

**THE BENEFITS OF BELIEVING YOU CAN CHANGE: IMPLICIT
MALLEABILITY THEORIES MODERATE THE RELATIONSHIP
BETWEEN LOW SELF-ESTEEM AND NEGATIVE OUTCOMES**

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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).

James Conigrave

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When I was seven I had to go in a running race. While I did not come last, I also quite profoundly did not come first. At the end of the race my mum took me aside and said “James, you’ve got your mum’s genes; you’re just not an athlete.” What she was really saying was not only was I bad at sport then, but I always would be regardless of how hard I tried. Following the writing of this thesis I have come to understand that any illusion of competence in academics was partly inspired by my clear incompetence at sports. So I’d like to thank my mum for helping me along my current trajectory.

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ABBREVIATIONS

Abbreviation	Meaning
ACT	Acceptance and Commitment Therapy
ASC	Academic Self-Concept
GPA	Grade Point Average
ITI	Incremental Theories of Intelligence
ITM	Incremental Theories of Morality
ITP	Incremental Theories of Personality
RFT	Relational Frame Theory
RSE	Rosenberg Self-esteem Scale
SES	Socioeconomic Status

GLOSSARY

Word	Meaning
Self-efficacy	An individual's belief in their ability to succeed on a given task
Implicit Theories	Cognitive frameworks used to understand the world
Entity Theory	An implicit belief that specific traits are fixed
Incremental Theory	An implicit belief that specific traits are malleable
Self-concept	An individual's perception of their own qualities
Self-esteem	An individual's perception of their social worth
Sociometer Theory	The hypothesis that self-esteem is a form of social perception

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ABSTRACT

There are at least two ways to combat the negative effects of low self-esteem: directly improve people's self-esteem, or to decouple the link between low self-esteem and negative outcomes (Hayes & Ciarrochi, 2015). Incremental theories are implicit beliefs that people's attributes are malleable. In this thesis I argue that subscription to these beliefs may help combat the negative effects of low self-esteem. Incremental theories make individuals less likely to make trait attributions as a result of failure and so may prevent low-self-esteem from occurring in response to failure. Incremental theories may also make people less likely to treat negative self-evaluations as truths that permanently define them, thus decoupling the link between low self-esteem and negative outcomes.

In study 1, I conducted a systematic review to examine the link between incremental theories and self-concept. I synthesize the results of 34 studies and found that incremental theories and self-esteem were modestly correlated ($r = .16$; 95% CI [0.11, 0.2]).

In study 2 and 3, I examined the extent that perceptions of self-malleability moderated the link between self-esteem and negative outcomes. I surveyed 489 Australian female high school students (age: $M = 14.7$; $SD = 1.5$) and a representative sample of 7,884 adult Americans of both genders (age: $M = 47.9$; $SD = 16$; 52.5% female) respectively. Moderation analyses in both samples showed that the links between low self-esteem and negative outcomes (lower wellbeing and achievement) were weaker for those with stronger incremental theories. While in those with high self-esteem there was little difference in wellbeing and achievement regardless of the level of incremental theories; in those with low self-esteem strong incremental theories had substantially higher levels of wellbeing and achievement.

People are likely to experience fluctuations in self-esteem due to success, failure, and social rejection. Incremental theories may help people respond to low self-esteem in more adaptive ways resulting in improved wellbeing and achievement.

INTRODUCTION

“A man can never be happy without his own approval”

-Mark Twain, 1929

In 1986, Governor George Deukmejian signed legislation which founded “The State Task Force to Promote Self-Esteem and Personal Responsibility”. The idea behind this group was to find ways to solve societal problems through improving self-esteem at a population level. This taskforce was the brain child of State Assemblyman John Vasconcellos who went on to found similar groups including the National Association for Self-Esteem which is still in operation, and lists its primary aim as “...to fully integrate Self-Esteem into the fabric of American society so that every individual, no matter what their age or background, experiences personal worth and happiness” (National Association for Self Esteem, 2016). Vasconcellos, like many others, was impressed by the wealth of research showing that self-esteem is a primary driver of human wellbeing and behaviour (Guindon, 2009). But this intense interest led to over-simplifications of self-esteem research. Rather than being seen as a nuanced, multi-dimensional construct (Marsh & Craven, 2006), self-esteem was boiled down to merely feeling good about oneself. These oversimplifications led to the production of very poor, and unsuccessful interventions (Baumeister, Campbell, Krueger, & Vohs, 2003; Guindon, 2009).

And so, the enthusiasm of policy makers waned. While participation prizes are still given to kids, the world has mostly forgotten why. But the research behind self-esteem has not abated. While self-esteem interventions are no longer considered a silver bullet, the construct of self-esteem is still considered to be a driver of human wellbeing and behaviour (Marsh & Craven, 2006). Much research has shown that low self-esteem is related to suicidal ideation, problem eating (McGee & Williams, 2000), substance abuse, delinquency

(Neumark-Sztainer, Story, French, & Resnick, 1997) and poorer academic performance (Marsh & Craven, 2006).

The centrality of self-esteem to human wellbeing, means that self-views can be useful constructs to consider when designing interventions to improve wellbeing and achievement. Two main approaches have been taken. Interventions have either attempted to change the level of self-esteem (Guindon, 2009), or attempted to decouple it from negative outcomes (Marshall et al., 2015). While nuanced interventions have successfully improved specific domains of self-esteem (self-concepts) to good effect (Swann Jr, Chang-Schneider, & Larsen McClarty, 2007), large scale interventions which aimed to boost global self-esteem have been unsuccessful in achieving their broad aims (Baumeister et al., 2003). Critics of the ‘self-esteem movement’ of the 70s or 80s claimed that self-esteem training programs were not only unsuccessful but potentially encouraged anti-social behaviour and narcissism (Baumeister et al., 2003; Dweck, 2000; Neff, 2009).

Subsequently researchers have identified that self-esteem training in populations is difficult to achieve due to the role of social comparisons in building self-esteem (Marsh, 1986). While self-esteem training is unlikely to be a silver bullet, the problem of low self-esteem remains and needs to be addressed. Prior research suggests that the negative effects of low self-esteem may be moderated by internal contextual factors (Marshall et al., 2015). In this thesis I explore whether the extent to which the self is viewed to be fixed or malleable affects the relationship between self-esteem and both wellbeing and achievement.

Implicit malleability theories are sets of beliefs regarding the fixedness or malleability of ones attributes (Dweck, Chiu, & Hong, 1995). People who perceive their attributes as more malleable (incremental theorists) tend to respond to failure with stronger desires to remediate (Hong, Chiu, Dweck, Lin, & Wan, 1999). In contrast, people who perceive their attributes to

be fixed (entity theorists) are more likely to attribute failures to rigid personal defects, and rather than attempt to remediate, they may engage in self-sabotage in order to generate socially acceptable reasons for failure (Ommundsen, 2001), or engage in downward social comparisons (Nussbaum & Dweck, 2008).

Incremental theories may prevent drops in self-esteem by reducing the extent to which failures can be attributed to stable aspects of the self (Dweck, 2000). As a result, incremental theories may make self-esteem more resilient to failure such that stronger incremental theories are related to higher self-esteem. Additionally, incremental theories may change the way low self-esteem is experienced. Rather than seeing low self-esteem as a life sentence, incremental theorists may be more likely to perceive ways out of their predicament. This mindset may improve their wellbeing and help them stay active in remedial efforts. In this thesis I explore these questions cross-sectionally. In Chapters 1 and 2, I summarise existing research on self-esteem and implicit malleability theories. In Chapter 3, I perform a meta-analytic synthesis of prior research, to assess the strength of the association between implicit theories and self-esteem. Additionally I attempt to find evidence of an interactive relationship between self-esteem and implicit malleability theories. In Chapters 4 and 5, I demonstrate that incremental theories moderate the relationships between self-esteem and wellbeing, and between self-esteem and achievement, in two diverse samples. Finally, in Chapter 6, I contextualise the findings of this thesis within the self-esteem and implicit malleability theory literatures.

CHAPTER ONE: THE SELF

“There are some philosophers, who imagine we are every moment intimately conscious of what we call our self; that we feel its existence and its continuance in existence; and are certain, beyond evidence of a demonstration, both of its perfect identity and simplicity.”

Hume (1738 [2003] pg. 164)

Introduction

At the heart of this thesis, is the idea that the effects of self-esteem dependent on context. In this chapter I introduce the construct of self-esteem. I discuss the nature of the self, how it develops and why it is important. Specifically, I present theories of how self-esteem may help individuals navigate complex social dominance hierarchies. I go on to suggest why low self-esteem is linked to a wide range of negative outcomes such as lower wellbeing and poorer achievement. I give a brief overview of different approaches designed to prevent the harms of low self-esteem, and conclude that contextual factors are important. I draw attention to the need to identify factors that change the way people respond to low self-esteem. Implicit malleability theories may be one such factor.

What is the self?

The feeling of being a self, of being somehow separate from one’s environment is a persistent and powerful human experience (Hume, 2003). Notions of the self are present in some of the earliest philosophical writings. Greek philosophers believed that humans had a core ‘essence’ (Hicks, 2015) and many religions have explored the self through the concept of ‘souls’, or an awareness or personhood which is distinct from the body. The self is such a

powerful experience that it has led many philosophers and theologians to suspect that the self may be so robust it might even survive death (Armstrong, 1994; Hicks, 2015).

But where does this notion of self, which is at the core of human experience, come from? While a sense of having a consistent identity is both strong and ubiquitous, it is difficult to pinpoint why we feel this way. For instance, think back to what you were like at the age of five; how you looked, the ideas you had, and your relationship to the world around you. You have almost certainly changed in every conceivable way since then, and yet your sense of self unifies all your life experiences into a single, enduring identity. Some have argued that this sense of consistency is illusory. Hume (2003) saw the self as merely a container where perceptions lurch into existence and then fade away without a trace: “The mind is a kind of theatre, where several perceptions successively make their appearance; pass, re-pass, glide away, and mingle in an infinite variety of postures and situations” (Hume, 2003; pg. 165). To Hume (2003) the self was not persistent, it ceased to exist when one went to sleep or was in a mindless state; and while memories can bind our experiences with a narrative structure, memories themselves are impermanent.

From a dispassionate viewpoint, what we might refer to as a self depends on scale and perspective. At a microscopic level, it is difficult to find any trace of a conventional notion of self. At this scale it would be easier to describe people as comprised of colonies of cooperative cells sharing resources, each responding as individuals to changes in a common environment. Smaller still, within each cell more individual actors are found: communes of cooperative and warring genes, each ‘selfishly’ striving for a chance to replicate (Dawkins, 2016).

There is much one could consider when weighing the existence of selves. And yet, all these thought experiments fall flat because, regardless of any academic protests, we

profoundly *feel* like selves. When children are born they do not run to the library and determine if they are selves, following a careful weighing of evidence. Instead a sense of self appears to arise spontaneously.

From birth, children spend immense time in self-exploration. Newborns have been observed to spend up to 20% of their waking hours interacting with their own faces (Korner, 1972). Children quickly learn to recognise images of themselves. By 18 to 20 months toddlers can recognise and interact with themselves in mirrors. Toddlers will attempt to take off unattractive clothing, adjust their posture, or remove blemishes from their faces as demonstrated in the ‘rouge’ experiments (Butterworth, 1990). This capacity to recognise the self and engage in self-grooming shows that not only do children of this age have a separate sense of self, but that they understand that the self can have good or bad qualities. Self-referential processing is one of the default modes of the human brain (Gusnard, Akbudak, Shulman, & Raichle, 2001). In spite of all the distraction in one’s environment, for better or for worse, our selves are often the most interesting things in the room. Because the self is such a vivid and persistent experience, we bring it into every situation. The world is coloured by the way we feel about the self. Our self-esteem has profound implications for our wellbeing and behaviour (Robins & Trzesniewski, 2005; Rosenberg, 1979). But what factors might account for the emergence of a phenomenological self in humans?

Evolutionary theories of the self

When exploring the evolutionary origins of any human (or non-human) trait it is important that one does not fall into the trap of panadaptationism — the idea that every identifiable human or animal trait must have been specifically selected for (Gould & Lewontin, 1979). Genes invariably have multiple effects. As a result, it is never entirely clear if a given trait is driving natural selection, or merely ‘piggybacking’ with another which is (Dawkins, 2016). For example, moths tend to fly at a fixed orientation towards light at night.

When these light sources have a celestial origin, this trait enables them to travel in straight lines. But, this same mechanism has the unfortunate side-effect of making moths spiral into burning candles. While this mechanism broadly has a net positive effect, to look at the self-immolating behaviour of moths in isolation and conclude that it must somehow be adaptive would be misguided (Dawkins, 1999). With these ideas in mind, does it make sense to talk about the evolutionary origins of the self? Piggybacking traits by necessity are not selected for, and so tend to be unreliably expressed (Stein, 1996). In contrast, the experience of self is prominent and experienced near universally. As a result, it is likely that it does serve adaptive functions, rather than merely hitchhiking with other adaptive traits.

While we cannot be entirely sure that our sense of self is adaptive, there are clear advantages to being able to separate oneself from the environment. Basic survival behaviours like eating, sleeping, and reproducing can be managed effectively without self-referential processes (Dawkins, 2016). But humans live in complex social environments. These environments present unique challenges and require complex strategies to navigate. For instance, while most animal species live in small groups, even in our early evolutionary history, humans have banded together in groups composed of more than 150 individuals (Harari, 2014). This ability to get along and work with others enabled new hunting styles and gave *Homo sapiens* a great advantage over their competitors. For example, the Neanderthals, despite demonstrating some capacity for language, showed no evidence of trade and tended to travel in smaller groups of fewer than 50 individuals (Harari, 2014). Humans on the other hand were able to work together in great numbers to great effect (Harari, 2014) While at a group level cooperation at this scale is a great advantage, it also places immense social pressure on individuals. Human survival to a degree is dependent on acceptance by and cooperation with others. In order to navigate this social terrain effectively, it is necessary to occasionally forego one's own immediate needs. People cannot just eat whatever is within

reach without recourse. Sometimes one's own wants and needs need to be negotiated in concert with others. Anyone who only maximised their own resources at the expense of their group would risk exile and would likely die and not pass on their genes (Leary, Tambor, Terdal, & Downs, 1995). So how might a sense of self help people to operate successfully in groups?

An ability to recognise individual actors is critical for negotiating social terrain (Blakemore & Decety, 2001). A sophisticated sense of self may provide a rubric by which to identify one's own needs and desires. For instance, what kinds of social relationships need to be developed, and what resources need to be acquired? The self may also be a social resource in and of itself; a way of presenting a unified front in order to encourage cooperation from others (Baumeister, 2005). Perceiving selves may have enabled humans to better understand their own needs, negotiate with others, survive, and prosper in highly social environments (Baumeister, 2005).

The importance of language for building self-representations

The self, almost certainly has many facets which rely on various mechanisms. In humans, this process of building stable models of the self, and of others, is driven partly through language (Hayes & Ciarrochi, 2015). Language is not only a mode of communication with others but also a form of self-communication. Humans engage in perpetual rumination which can be thought of as a form of self-narration (Treynor, Gonzalez, & Nolen-Hoeksema, 2003). It is not clear exactly why humans engage in inner-speech. For instance, if someone is running late for work they might verbalise to themselves "I'm running late, my boss is going to kill me". As Harris (2014) observed, if someone is both the origin and the recipient of a thought, why have it at all? Did our late-running person not already know that they were running late before thinking it to themselves?

In fact, it may not be clear what we know before we have these internal conversations — inner experiences are complicated. The same emotional sensations can mean completely different things in different circumstances. Similar feelings of nervousness can occur when people feel unsafe as when they feel passionate love (Dutton & Aron, 1974). Language may help people integrate confusing internal states into meaningful narratives. Language is useful for consolidating information – understanding the self and reliving past lessons. Language can also create psychological distance from problems and is useful for future planning as evident in worry and anticipation (Morin, 2005). Language is crucial for building up persistent and deep self-models (Leary & Tangney, 2003). It allows individuals to step outside the body and view the self from the perspective of others (Schwalbe, 1983). It also allows the various aspects of the self to be categorised and known e.g. thin, tall, clever, nice, or happy (Stipek, Gralinski, & Kopp, 1990).

Knowing one's own capabilities is extremely useful. In order to safely jump between two rocks people need to know their physical limits. Some of this information about the self may be discovered in play, but social comparison is also an extremely useful tool. In many domains of life people place themselves in competence hierarchies (Marsh, 1990b). This gives them a sense of how they stack up against others on tasks they may not have even performed before. This gives people a sense of how they are distinctive relative to others (Turner & Onorato, 1999). This ability to compare the self to others becomes apparent in children at the age they are developing language (Milligan, Astington, & Dack, 2007). By learning how to describe the self, children are able to go beyond implicit sources of self-concept (the way interactions make them feel) to explicitly understand their qualities and relative worth. This judgement of personal worth, which is made in reference to others, is one's self-esteem.

Self-esteem

Development of self-esteem

The realisation that there are other entities in the world can be a rude awakening. From the age of 2-5, as children are developing language, they begin to understand the extent to which the universe is comprised of myriad selves separate from their own (Milligan et al., 2007). While the infantile self was originally perceived to be boundless, as children grow older, their notion of self becomes increasingly differentiated from the world (Nardini, Burgess, Breckenridge, & Atkinson, 2006). The self becomes an object in the world with its own set of properties, some good and some bad (Robins & Trzesniewski, 2005). This new understanding is threatening. The child's behaviour and capabilities, their self-worth, can now be judged relative to others. While pre-school age children tend to report very high self-esteem, possibly due to a lack of external feedback (Robins & Trzesniewski, 2005), school-aged children increasingly base their self-evaluations on social comparisons and feedback from others. As a result their self-esteem rapidly falls (Robins & Trzesniewski, 2005). There is intense psychological desire to be better than others, but unfortunately that is not possible for everyone in every domain. In absence of others to compare themselves with people tend to feel better than average, but this illusion is pulled out from under their feet when they are confronted by the capabilities of their peers (Alicke, Klotz, Breitenbecher, Yurak, & Vredenburg, 1995). The way that children evaluate their worth has profound impacts for their wellbeing and functioning (Robins & Trzesniewski, 2005).

Discriminating self-esteem from perceived self-efficacy

People need to understand their own limitations so that they can know which challenges should be attempted, and which would be better to pass by. But having high self-esteem is not just about feeling that good at something, it is about feeling that good relative to

others. This emphasis on social comparison discriminates self-esteem from self-efficacy (Marsh et al., 2015).

Self-efficacy can be defined as one's confidence in being able to successfully complete a discrete task (Bandura, 2006). Self-efficacy has been shown to predict the extent to which individuals invest resources, take risks, and persevere in the face of adversity (Bandura, 1982). This can be understood in terms of Expectancy Value Theory (Wigfield & Eccles, 2000). When multiple behaviours are possible, people will tend to act in ways that they believe will be successful, and achieve an outcome which is valued (Wigfield & Eccles, 2000). In other words, there is little utility in attempting a task when we think it is unlikely that we will successfully complete it, or one in which we do not care about the outcome. In fact, doing so may only have negative social consequences (e.g. embarrassment) if we fail (Ommundsen, 2001). Self-efficacy is important because it helps people allocate resources effectively to situations where they are likely to bear fruit. While self-efficacy is often defined narrowly, many tasks require such a broad set of skills that some authors have suggested that people may hold a generalised sense of self-efficacy (Scholz, Doña, Sud, & Schwarzer, 2002).

But when it comes to self-assessments of worth (i.e. self-esteem), people are generally more interested in social comparisons than absolute levels of competence (Marsh & Hau, 2003). Consider that, relative to other species, humans are vastly intelligent. Humans went from inventing flight (in 1903) to landing on the moon (1969) in less than 100 years. Compare this breakneck rate of progress to our 99% genetically identical cousins *Homo Erectus*, who in two million years never progressed from simple stone tools (Harari, 2014). But humans do not judge themselves in absolute terms, instead, they compare themselves to their close peers (Marsh & Hau, 2003). As such, even though most humans could write a better sonnet than a jellyfish, or outperform a sloth in calculating times tables, it is still very

common for even average performers to feel bad at English or mathematics. The way we evaluate our self-worth has profound implications for wellbeing and behaviour.

The consequences of low self-esteem

Feelings of low social worth (i.e. low self-esteem) have been shown to be associated with a wide range of negative outcomes (Guindon, 2009). Low self-esteem makes individuals anticipate and become sensitive to failure. If someone thinks they are worse than others, then facing up to challenges may only advertise their relative weakness to others when they inevitably fail. This anticipated failure results in reduced persistence and performance on tasks among individuals with low self-esteem (Shrauger & Sorman, 1977).

In this way low self-esteem can spark downward spirals where negative self-evaluations lead to poorer performances leading to even worse self-evaluations (Marsh & O'Mara, 2008). These behaviour patterns ultimately lead to a wide range of undesirable outcomes. Low self-esteem has been associated with problem eating (McGee & Williams, 2000), mental illness, poorer performance (Shrauger & Sorman, 1977), suicidal ideation (Neumark-Sztainer et al., 1997), truancy (Swann Jr et al., 2007) and social isolation (Marshall, Parker, Ciarrochi, & Heaven, 2014).

Given the long list of ills associated with low self-esteem, it may seem surprising that it has not been eliminated by natural selection. What is the value in feeling bad about oneself if it is only going to result in apathy, which may hamper reproductive success? And indeed, the majority of people tend to have a positive bias towards feeling worthy, and even feeling better than others (Alicke et al., 1995). And yet people do not walk around feeling great about themselves all the time. Why not? There are a few potential explanations for this. The classical view, enshrined in the self-esteem movement, is that low self-esteem is merely a disorder which needs to be cured (Baumeister et al., 2003). And yet, other theorists have

suggested that self-esteem may mirror how other animals monitor and regulate status. This has led some theorists to hypothesise that low self-esteem may have adaptive properties (Baumeister & Leary, 1995). Self-esteem may help people to track their social, protecting them from social exclusion. Analogues to this process can be seen in animals.

Animal analogues to self-esteem

Social status is a matter of life and death to many kinds of animals. While all animals have intense drives to acquire resources (e.g. territory or food) and reproduce, resources are limited. This can lead to fierce disputes when rivals compete for mates, or both want access to food or other resources. Monitoring one's social status is one way of avoiding unnecessary conflict. Rather than fighting to the death over every dispute, most social animals are able to recognise a larger rival, and defer (Sapolsky, 2004). Lobsters are a great example of this (Peterson, 2018). Male lobsters are extremely territorial animals. When they encounter a rival, they face off, sending out chemical signals declaring their size and status. Generally the smaller lobster will quickly flee, but if there is a contest over who is more powerful they will eventually fight, which can end fatally. The winner will have access to food, shelter, and a steady stream of females who only mate with dominant lobsters. This behaviour is partly moderated by serotonin (Edwards & Kravitz, 1997). When lobsters come into contact with a bigger foe, serotonin levels drop which makes them more likely to flee (Edwards & Kravitz, 1997). Lobsters who have recently lost face-offs have lower serotonin and can become increasingly submissive (Huber, Panksepp, Yue, Delago, & Moore, 2001).

Lobsters and many other social animals clearly have a rudimentary way of monitoring their status relative to rivals. This is an incredibly important skill to have. Without this ability, young elephant seal pups may provoke larger bulls and get savaged; or teenage gorillas might obviously draw the ire of silverbacks. This ability is also important for humans. Without the ability to sense status, people would not be able to maintain their position in social

hierarchies as effectively (Leary & Baumeister, 2000). Leary et al. (1995) suggests that self-esteem may constitute a 'sociometer' or a form of social perception. That self-esteem may help people perceive dominance hierarchies and keep people safe from threats of exclusion (Leary et al., 1995).

