3. Weeks gestation	.15*	.24***	1		
4. Birth order	.07	.46***	.18**	1	
5. Country of residence	.31***	-.19***	-0.01	.14*	1

Note. $N = 282$. PPrAS = Paternal Pregnancy-related Anxiety Scale. For birth order, 1 = first baby, 2 = second or subsequent child. For country of residence, 0 = other country, 1 = Australia.

* $p < .05$, ** $p < .01$, *** $p < .001$, 2-tailed.

Appendix O Table 2

Sample 1: Pearson Correlations, Means, and Standard Deviations for Study Variables, using Rasch-Converted PPrAS Scores

Variable	1	2	3	4	5
1. PPrAS (Rasch-converted)	1				
2. Adapted PRAQ-R	.75***	1			
3. HADS-A	.80***	.66***	1		
4. EPDS	.80***	.65***	.77***	1	
5. IPIP-N	.68***	.50***	.67***	.79***	1
<i>M</i>	78.21	12.33	8.63	13.35	27.44
<i>SD</i>	10.21	4.99	3.23	5.73	6.91

Note. $N = 282$. PPrAS = Paternal Pregnancy-related Anxiety Scale. Adapted PRAQ-R = Pregnancy-Related Anxiety Questionnaire, Revised, adapted for fathers. HADS-A = Hospital Anxiety and Depression Scale, anxiety subscale. EPDS = Edinburgh Postnatal Depression Scale. IPIP-N = International Personality Item Pool, neuroticism subscale.

*** $p < .001$, 2-tailed.

Appendix O Table 3*Sample 1: Hierarchical Multiple Regression Analysis Predicting Rasch-Converted PPrAS Scores*

	<i>B</i>	<i>SE B</i>	95% CI for <i>B</i>	β	<i>p</i> -value	<i>sr</i>	<i>sr</i> ²
Model 1							
Weeks gestation	0.11	0.07	-0.03, 0.25	.09	.111	.09	.008
Country of residence	6.65	1.19	4.31, 8.98	.32	< .001	.32	.102
Model 2							
Weeks gestation	0.07	0.04	-0.01, 0.14	.05	.089	.05	.003
Country of residence	2.92	0.65	1.64, 4.21	.14	< .001	.14	.020
HADS-A	1.41	0.16	1.10, 1.72	.43	< .001	.27	.073
EPDS	0.80	0.09	0.63, 0.98	.44	< .001	.28	.078

Note. *N* = 282. *B* = unstandardised regression weight. *SE B* = standard error of regression weight.

B = standardised regression weight. *Sr* = semi-partial correlation. *Sr*² = semi-partial correlation squared.

Model 1: *R*² = .11, adjusted *R*² = .10, *F*(2, 279) = 16.75, *p* < .001

Model 2: *R*² = .75, adjusted *R*² = .74, $\Delta F(2, 277) = 347.22$, *p* < .001

Appendix O Table 4

Sample 2: Binary Logistic Regression using Rasch-Converted PPrAS Scores to Predict “Anxious” versus “Non-Anxious” Group Membership

Binary logistic regression results	
Overall Model Chi-square statistic	$\chi^2(1) = 187.54, p < .001$
Hosmer and Lemeshow test	$\chi^2(8) = .384, p = 1.00$
<i>B</i> (<i>SE</i>)	.50 (0.12)
Wald	16.53
Odds Ratio, 95% CI	1.64, 95% CI[1.29, 2.08], <i>p</i> < .001
Cox and Snell <i>R</i> ²	.71
Nagelkerke <i>R</i> ²	.95
Sensitivity	96%
Specificity	97.4%

Note. *N* = 152. *B* = unstandardised regression weight. *SE* = standard error.