Sociometer theory and the importance of social status

While feeling good about oneself can be pleasurable, it may not always be desirable. Deference to someone bigger or more powerful may help people with lower status to stay safe. If an apprentice attempts to humiliate their boss the results are likely to be professionally catastrophic. The reverse, while no more desirable, is unlikely to bear the same consequences for the aggressor. If people misjudge their social worth and agitate a socially dominant rival they may find themselves isolated from the rest of their group. Leary et al. (1995) speculated that self-esteem may act as a form of social perception: drops in self-esteem may indicate a drop in status and a threat of exclusion. Fluctuations in self-esteem may help people operate within social structures, similarly to how other species moderate their behaviour within pecking orders. Self-esteem may operate like an emotional alarm (Leary & Baumeister, 2000). When more powerful people are around, it may be beneficial to defer to them rather than risking one's personal safety.

According to sociometer theory, people experience high self-esteem when they are included and have higher social status (Leary & Baumeister, 2000). High self-esteem has the effect of emboldening individuals so they capitalise on their social status. Low self-esteem may occur when social currency is low and makes individuals cautious and deferential. Leary et al. (1995) claimed that the ability to perceive social status and operate within groups has been essential in our evolutionary past. Individuals who were insensitive to social cues from others (especially from higher status rivals) were ostracised and, without the shared resources of their group, failed to pass on their genes. Those individuals whose self-esteem dropped in

response to social failure may have been sufficiently inhibited such that they did not further aggravate dominant rivals and were able to remain in the group, thereby increasing their reproductive fitness. Self-esteem would therefore form an essential role in navigating perilous social circumstances and make individuals' behaviour sensitive to their current social status.

Much evidence supports the sociometer theory of self-esteem. Self-esteem rises and falls with perceived rejection, social estrangement (Eisenberger & Lieberman, 2004; Leary, Haupt, Strausser, & Chokel, 1998; Reitz, Motti-Stefanidi, & Asendorpf, 2016), and is linked to social network size (Marshall et al., 2014). The ability to track your social status may be an important skill for operating in social hierarchies. This means that low self-esteem can be protective in many scenarios. But while self-esteem may be adaptive in some contexts, in other scenarios it can cause problems. For example, some individuals have self-esteem, which is highly unstable. Labile self-esteem tends to be associated with poorer outcomes (Crocker & Park, 2004).

Self-esteem lability

While low self-esteem may serve an adaptive social function, excessively unstable self-esteem has been shown to predict a wide range of negative outcomes (Kernis, 2005). Self-esteem variability is a better predictor of depression than the mean level of self-esteem (Butler, Hokanson, & Flynn, 1994). Unstable self-esteem tends to be partly caused by a tendency to make trait attributions (Hayes, Harris, & Carver, 2004). This tendency makes adverse interpersonal events more threatening as they are reflected onto the self and thought to be evidence of defectiveness. As a result, self-esteem can vary rapidly depending on whether one has recently received positive or negative feedback (Kernis, Paradise, Whitaker, Wheatman, & Goldman, 2000).

The result of unstable self-esteem is a weaker sense of self even at times when self-esteem is high (Kernis et al., 2000). People with unstable self-esteem tend to avoid situations where their self-esteem may be threatened. They have reduced curiosity, increased defensiveness and tend to avoid challenges (Kernis, Lakey, & Heppner, 2008; Waschull & Kernis, 1996).

Addressing the Harms of Self-esteem

Self-esteem is not a simple construct. Low self-esteem tends to be associated with negative outcomes. At the same time, rigid self-concepts may impede people's natural sense to track social self-worth, potentially leading to social dysfunction and narcissism (Neff, 2009). By the same token, highly labile self-esteem may also cause problems (Kernis, Cornell, Sun, Berry, & Harlow, 1993). Boosting self-esteem in individuals with fragile self-worth could harm the stability of their self-esteem. Increased self-esteem lability may then increase defensiveness as they cling to their positive self-concepts and try to protect it from harm (Kernis et al., 2008). This presents a challenge for policy makers trying to address the harms of low self-esteem. Even if someone's level of self-esteem is improved temporarily, unless their resilience is also improved they may still be vulnerable in the future. Additionally, making people insensitive to social rejection may not be a desirable goal. Self-esteem which never falls could be symptomatic of narcissism, and may prevent people from connecting with others (Hayes & Ciarrochi, 2015; Leary et al., 1995; Neff, 2009).

Despite these considerations low self-esteem is still related to a wide range of negative outcomes. Persistent low self-esteem can be particularly toxic because, people who suffer frequent failures become increasingly submissive which prevents them taking action which could improve their situation (Shrauger & Sorman, 1977). So while the way to manage low self-esteem is not clear-cut, it is clear that it does need to be managed. The most

straightforward way that researchers and policymakers have tried to intervene on low self-esteem is through self-esteem training.

Self-esteem training: dissecting the self-esteem movement.

Self-esteem has long been considered a variable of interest for policy makers and researchers due to its association with a wide range of negative outcomes (Baumeister et al., 2003; Robins & Trzesniewski, 2005). In a longitudinal study Trzesniewski et al. (2006) showed that adolescents with low self-esteem were at increased risk of mental and physical health problems, and had lower economic prospects later in life. Researchers and policy makers have attempted to address the harms of low self-esteem using two main strategies: altering the valence of self-esteem itself (Kahne, 1996) and/or decoupling low self-esteem from negative outcomes (Ciarrochi, Atkins, Hayes, Sahdra, & Parker, 2016; Levin, Luoma, & Haeger, 2015).

Historically, researchers and policy makers have sought to directly change the valence of self-esteem (Guindon, 2009). This approach targets the content of an individual's mind, their thoughts, and feelings about themselves. The aim is to prevent or reduce the extent to which people have negative thoughts about themselves. Interventions aiming to boost self-esteem were widespread during the 'self-esteem movement' (Baumeister et al., 2003). Spurred by research into the detrimental effects of low self-esteem, many policy makers in the 60s and 70s viewed self-esteem training as a panacea to almost all societal ills (Guindon, 2009; Swann Jr et al., 2007). Policy makers assumed that if children's self-esteem was raised early on, that they would be healthier, more successful and productive later in life. Self-esteem training was seen as a way to improve health, educational outcomes and social cohesion while simultaneously reducing crime and drug use (Baumeister et al., 2003). These good intentions however, did not translate into good results. This was partly due to the overly

simplistic models of self-esteem upon which these interventions were built. While nuanced self-esteem interventions have shown that improving specific self-concepts can be effective for improving specific outcomes (O'Mara, Marsh, Craven, & Debus, 2006), interventions designed by educational departments and delivered by teachers, were often generated without reference to theory, instead relying on simplistic messages such as 'every child is special' (Crocker & Wolfe, 2001).

This crude form of self-esteem training was widely rolled out and yielded inconsistent and disappointing results (Baumeister et al., 2003; Guindon, 2009). These mixed results led to criticisms of self-esteem as a concept, claiming that any attempts to change the valence of self-esteem would be ineffective at best and harmful at worst (e.g. Baumeister et al., 2003; Crocker & Park, 2004; Dweck, 2000; Neff, 2009). Baumeister et al. (2003) claimed that while self-esteem was a 'seductive' construct it has little utility in psychological science from an interventionist perspective.

These cynical reactions may have been symptomatic of frustration with the self-esteem movement rather than with the science of self-esteem (Marsh & Craven, 2006). Despite these strong criticisms, researchers in the field have argued that the failures of the self-esteem movement were not due to any weaknesses in the construct, but rather due to weaknesses in those specific interventions. Marsh and Craven (2006) argued that the criticisms of the construct tended to rely on simplistic models of self-esteem. For instance, few of these interventions recognised multi-dimensional aspects of self-worth.

The multidimensional self

Self-esteem is often framed as being unidimensional, this implies that people make one single value judgement about their worth. In aggregate this is loosely true (Shavelson, Hubner, & Stanton, 1976). But humans have complex social lives which means they are often

operating in multiple social hierarchies simultaneously. For instance, among someone's friends, they may be regarded as witty and highly respected. At work they could be renowned for being bad at their job. And they could be just average at swimming.

In order to complete in all these social races, people require a way to track their attributes in a wide range of dimensions. This means that we can like certain aspects of ourselves more than other aspects. When we make global assessments of self-worth, these assessments are generally based on how we view the self in specific dimensions. For instance someone might feel that overall they are a good person (global assessment), because they make friends easily (social self-concept), they are kind to those around them (moral self-concept), and they work hard and do well at school (academic self-concept) (Shavelson et al., 1976). Further down this hierarchy they could have more specific self-concepts. For instance, they could feel that academically they are an average student, because while they are competitive when it comes to mathematics and physics, they are not at all good at art or English. Self-esteem (considered to be a global self-concept) in this model sits on top of a hierarchy of more specific yet correlated self-concepts (Shavelson et al., 1976).

In the Shavelson et al. (1976) formulation, changes in self-esteem can be traced back to changes in more specific self-concepts, lower down the hierarchy. While self-esteem is reflective of perceived social worth (Leary et al., 1995), we consider ourselves high or low worth based on a wide number of domains. A reduction in self-esteem could for instance be a function of a drop in one's academic self-concept which in turn was due to a poor performance on a maths test. Conversely the model proposed by Shavelson et al. (1976) suggests that in order to change global self-esteem, generally one must target a combination of lower order self-concepts. Additionally, to maximise the effectiveness of interventions, researchers have argued that interventions should target self-concepts which exist in similar

domains to the desired outcome. This is often referred to as the specificity matching principle (Swann Jr et al., 2007).

The specificity matching principle suggests that specific outcomes will be more strongly related to self-concepts which are in the same domain (Swann Jr et al., 2007). For example, someone's academic performance should be more influenced by how good they feel they are at school (domain matched), than how good they feel about their sporting ability (domain contrast), or by their self-worth generally (domain general) (Marsh & O'Mara, 2008). Evidence for the specificity matching principle has been found across all domains of self-concept (Swann Jr et al., 2007). For instance, while global self-concept (self-esteem) has been inconsistently related to academic achievement, academic self-concept is consistently shown to be strongly, reciprocally related to academic achievement (Marsh & Craven, 2006). That is, higher academic self-concept tends to result in improved academic achievement, which in turn results in improved academic self-concept.

Marsh and Craven (2006) claim that part of the reason that the self-esteem movement failed to achieve its aims was due to interventionists failing to match self-concepts to outcomes. Self-esteem was expected to do too much, and success was measured too nebulously. Further, contrary to the predictions made by Shavelson et al. (1976), self-esteem is less stable than specific self-concepts. Respondents often rate their self-esteem in response to short-term events and mood (Marsh & Craven, 2006). This fits with Leary's (2000) conceptualisation of self-esteem as an internal indicator of social status and security. This presents challenges in understanding people's baseline level of self-esteem from single measurements.

Research into the multi-dimensional self suggests that interventions which target specific self-concepts may be more effective than those which target general self-esteem

(Marsh & Craven, 2006). But research into how self-concepts are formed and maintained presents interventionists with another challenge. Self-esteem and self-concept are made through comparisons. This means that it is difficult to raise one person's self-concept, without lowering that of another.

External frames of reference and the Big Fish Little Pond Effect.

At its core, self-esteem is social. If you ask someone the question, "How valuable are you?" everyone can come up with their own answer to this question as it is not strictly defined. For instance, someone could be tall, have nice hair, have excellent yo-yo skills, be a smooth talker, or be two standard deviations above the mean at calculus. But all these considerations are relative. Without anything concrete people are left to make value judgements based on social comparisons which are highly context-dependent. The extent to which people feel tall, partly depends on the height of those around them. Even if someone is six feet tall, if the average height of their family is six feet and five inches, they may still identify as being short. This means that people feel valuable not based on their qualities alone, but based on the differences between their qualities and the qualities of those around them (Marsh & Hau, 2003).

Social comparisons drive what has been dubbed the "Big Fish Little Pond Effect". Research into the Big Fish Little Pond Effect has shown that the self-concept and performance of students is harmed by surrounding them with other high performing students (Marsh & Hau, 2003). Often parents will send their children to selective schools to maximise their children's talents. But this act may actually compromise their self-esteem thereby reducing their performance (Marsh & Hau, 2003). For instance, consider a high performing child near the end of elementary school. Because they are one of the best in their class they are likely to receive a boost to their academic self-concept (Marsh, 1990a). This helps improve grades in a reciprocal relationship (Marsh & Craven, 2006); that is academic self-

concept improves grades which in turn improves academic self-concept. This boost to their academic performance increases their chances of getting into a selective high school.

However, now rather than being in the top of the class they are only average. This may compromise the extent to which they feel competent, lowering their self-concept and harming their performance. Previously, this child was figuratively a big fish in a little pond. But now their only reference point is other academic titans; as a result their self-worth is likely to drop, which hampers their performance. Paradoxically, that student may have performed better if they went to an average high school (Marsh & Hau, 2003).

Surrounding a student with other students with high self-esteem compromises their self-concepts (Marsh & Hau, 2003). This is a major limitation which must be taken into account when trying to design interventions aiming to improve outcomes by targeting self-esteem. As self-esteem often involves social comparisons, telling an entire group that they are all special is unlikely to improve their self-worth. People do not want to be average. For instance, if someone is told “you’re below average in attractiveness, but don’t worry because everyone is pretty good-looking”, they are likely to still get offended. Stressing to children that everyone is valuable will not necessarily make anyone *feel* valuable. To paraphrase Carlin (2008): if we are all special, then the whole idea loses all its meaning.

Internal frames of reference

Even in individuals it is difficult to improve self-esteem in one domain without harming it in another. Self-esteem is affected by internal frames of reference. That is, we judge each of our traits by referencing our other attributes. Our self-concepts do not exist within vacuums, they interact with each other. Marsh (1986) noted that although achievement across domains e.g. English and mathematics are highly correlated, self-concepts related to those domains are not. This is because we make value judgements about our traits by comparing them to one another. This means that what makes someone a ‘maths person’ is not

just their performance in maths, but also the fact that they are better at maths relative to other subjects. This boost in mathematics self-concept tends to improve future math performance thereby solidifying this self-concept (Marsh & O'Mara, 2008).

This means that improvements in one area of self-esteem tend to correspond to decreases in others. If someone is an average English student, but also a fantastic maths student, they might still have the impression that they are bad at English, due to this internal comparison. This creates further issues when trying to raise self-esteem. A successful intervention on one domain of self-esteem has the potential to sabotage self-concepts in other domains.

Problems with trying to change the valence of global self-esteem

The above sections have argued that self-esteem is a complicated and multi-faceted construct. While self-esteem is a primary driver of wellbeing and behaviour, it is by no means simple to intervene on. After all, self-esteem corresponds to social status. While it may be possible to inflate someone's social worth in the short term, their interactions with others will quickly bring them a reality check of where they fall in a given pecking order (Baumeister et al., 2003; Leary & Baumeister, 2000).

Further what does it mean to raise everyone's self-esteem? Can we really flatten social hierarchies? Is that even desirable? While targeting specific self-concepts can be highly effective (O'Mara et al., 2006) due to the complexity of self-esteem, and the potential social value of fluctuations in self-esteem (Leary & Downs, 1995), it may not make sense to try and raise self-esteem in entire populations. As self-concepts rely on internal and external comparisons, it is hard to improve self-esteem in one person, without harming it in another. Additionally, efforts to praise children with low self-esteem in order to improve their self-concepts have been found to be unhelpful in many cases. Praise intended to improve self-

esteem can result in children holding themselves to higher standards resulting in challenge avoidance (Brummelman, Thomaes, Orobio de Castro, Overbeek, & Bushman, 2014).

Despite these challenges, self-views are still critically important. Viewing the self negatively can cause depression, and wide reaching problems. Not only does low self-esteem lead to a wide range of negative outcomes, but these relationships often include feedback loops. For instance, much work has shown that specific domains of self-esteem reciprocally predict a wide range of outcomes such as academic achievement, where low self-concept predicts poorer achievement and visa-versa (Marsh & O'Mara, 2008). More generally, there is evidence that low self-esteem reciprocally predicts lower wellbeing. Ciarrochi, Heaven, and Davies (2007) found that low self-esteem leads to increases in sadness, which in turn, leads to decreases in self-esteem, forming a downward spiral. While self-concept interventions are effective at increasing specific outcomes, the dream of a global intervention to improve all facets of life seems unrealistic. Given work into the importance of self-esteem in social perception, assuming that high self-esteem is always good and low self-esteem is always bad may be overly simplistic (Hayes & Ciarrochi, 2015).

Decoupling self-esteem from negative outcomes

It may not make sense to try and alter people's global self-esteem. But that does not mean that the negative outcomes associated with low self-esteem cannot be addressed. Persistent low self-esteem is problematic. It makes individuals physiologically and psychologically reactive (McFarlin & Blascovich, 1981; Peterson, 2018). It also increases submissiveness and reduces persistence, which prevents people from making positive changes that might improve their situation (Leary & Downs, 1995). Low social status is in many ways an emergency, and these sorts of strategies may help people in the short term (Leary & Downs, 1995; Peterson, 2018), but chronic stress is harmful.

Rather than trying to reduce the source of social stress, is it possible to improve how people respond to social stress? To what degree can low self-esteem be decoupled from negative outcomes? Prior research suggests that the outcomes of low self-esteem are not fixed, but depend on context (Hayes & Ciarrochi, 2015). For example, having more self-compassion may reduce the strength of the relationship between self-esteem and mental illness (Marshall et al., 2015). Similarly, low self-esteem individuals' depressed reactions to failures have shorter durations when individuals tend not to make trait attributions (Metalsky, Joiner, Hardin, & Abramson, 1993). By finding contextual factors that improve resilience, and reduce the harmful effects of self-esteem, outcomes can be improved without having to change the valence of self-esteem. Not only does this solution avoid the challenges of self-esteem training, but it also may reduce experiential avoidance (attempting to avoid negative self-concepts), which can be harmful in its own right (Gámez, Chmielewski, Kotov, Ruggero, & Watson, 2011).

Dangers of rejecting painful experiences

Many researchers warn against attempts to change the content of experience. Research related to Acceptance and Commitment Therapies (ACT) (Hayes, 2004) suggests that treating painful thoughts and feelings as pathologies may make people attempt to push them away. This can create cycles of struggle which make those painful experiences more salient and therefore potentially more intrusive and damaging (Harris, 2006). Pushing away experiences is often referred to as experiential avoidance and has been related to a range of problematic outcomes (Sahdra, Ciarrochi, Parker, & Scrucca, 2016).

Animals tend to seek pleasure and avoid pain. These basic drives enable organisms to seek out opportunities and avoid threats hence improving the likelihood of reproductive success (Dawkins, 2009). When it comes to physical pain, avoidant behaviour is almost always protective. By anticipating bodily harm and responding rapidly to pain cues, severe

injuries can be prevented (Loeser & Melzack, 1999). When it comes to emotional pain however, this avoidant behaviour can have unintended consequences. While physical and emotional pain rely on common neurological circuitry (Eisenberger & Lieberman, 2004), emotional pain, unlike physical pain, does not have reliable causes or effects. While an intense burning sensation will reliably follow touching a hot pan, and indicate structural damage, the causes and consequences of emotional pain are much less certain. In humans, emotional pain is often caused or in many cases maintained through thoughts, which are predominantly experienced through language (Hayes & Ciarrochi, 2015). Following a life and death situation with a lion, a gazelle, without therapy, can quickly calm down and return to grazing. Humans, on the other hand, may verbally obsess over even minor life events constantly retriggering painful emotions (Hayes & Ciarrochi, 2015). Given a certain event, for example, rejection, thoughts can vary on three important dimensions: form, frequency and function (Hayes, 2004). ‘Form’ refers to the content of the thought. For example, someone could respond to failure with thoughts such as “I am worthless” or “I need to try harder”. ‘Frequency’ refers to the fact that thoughts can occur at different rates e.g. just once or continually for hours, and ‘function’ refers to the fact that an identical thought can have various consequences. For example, the thought “I am single again” could cause feelings of hopelessness and depressed mood, or enthusiasm and optimism depending on how much a person liked their ex-partner, how desirable they perceive themselves to be, and how much they are looking forward to dating someone new. As such, while avoiding physical pain is often a good strategy, when it comes to emotional pain things are not as straightforward.

Research has consistently shown that attempts to push emotional pain away often make matters worse rather than better (Hayes, Luoma, Bond, Masuda, & Lillis, 2006). Attempting to push negative thoughts and experiences away has a spotlight effect, where distressing thoughts become more salient (Hayes et al., 2006). By trying to reject painful

thoughts, they can get interpreted as being more threatening, this results in further obsessing and rumination (Hayes & Ciarrochi, 2015). Research has shown that attempting to avoid negative emotions is linked to mental ill-health and a wide range of maladaptive behaviours such as substance abuse (Hayes, 2004). As such, attempts to change the level of self-esteem risk unintentionally drawing more attention to feelings of low self-worth, hence reducing psychological flexibility and enhancing negative outcomes.

Defusion

Dweck (2000) suggests that overemphasising self-esteem can cause people to cling to positive self-concepts. This can cause stress when those self-concepts are eventually challenged. If feelings of low self-worth should not be pushed away, how can their harmful effects be avoided? Often negative thoughts are seen as problems which need to be solved. In many cases, however, it is people's reactions to thoughts which causes damage rather than the content of the thought itself.

When two people experience an identical thought, it would seem rational to expect that these thoughts would have the same consequences. However, the content of thoughts does not have intrinsic meaning. Thoughts are interpreted via a deep web of mental relationships (Hayes, Barnes-Holmes, & Roche, 2001). As a result, we can react to the same thought e.g. "I am a failure" differently depending on the time of day, other thoughts we have had recently, what we take concepts such as 'failure' to mean, and how we view the ourselves generally. Relational Frame Theory (RFT) predicts that the function (or consequences) of thoughts is dependent on the extent to which they are believed to be literally true (Hayes, 2004). Hence a thought such as "here comes a shark" results in varying degrees of distress depending on whether you find yourself in open water or a bathtub. When thoughts are treated as if they were literally true, rather than viewing them as transient experiences, we allow them to alter the way we view ourselves. This makes those thoughts more powerful and

potentially more distressing. Our thoughts have become “fused” to the self. In this state words are not mere language but reflective of the value and worth of the self.

Various therapies have been developed to try and address cognitive fusion. ACT includes a task to reduce the believability and as a result, the negative consequences of thoughts (Masuda, Hayes, Sackett, & Twohig, 2004). Subjects are instructed to continually repeat a harmful thought for long periods of time e.g. thirty seconds or more. By repeating harmful thoughts, the words which originally evoked pain, now just sound like babbling. The thought has been separated from its meaning. With successive trials, repeating a painful thought substantially reduces the extent that it causes distress (Masuda et al., 2004). Other approaches attempt to reduce cognitive fusion by changing the relationship to experiences generally. Mindfulness meditation, for instance, encourages people to relate to their experiences in an attentive non-judgemental fashion (Keng, Smoski, & Robins, 2011). During mindfulness practice hurtful thoughts are encoded as raw experience. For example, if a mindfulness practitioner experiences the thought “I am loveable”, rather than holding onto that thought and obsessing over its meaning, they would just watch the sound and shape of the thought, and let it go to make room for the next experience. In this way thoughts and emotions are encoded as mere abstract experiences devoid of meaning, and ruminative downward spirals can be avoided. This perspective promotes a different view of the self. Rather than the self being identical to content (thoughts and experiences) the self becomes the space where these experiences arise.

Self as content vs self as context

Merely walking down the street generates immense brain activity. Our retinas are bombarded with constantly changing visual information. Our ears detect a cacophony of sounds, and our bodies constantly send a complicated array of nervous impulses to the brain in order to provide feedback on everything from balance and posture to temperature. But just

a single self-critical thought can be enough to have all of this information filtered out of conscious awareness leaving us aware only of the words “I’m a failure”. In this moment the distance between one’s thoughts and what they perceive to be the self completely collapses; they are not aware that they are *thinking* about being a failure, they are aware that they *are* a failure.

It is natural to feel as though the self is identical to our thoughts and feelings as these are some of the most powerful experiences we have. In Relation Frame Theory (RFT) the experience of being somehow reflected in one’s thoughts and feelings is referred to as “self as content” (Shapiro, Carlson, Astin, & Freedman, 2006). While feeling that your thoughts and feelings say something tangible about you is deeply intuitive, it is not necessarily rational. If one moment you are thinking about being a failure, and in the next you are being proud of an achievement or thinking about pizza, which thought gets to define who or what you are? How are we ever convinced that whatever thought is currently crossing our busy minds is in some way self-defining? Given that the contents of conscious awareness are constantly shifting and changing it makes sense that the self must be bigger and more stable than any individual thought or feeling that crosses the ‘theatre of the mind’ (Harris, 2014; Hume, 2003). Experiencing the self as a container for experiences rather than those experiences themselves is referred to as ‘self as context’ (Hayes et al., 2006). Research has shown that viewing the self more flexibly as a container for experience, rather than individual experiences predicts improved wellbeing longitudinally over periods of 6 – 12 months (Atkins & Styles, 2016). This orientation allows people to let go of painful experiences rather than be caught up with worry that they are deeply meaningful and may say something ominous about a personal defect.

Addressing low self-esteem by targeting one's perception of the nature of the self

The prior sections have demonstrated that multiple contextual factors influence how individual thoughts and feelings affect us. Interventions that target the valence of self-esteem often assume that the self is identical to thoughts and feelings. If the intervention can replace negative self-talk “I am worthless”, with positive self-talk “I am good enough” then the quality of the self has in some way changed. Thoughts such as these however are not constant; they disappear and appear, and have different effects depending on context (Hayes & Ciarrochi, 2015). For most people who would be classed as having low self-esteem, much of the day they may be fully immersed in activities, and only engage in negative self-talk following contextual triggers like failure (Brunstein & Gollwitzer, 1996). If the self is identical to the contents of thoughts, in moments of flow (Nakamura & Csikszentmihalyi, 2014) can anyone be said to have low self-esteem?

Contextual behaviourists challenge the assertion that the self can be defined in terms of contents of thought, instead they describe what we think of the self as behaviour. Thoughts of worthlessness under this model are not reflective of any stable aspect of the self, but are merely behaviour akin to yawning which is dependent on context. Just as we are more or less likely to yawn depending on how tired we and others around us are, we are more or less likely to have negative thoughts depending on the context we find ourselves in. Similarly context effects the consequences of thoughts just like any behaviour. Yawning is fairly innocuous when one is trying to sleep, but during a marriage proposal it is likely to evoke a range of interesting behaviours and emotions. Similarly, thoughts of worthlessness may in some contexts be harmful, yet in others be relatively benign (Hayes & Ciarrochi, 2015; Marshall et al., 2015; Metalsky et al., 1993)

Context under this formulation includes not only the external environment, but also the internal environment. In defusion interventions, the target is not the thought that is

experienced as painful for example, “I am fat”, but rather other cognitions that relate to that thought, that is, “this painful thought is meaningful and literally true”.

In terms of self-esteem interventions, rather than encouraging people to strive for positive self-concepts, interventionists can target the internal context where self-evaluations occur. For instance rather than targeting the thought “I feel worthless”, it may be just as effective to change beliefs about the self (Dweck, 2000) which make that thought damaging in the first place. In this way it may be possible to address the harms of self-esteem without manipulating self-concepts.

Changing contextual factors that make low self-esteem harmful has advantages over raising self-esteem, as the pursuit of self-esteem can be maladaptive (Crocker & Park, 2004). Dweck (2000) has argued that by attempting to raise self-esteem, we inadvertently teach people to cling to positive self-concepts. While this may have short term benefits it may cause distress in the longer term, when these positive self-views are inevitably challenged. Challenging perceptions of self-malleability may be one way to change the internal context within which negative self-evaluations occur thereby making them less damaging (Hayes & Ciarrochi, 2015).

Self-esteem and the fixed self

Failure is inevitable in life. Even if someone has the good fortune to have a childhood free of rejection, hurt, or failure, inevitably their luck is likely to run out and their self-esteem will, at least temporarily, plummet (Hayes & Ciarrochi, 2015). In that moment, some people seem to become trapped by low self-esteem and enter downward spirals where low self-esteem leads to reduced wellbeing and performance. This feeds back into lower self-esteem, whereas others will escape relatively unscathed. What is it in people’s internal context which leaves some people vulnerable to low self-esteem and others resilient?

Metalsky et al. (1993) showed that a tendency to make trait attributions leads to poorer outcomes in people with low self-esteem. Following a negative test result at college, all students tended to have immediate depressive reactions. These reactions for most students were generally brief. However, students with low self-esteem who also tended to make attribute failures to the self, continued having depressive reactions days later. Can failures be prevented from being attributed to stable elements of the self?

Research has shown that the extent to which the self is perceived to be malleable impacts the degree to which people make trait attributions (Dweck et al., 1995; Levy, Stroessner, & Dweck, 1998). Belief in a flexible self may be one way to decouple low self-esteem from negative outcomes. Low self-esteem is threatening not just because it is associated with increased challenge but because it might be evidence of enduring defectiveness. Someone might ask themselves why they are worse than others. What is it about them that makes life so hard? They could conclude that there is something fundamentally wrong with them that makes them inferior to others. This conclusion, if made, would likely be particularly disheartening. Not only is your life currently painful, but due to some deep personal deficiency, save for pure luck, it always will be. This perspective may also limit a sense of internal locus of control. That is, you may feel that you have little control over your current struggles. If the problem you face is something fundamental to your character, you may perceive there to be fewer ways to address it.

By seeing the self as ever changing and malleable, failures may not be attributed to fixed aspects of the self. Implicit malleability theories may prevent self-esteem falling while simultaneously reducing the harms of low self-esteem. Research into implicit malleability theories and its potential role in buffering the negative effects of low self-esteem is discussed in Chapter 2.

Chapter summary

In summary, the ‘self’ is at the core of human experience and facilitates the ability to strategize and cooperate with others. Having the ability to perceive one’s own self enables social comparisons and for people to judge their worth relative to others. While self-esteem may help people operate in dominance hierarchies (Leary & Downs, 1995), it also is strongly linked to a wide range of positive outcomes such as wellbeing and performance (Robins & Trzesniewski, 2005). Interventionists who have tried to improve these outcomes via improving global self-esteem have achieved mixed results. This is partly due to the failure of these models to recognise the domain specificity principle, and the fact that self-esteem is based upon social comparison, making population-wide interventions difficult. An alternative approach to addressing the harms of self-esteem is decoupling it from negative outcomes. The consequences of self-esteem are affected by internal contextual factors. Perceived self-malleability may be one such factor. Chapter 2 examines implicit malleability theories and the extent to which they may moderate the effects of low self-esteem.

CHAPTER TWO: THE FIXED AND MALLEABLE SELF

“Ever tried. Ever failed. No Matter. Try again. Fail again. Fail better.”

Samuel Beckett (1983, pg. 7)

Introduction

Beliefs shape the world we live in

Beliefs are important. Often people treat beliefs as if they were private events that have little bearing on the external world. Across the dinner table even the strangest of theories can be defended from scrutiny with the hasty utterance “but that’s *just* my belief”. But rather than being purely personal events, beliefs are a very real part of our environment. Beliefs change the way we see ourselves and the world, and accordingly they have very real consequences for behaviour. Take for instance a belief once held by Netsilik Inuits, that during birth newborns give off a deadly vapour. Mothers in labour were considered so dangerous that they were confined to small huts to give birth in total isolation, so as to protect the rest of the community from mortal danger (Edgerton, 2010). This belief cannot be considered objectively true, but it changed behaviour meaningfully nonetheless. Beliefs change how we interpret things as opportunities or threats and as a result change our reactions to internal and external events (Hayes & Ciarrochi, 2015).

The effects of explicit beliefs such as the example given above are easy to draw attention to, but all our conceptions of the world are similarly couched in deep webs of meaning (Hayes et al., 2001). The way that we believe different aspects of the world function, changes our behaviour. In Chapter 1 I discussed the consequences of belief in the value of the self and its radical consequences for behaviour. But there are many ways to conceive of the self. These various self-conceptions may not operate in vacuums, but may change the outcomes associated with each other.

For instance, just as the self can be viewed on a spectrum of being valuable to not valuable, it can also be viewed on a dimension of malleability. Researchers have shown that people respond to failures and stress differently depending on how malleable they believe their attributes to be (Dweck, 2000). In this chapter, I introduce implicit malleability theories. I present research that suggests that the extent to which individuals believe their traits to be malleable or fixed, makes them respond differently to failure. I suggest that these behavioural patterns may change the way that low self-esteem is experienced and responded to. I end by hypothesizing that implicit theories and self-esteem may interact when predicting outcomes such as wellbeing and achievement.

What are implicit theories of malleability?

Implicit theories of malleability are perceptions of how flexible certain characteristics are (Hong et al., 1999). Research into implicit malleability theories places people on a spectrum of perceived malleability. On one end of this spectrum are those who believe traits are highly malleable. These people are often referred to as incremental theorists (Dweck et al., 1995) or are sometimes said to have a ‘growth mindset’. On the other end of the spectrum are those who believe certain traits are fixed. These individuals are referred to as entity theorists or are sometimes said to have a ‘fixed mindset’ (Dweck et al., 1995). The extent to which traits are perceived to be malleable has been shown to have relevance to how individuals approach learning and relate themselves, others, and the world (Dweck, 2000).

Just as self-esteem can vary across different domains, people also hold multiple implicit theories. While some people may staunchly believe that anyone can learn to paint if they give it a go, they may simultaneously believe that to do well in maths you just have to be a certain kind of person (Dweck et al., 1995). As such, implicit theories are measured in specific domains rather than globally. For any given trait e.g. intelligence, people differ regarding their perceived stability of the trait. Some might feel that intelligence is fluid and

can be significantly changed through effort, whereas others believe intelligence is a fixed resource; set in stone. Regardless of the objective reality of these beliefs, feeling that attributes are more malleable prevents hopeless responses to failure and challenge (Hu, Chen, & Tian, 2015). When researchers refer to ‘incremental theorists’ they typically mean people who hold ‘incremental theories’ in a particular domain, as opposed to any broader class of person.

Implicit theories as self-efficacy for improvement

Research into implicit malleability theories arose partly from Albert Bandura’s body of work on perceived self-efficacy. Perceived self-efficacy refers to the extent to which individuals feel confident that they have the capabilities and resources to accomplish discrete tasks (Bandura, 1977). Research has consistently shown that perceived self-efficacy is linked to the frequency with which tasks are attempted (McAuley, 1992), the extent to which individuals use coping strategies during challenges (Luszczynska, Schwarzer, Lippke, & Mazurkiewicz, 2011), and how well individuals perform on tasks (Stajkovic & Luthans, 1998). If someone believes that they do not have the resources to perform well on an upcoming test, their efforts will feel futile, they may be less engaged with study and as a result their performance could be sabotaged (Multon, Brown, & Lent, 1991). Alternatively, if they are highly confident in their ability to use computers, they may be more willing to fearlessly play around when learning new software. This learning orientation would aid mastery and reinforce positive self-concepts.

But given our innate capacity to learn and acquire new skills, why is low self-efficacy and failure so detrimental to our motivation? Even if someone is bad at something now, why would that deficit not just motivate them to learn from their mistakes and improve? Dweck and Reppucci (1973) noted that failure only seems to lead to feelings of helplessness in some

people. They found that subjects who attributed their failures to stable aspects of the self (ability) as opposed to behaviour (effort) tended to be less engaged and did not persist as long following challenges. Dweck (1975) reasoned that people may be protected from learned helplessness if they were taught to attribute failures to effort rather than ability, thereby taking having an internal locus of control. Dweck (1986) suggested that people who believed their attributes were malleable would see failure as part of a learning process and so would not be discouraged. On the other hand those who saw their attributes as fixed would see failures as indicators of personal deficiencies and as a result display helpless response patterns. Implicit malleability theories can be thought of as drivers of perceived self-efficacy for improvement. According to Expectancy Value Theory (Wigfield & Eccles, 2000), individuals should be interested in learning and remediation to the extent that they believe they will gain things of value by doing so. As learning is only likely to be perceived as beneficial to those who believe that their traits can be improved, it makes sense that these individuals would be more interested in self-improvement.

The consequences of fixed and malleable self-theories

Mueller and Dweck (1998) showed that changing the way children are praised could manipulate their implicit malleability theories. The researchers split a group of fifth graders into two groups (with a third neutral control condition) and asked them to complete a series of ability tests. Through praise, students were implicitly encouraged to believe that talent was either innate or malleable. In one group, students were praised for ability (for example, “You must be smart at these problems”). In the other group students were praised for effort (for example, “You must have worked hard at these problems”). Ability praise was theorised to implicitly communicate that talent was innate, whereas effort praise was thought to suggest that talent could be developed. In line with the authors’ hypotheses, students who were praised for ability blamed their failures on a lack of intrinsic ability, and were less likely to

seek out challenges. Students praised for effort on the other hand did not make trait attributions from their failures and sought out harder tasks. Further, despite no original difference in ability, by the end of the experiment students praised for ability performed significantly worse on even the easiest tasks which they had previously performed at competitively.

This pattern of results has been found in many experiments and across multiple domains. Relative to entity theorists (who perceive traits to be fixed), incremental theorists (who perceive traits to be malleable) tend to have greater interest in learning and self-development (Dweck et al., 1995; Mueller & Dweck, 1998), and respond more adaptively to failure. Following failure incremental theorists tend to have increased persistence (Kasimatis, Miller, & Marcussen, 1996; Mueller & Dweck, 1998; Spray, Wang, Biddle, Chatzisarantis, & Warburton, 2006), reduced negative self-relevant emotion (Hu et al., 2015), less shame (Robins & Pals, 2002), and reduced feelings of helplessness (Davis, Burnette, Allison, & Stone, 2011). These effects appear to be partly explained by lay dispositionism i.e. the tendency to make trait attributions (Chiu, Hong, & Dweck, 1997).

Entity theories lead to trait attributions

Incremental theorists believe their attributes are constantly changing; who they are today does not necessarily say all that much about who they will be in the future. As such, failure cannot be reflected directly onto a stable conception of self, as the self is constantly in a state of flux. This means incremental theorists are less likely to make trait attributions. To an incremental theorist the self is a moving target and any trait attributions that are made quickly lose relevancy (Chiu et al., 1997). In contrast, entity theorists have rigid self-concepts; the self is perceived to be fixed and unchanging. This makes entity theorists' selves like a static target. To an entity theorist, failure becomes a means for diagnosing permanent flaws in both the self and or in others. Further, as ability is deemed to be fixed, the

identification of flaws does not lead entity theorists to have increased motivation for remediation as learning is perceived to be fundamentally ineffective. For entity theorists continued persistence is not only perceived to provide no benefit, but can also be highly threatening as it may open entity theorists up to embarrassment in front of others (Dweck et al., 1995; Stenling, Hassmén, & Holmström, 2014) who may notice their flaws. As a result, entity theorists are more likely to have performance orientations (Biddle, Seos, & Chatzisarantis, 1999; Erdley, Loomis, Cain, & Dumas-Hines, 1997; Fillmore, 2015; Leary et al., 1995; Stenling et al., 2014). They are less likely to approach tasks with a view to improve, but rather they strive to appear favourably to the self and to others. Following failure, entity theorists will actively avoid opportunities to remediate or receive support from others (Hong et al., 1999). Additionally entity theorists may avoid the domain they failed in altogether (Dweck, 2000), instead attempting to demonstrate their worth in other areas (Park & Kim, 2015). Instead of attempting to improve, entity theorists are more likely to try and repair their self-esteem following failure by engaging in downwards social comparisons (Nussbaum & Dweck, 2008). Dweck (2000) has suggested that entity theorists may contribute to cultures where high performers are denigrated, and unspoken pacts are made to not try too hard.

While performance orientations may have some utility in avoiding short-term embarrassments, they also encourage individuals to avoid situations at the edge of their ability where there is greatest opportunity to improve (Dweck, 2000). In fact, in order to avoid embarrassment entity theorists have even been found to self-handicap, manufacturing injuries or deliberately reducing their effort (Ommundsen, 2001) in order to generate socially acceptable explanations for anticipated failure.

In contrast, incremental theorists pay little attention to individual performances and have learning orientations (Biddle et al., 1999; Erdley et al., 1997; Fillmore, 2015; Leary et

al., 1995; Stenling et al., 2014). Failure is seen merely as a part of a process of self-improvement and so is not intrinsically embarrassing. Even if failure is found to be aversive, incremental theorists tend to respond to this stress by obsessively focusing on the activity with a view to improve (Mueller & Dweck, 1998; Park & Kim, 2015).

Incremental theories seem to not only promote remediation, but may also enhance the ability to learn. Neurological studies show that during learning, incremental theorists tend to have enhanced processing of errors (Mangels, Butterfield, Lamb, Good, & Dweck, 2006). In contrast, entity theorists tend to mentally recoil from errors. This may limit the ability of entity theorists to learn from their mistakes, providing further confirmation to an entity theorist that one's level of ability is fixed.

Implicit malleability theories and social failure

Implicit malleability theories may also be protective when people experience social failures. In a series of experiments, Erdley et al. (1997) took primary school students and told them that they had an opportunity to join an international pen pal club. In order to join however, they first had to write a letter introducing and recommending themselves. Regardless of what the students wrote, all were uniformly given a response saying that based on what they wrote the club was not sure they wanted the student as a member and would like further information. While this rejection was somewhat ambiguous, for many children with stronger entity theories this was evidence of personal defectiveness. Those with stronger entity theories were more likely to conclude that they had a fundamental inability to make friends.

Humans by nature are social animals, requiring relationships to survive and reproduce (Baumeister & Leary, 1995). Due to the centrality of relationships to our evolutionary success, it is not surprising that humans need positive relationships in order to flourish. Self-

esteem, a major driver of human emotion and behaviour, has itself been theorised to be a form of social perception used to facilitate healthy social interaction (Leary et al., 1995). Humans react to social failures in similar ways as they do to physical pain (Eisenberger & Lieberman, 2004; Leary et al., 1995; MacDonald & Leary, 2005). Feeling connected to others is not just a contributor to wellbeing, but it is a fundamental psychological need (Deci & Ryan, 2000). As such, social domains are almost universally valued and cannot be devalued in the same way that other domains can be following failures. As much as people may try to supplant human relationships with drugs and computer games, a failure to connect with others eventually catches up with people (Kaczmarek & Drajkowski, 2014). While a ‘never give up’ attitude may have pros and cons in many domains, in the social domain giving up really is not an option and incremental theories may therefore be particularly important. Given the abundance of social failure available to us, it is important that people can recover from drops in self-esteem without becoming trapped in cycles of distress and hopelessness (Ciarrochi et al., 2007). Incremental theories may make people more resilient in the face of rejection and resultant low self-esteem by changing the way people perceive the self, such that failures are not interpreted as personally meaningful (Niiya, Crocker, & Bartmess, 2004a). In addition, incremental theories may reduce the pressure felt during social interactions (Yeager, Lee, & Jamieson, 2016) thereby improving social functioning.

Improving social functioning by promoting incremental theories

Implicit malleability theories change the way we view others in the same way they change the way we view ourselves. Just as entity theories make us more likely to attribute our own behaviours and failures to stable aspects of the self, entity theories also make people more likely to cast rigid judgements about others based on their behaviour (Erdley & Dweck, 1993; Levy et al., 1998). Erdley and Dweck (1993) found that entity theorists formed judgements about others more readily based on limited behavioural information. Learning

that another individual had stolen something made that person fundamentally a ‘thief’. This had a dehumanizing effect where entity theorists showed less empathy towards these individuals and recommended harsher punishments for transgressions. In addition, once these judgements were made, entity theorists were less able to change them even when faced with contradictory evidence. This propensity to make quick, inflexible judgements extends to broader attitudes. For example, entity theories are associated with stereotyping of others generally (Levy et al., 1998).

While developing heuristics can often be useful, making these inflexible judgements causes some social problems for entity theorists. When another person transgresses against an entity theorist, they tend to diagnose a defect either in themselves, resulting in lower self-worth, or in others, which may result in feelings of enmity (Yeager, Miu, Powers, & Dweck, 2013; Yeager, Trzesniewski, Tirri, Nokelainen, & Dweck, 2011). This means that even when ambiguous slights are made against entity theorists, they are more likely to respond with hostility (Yeager et al., 2011). While having someone collide with you in a corridor could signal all manner of things, a lot of them benign (like a lack of coordination in the other person), an entity theorist is more likely to conclude that the behaviour occurred due to one of the parties being defective and then desire vengeance (Yeager et al., 2014; Yeager, Trzesniewski, & Dweck, 2013). This could set up spiralling hostility where innocent transgressions get interpreted as hostile, resulting in retaliation and further altercations.

Incremental theories on the other hand can lead to prosocial responses in the face of victimisation. Yeager, Trzesniewski, et al. (2013) made high school students play a game of ‘cyber ball’ where three subjects play virtual catch with each other. Unknown to the participant, the two other players were in fact computer controlled agents, who after a few rounds excluded that real participant and threw the ball only to each other. Yeager, Trzesniewski, et al. (2013) gave the participants an opportunity to retaliate. Following the

game, participants were told that the two other players would have to eat hot sauce and that the participant could decide how much to allocate and could also send a note along with the sauce. Entity theorists tended to allocate significantly greater quantities of hot sauce to other players and often sent vindictive notes such as “I gave you a lot because you do not like spicy!” Incremental theorists on the other hand allocated less hot sauce and were more likely to send prosocial messages (such as warnings or apologies for being forced by the experimenters to allocate any sauce at all).

Incremental theories have also been found to promote pro-sociality between groups of people. Researchers studying the Israeli–Palestinian conflict found that people who held stronger incremental theories were also more likely to harbour positive attitudes towards the opposing side. Furthermore, merely reading an article which suggested that group attributes were malleable increased the willingness of participants to meet with members of the out-group and discuss compromises (Halperin, Russell, Trzesniewski, Gross, & Dweck, 2011).

Finally, incremental theories may play a role in reducing the extent to which social situations feel pressured. As entity theories make failure feel more meaningful, entity theorists may feel like they are constantly at risk of discovering some horrible secret about themselves while socialising. This is especially so in the teenage years where self-concept is still forming (Hayes & Ciarrochi, 2015) and teenagers are still learning about themselves and establishing themselves in dominance hierarchies. Belief that the self can change may take the pressure off these situations somewhat, because even if someone is not relating to others in the way they would like to now, they could always change in the future. Yeager et al. (2016) simulated social stress in teenagers by asking them to do a speech in front of others. Subjects with stronger incremental theories of personality had lower levels of cortisol following the speech and rated the situation as less stressful. In summary, incremental theories may improve social functioning by preventing trait attributions following social

failures, by stopping hostile intent being imputed by ambiguous slights, by promoting pro-sociality, and by reducing the extent to which social situations are perceived to be stressful.

Implicit malleability theories and wellbeing

Social functioning is crucial to maintaining wellbeing (Hayes & Ciarrochi, 2015). As incremental theories reduce stress in tense social situations (Yeager et al., 2016), and reduce hostility following conflict (Yeager et al., 2011), belief in self-malleability could promote mental health. While a wealth of research has shown the benefit of incremental theories for improving performance and self-efficacy in academic and sporting domains (Hong et al., 1999), surprisingly little research has looked at the effects of implicit theories on wellbeing.

When people experience mental ill-health, it can be very difficult to persist with self-care and help-seeking behaviour. Even when one feels at their best, changing daily routines like starting running, or trying to eat less junk-food can be incredibly difficult. This problem is compounded many times over when people do not feel well. When people feel down just getting through the day can be a Herculean effort; trying to engage in additional self-care can feel impossible. Entity theories on top of this are likely to make the situation feel even more hopeless. If someone believes the self is fixed they may start doubting whether self-care will even make a difference. What is it about them that makes them feel this way when everyone else seems to be doing fine? If they decide that at their core they are defective, then it may seem futile engaging in such intense struggle. On top of that if they try really hard to engage in self-care and still do not recover they run the risk of revealing their perceived defectiveness to others causing embarrassment (Dweck, 2000). On the other hand if someone perceives the self as malleable, they may feel like their struggle is more likely to be rewarded with lasting change.

While research into this area is new, incremental theories do seem to relate to self-care. Schroder, Dawood, Yalch, Donnellan, and Moser (2014) asked undergraduate students how they would hypothetically treat an anxiety problem. As predicted, entity theorists who felt anxiety is a stable trait were not interested in lifestyle change or therapy, they just wanted to take medication. This suggests they were trying to fix something chemically wrong with themselves. On the other hand, incremental theorists were more drawn to behavioural interventions suggesting they felt their condition could change through effort and strategy. It also seems that once engaged, people with stronger incremental theories gain more from therapy. Valentiner, Jencius, Jarek, Gier-Lonsway, and McGrath (2013) showed that clients who perceive their level of anxiety as more malleable receive greater benefit from exposure therapy. This effect extends to other forms of structured self-care. Incremental theorists tend to be more engaged with weight loss programs. They report greater intention to change their lifestyles in meaningful ways (Beruchashvili, Moisio, & Heisley, 2014), persist longer following setbacks (Burnette, 2010) and have greater expectations of success (Burnette & Finkel, 2012).

People with stronger perceptions of self-malleability tend to see more benefit in remediation (Hong et al., 1999), and as a result are more likely to be motivated to make changes in their lives. This focus on remediation may mean that people with incremental theories tend to have higher wellbeing. Rather than seeing sadness as a sign of personal defectiveness which needs to be hidden or medicated, they may be more orientated towards self-care. While research has shown that incremental theories may help prevent depression (Miu, Yeager, Sherman, Pennebaker, & Trzesniewski, 2014), the extent to which incremental theories related to positive aspects of mental health, e.g. wellbeing, has been largely unexplored and will be examined cross-sectionally in Chapters 4 and 5. The ability of incremental theories to recover from failures and re-engage in the project of self-building

may mean that they can help maintain adequate self-esteem and lessen the impact of low-self-esteem when it arises.

Viewing the self from two perspectives

The model of self-esteem proposed by Shavelson et al. (1976) suggested that self-esteem is not comprised of a single evaluation of the self, but rather a collection of evaluations in various domains. People can feel good or bad about multiple different aspects of the self. This model has been corroborated by much subsequent research (Marsh, 1986, 1990b, 1993). But we hold many beliefs about the self in addition to whether our qualities are positive or negative.

Implicit malleability theories and self-esteem can be seen as two ways of viewing the self. While self-esteem refers to the extent to which the self is perceived to be of high or low social value (Hayes & Ciarrochi, 2015; Leary & Baumeister, 2000), implicit malleability theories refer to the extent to which the self is considered to be fixed or flexible (Dweck et al., 1995). Despite operating in similar conceptual spaces, these constructs have mostly been studied separately. While research has shown how incremental theories change behavioural responses to specific events e.g. failure, little attention has been given to how implicit theories may change behavioural and emotional responses to low self-esteem.

Theoretically, it is plausible that self-esteem and implicit theories would not operate in vacuums but would influence each other. As incremental theories reduce the extent to which failures are reflected onto stable aspects of the self (Erdley & Dweck, 1993), it is likely that failure is less damaging to incremental theorists' self-concepts. In this way implicit theories may perform a buffering role where incremental theories do not directly raise self-esteem, but make it more resilient to setbacks. As a result, self-esteem should on average be higher among those who more strongly endorse incremental theories. Accordingly some

researchers have shown that incremental theories and self-esteem are modestly related (Robins & Pals, 2002) although the exact magnitude of this relationship is not known. Further, as implicit theories and self-esteem are both domain specific constructs it is not clear how each domain of implicit theory relates to each domain of self-concept. The specificity matching principle (Swann Jr et al., 2007) would predict that more similar domains of implicit theories and self-esteem should be more strongly correlated. For instance implicit theories of intelligence should relate more strongly to academic self-concept (in the same domain) than to self-esteem (in different domains). Less ground work has been laid for how self-esteem may be felt differently based on implicit malleability theories. While prior research has shown that people tend to behaviourally respond differently to low self-esteem based on their implicit malleability theories (Nussbaum & Dweck, 2008), but it is not clear whether incremental theories can reduce the negative effects of low self-esteem more broadly.

Previous research has shown that, following failures, people attempt to repair self-esteem differently depending on their implicit theories. While those with stronger incremental theories tend attempt to repair self-esteem through remediation, those with stronger entity theories are more likely to engage in downward social comparisons (Nussbaum & Dweck, 2008). This relationship is logical. When one's self-esteem is threatened it means one's perceived worth has been lowered relative to others. As incremental theorists perceive the self to be improvable, they are more likely to see remediation as being a way to repair their worth. In contrast to this, entity theorists' failures are likely to be interpreted as being indicative of personal defects (Dweck et al., 1995), in which case, attempts to remediate would be ineffective and possibly open oneself up to further failure and embarrassment. As a result, those with stronger entity theories are more likely to be drawn to alternative ways of increasing relative worth such as drawing attention to the failures of others.

In summary, prior research has shown that incremental and entity theorists engage in different behaviour in order to repair self-esteem. Are thoughts and feelings of worthlessness the same in the context of incremental or entity theories? The interaction between self-esteem and implicit malleability theories has been little studied.

Could implicit malleability theories buffer the negative effects of low self-esteem?

One of the major problems with low self-esteem is that people tend to focus on short-term survival. When challenges come, they shirk them or self-handicap to create more socially desirable excuses for failure (Eronen, Nurmi, & Salmela-Aro, 1998). That way they can avoid flagging their status to others. This behaviour pattern closely mirrors the way that entity theorists respond to challenges. Both are pre-occupied with the perception of others, rather than personal growth (Nussbaum & Dweck, 2008). Among entity theorists with high self-esteem, this strategy may be effective in maintaining self-esteem. But for entity theorists with low self-esteem, constant comparisons to others may simply be a form of self-torture.

Theoretically it would seem that low self-worth is a fundamentally different proposition depending on whether someone believes the self to be fixed or malleable (see Figure 1). In the prior chapter, I summarised research which showed that the consequences of thoughts changes depending on how believable a thought is. Thoughts which are not seen as literally true tend not have to have as dire effects (Masuda et al., 2004). Incremental theorists view the self flexibly (Dweck, 2000). To an incremental theorist, the thought “I am worthless” is likely to be less potent as ‘I’ is conceptualised as an unstable entity and ‘worth’ is perceived to be vulnerable to change. On the other hand, entity theorists are likely to see the self as highly stable and their worth to be a fixed quantity. As a result, the statement may be perceived as more likely to be true, or one which has more serious consequences. In this way incremental theories may reduce cognitive fusion of self-critical thoughts.

In addition to reducing cognitive fusion, incremental theories may help people to see their situation as more amenable to change. If one feels they have low social worth but also believes that they can change, then those feelings, while unpleasant, do not necessarily have any bearing on one's future outlook. On the other hand, if one has low self-esteem and perceives the self to be unchangeable, that person may feel utterly helpless. Entity theorists may be more likely to interpret low self-esteem as a sign that they have permanent defects which mean on a deep level they will never be as good as other people. For these reasons it is likely that in people with low self-esteem, stronger incremental theories are likely to be associated with improved wellbeing and performance relative to entity theories.

While incremental theories may lessen the harms of low self-esteem, they may confer little advantage to people with high self-esteem. Perceiving one's attributes as malleable when one has high perceived worth is unlikely to be comforting as there may be little scope, or need, for improvement—when you are already at the top, the only way to go is down. On the other hand perceiving attributes as fixed could give people with high self-esteem a sense of security; they might think they are worthy because there is something about them that makes them superior to others. Such an outlook could even lead to higher wellbeing and achievement.

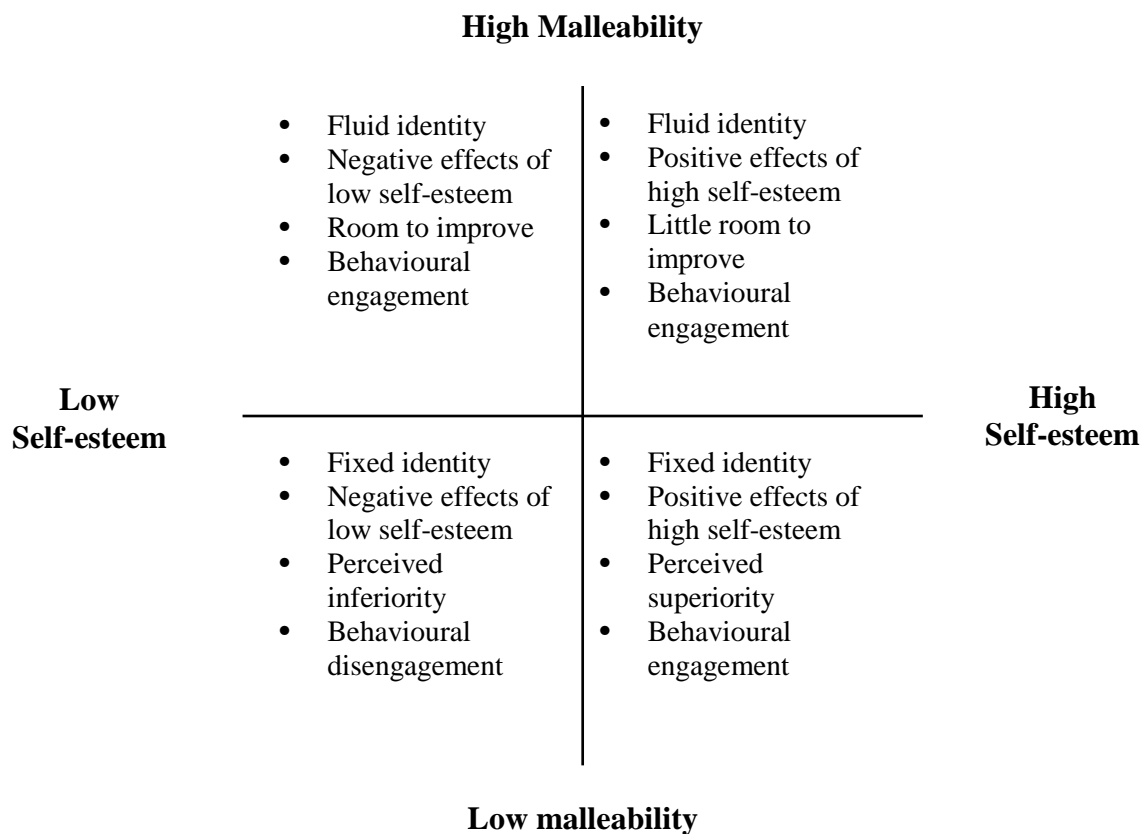


Figure 1. Intersection of implicit theories and self-concept

If implicit theories and self-esteem do interact in this way, then it is likely that the benefit of incremental theories over entity theories will be most clear among those with lower self-esteem and less clear among those with high self-esteem. In other words, incremental theories may buffer, or reduce the extent to which low self-esteem leads to negative outcomes. Self-esteem may become a worse predictor of wellbeing, and general functioning in those with stronger incremental theories.

Exploring the interaction of incremental theories and self-esteem

In order to explore the relationship between self-esteem and implicit malleability theories, I look at the extent to which self-esteem and implicit theories interact to predict

outcomes. In Chapter 3, I present a meta-analysis looking at the strength of relationship between self-esteem and implicit theories and their interaction. In Chapter 4 I show how incremental theories moderate the relationship between self-esteem and both wellbeing and achievement in schools. In Chapter 5 I replicate findings in a large representative sample of American adults.

Chapter summary

Implicit malleability theories are beliefs about how fixed or fluid attributes are perceived to be. People who believe their attributes are more malleable, tend to see more value in learning and remediation following failure. This has been shown to be an important motivational and resiliency factor in educational and sporting settings. To a lesser extent, research has shown that implicit theories are also important for predicting how people respond to social failure and threats to self-esteem. It is likely that by preventing failures from being attributed to the self that incremental theories are related to higher self-esteem. They may also moderate the extent to which low self-esteem results in negative outcomes by reducing the extent to which thoughts of worthlessness are perceived to be literally true, and tied to permanent features of the self. Chapter 3 clarifies the magnitude of the relationship between implicit malleability theories and self-esteem with a meta-analytic synthesis of the literature.

CHAPTER THREE: THE RELATIONSHIP BETWEEN IMPLICIT THEORIES AND SELF-ESTEEM: A META- ANALYSIS

Introduction

Chapters 1 and 2 outlined a case for why implicit malleability theories and self-esteem are related constructs that should be considered together. I argued that through reducing trait attributions, implicit malleability theories may prevent drops in self-esteem. Additionally, I argued that implicit theories may moderate the relationship between self-esteem and both achievement and wellbeing. As a first step, I clarify the results of prior study on this topic. Specifically I aimed to discover what the association is between self-esteem and implicit theories, and what work has been conducted looking at the interaction of these two constructs.

In Chapter 3, I use a meta-analytic synthesis of prior research to show that implicit theories and self-esteem are modestly correlated. Additionally, I show that scales which feature more incremental than entity items, and items which reference the self rather than people generally, were more strongly associated with self-esteem. In addition, I found that while prior work has looked at how self-esteem has been maintained by entity and incremental theories, no work has explored how implicit theories change the outcomes associated with low self-esteem.

The need to synthesize prior research on self-esteem and implicit theories.

While prior research has included both implicit malleability theories and self-esteem in broad correlational analyses, the relationship between these variables has rarely been the explicit subject of much work. Experimental research would suggest that by preventing trait attributions (Levy et al., 1998), incremental theories could buffer self-esteem from failures. It

is therefore reasonable to assume that self-esteem and incremental theories would be positively linked. While the correlation between these two variables has been reported in multiple studies, these effect sizes have been inconsistent. As a result the strength of this relationship and the source of this variation in effect sizes is unclear (i.e. heterogeneity; Cheung, 2015).

One possible for this heterogeneity may be due to the domains that self-esteem and implicit theories are measured in. Both self-esteem and implicit theories are considered to be domain specific. Prior research has shown that when the domain of self-esteem and the domain of an outcome are matched, the relationship between them tends to be stronger (Marsh & Craven, 2006). This may partly explain the heterogeneity seen in the effect sizes between implicit theories and self-esteem. If the domain specificity theory holds for both implicit theories and self-esteem, this may provide evidence that self-esteem and implicit theories are structured similarly. That is, that they may share similar hierarchical structures.

This would be a boon to research into the psychometrics of implicit theories. While a substantial amount of research has clarified the hierarchical structure of self-esteem (Bong & Skaalvik, 2003; Marsh, 1993; Marsh & Shavelson, 1985; Shavelson et al., 1976), researchers have only begun trying to clarify how implicit theories relate to each other (e.g., Schroder, Dawood, Yalch, Donnellan, & Moser, 2016). If the correlates of the domains of self-esteem are strongly related to the matching domains of implicit theories, it may make for future researchers to try and replicate the structure of self-esteem with implicit theories.

Challenges in synthesizing prior research

Different research methodologies

One of the challenges with assessing the relationship between self-esteem and implicit theories is that they have traditionally used different research methods. While research into

implicit theories has benefited from a rich experimental tradition (Dweck, 2000), research into self-concept has been more heavily weighted towards self-report and psychometrics (Marsh & Shavelson, 1985).

A substantial number of experiments have suggested that incremental theories are likely to be causally related to a wide range of interesting phenomenon. The ability to test the effects of incremental theories by manipulation has meant that implicit theory researchers have not had to rely on self-report in the way that self-esteem researchers have. While implicit theories have been measured, this has generally taken a back seat to direct manipulation of implicit theories. This presents challenges for exploring the relationship between implicit theories and self-esteem.

Differing research methodologies may have limited the amount of work that has been done on implicit theories and self-esteem. The effects of self-esteem is difficult to study in lab-sessions. This is because long-term patterns of self-esteem are considered to be more important than the level at any particular moment in time (Kernis, 2005). As such, measurement of self-esteem may be more useful than manipulation. It is easy to cause a participant to have a momentary dip in self-esteem, but if it quickly returns to baseline after an experiment, this may not have broad consequences.

The structure of implicit theory scales is unclear

Research into implicit theories has not used a consistent battery of items in the way that self-esteem researchers have. This may make domain specific comparisons between implicit theories and self-esteem difficult. Self-esteem researchers have differentiated between global and specific factors of self-esteem. For instance, maths self-esteem is nested under academic self-esteem which itself falls under global self-esteem. In contrast, researchers studying implicit theories have often created new scales frequently every time an

experiment is conducting in a new domain of research. The first scales of implicit theories were developed using a range of techniques including factor analysis, and the careful mapping of scale to interview responses (Dweck et al., 1995). However, these original scales have been adapted numerous times resulting in a dizzying array of scales. As a result, a vast number of scales now exist which have not been placed into any sort of hierarchical structure and without clear separation of domains. For instance do the theories of anxiety and shyness scales form different factors, or are they both tapping into the same latent factor (Tamir, John, Srivastava, & Gross, 2007; Valentiner et al., 2013)?

While some researchers have tried to create more robust models of implicit theories scales, these models are still in their early stages (Hughes, 2015; Schroder et al., 2016). Given that implicit theories and self-esteem both measure perceived attributes of the self, they may have similar hierarchical structures. Evidence for this could be found if similar domains of implicit theories and self-concept are more closely related than more distal ones.

Are entity and incremental theories unidimensional?

Another issue which needs to be clarified is whether entity and incremental statements form two ends on a bipolar scale, or map onto separate factors. The original scales as reported by Dweck et al. (1995) used only entity items, i.e., items where respondents rated agreement to statements suggesting their attributes are fixed, e.g., “You have a certain amount of intelligence and you really can’t do much to change it.” This was due to the fact that in early studies even participants who endorsed entity theories in interviews would respond with high levels of agreement to incremental items (Dweck et al., 1995). Dweck et al. (1995) argued that incremental statements were so compelling, that participants would agree with them, whether or not they actually corresponded to their implicitly held beliefs. It is possible, as Dweck et al. (1995) suggests, that this lack of a correlation is due to insensitive responding to incremental items. However, it is also possible that incremental and entity beliefs do not exist

on the same continuum and therefore should be treated as separate factors. Perhaps, incremental items and entity items somehow tap into different aspects of perceived malleability and so it is possible to have both high entity and incremental beliefs in a single domain. For instance one might believe that there is a strong genetic basis for intelligence and so would endorse entity statements, but they simultaneously believe that through strategy one might still be able to improve their performance and so would also endorse incremental items. The current evidence cannot rule out this possibility. As such, the assumption that scales which use exclusively entity items tap into people's incremental theories requires scrutiny. In this chapter I examined this supposition by seeing if using entity vs. incremental items moderates the strength of the relationship between implicit theories and self-esteem.

Self vs other focused items

Finally, implicit theory measures tend to employ items which reference people generally, for example, “you have a certain amount of intelligence and you really can't do much to change it” (Dweck et al., 1995). However it is possible that people hold different theories for themselves than they do for others. Someone might feel that while most people can improve their mathematical ability, there is something special about them that makes them a lost cause. To address this, De Castella et al. (2013) modified the format of implicit theory measures to make them self-focused, e.g., “No matter how hard I try, I can't really change the emotions that I have”. De Castella and Byrne (2015b) claim that these self-focused scales tap into the construct more effectively.

In summary, Study 1 will attempt to clarify these concerns by exploring the extent that implicit theory and self-esteem domains mirror each other. This may provide clues as to whether the two constructs have parallel hierarchical structures. Attention will also be paid to the degree to which scales are composed of incremental and entity items. If scales composed of entity vs incremental items behave differently, it may make sense to treat incremental and

entity items as separate factors. Attention will also be paid to whether or not scales use personal variants of implicit theory scales as opposed to referencing people generally.

Methodological issues: The advantage of meta-analyses

When trying to calculate the true strengths of the associations between two variables, several biases must be taken into account. Due to resource limitations, it is rare that entire populations are surveyed; instead samples must be used. As samples are only a subset of a population of interest, they will tend to vary from their parent populations based on size, i.e. sample effect sizes will approach that of the true effect size as the size of the sample approaches the size of the parent population (Field, 2009). While larger studies are more likely to represent the effect size accurately, no single study will do so perfectly. One way to reduce sampling error is simply to study constructs using very large datasets (Marsh, Bornmann, Mutz, Daniel, & O'Mara, 2009). However, as study characteristics (e.g. demographics, instruments, time) and research methodologies (e.g. instruments, sampling techniques) can alter effect sizes, even a large sample may result in effect sizes which are not representative of the true population parameters.

This is particularly pertinent for psychological research as a range of self-report measures can be used to study a single construct. Self-esteem and implicit malleability theories have both been measured by dozens of instruments, all with unique psychometric properties. Due to these psychometric differences, one would not expect each of these scales to behave identically in analyses.

Systematic narrative review

One way researchers have attempted to resolve these issues is to conduct a systematic review where every study is read by a researcher to estimate the magnitude of the effect size. This approach is potentially problematic as study characteristics are not taken into account in

a systematic way in the formation of impressions. In this methodology each study is effectively given a 'vote' towards the researcher's conclusions regardless of magnitude, study quality, methodologies used and sample characteristics (Marsh et al., 2009). The extent that the findings of each study influence the researchers assessment depend on the researcher's background and pre-conceptions. While narrative reviews can help synthesize research they are at risk for bias.

Meta-analysis

Glass (1976) popularised the meta-analysis as a solution to these methodological issues. Provided that a field has an adequate number of studies, rather than conducting further sampling, secondary analysis can be conducted on existing research. This means that each study's effect size essentially becomes a data point as a substitute for the original individual observations (Cheung, 2014b). The extent to which each study contributes to a global effect size is weighted based upon the variation in the measurement. This way, more accurate effect sizes are treated preferentially over ones with large confidence intervals. Pooled estimates are generally more accurate than that of any individual sample. By combining effect sizes across varying methodologies, each with their strengths and weaknesses, meta-analyses can also help identify features of the broader construct that researchers are attempting to tap into. Meta-analyses also allow researchers to account for sources of heterogeneity (Cheung, 2015).

Issues with heterogeneity

An issue with meta-analytic approaches to effect size estimation is that they assume homogeneity among effects, that is, that there is one true effect size. The reality is that often varying sample characteristics and methodologies will introduce systematic differences in effect sizes such that rather than being one true effect, there are multiple effects (Cheung, 2015). For instance, it is possible that the relationship between implicit malleability theories and self-esteem would be stronger among girls than boys, or stronger in younger than older

samples. This heterogeneity can become problematic especially when studies have multiple effect sizes. As each study has its own unique features, studies which report multiple effect sizes are not truly independent, which can introduce bias in the interpretation of the population parameters (Cheung, 2014b). This must be assessed and controlled for to ensure that effect sizes are as accurate as possible (Cheung, 2015).

Research Aims

Study 1 aims to consolidate research on both self-esteem and implicit malleability theories using a meta-analytic synthesis of prior research. The primary aim is to measure the strength of the relationship between implicit theories and self-esteem. The secondary aim is to see the extent to which implicit theory domains match self-concept domains. The final aim is to identify prior work that has looked at the interaction between self-esteem and implicit theories.

The current study

As meta-analyses allow for the generation of effect sizes across a range of methodologies such that they are representative of a field of research, they are currently considered best practice for estimating the true relationship between two variables and as such will be utilised in study 1.

Research Questions and Hypotheses

Research Question 1

What is the magnitude of the association between incremental theories and self-esteem across all domains of both constructs (for example, academic, physical, and creative domains)?

Research Question 2

Do self-concept and implicit theory scales in matching domains (e.g., implicit theories of intelligence and academic self-concept) correlate more strongly than scales in different domains?

Research Question 3

Do implicit theories and self-concept scales correlate more strongly when the implicit theory scales reference the self as opposed to people generally?

Hypothesis 1

Incremental theories will be positively related to both self-esteem and self-concept. By reducing trait attributions (Levy et al., 1998), incremental theories should make failures less likely to affect self-image resulting in higher self-esteem/ self-concept.

Hypothesis 2

Incremental theories will be most strongly related to self-esteem when the domains of each scale are similar. For example, incremental theories of intelligence should be more strongly related to academic self-concepts, than physical self-concepts or self-esteem generally.

Hypothesis 3

Correlations between incremental theories and self-concept will be stronger when implicit theory scales reference the self rather than people generally. Scales which refer to people generally will not adequately reflect perceptions of self-malleability. People may feel their attributes are more or less malleable than other people.

Method

Eligibility criteria

Studies were included which had quantitative measures, in any domain, of either self-concept (including self-esteem) or implicit malleability theories as described by Dweck et al. (1995). Studies in which full texts in English could not be obtained were excluded to ensure data extraction was accurate. Only original research was eligible for inclusion, as such data presented in review papers and previous meta-analyses were excluded in order to ensure that each study's results were only pooled once. Studies were accepted irrespective of cohort features (e.g. age, gender, socioeconomic status), which were assessed as moderators.

Sources

Four databases were used for finding eligible papers: ERIC, PsychINFO, Scopus and Web of Science. Additional papers were sourced from Google Scholar and included on advice from researchers in the relevant fields.

Development of keywords

In order to scope for relevant keywords, abstracts from all articles used in Chapter 1 and 2 were loaded into the statistical programming language R (R Core Team, 2018). Word frequencies were then inspected in order to extract relevant keywords. The use of word frequency analysis to identify keywords is not an established practice. This technique may help to identify terms used in a given field, which would otherwise be missed. Word frequencies are presented in Figure 2. This word cloud was produced in R using the 'wordcloud' package (Fellows, 2012). Keywords were further refined following a pilot search and based on feedback from senior researchers in related fields.

Keywords

Implicit theories was represented by variations of the term as follows: ‘implicit theory’ ‘incremental theorist’, ‘entity theorist’, ‘fixed mindset’, or ‘growth mindset’. ‘Dweck’ was also used as a keyword for implicit theories due to her prominence in the field of research (Dweck, 2000). Papers with self-esteem were located with variants of the following keywords: ‘self-esteem’, ‘self-concept’, ‘self-perception’, ‘self-appraisal’, ‘self-image’, ‘self-worth’, or ‘self-attributions’. Papers were returned that featured at least one of these keywords from both the implicit theory and self-esteem set.

Study screening

Eligible studies were imported into an Endnote library and duplicates were removed. I screened titles and abstracts with the assistance of two other researchers. Records were removed where all researchers unanimously agreed studies did not meet eligibility criteria. Full texts were obtained for all remaining records and then screened for eligibility. In cases of disagreements about the eligibility of certain studies, researchers discussed these cases until a unanimous decision could be made.

Data extraction

Data were extracted from the remaining studies into an Excel spreadsheet. Each row represented an effect size. In instances where multiple effect sizes were present in a single study, these effects were inputted on separated rows, and were linked by study ID. In this meta-analysis, studies only presented effect sizes as Pearson's r . Accordingly, no effect sizes needed to be mathematically transformed. Beyond effect size, other information was extracted about each study including publication year, cohort socioeconomic status, cohort gender ratio, mean age of subjects, the domain of the self-concept scale, which self-concept scale was used, the implicit theory domain, which implicit theory scale was used, whether the implicit theory scale referenced the self or people generally, the alphas of each scale, and finally, the effect size.

Effect sizes

Pearson's r was used as a global effect size to measure the relationship between incremental theories and self-esteem/self-concept. As per common practice, .1 can be considered a small effect size, .3 as medium, and .5 as a large effect size (Cohen, 1988). Where correlations were not reported, they were generated through mathematical transformations from other effect sizes. If correlations could not be calculated, the authors

were contacted with a request for the effect size. Once all correlations were extracted, variances were calculated by using Schmidt and Hunter's (2014) method. This method calculates variances based on a pooled effect size which has been shown to make variances more accurate. While this methodology assumes homogenous effect sizes (one true effect size), it has been found to perform well even in cases where the effect sizes are heterogeneous (Aguinis, 2001).

Analysis

In this study, there potentially multiple sources of heterogeneity that would imply that there are multiple effects. To deal with this, moderators need to be confirmed and effect sizes calculated separately where appropriate. First, incremental theories and self-concept were measured across multiple domains. Second, even within domains, different measures were used across studies to measure incremental theories and/or self-esteem. Sample characteristics vary such that sample features may moderate the magnitude of effect sizes. Finally, in meta-analyses effect sizes are generally assumed to be independent. However, single studies often report multiple effect sizes which are not independent of each other due to common methodologies and sample features. To control for the dependence of effect sizes, Cheung (2014b) developed a form of structural equation modelling meta-analysis. This enables heterogeneity to be measured and controlled for at both between and within studies. All analyses were performed in R (R Core Team, 2018) using the packages "metaSEM" (Cheung, 2014a) and "metafor" (Viechtbauer, 2010).

Moderators

A range of moderators were extracted from studies, including the gender ratio of the sample, cohort socioeconomic status (SES), age, ethnicity, cohort source e.g., college students or patients, whether the incremental theory scale was self-focused (e.g. "I am

malleable”) vs. other focused (e.g. “people are malleable”), whether the implicit theory scales were comprised of entity, incremental items, or both, whether the paper was published in a journal or was a dissertation, and whether the scales were validated.

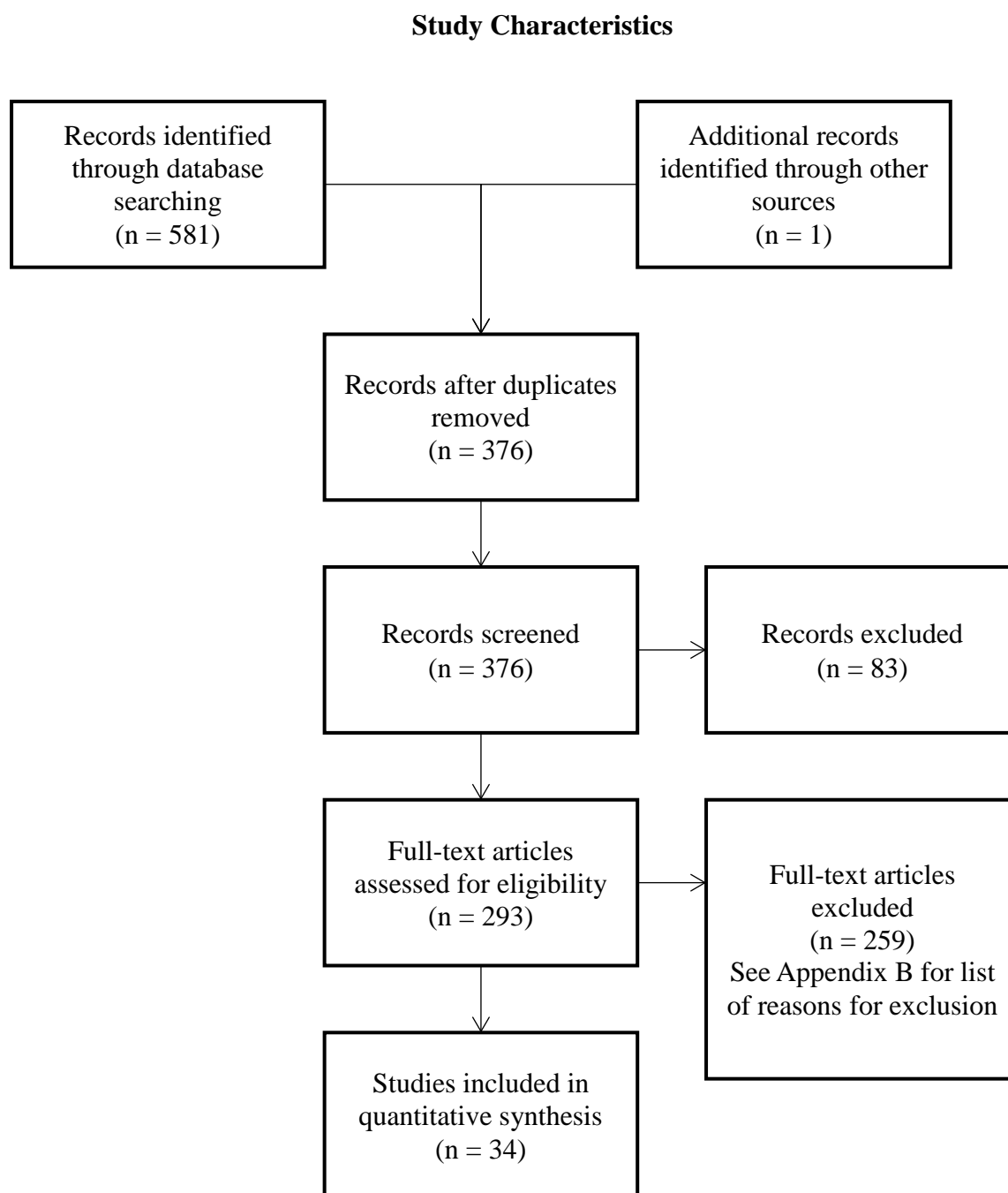


Figure 3. Flow diagram of meta-analysis

Results

Thirty four studies were included in the quantitative synthesis which measured the association between incremental theories and self-esteem. The results presented below explore the association between self-esteem and implicit theories.

In line with hypothesis 1, across all domains, incremental theories tended to be related weakly to self-concept $r = .16$, 95% CI [.11, .20]. See Figure 4 for a forest plot, which shows the effect size for each individual study as well as pooled effect sizes per domain of self-concept. In order to look at intra-domain relationships, the domains of each mindset and self-concept were collapsed into broader categories. “Self-esteem” included global self-concept, social self-concept, and self-esteem measures; “academic self-concept” included self-concept measures in the domains of mathematics, science, verbal ability and memory; and “physical self-concept” included self-concept measures of sporting ability, physical self-worth, and spatial abilities. With regards to implicit malleability theories, “intelligence” included implicit malleability measures in the domains of both mathematics and intelligence; “personality” included scales which referenced general characteristics or personality; “mental health” included scales which measured perceived malleability in emotions and anxiety; and, “physicality” included scales on sporting ability and physical characteristics, such as, weight.

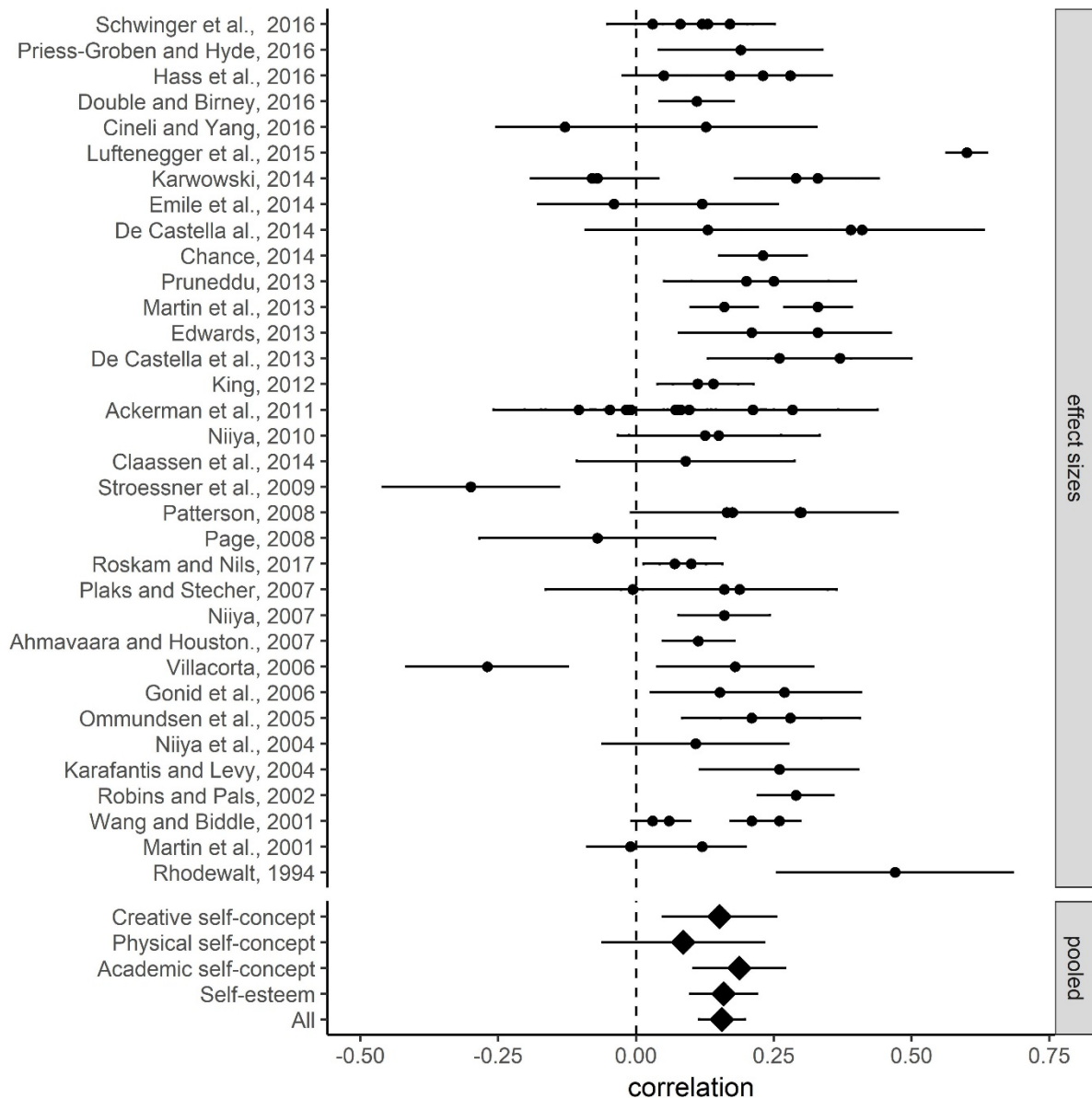


Figure 4. Forest plot of effect sizes.

Note. Pooled effect sizes demonstrate the correlation between incremental theories and the different domains of self-esteem. Many studies had multiple effect sizes. In this figure, multiple effect sizes are indicated where multiple points and confidence intervals are present in a single row.

Relationship by domain

Within domains the magnitude of the relationship between implicit theories and self-esteem tended to vary. Implicit theories and self-concepts tended to be more strongly related

when in similar domains than when in different domains (see Table 1 for effect sizes based on domains of self-concept and implicit theories as well as the percentage of heterogeneity which is explained at level 2 and 3).

Table 1.

The links between specific domains of self-concept and implicit theories

Domain	k	n	r	SE	Lower 95% CI	Upper 95% CI	t^2	I^2	$t^2_{_3}$	$I^2_{_3}$	Q
All	34	79	0.16	0.02	0.11	0.2	0.01*	0.58	0.01	0.32	1020.92
Intelligence	21	48	0.16	0.03	0.1	0.21	0.01	0.35	0.01	0.54	731.19
Mental health	2	5	0.31	0.04	0.24	0.39	0	0	0	0	5.22
Personality	6	8	0.16	0.09	-0.02	0.34	0	0	0.05	0.86	46.05
Physicality	4	10	0.12	0.02	0.08	0.15	0.01	0.93	0	0	131.04
Creativity	2	8	0.15	0.05	0.05	0.25	0.02	0.91	0	0	70.58
Self-esteem											
Intelligence	14	22	0.13	0.03	0.07	0.18	0.01	0.85	0	0	119.35
Mental health	2	5	0.31	0.04	0.24	0.39	0	0	0	0	5.22
Personality	6	7	0.17	0.1	-0.02	0.36	0	0	0.05	0.87	46.05
Academic self-concept											
Intelligence	11	22	0.18	0.05	0.09	0.27	0	0.09	0.02	0.82	556.69
Personality	1	1	0.17	0.09	-0.01	0.34	0	0.5	0	0.5	0
Physicality	1	2	0.25	0.05	0.16	0.33	0	0	0	0	0.59
Physical self-concept											
Intelligence	1	4	0.08	0.07	-0.05	0.22	0.01	0.67	0	0	12.18
Physicality	3	8	0.09	0.07	-0.05	0.22	0.01	0.94	0	0	124.38
Creativity											
Creativity	2	8	0.15	0.05	0.05	0.25	0.02	0.91	0	0	70.58

Note. Bolded items indicate self-concept scales. k = number of studies, n = number of effect sizes. T^2 = tau values, I^2 = variation explained by heterogeneity rather than chance. ‘_3’ = heterogeneity indices measured at level 3. Significant tau values indicated with asterisks.

While most domains of implicit malleability theories tended to correlate with pooled self-concept scales at similar levels, mental health malleability theories, e.g., implicit theories of anxiety had the strongest relationship, $r = .31$, 95% CI[.24, .39] and implicit theories of physicality was related the most weakly, $r = .12$, 95% CI [.08,.15]. This suggests that people with incremental theories about their mental health tended to have more positive self-

concepts than those who had incremental theories in other domains. With regards to self-esteem, implicit theories in more general domains (e.g. mental health and personality) were correlated more strongly than implicit theories in more distal domains (e.g. intelligence). Implicit theories of mental health correlated most strongly with self-esteem at the before mentioned level, followed by implicit theories of personality, $r = .17$, 95% CI[-.02, .36], $I^2_2 = .87$; although in this case there was a large degree of heterogeneity among effect sizes such that the confidence interval crossed zero. This could be due to a single (seemingly) aberrant effect size. While most effect sizes ranged from .1 to .2, one study recorded an effect size of -.3. A lack of studies finding similar effects meant that the methodological or sampling reasons for this deviation from the norm could not be determined. Implicit theories of intelligence was correlated at a weaker, yet significant level $r = .15$, 95% CI [.08, .21].

For academic self-concept (ASC), 11 studies (22 effect sizes) correlated implicit theories of intelligence (ITI) with academic self-concept with a moderate pooled relationship $r = .18$, 95% CI [.09, 0.27]. Surprisingly, ASC appeared to be most strongly correlated with implicit theories of physicality $r = .25$ 95% CI [.16, .33], but caution is needed while interpreting this result due to the dearth of studies testing this effect ($k = 1$). Unfortunately no other domains of incremental theories were studied with academic self-concept. This means that it is not possible to test hypothesis 2 within this domain of self-concept, i.e., that effect sizes will be stronger when the domain of implicit theory and self-concept is more similar. While the effect sizes between ITI and ASC tended to be stronger than effect sizes where ITI was matched with other domains of self-concept, confidence intervals intersected.

With regards to physical self-concept, pooled associations were small and not statistically significant in all domains of implicit theories. Implicit theories of intelligence were not significantly related to physical self-concepts $r = 0.08$ 95% CI [-0.05, 0.22], nor were implicit theories of physicality $r = .09$ 95% CI [-0.05, .22]. Finally, eight effect sizes

across two studies showed that creative self-concepts and implicit theories of creativity were significantly correlated, $r = .15$ 95% CI [.05, .25].

Publication bias

Publication bias was checked with funnel plots. Publication bias refers to cases where studies are more likely to be published when effect sizes are at a desirable level (e.g., inflated or aligned with expectations). If studies are being published irrespective of results, effect sizes will tend to fall symmetrically around the mean. Effect sizes should mostly be within the dotted confidence interval bounds with larger studies providing better estimates than smaller studies (Macaskill, Walter, & Irwig, 2001). If asymmetry in funnel plots is found, it may indicate that publication bias has occurred. For instance, smaller studies may only be published if they find an exciting (e.g., large) effect. Alternatively many effect sizes falling outside of the confidence intervals may indicate issues with heterogeneity (multiple true effect sizes) (Macaskill et al., 2001).

The funnel plot for all pooled effects can be seen in Figure 5, in which no clear evidence of systematic publication bias can be observed. Larger studies tended to fall symmetrically around the estimate of the mean. Although a number of effect sizes fall outside of the 95% confidence interval bounds, they do not appear to bias results in any systematic direction. To formally test plot asymmetry, Egger's test was performed (Egger, Smith, Schneider, & Minder, 1997). This test found no evidence of funnel plot asymmetry ($p = .64$). However, moderation analysis revealed that there was a systematic difference between studies which reported effect sizes relative to those which did not. Sixteen studies did not list a correlation between implicit malleability theories and self-esteem. Of these, five responded to a request for the respective data. The effects in these studies ($r = 0.079$, 95% CI [0.04, 0.12]) were substantially smaller than those which listed effect sizes within their published reports ($r = .17$, 95% CI [0.13, 0.22]; $p < 0.01$). These results suggests that authors who

found smaller correlations may have been less likely to include them in their results, which is a potential source of bias.

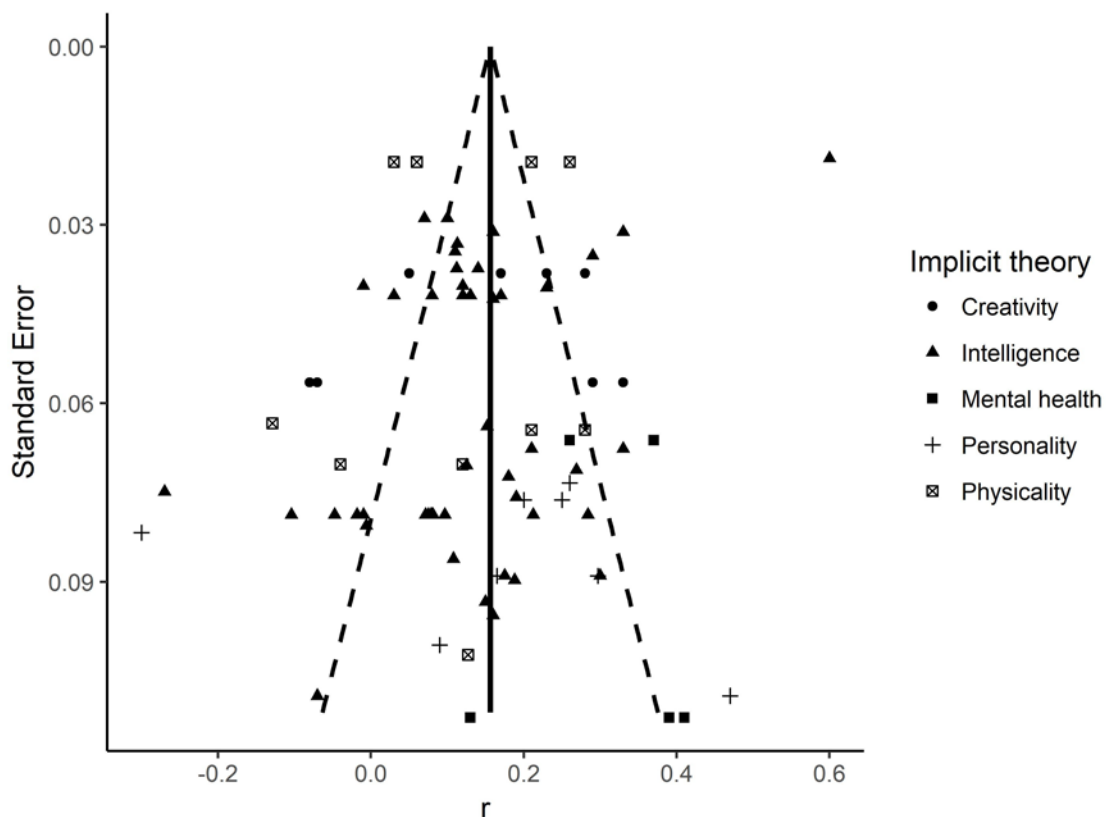


Figure 5. Funnel plot of all effect sizes

Due to the heterogeneity of effects, it's possible that publication bias was present in some combinations of self-esteem and implicit theories, but not in others. To look at publication bias within different domains of self-concept and implicit theories, Figures 6 – 9 were constructed. Each funnel plot is organised by the domain of self-concept, however the different domains of implicit theories are represented in each plot by varying symbols.

Self-esteem

Figure 6 shows the funnel plot for all effects where implicit theories were correlated with global self-esteem. All effect sizes generally fit within the dotted lines indicating little bias. Egger's test did not find evidence of plot asymmetry ($p = .78$). There were however two

effects which were strongly negative. Interestingly these effects, if positive and with the magnitude, would have fit nicely inside the confidence intervals. It's possible that these authors did not score their implicit theory measure in the correct direction. To prevent introducing a new source of bias they were not excluded from analysis.

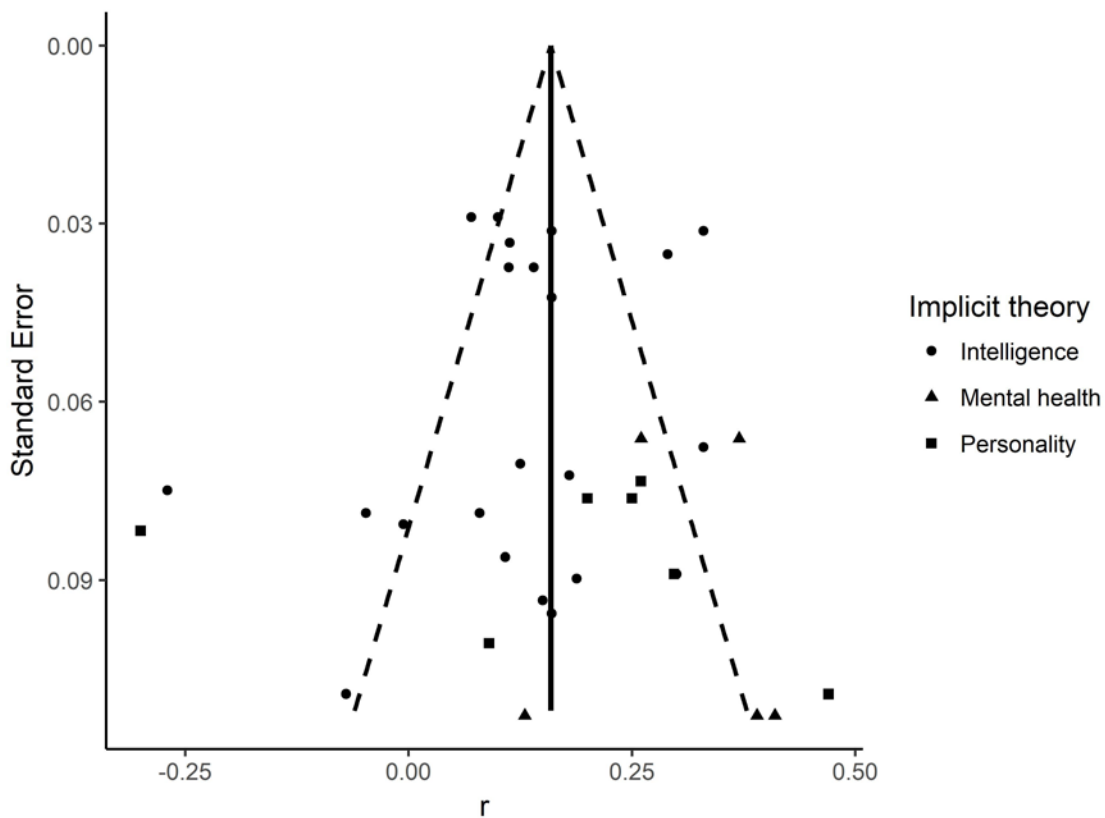


Figure 6. Funnel plot of effects between implicit theories and self-esteem

In figure 6, the domain of implicit theory is represented by the shape of each point. This figure shows the implicit theories of mental health (represented as triangles) tended to be more strongly related to self-esteem, however the standard error for these studies was larger.

Academic self-concept

Figure 7 shows the funnel plot for the correlation of incremental theories and academic self-concept. There was a clear outlier way outside of the bounds of the confidence intervals. Interestingly as standard error increased more effects fell to the left of the confidence intervals. This could potentially indicate publication bias, with smaller studies

tending to have larger effect sizes. However, an Egger's test was not able to demonstrate plot asymmetry ($p = .29$).

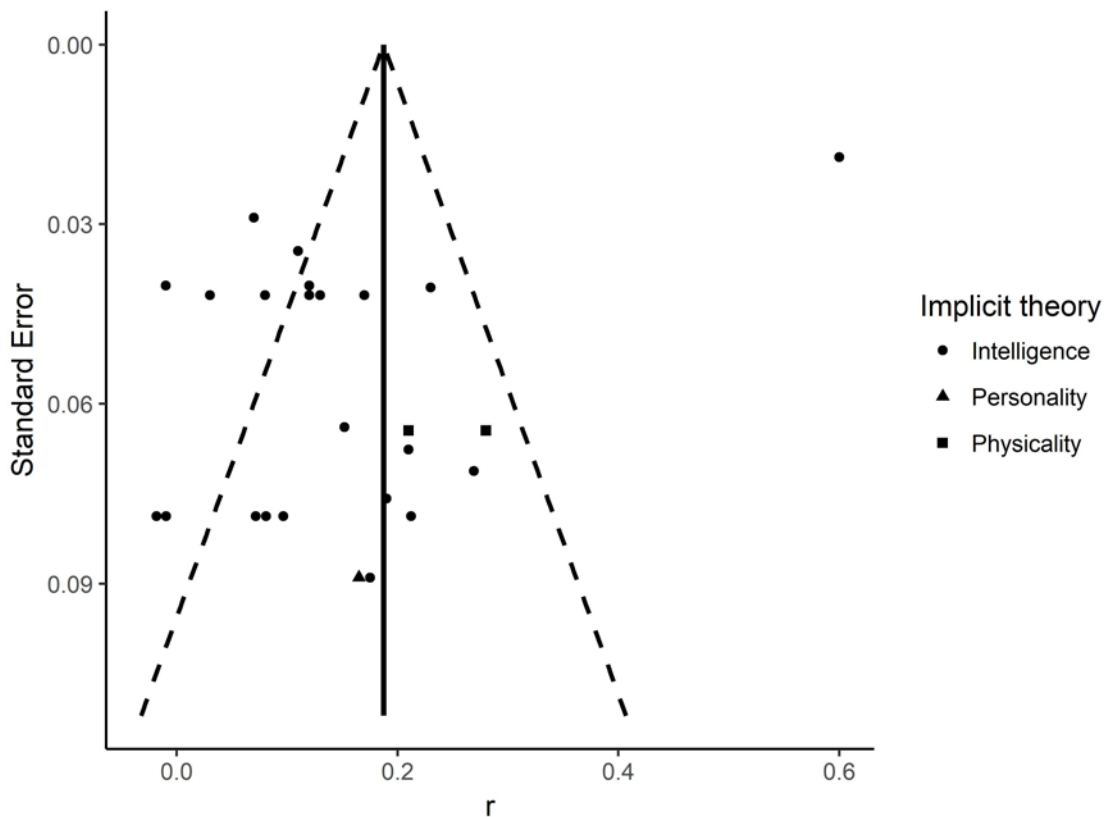


Figure 7. Funnel plot of effects between implicit theories and academic self-concept

Physical self-concept

Figure 8 shows the funnel plot for the correlation of incremental theories and physical self-concept. Only two domains of implicit theories were studied with this self-concept. There were not many studies looking at the relationship between implicit theories and physical self-concepts. The few studies that did however, not show any signs of systematic publication bias ($p = .40$; Egger's test).

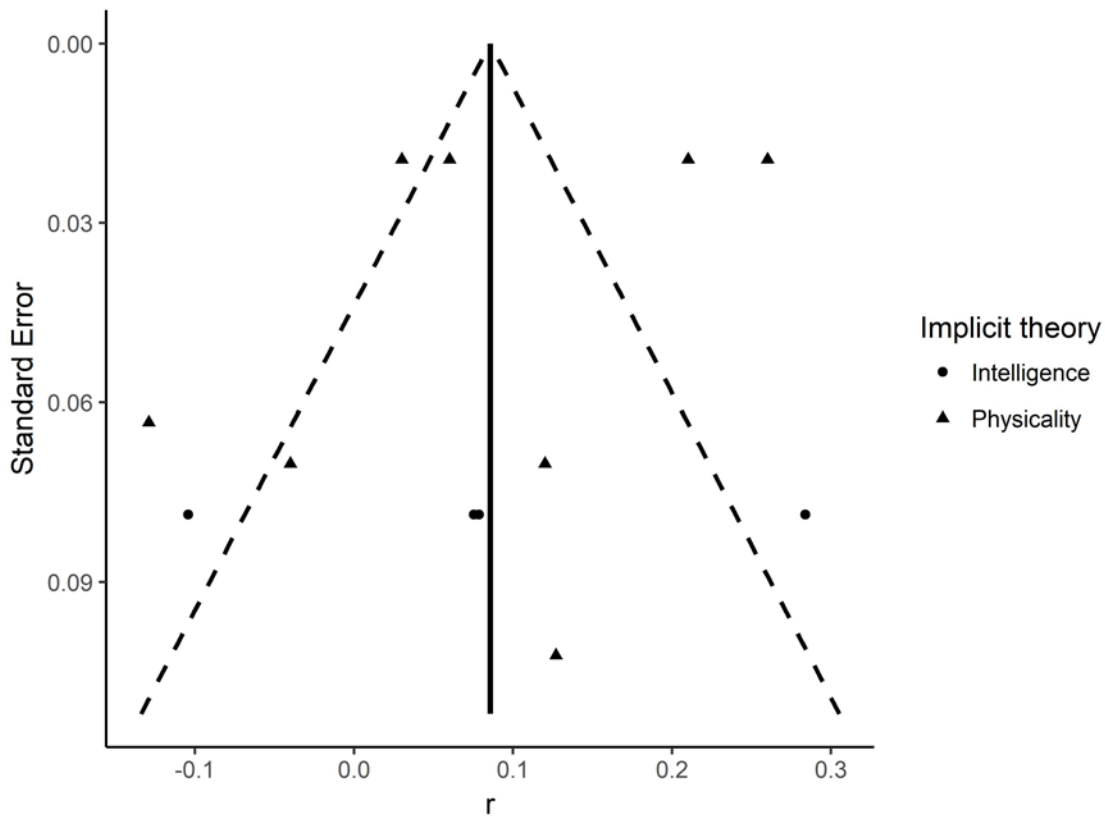


Figure 8. Funnel plot of effects between implicit theories and physical self-concept

Creative self-concepts

Figure 9 shows the funnel plot for the correlation of incremental theories and creative self-concepts. While a funnel plot was constructed for the domain of creativity (Figure 8), fewer than 10 effect sizes were available ($n = 8$). Prior authors have suggested that there is little point checking for plot asymmetry when there are so few effect sizes. This is because current methods lack sufficient power to detect asymmetry for small sample sizes (Sterne, Gavaghan, & Egger, 2000). Accordingly, Egger's test was not performed as it would be uninterpretable.

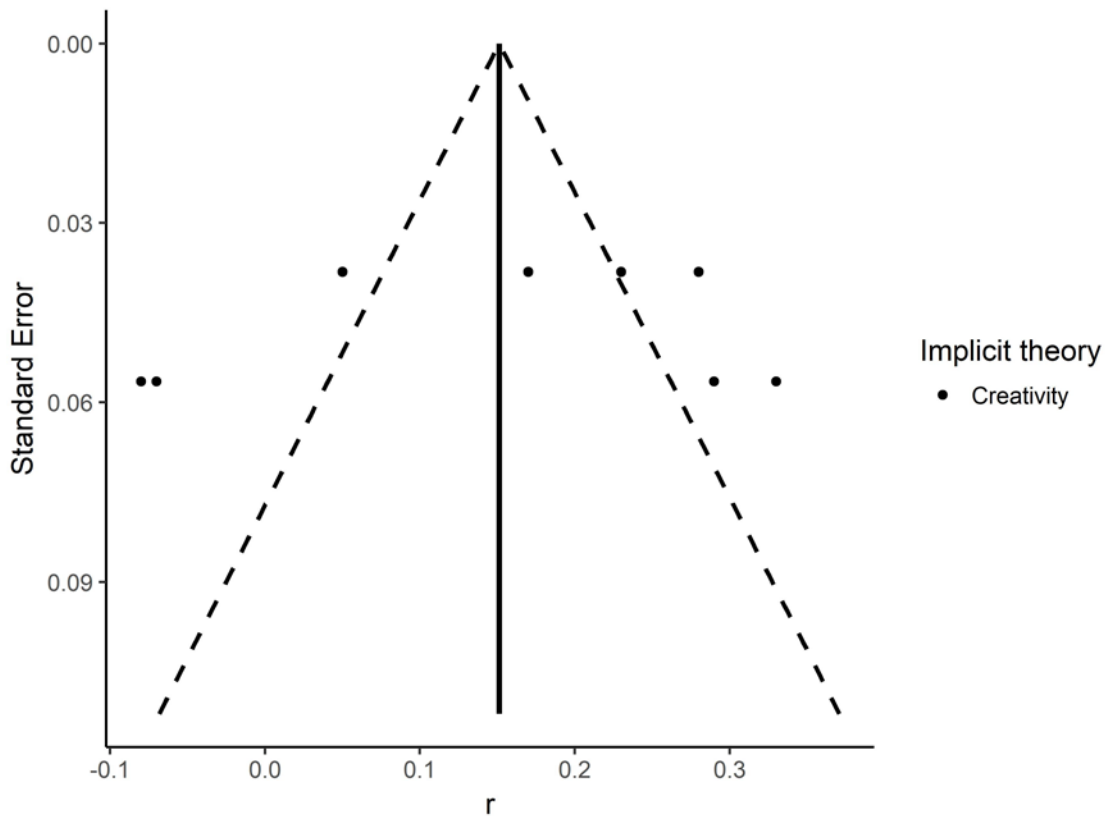


Figure 9. Funnel plot of effects between implicit theories and creative self-concept

Moderation

Personal implicit theories. In the majority of studies, researchers used implicit theory scales which referenced people generally, e.g., “You can’t really change your level of intelligence” ($k = 71$). In five cases, researchers instead used personal variants of these items, e.g., “I can’t really change my basic level of intelligence”. Scales that used the self as the subject correlated with self-concept much more strongly $r = .38$, 95% CI [.21, .56] than those that focused on people generally $r = .14$ 95% CI [.10, .17] $p < 0.001$. This suggests that people do hold multiple theories for themselves and for people generally.

Entity vs incremental items. Whether implicit theories scales used exclusively incremental or entity items, or a combination of both, was found to be a significant moderator

of effect sizes ($p < 0.00$). Studies with more incremental items tended to report stronger effect sizes. Scales with only entity items tended to report the weakest correlations ($r = .13$, 95% CI [0.04, 0.21]), followed by scales that contained both entity and incremental items ($r = .16$, 95% CI [0.10, 0.22]). Scales which used only incremental items reported the strongest correlations ($r = .22$, 95% CI [.15, .29]). If implicit theory scales were bipolar then incremental items should merely be the reverse of entity items and their presence should not change the magnitude of effect sizes.

Age. To test if age was a moderator, four binary variables were created to cover children (13 or under, $k = 11$), adolescents (14-18, $k = 14$), young adults (19-25, $k = 19$), and adults (26+, $k = 12$). These categorical variables were used together as moderators in a three level meta-analysis. This model was not significantly different from the baseline model ($p = 0.34$). The relationships between self-concept and implicit theories by age were as follows: children ($r = 0.17$, 95% CI [0.1, 0.24]), adolescents ($r = 0.2$, 95% CI [0.07, 0.33]), young adults ($r = 0.19$, 95% CI [0.14, 0.24]), and adults ($r = 0.12$, 95% CI [0.02, 0.22]). This shows that the relationship between implicit theories and self-esteem is not age dependent.

Publication date. Publication date was not found to be a moderator ($p > 0.9$). Effect sizes were not significantly different regardless of whether they were from studies published in the 1990s ($k = 1$, $n = 1$), 2000s ($k = 14$, $n = 26$) or 2010s ($k = 18$, $n = 49$). Effect sizes have been found at similar levels across recent decades. This eliminates several sources of potential bias due to changing scientific consensus or evolving methodologies.

Reliability. Scales were identified as potentially unreliable if the alpha reliability was less than 0.7, or if it was not reported. Just under half of effects reported adequate reliability for each scale ($k = 19$, $n = 31$). However, the reliability of scales did not appear to moderate the strength of effects ($p = 0.13$). This was true regardless of whether the implicit theory scale

was unreliable ($r = .15$, 95% CI [.08, .23]), the self-concept scale was unreliable ($r = .12$, 95% CI [.04, .20]) or when both scales were unreliable ($r = .15$, 95% CI [.11, .20]). These results show that the effect size between self-esteem and implicit theories was stable. Studies utilizing less reliable scales produced similar effect sizes to those with highly reliable ones.

Gender. Three dummy codes were generated such that samples were considered mostly male when fewer than 33% of participants were female ($k = 1$, $n = 2$); mixed if the percentage of females ranged between 33% and 66% ($k = 22$, $n = 57$) and considered mostly female when the percentage of female participants exceeded 66% ($k = 11$, $n = 16$). Including gender as a moderator significantly improved the model over the baseline model ($p = 0.01$). Studies with mostly male samples ($r = 0.24$, 95% CI [0.16, 0.33]) tended to have stronger effect sizes than those with mixed genders ($r = 0.17$, 95% CI [0.12, 0.23]), which had stronger effects than those with mostly female participants ($r = 0.12$ 95% CI [0.03, 0.21]). These results show that studies with more females in them tended to have smaller effect sizes.

Education. The relationship between self-concept and implicit theories did not significantly change regardless of whether samples were from elementary schools, high schools, or universities ($p > 0.9$), suggesting that the relationship between implicit theories and self-esteem does not change substantially across educational phases.

Direction of effects and interaction

No studies were found which tested for an interaction between the constructs of self-esteem and implicit theories. Further, prior work has not shown the relationship between implicit theories and self-esteem longitudinally.

Table 1.
Meta-analysis results by moderator variables

domain	ANOVA p value	k	n	r	SE	Lower 95% CI	Upper 95% CI	t ²	I ²	t ² _3	I ² _3	Q
Implicit theory frame	0.00											
Self-theories		4	5	0.38	0.09	0.21	0.56	0	0	0.03*	0.86	38.64
Other-theories		31	71	0.14	0.02	0.1	0.17	0.01*	0.76	0	0.1	435.16
Implicit theory items	0.00											
Entity		18	35	0.13	0.04	0.04	0.21	0	0.05	0.03*	0.89	791.7
Combined		14	24	0.16	0.03	0.1	0.22	0.01	0.51	0.01	0.32	107.79
Incremental		9	17	0.22	0.04	0.15	0.29	0	0.06	0.01	0.78	60.91
Age	0.34											
children		4	11	0.17	0.04	0.1	0.24	0	0.12	0	0.39	18.93
adolescents		7	14	0.2	0.07	0.07	0.33	0.01	0.24	0.02	0.74	679.41
young adults		10	19	0.19	0.03	0.14	0.24	0	0.52	0	0.19	66.48
adults		5	12	0.12	0.05	0.02	0.22	0.03	0.86	0	0	78.64
Decade	0.18											
1990s		1	1	0.47	0.11	0.26	0.68	0	0.5	0	0.5	0
2000s		14	26	0.12	0.03	0.06	0.18	0.01	0.7	0	0.23	226.98
2010s		18	49	0.18	0.03	0.12	0.23	0.01*	0.52	0.01	0.36	707.3
Poor reliability	0.11											
neither		19	31	0.18	0.03	0.11	0.24	0.01	0.55	0.01	0.39	742.24
implicit theories		15	33	0.15	0.04	0.08	0.23	0.01	0.24	0.01	0.63	155
self-concept		14	39	0.12	0.04	0.04	0.2	0	0.2	0.02	0.69	173.99
both		18	45	0.14	0.03	0.08	0.21	0	0.19	0.02	0.69	207.74
Gender	0.01											
mostly male		1	2	0.24	0.05	0.16	0.33	0	0	0	0	0.59

mixed		22	57	0.17	0.03	0.12	0.23	0.01	0.59	0.01	0.31	873.22
mostly female		11	16	0.12	0.05	0.03	0.21	0.01	0.26	0.01	0.60	94.6
Education level	0.95											
elementary		4	12	0.18	0.04	0.11	0.25	0	0.13	0	0.39	22.38
High school		7	13	0.17	0.07	0.04	0.31	0.01	0.2	0.03	0.78	665.32
university		15	35	0.15	0.04	0.08	0.22	0.01	0.41	0.01	0.44	188.22

Note. Bolded items indicate moderation analysis performed. k = number of studies, n = number of effect sizes. Significant tau values indicated with asterisks. ANOVAs compare models with moderation to baseline model.

Discussion

Overview

The current study examined the relationship between implicit malleability theories and self-concept using a meta-analytic approach. By synthesizing 79 effect sizes nested within 34 studies, this study demonstrated that self-esteem and self-concept are consistently related to implicit malleability theories across studies ($r = .16$; hypothesis one). Effects were consistent across age and educational level. However, we found four important moderation effects. First, there were strong implicit-theory frame effects. Implicit theory measures that focused on the self, had much stronger links to self-esteem than implicit theories focused on others. Second, there was some evidence for domain specificity, with general self-concept being more strongly linked to implicit theories of mental health than to implicit theories of intelligence. Third, measures that focused on incremental theories tended to have stronger links to self-esteem than those focused on entity theories or that combined entity and incremental theory items. Fourth, there were gender effects: Studies that had cohorts mostly composed of males found stronger links between self-concept and implicit theories compared to mixed and majority female cohorts.

The content of implicit theory measures

It found that incremental items related more strongly to self-concept than entity items. There has been some debate in the field regarding whether incremental items should be used at all. Dweck et al. (1995) has suggested that entity and incremental items exist on the same bipolar spectrum and so rejection of incremental theories equates to endorsement of entity theories and visa-versa. In this study, it appears as though the relationship between implicit theories and self-concepts does differ in strength depending on whether scales used exclusively entity items, incremental items, or a combination of both. If these items were

truly mirror images of each other than their relationship to other variables should not greatly differ. Future research is needed to clarify why incremental items do not mirror each other in their correlates. It may be that people hold more complex views of themselves than originally thought. For example, perhaps they view some aspects of their personality as changeable and other aspects as unchangeable. This could lead them to say that they are both fixed and capable of change.

This study also found evidence showing that implicit theory scales that refer to the self (e.g., “my attributes are malleable”) related more strongly to self-esteem than those which referred to people in general (e.g., “your attributes are malleable”). Although the focus of research into implicit malleability theories has been on the extent to which individuals believe their own attributes are malleable, scales have not echoed this faithfully. By using scales that reference people generally, researchers have assumed that people have only one set of implicit theories for everyone. The results of this meta-analysis imply that people may hold separate theories for themselves than they do for people in general. Future researchers should use implicit theory items which reference the self unless they are interested in the participant’s perceptions of the malleability of other people.

Domain specificity

Some evidence was found that similar domains of self-concept and implicit theories were more strongly related. There was clear support that self-esteem was more strongly related to implicit theories of mental health, than to intelligence. However, in other domains the pattern was less clear. This may be partly due to a lack of studies where the domains of implicit theories and self-concept do not match. This could be demonstrative that researchers are already be employing the specificity matching principle between implicit theories and self-concept domains.

Gender effects

I found evidence that effect sizes varied depending based on the composition of males and females in each study cohort. Implicit theories tended to be more strongly related to self-esteem when study cohorts had more males than females. While causal orderings are unclear, this finding raises the question of whether incremental theories provide more benefit to males than to females. If this is the case, it is likely that the benefit of incremental theories is moderated by other variables which may be missing from current models.

Issues with causal ordering

No research was found where implicit theories were intervened on and self-esteem change measured (or visa-versa), which met eligibility criteria. While one paper measured self-esteem following an implicit theory intervention, no baseline was recorded, nor did the authors find a significant difference between treatment and control in mean level of self-esteem at follow up ($p = 0.13$) (Miu et al., 2014). As such, this meta-analysis was unable to establish the direction of effects between implicit theories and self-esteem. Arguments could be made for incremental theories being an antecedent or consequence of positive self-concept. Research has demonstrated that people with stronger incremental theories are less likely to make trait attributions (Levy et al., 1998; Robins & Pals, 2002; Yeager et al., 2011), and reduce self-relevant emotion following failure (Hu et al., 2015). It is possible that incremental theories serve as a buffer for self-esteem, reducing the extent to which failures can change one's self-image. Rather than raising self-esteem, they may make it more resilient in the face of negative feedback, which is consistent with the evidence that incremental theorists have higher levels of self-esteem than entity theorists on average. However, an argument could be made for entity theories being beneficial for self-esteem in some context.

For example, although entity theorists tend to leave domains in which they are failing, they also compensate by improving effort in other domains (Park & Kim, 2015), which may also serve a function of self-esteem repair. It is not clear the extent to which these strategies would be successful in maintaining higher self-esteem. However, entity theorists' responses to failure might be classed as avoidance-based coping, which itself has been found to be related to lower self-esteem (Eisenbarth, 2012). In summary, it is plausible that implicit malleability theories could lead to higher self-esteem.

A case could be made for implicit theories being the consequence of high self-esteem. However, the limited research that is available is not consistent with this possibility. Failure, presumably associated with a drop in self-esteem, has been found to prime people to more readily adopt incremental theories (Leith et al., 2014). When one is feeling bad about oneself, the idea that change is possible could be a welcome message. As a result, low self-esteem individuals may be more receptive to cues which suggest the malleability of traits leading to rises in the extent to which they will endorse incremental theories. On the other hand, those with high self-esteem may be more resistant to cues suggesting the malleability of the self. If one feels superior, the fact that your worth could go down relative to others is not necessarily a comforting message and may be more likely to be rejected. As a result, high self-esteem individuals could be drawn to the adoption of entity theories and those with low self-esteem drawn to incremental theories. No evidence was found to directly support this model however.

Limitations

While the structural equation modelling approach to meta-analysis allows for the clustering of effect sizes to be controlled for, it also requires moderation analyses to be performed on categorical variables (Cheung, 2014a). This conversion of continuous variables (for example, mean age) to categorical variables (for example, 14-18 years) is a limitation of

this approach as it reduces the variance of these variables making the analysis underpowered. However, due to the hierarchal clustering of effects, alternative techniques such as meta-regression could give biased results (Hedges, Tipton, & Johnson, 2010).

Due to the lack of experimental and longitudinal studies, it was not possible to establish causal orderings. Future research should use cross-lag models and experimental studies to establish the extent to which implicit theories and self-esteem reciprocally cause each other. Further, no studies considered the interaction between self-esteem and implicit theories. The association between self-esteem and implicit theories was only small. This means that both entity and incremental theorists experience high and low self-esteem. But this is only a limited picture of the relationship between these two constructs. In the introduction, I argued that implicit theories may change the relationship between self-esteem and a range of outcomes. I argued that perceiving the self as malleable self, would help people see low self-worth as a temporary condition. This would mean that incremental theories would reduce the extent that low self-esteem is associated with poorer wellbeing. Additionally incremental theories may help people to stay engaged with their goals. This may be evident in low self-esteem not being associated with reduced achievement in people with stronger incremental theories. Future research needs to establish if implicit theories and self-esteem moderate each other's relationship on outcomes. In Chapter 4, I explore these hypotheses cross-sectionally. In an Australian sample of female high school students, I show that implicit theories moderate the relationship between self-esteem and both wellbeing and achievement.

Chapter Summary

Study 1 has shown that implicit theories and self-esteem are modestly related. Stronger incremental theories tend to be associated with more positive self-esteem and self-

concepts. Some evidence was found that these relationships followed the specificity matching principle. Implicit theories tended to be more strongly related to self-concepts when the domains were similar. These relationships were moderated by various variables. Implicit theory scales which referenced the self were more strongly related to self-esteem and self-concept. Samples with higher proportions of males showed stronger effects. Finally scales with more incremental items tended to correlate more strongly to self-esteem and self-concept scales. Future research should utilise experimental and longitudinal designs to demonstrate the direction of effect between implicit theories and self-esteem. In Chapter 4, I explore how implicit theories and self-esteem interact to predict academic achievement and wellbeing in a sample of Australian high school girls.

CHAPTER FOUR: IMPLICIT THEORIES AS A MODERATOR OF THE RELATIONSHIPS BETWEEN SELF-ESTEEM AND NEGATIVE OUTCOMES IN FEMALE HIGH SCHOOLERS

Introduction

Study 1 showed that implicit malleability theories and self-esteem are modestly related. Individuals with stronger incremental theories tend to have higher self-esteem, but the modest correlation indicates substantial unshared variance. This suggests that some people may have strong incremental theories while also having low self-esteem, and others may show a reverse pattern. Thus, given these variables are not redundant with each other, it is possible that implicit theories might moderate the known link between low self-esteem and poor well-being (Rosenberg, Schooler, Schoenbach, & Rosenberg, 1995). In Chapter 1, I argued that incremental theories are likely to change the believability of thoughts of worthlessness, and keep people focused on remediation and self-improvement. As such incremental theorists may be less likely to be affected by low self-esteem. People with low self-esteem who also believe they can change, are likely to feel more able to improve their predicament. As a result, they may be more engaged with remediation and be less likely to descend into helplessness. In contrast, those with low self-esteem who believe their qualities are fixed may feel that their low social status is permanent and so may be generally disengaged and have poorer wellbeing. To date, no researchers have studied how these two variables interact to predict outcomes.

In this second study, I aim to rectify this gap in the literature. I examined how implicit malleability theories moderate the link between self-esteem and outcomes. In particular I looked to see if the links between self-esteem and wellbeing, and self-esteem and achievement would be weaker in people with stronger incremental theories.

Wellbeing, self-esteem and implicit theories

Self-esteem is related to a wide range of problems including substance abuse, suicidal ideation (Neumark-Sztainer et al., 1997), and depression (Crocker & Park, 2004). These consequences of low self-esteem are consistent with the hypothesis that low self-esteem is an emotional alarm which signifies social instability (Leary et al., 1995). People with low self-esteem may experience high degrees of stress because they are on high alert due to being more socially vulnerable. This increased stress may explain why people with lower self-esteem also tend to have lower wellbeing (Paradise & Kernis, 2002). They are experiencing stress because they are currently more vulnerable due to low social rank. As a result, or perhaps in addition, lower self-esteem tends to be related with lower wellbeing (Paradise & Kernis, 2002). Wellbeing can be defined as the tendency to feel positive emotions, feel connected to others and that life is meaningful (Keyes, 2006b; Ryff & Keyes, 1995).

Part of this connection between self-esteem and wellbeing may be due to the way that an individual is cognitively appraising their current situation. I argued in Chapter 2 that individuals with stronger entity theories may be more likely to see their condition as permanent leading to hopelessness. This would indeed reduce the extent to which life is seen as meaningful and may result in reduced wellbeing. However incremental theories may help people to cognitively re-appraise their predicament such that wellbeing is maintained to a greater extent.

Achievement, self-esteem and implicit theories

Implicit theories may also be related to achievement. When life feels meaningless it may be more difficult to persist with challenges and reach one's potential. What's more students can get trapped in cycles where poor academic performance leads to lower self-esteem, which leads to even worse performance (Trautwein, Lüdtke, Köller, & Baumert, 2006). However research on the links between self-esteem and achievement has been

inconsistent. In some samples there is a clear link and in others there is not (Marsh, 1993). Perhaps this heterogeneity of effects is partly explained by differences in implicit theories. As they believe they can improve (Dweck et al., 1995), incremental theorists may stay engaged with academic study even when they are experiencing low self esteem

Research Questions and Hypotheses

In order to test these ideas, I conducted cross-sectional research among Australian female high school students. This sample was chosen because of convenience and also because of the availability of fairly objective indicators of performance, namely, grade point average. I expected that the associations between self-esteem and the outcomes would be strongest among students with stronger entity theories. In line prior research (e.g. Schroder et al., 2016), I expected that these effects would be domain specific – implicit malleability theories would most strongly moderate the links between self-esteem and outcomes when the domain of the implicit theory (e.g. intelligence) matches the domain of the outcome (e.g., academic achievement).

Research Question 1

Are implicit theories related to wellbeing?

Research Question 2

Is low self-esteem as strongly related to lower wellbeing in students with strong or weak incremental theories?

Research Question 3

Is low self-esteem as strongly related to lower grades in students with strong or weak incremental theories?

Hypothesis 1

Incremental theories will be related to improved wellbeing. As incremental theories have been shown to reduce trait attributions (Levy et al., 1998) and have more positive emotional (Hu et al., 2015; Tamir et al., 2007) and behavioural (Hong et al., 1999) responses to failure, it is likely they will on average have improved wellbeing.

Hypothesis 2.

The links between self-esteem and both wellbeing and achievement will be moderated by implicit theories. Self-esteem will be a stronger predictor of wellbeing and achievement among students with stronger entity theories. By perceiving their low self-worth to be temporary and amenable to effort (Dweck, 2000), it is likely incremental theorists with low self-esteem will feel more optimistic about improving their current predicament, and be more engaged in remediation resulting in higher wellbeing and achievement.

Hypothesis 3

Implicit theories and self-esteem will interact more strongly when the domain of the outcome matches the domain of the implicit theory. The review in the previous chapter and prior research has shown the importance of domain matching (Schroder et al., 2016). The effects of implicit theories tend to vary by domain. As such different domains of implicit theories should behave differently. Specifically, for the outcome of grades, implicit theories of intelligence should interact with self-esteem more strongly than implicit theories of personality. The previous chapter also showed that self-esteem was more closely related to implicit theories of wellbeing and personality, than to implicit theories of intelligence. As such, implicit theories of personality may be a stronger moderator of the relationship between self-esteem and wellbeing than implicit theories of intelligence.

Method

Participants and procedure

Study 2 consisted of a convenience sample of 489 female high school students in grades 7 to 11 (age: $M = 14.7$, $SD = 1.5$). The sample was drawn from an Australian private girls' school located in an affluent neighbourhood. Students completed an online survey administered by the teaching staff during school hours.

Instruments

Implicit theories. Two scales assessing implicit malleability theories were included. The implicit theory of intelligence (ITI) (Dweck et al., 1995) and the implicit personality theory scale (ITP) (Erdley et al., 1997). Example items for the ITI are: *"Your intelligence is something about you that you can't change very much,"* and *"You can learn new things, but you can't really change your basic intelligence."* ($\alpha = 0.89$, for this sample). For the ITP, example items are: *"You have a certain personality, and that is something that you can't do much about"* and *"Your personality is something about you that you can't change very much"* ($\alpha = 0.84$, for this sample). Responses for both the ITI and ITP were recorded on 6-point Likert scales ranging from 1 "Strongly disagree" to 6 "Strongly agree". Both scales were reverse scored such that higher scores indicated stronger incremental theories.

Wellbeing. The mental health continuum short-form (Keyes, 2006a) was used to measure positive aspects of mental health. This scale has been frequently used and found to be both reliable and valid (Keyes, 2006b; Lamers, Westerhof, Bohlmeijer, ten Klooster, & Keyes, 2011). The 12 items were averaged to generate a single variable ($\alpha = 0.92$, for this sample). Example items are: *"In the past month, how often did you feel good at managing the responsibilities of your daily life?"* and *"In the past month, how often have you felt interested*

in life?” Responses were indicated on a 6-point Likert scale ranging from 1 “Never” to 6 “Every day”.

Self-esteem. Self-esteem was measured with Rosenberg’s (1979) widely used 10-item Self-Esteem scale (RSE). Example items include: “*All in all, I am inclined to feel that I am a failure*” and “*I feel that I have a number of good qualities*” ($\alpha = 0.90$, for this sample).

Responses were indicated on a 6-point Likert scale ranging from 1 “Strongly disagree” to 6 “Strongly agree”.

Academic achievement. Student grade point average (GPA) was used as a metric of academic achievement. GPAs were received directly from the school and could range between 0 and 5; higher scores indicated stronger academic performance. GPAs were averaged across all subjects and reflected student performance during the entire school year.

Results

Intercorrelations

Intercorrelations were produced using the ‘Conigrave’ package in R (Conigrave, 2017). Consistent with previous research (Keyes, 2006b), self-esteem and wellbeing were highly correlated as shown by Table 3. The ITI and ITP were moderately related to each other, replicating findings by Schroder et al. (2016). The ITI and ITP were weakly related to self-esteem, which was consistent with previous research (De Castella et al., 2013). The ITI, ITP and self-esteem were weakly correlated with GPA. Wellbeing and GPA were unrelated – high achieving students are not necessarily the happiest students. Finally, in line with hypothesis 1, both the ITI and ITP were positively related to improved wellbeing, which is a novel finding as little research has looked at the relationship between implicit theories and wellbeing previously.

Table 2.
Summary of intercorrelations means and standard deviations (study 2)

	1	2	3	4	5	<i>M</i>	<i>SD</i>
1. ITP	-					3.89	1.19
2. ITI	.40**	-				4.40	1.17
3. Self-esteem	.23**	.24**	-			4.27	0.93
4. Wellbeing	.23**	.23**	.67**	-		4.45	0.95
5. GPA	.20**	.19**	.16**	.09	-	3.94	0.66

Note. ITP = implicit theory of personality; ITI = implicit theory of intelligence;

* $p < 0.05$. ** $p < 0.01$.

Implicit theories, self-esteem and wellbeing

I utilized regression analyses to test the hypothesis that incremental theories would moderate the links between self-esteem and wellbeing. Two separate multiple regression models were conducted, for ITP and ITI, respectively. All coefficients were standardized. In the first model self-esteem had a substantial main effect predicting wellbeing ($\beta = 0.67$, $SE = 0.03$, $t = 20.15$ 95% CI [0.61, 0.74]), as did ITP ($\beta = 0.08$, $SE = 0.03$, $t = 2.32$ 95% CI [0.01, 0.14]), which were qualified by an interaction between self-esteem and ITP ($\beta = -0.08$, $SE = 0.03$, $t = -2.71$ 95% CI [-0.14,-0.02]). Simple slopes analysis was performed using the car package in R (Fox & Weisberg, 2010) that allowed us to test the relationship between self-esteem and wellbeing when ITP was low and high (-1 and +1SD respectively). Interactions were plotted using the ‘Conigrave’ package in R (Conigrave, 2017). As depicted in Figure 10, self-esteem was a stronger predictor of wellbeing for individuals who were low in ITP ($\beta = 0.72$, $SE = 0.04$, $t = 11.95$, 95% CI [0.64, 0.81]) than for individuals high in ITP ($\beta = 0.57$, $SE = 0.05$, $t = 16.30$, 95% CI [0.47, 0.66]).

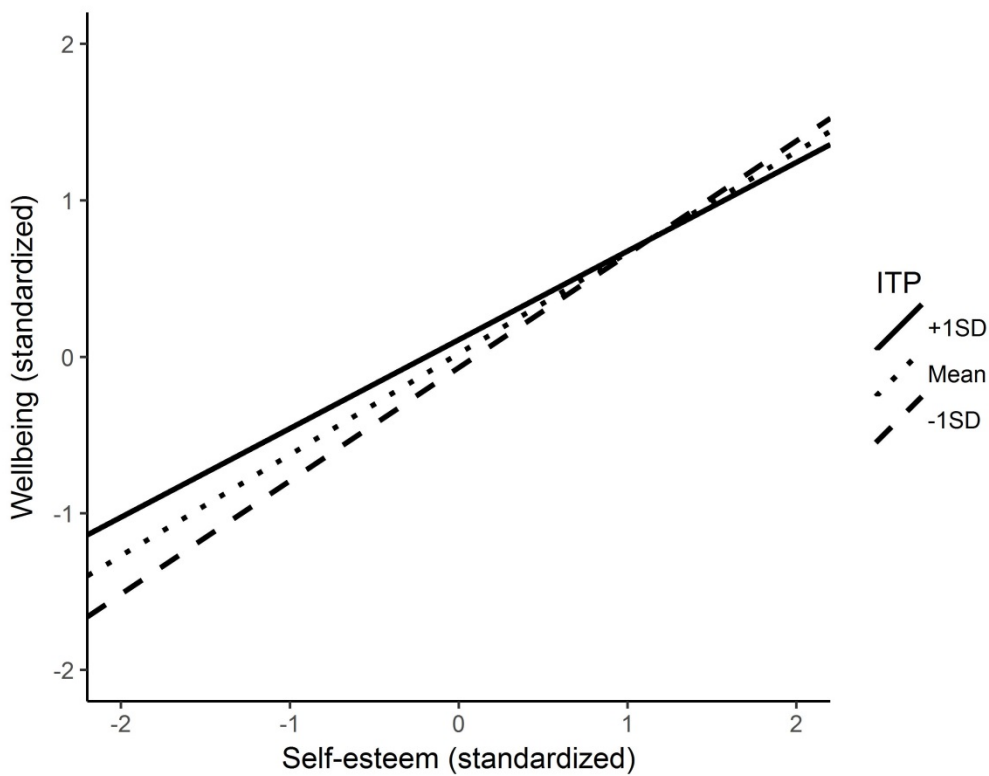


Figure 10. ITP moderating the link between self-esteem and wellbeing.

ITP = Implicit Theories of Personality.

In the second model, both self-esteem ($\beta = 0.68$, $SE = 0.03$, $t = 19.92$, 95% CI [0.61, 0.75]) and the ITI ($\beta = 0.07$, $SE = 0.03$, $t = 2.02$, 95% CI [0.00, 0.13]) uniquely predicted wellbeing but I found no evidence of an interaction between the ITI and self-esteem ($\beta = -0.01$, $SE = 0.03$, $t = -0.20$, 95% CI [-0.07, 0.05]).

These results support hypothesis 2, that self-esteem is a stronger predictor of wellbeing amongst people with strong entity theories. This means that drops in self-esteem are associated with greater drops in wellbeing for people who perceive the self to be more fixed. Individuals with high self-esteem tended to have similar levels of wellbeing irrespective of whether they viewed the self as fixed or malleable. In contrast, individuals

with low self-esteem tended to have substantially higher wellbeing if they had stronger incremental theories.

Implicit theories, self-esteem and academic grades

To test the hypothesis that incremental theories of intelligence will be related to improved academic performance in individuals with low self-esteem, I ran two regression models for each domain of implicit theory. All coefficients were standardized. In the first model, ITP and self-esteem were both found to have substantial main effects predicting academic performance ($\beta = 0.15$, $SE = 0.05$, $t = 2.89$, 95% CI [0.05, 0.25]; $\beta = 0.12$, $SE = 0.05$, $t = 2.24$, 95% CI [0.01, 0.22]; respectively) but, as expected, I found no evidence of an interaction between self-esteem and ITP ($\beta = -0.01$, $SE = 0.05$, $t = -0.26$, 95% CI [-0.10, 0.08]). In the second model, only the ITI had a main effect predicting GPA ($\beta = 0.18$, $SE = 0.05$, $t = 3.41$, 95% CI [0.08, 0.28]). While self-esteem had no main effect ($\beta = 0.09$, $SE = 0.05$, $t = 1.63$, 95% CI [-0.02, 0.19]), it predicted GPA, as expected, through an interaction between self-esteem and ITI ($\beta = -0.10$, $SE = 0.05$, $t = -2.12$, 95% CI [-0.19, -0.01]). I reran the analysis controlling for school year and confirmed that this effect could not be explained by clustering of students within year groups (those results are reported in Appendix E).

As illustrated in Figure 11, simple slopes analysis showed that amongst individuals with low ITI (-1 SD) a significant positive relationship was found between self-esteem and GPA ($\beta = 0.18$, $SE = 0.06$, $t = 3.02$, 95% CI [0.06, 0.30]). However, in individuals high in ITI (+1 SD), the relationship between self-esteem and academic grades was non-significant ($\beta = -0.01$, $SE = .08$, $t = -0.13$, 95% CI [-0.16, 0.14]).

These findings support Hypothesis 2. Self-esteem was a predictor of academic grades in those with stronger entity theories — individuals with lower self-esteem tended to receive worse grades. However, among individuals with stronger incremental theories, self-esteem

and grades were not associated. In other words, students with strong incremental theories achieved similar grades regardless of whether they perceived their worth to be high or low.

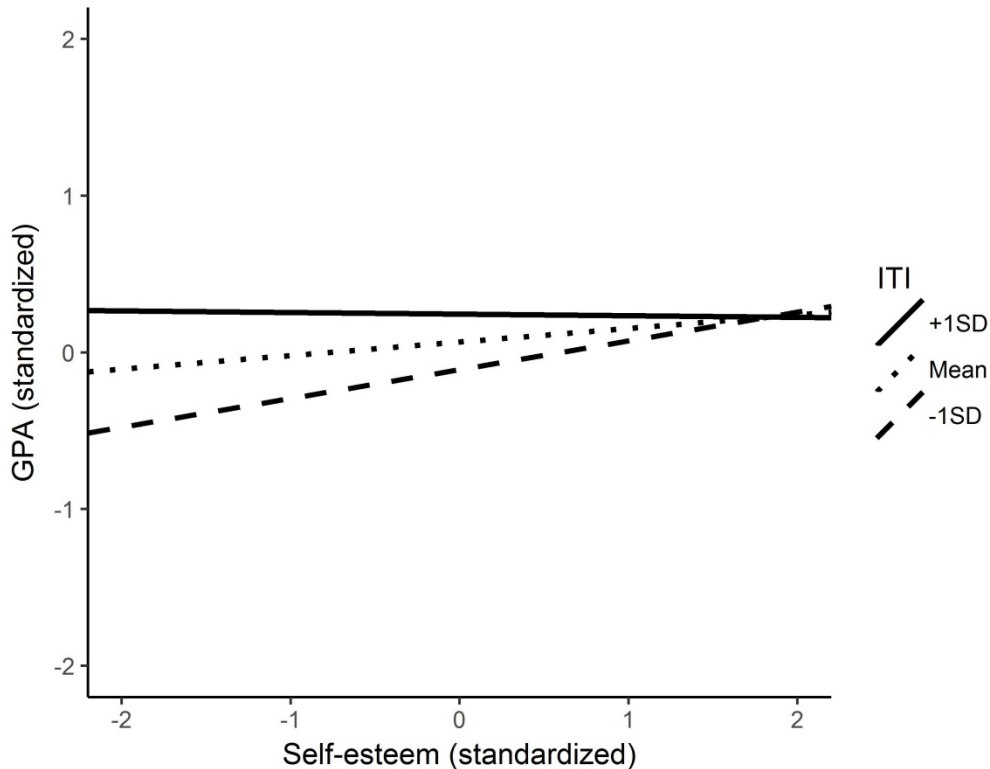


Figure 11. ITI moderating the link between self-esteem and GPA.

ITI = Implicit theories of intelligence.

Discussion

As hypothesized, I found that implicit malleability theories moderate the links of self-esteem with wellbeing and academic achievement in female high school students.

Incremental theories provided little benefit to students with high self-esteem. However, among students with low self-esteem (-2 SD), relative to those with weaker incremental theories (-2 SD), students with stronger incremental theories (+2 SD) scored 32.5% higher on measures of wellbeing, and achieved 28.8% higher grades.

As expected, these relationships were domain specific. Implicit theories of personality moderated the effects of self-esteem on wellbeing, while implicit theories of intelligence

moderated the effects of self-esteem on academic achievement. These findings suggest that implicit malleability theories not only prevent the formation of negative self-evaluations, as shown in past research (Erdley et al., 1997; Mueller & Dweck, 1998), but may also be related to the extent to which those evaluations are associated with negative outcomes once formed. Prior research has shown that incremental theories provide a framework with which to interpret the meaning of external events such as failures (Miu et al., 2014). The results of Study 2 suggest that they may also change the way that negative evaluations are interpreted and related to the self.

Limitations

As this research is cross-sectional, causal inferences cannot be made. It is not clear if implicit theories are changing the relationship between self-esteem and the outcome variables or if the opposite is true. Longitudinal or experimental studies are required to establish the direction of effects. Further, as this sample included only female high school students, it remains to be seen whether these results would generalise to males or beyond educational settings to adults. These results need to be replicated in a more diverse sample.

Chapter summary

I found that in high school girls, implicit theories are not only associated with higher self-esteem, but they also interact with self-esteem to predict a range of outcomes. Incremental theories are most strongly associated with improved wellbeing and academic achievement in those with low self-esteem. In Chapter 5 I replicate and extend these findings in a large representative sample of American adults of both genders.

CHAPTER FIVE: IMPLICIT THEORIES AS A MODERATOR OF THE RELATIONSHIP BETWEEN SELF-ESTEEM AND NEGATIVE OUTCOMES IN ADULTS

Introduction

In Study 2, I found that implicit malleability theories and self-esteem interact to predict wellbeing and academic performance. The extent to which self-esteem was related to wellbeing was weaker for those with stronger incremental theories. For academic achievement, self-esteem was only related to student GPA among those with weaker incremental theories; in students with stronger incremental theories, self-esteem had no relationship to performance. When it came to wellbeing, the extent to which lower self-esteem was associated with lower wellbeing was stronger for those with stronger entity theories.

As this study relied on a sample of affluent high school girls, its findings cannot be generalised to the broader population. It is possible that the moderating role of implicit theories only works during adolescence when self-images are less stable (Hayes & Ciarrochi, 2015). In order to replicate and extend these findings of Study 2, I test these relationships in a large representative sample of American community members. Specifically I measure the extent to which implicit theories moderate the relationship between wellbeing and progress on personal goals. In this instance progress on personal goals is a proxy for achievement. As the population for Study 3 is a community sample no metric of academic achievement was available. This is because standardized testing is only available in educational populations.

I hypothesised that the effects found in Study 2 would generalise to a broader sample of Americans. Specifically, that incremental theories would be related to improved wellbeing and progress on personal strivings, and that implicit theories would moderate the relationship

between self-esteem and both wellbeing and achievement. Age and gender were not expected to affect the interactions between implicit theories and self-esteem.

Research Questions and Hypotheses

Research Question 1

Do the findings in Study 2 generalise to a representative sample of adults?

Specifically, in adults of both gender, will implicit theories moderate the relationship between self-esteem and wellbeing, and self-esteem and achievement?

Hypothesis 1

I hypothesized that the findings in Study 2 generalise to a representative sample of adults? Specifically, the links between self-esteem and both wellbeing and achievement are expected to be moderated by implicit theories. Self-esteem will be a stronger predictor of wellbeing and achievement among students with stronger entity theories.

Method

Participants and design

Study 3 utilised a nationally representative sample of Americans ($N=7,884$; 52% females; age: $M=47.9$, $SD=16$). Participants completed an online survey administered by a professional survey company. The initial part of the survey consisted of a demographics form and a measure of personal strivings. The remaining survey employed matrix sampling or a planned missing data design (Graham, Taylor, Olchowski, & Cumsille, 2006; Schafer, 1997), such that each participant received a random set of 60 items and each item had responses from at least 21% of the sample (1655 participants). Since the data were missing-completely-at-random, multiple imputations (implemented in the R package, Amelia II (Honaker, King, & Blackwell, 2011) were used to account for missing data uncertainty. The random set of 60

items that each participant completed was selected from a larger pool of items consisting of different measures suited for separate studies, some of which have been published (Ciarrochi et al., 2014; Sahdra et al., 2016; Sahdra, Ciarrochi, & Parker, 2016). For the purposes of the current study, I focused on the following instruments:

Instruments

Implicit theories. Three scales assessing implicit theories were included. The theory of intelligence (ITI) and morality scales (ITM) (Dweck et al., 1995) both contained three items (Dweck et al., 1995). Items for the ITI were the same as in Study 2 ($\alpha = 0.78$, for this sample). Example items for the ITM were “*A person’s moral character is something very basic about them and it can’t be changed very much*” and “*There is not much that can be done to change a person’s moral traits*” ($\alpha = 0.68$, for this sample). Two items from the Implicit Person Theory scale (Dweck et al., 1995) were included “*The kind of person someone is is something very basic about them and it can’t be change very much*” and “*People can do things differently, but the important parts of who they are can’t really be changed*” ($\alpha = 0.58$, for this sample). Participants indicated the extent to which they agreed with these statements using a rating scale ranging from 1 “Strongly agree” to 6 “Strongly disagree”. The third item of this scale was omitted due to a clerical error (two items were repeated). This omission may have resulted in the poor internal consistency which was observed. This low alpha reliability raises the possibility that these two items do not adequately represent the target construct. In order to investigate this, factor analysis was performed (reported in supplementary materials, S2). This analysis suggested that the items from the implicit theory of morality and personality scales loaded onto the same factor, whereas the implicit theory of intelligence items loaded onto a separate factor. All analyses were completed for the two-item implicit person theory measure, and the combined person and morality measure. As the results of these regressions were identical, for simplicity I only

report the outcomes of the combined measure here (ITP) ($\alpha = 0.78$, for this sample), but see the supplementary materials for the full analyses and replication involving only the implicit theory of personality items.

Wellbeing and self-esteem. I utilized the same self-esteem ($\alpha = 0.70$, for this sample) and wellbeing measures ($\alpha = 0.86$, for this sample) described in Study 2. Flourishing responses were indicated on a 6-point scale ranging from 1 “Never” to 6 “Every day”. Responses to the RSE were indicated on a 9-point scale ranging from 1 “Very strongly disagree” to 9 “Very strongly agree”.

Achievement. In the absence of any variables measuring academic achievement, I utilized a measure of progress on personal strivings as a generalised metric of achievement. I employed an idiographic measure of personal strivings (Emmons & McAdams, 1991) in which respondents were asked to list four personal strivings and rate how satisfied they were with the progress they had made on those goals in the last ten weeks. Participants indicated their responses using a 6-point Likert scale ranging from 1 “Disagree strongly” to 6 “Agree strongly” ($\alpha = 0.69$ across all four strivings in this sample).

Multiple imputation and pooling of results

Multiple imputation resulted in 25 complete versions of the same dataset. Simulation studies have shown that when data is missing completely at random, results obtained from multiple imputed datasets accurately reflect those that would be obtained from the theoretically complete dataset (Schafer & Olsen, 1998). Multiple imputation is an effective way of dealing with missing data, however the resulting set of datasets presents some challenges for analysis. Any analysis must be repeated on each dataset separately, and then the results pooled to produce a single set of statistics. The resulting statistics are then interpretable as if they had come from a single dataset. However, due to the different

structure of this data, most of the regular functions in R will not work with multiply imputed data. As a result researchers need to use two sets of functions for the same tasks depending on whether they are working on multiply imputed data, or a standard dataset. In order to improve this workflow I wrote an R package “Conigrave”. This package was written specifically for this study. It is hosted on the Central R Archive Network (CRAN) and may be accessed by anyone for free. This package includes functions to prepare correlation matrices and interaction plots. The functions automatically detect the structure of the dataset, apply the appropriate methods, and present the results in a form ready for publication. This way the same set of functions can be used on lists of multiply imputed datasets and regular datasets. This package was used to generate the correlation matrices in this thesis, as well as the interaction plots. This package relied on functions from three other packages: ‘ggplot2’ (for plotting interactions; Wickham, 2016); ‘mitools’ (for pooling regression results; Lumley, 2006); and ‘miceadds’ (for pooling correlations; Robitzsch, Grund, & Henke, 2014).

Results

Demographics

Participants were 7884 Americans (52.4% female, $n = 4136$). Ages ranged from 18 to 99 ($M = 49$, $SD = 17.0$). Participants represented a broad cross-section of the population. The majority of the sample were in relationships (64.8%; $n = 2774$). Just over half the sample had finished a college degree (51.4%; $n = 51.4\%$). Roughly half of the sample was Caucasian (51.5%; $n = 4062$), 7.3% were African American ($n = 573$), and 5.6% were Hispanic ($n = 442$).

Intercorrelations

Intercorrelations were produced using the ‘Conigrave’ package in R (Conigrave, 2017). Intercorrelations and descriptive statistics are presented in Table 4. ITI and ITP were

moderately correlated with each other and weakly to self-esteem and wellbeing at similar magnitudes as was found in Study 2, and in prior research (as demonstrated in Study 1). Self-esteem was moderately correlated with both wellbeing and striving progress. Both implicit theory measures had a mean past the midpoint, suggesting that the participants tended to have stronger incremental theories.

Table 3.
Summary of intercorrelations, means and standard deviations (Study 3)

	1	2	3	4	5	<i>M</i>	<i>SD</i>
1. ITP	-					3.59	1.00
2. ITI	.45*	-				3.92	1.23
3. Self-esteem	.10*	.17*	-			6.52	1.54
4. Wellbeing	.22*	.19*	.55*	-		3.81	0.88
5. Progress	.17*	.13*	.31**	.44**	-	4.40	1.04

Note. ITP = implicit theory of personality; ITI = implicit theory of intelligence; SE = self-esteem; Progress = Subjective progress on personal strivings.

* $p < 0.05$. ** $p < 0.01$.

Implicit theories self-esteem and wellbeing

To replicate my original finding that implicit malleability theories moderate the relationship between self-esteem and wellbeing, I utilized regression analysis. Regressions results for each imputation were combined using the R package ‘mitools’ (Lumley, 2006). To test whether the effects observed in Study 2 (female adolescents) apply to both males and female participants (of all ages), I added age and gender as moderators. Preliminary analyses showed that age did not moderate the key test of interaction between self-esteem and implicit malleability theories, and therefore age is omitted from the models reported here to simplify the presentation of findings. Standardized regression coefficients and 95% confidence intervals are reported below in Table 4.

Table 4.
Wellbeing predicted by implicit theories of personality, self-esteem and gender

	β	SE	t	95% CI
Intercept	0.01	0.02	0.48	[-0.03, 0.04]
ITP	0.22	0.03	7.80	[0.16, 0.27]*
SE	0.48	0.02	27.54	[0.45, 0.52]*
Female	0.00	0.03	0.06	[-0.05, 0.06]
SE * ITP	-0.09	0.02	-5.18	[-0.13, -0.06]*
SE * Female	0.10	0.02	4.43	[0.05, 0.14]*
ITP * Female	-0.09	0.02	-3.84	[-0.14, -0.04]*
SE * ITP * Female	0.06	0.02	2.52	[0.01, 0.1]*

Note. ITP = implicit theory of personality, SE = self-esteem.

* $p < 0.05$

These findings replicate those found in Study 2; both self-esteem and ITP showed substantial main effects predicting wellbeing, which were moderated by the interaction of ITP and self-esteem. This two-way interaction was qualified by gender in a three-way interaction between self-esteem, ITP and gender (Figure 12). Consistent with Study 2, simple slopes analysis showed that self-esteem was a stronger predictor of wellbeing among females with low ITP ($\beta = 0.61$, $SE = 0.02$, $t = 26.04$, 95% CI [0.56, 0.66]), compared to females with high ITP ($\beta = 0.54$, $SE = 0.02$, $t = 23.53$, 95% CI [0.50, 0.59]). This relationship was also found for males but the moderating effect ITP had on self-esteem was much stronger. Among males, self-esteem was more strongly related to wellbeing when ITP was low ($\beta = 0.57$, $SE = 0.02$, $t = 24.28$, 95% CI [0.53, 0.62]) than when ITP was high ($\beta = 0.39$, $SE = 0.03$, $t = 15.03$, 95% CI [0.34, 0.44]).

These findings confirm those found in Study 2. In those with low self-esteem people with stronger incremental theories of personality have substantially improved wellbeing. In contrast, among those with higher self-esteem, people had similar levels of wellbeing

irrespective of their implicit theories. This dynamic was even more exaggerated in male participants. This raises the question, are incremental theories more important for males compared with females?

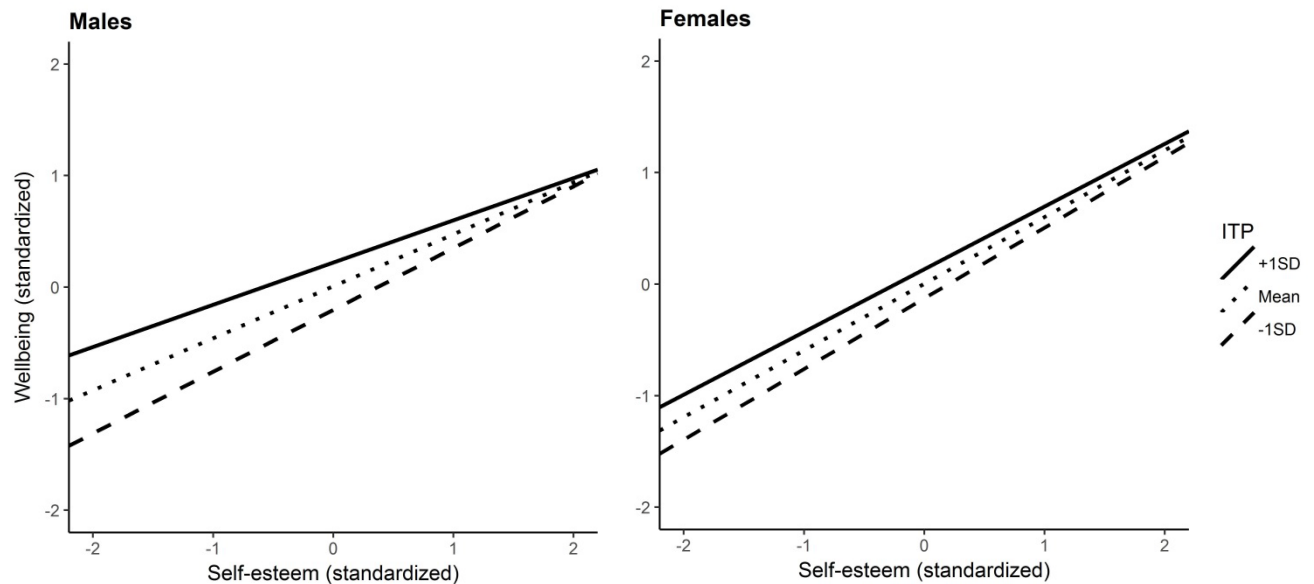


Figure 12. ITP moderating the link between self-esteem and wellbeing by gender

Note. ITI = Implicit theories of intelligence.

Next, I examined the relationship between self-esteem and wellbeing including the ITI as a moderator. I found evidence for a main effect of ITI ($\beta = 0.11$, $SE = 0.02$, $t = 5.81$, 95% CI [0.07, 0.14]), a main effect of self-esteem ($\beta = 0.53$, $SE = 0.01$, $t = 39.40$, 95% CI [0.51, 0.56]), and an interaction between incremental theories and self-esteem ($\beta = -0.05$, $SE = 0.01$, $t = -4.49$, 95% CI [-0.07, -0.03]). I found no evidence that the 2-way interaction was moderated by gender or age. Simple slopes analysis showed that the link between self-esteem and wellbeing was weaker in individuals with higher ITI (+1 SD) ($\beta = 0.48$, $SE = 0.02$, $t = 29.82$, 95% CI [0.45, 0.52]), than in individuals with lower ITI (-1 SD) ($\beta = 0.58$, $SE = 0.02$, $t = 31.83$, 95% CI [0.54, 0.62]).

Taken together, this set of results show that incremental theories of intelligence and personality are related to improved wellbeing. Additionally, both these implicit theories moderate the relationship between self-esteem and wellbeing. Further, the moderating effect of implicit theories on the relationship between self-esteem and wellbeing was stronger when the domain of implicit theory was more closely matched to the domain of the outcome.

Implicit malleability theories, self-esteem and striving progress

Finally, I examined the link between self-esteem and incremental theories on striving progress. In the first model, I found that there was a main effect of ITI ($\beta = 0.08$, $SE = 0.02$, $t = 3.70$, 95% CI [0.04, 0.12]) and a main effect of self-esteem on striving progress ($\beta = 0.29$, $SE = 0.02$, $t = 16.89$, 95% CI [0.26, 0.33]), but I found no evidence for an interaction between ITI and self-esteem ($\beta = -0.02$, $SE = 0.01$, $t = -1.50$, 95% CI [-0.05, 0.01]). In the second model, I found that both self-esteem and ITP had substantial main effects in predicting progress on strivings ($\beta = 0.29$, $SE = 0.02$, $t = 16.92$, 95% CI [0.26, 0.33], $\beta = 0.14$, $SE = 0.02$, $t = 7.94$, 95% CI [0.10, 0.17]), respectively; which were moderated by an interaction between self-esteem and ITP ($\beta = -0.03$, $SE = 0.01$, $t = -2.32$, 95% CI [-0.05, 0.00]). Simple slopes analysis showed that self-esteem was more strongly related to striving progress for individuals with low ITP ($\beta = .32$, $SE = 0.02$, $t = 14.81$, 95% CI [0.28, 0.36]), than for individuals with high ITP ($\beta = .26$, $SE = 0.02$, $t = 12.41$, 95% CI [0.22, 0.30]).

Discussion

I found that belief in the malleability of one's attributes was associated with improved progress on personal strivings. Self-esteem was not as strong a predictor of striving progress when people felt their personality was more malleable. In this case, the perceived malleability of one's intelligence was not found to be relevant. While cross-sectional, these findings

suggest that incremental theories could potentially help people stay engaged with their goals when they have poorer self-esteem.

While much research has demonstrated that incremental theories prevent the formation of negative self-evaluations (Dweck & Leggett, 1988; Erdley et al., 1997; Mueller & Dweck, 1998; Nussbaum & Dweck, 2008), Study 3 has supported the results of Study 2 that incremental theories also moderate the extent to which low self-esteem is associated with negative outcomes. The interaction effect was replicated in a sample of adults and found to be even stronger in adult males. In addition, while low self-esteem was associated with poorer academic performance in the student sample, this relationship was eliminated in students with stronger incremental theories of intelligence. In Chapter 6 I discuss these findings and contextualise them in the literature.

Limitations

Due to the cross-sectional nature of these results, causal orderings cannot be established. To demonstrate that incremental theories buffers the negative effects of low self-esteem, researchers would need to use longitudinal, cross-lag, or experimental designs.

Chapter summary

In Chapter 5, I replicated the results of Study 2 in a large representative sample of American adults. I found that while incremental theories were not associated with much benefit in those with high self-esteem, in those with low self-esteem incremental theories were associated with improved wellbeing and progress on valued strivings. In Study 3, I noted that for wellbeing, the moderating effect of implicit theories on self-esteem was much stronger in males than females. In Chapter 6, I provide a general discussion of how the results of study 1 - 3 inform research into both implicit theories and self-esteem. Further I discuss

the potential for scalable incremental theory interventions to improve wellbeing in large populations.

CHAPTER SIX: GENERAL DISCUSSION

Introduction

In Chapters 3, 4, and 5 I presented the findings of my thesis. Specifically, in Chapter 3 I presented results that showed implicit theories and self-esteem are positively associated with each other. In Chapters 4 and 5, I demonstrated in two large cross-sectional samples, that implicit theories moderate the relationship between self-esteem and wellbeing, and between self-esteem and achievement, as measured both objectively (i.e., grades) and subjectively (i.e., perceived striving progress). This is the first body of research that has demonstrated that implicit theories and self-esteem interact to predict outcomes cross-sectionally.

In this final chapter I discuss these findings and contextualise them within the broader psychological literature. I argue that implicit malleability theories and self-esteem should be considered together. While self-esteem is a primary driver of human affective states and behaviour, the effects of low self-esteem depend on context (internal and external). The findings of this thesis suggest that implicit theories may be an important contextual factor that change the effects of self-esteem. I argue that while the benefits of implicit theories may be small relative to other constructs due to the scalability of implicit theory interventions, they could prove to be a useful tool to interventions seeking to reduce the harms of low self-esteem.

Do incremental theories lead to higher self-esteem?

As discussed in Chapter 1, raising self-esteem is not necessarily a desirable goal in and of itself. Self-esteem may be a form of social perception that indicates social safety (Leary & Baumeister, 2000). Low self-esteem may be a state of stress resulting from threats of social exclusion. As such the problem may be the fact that someone is not well socially

integrated, rather than that they currently feel bad about themselves. This means that programs which improve social connectedness resulting in higher self-esteem, may be superior to those which just try to make people feel good, without improving the relationships between people. Incremental theories may serve both these functions. As outlined in Chapter 2, research has shown that when people perceive their characteristics to be malleable, they are more likely to engage in self-improvement. This dynamic has led many theorists to claim that incremental theorists may be better able to learn from failure and reach their full potential (e.g. Dweck, 2006). If this is the case, incremental theorists should be able to respond effectively to threats of exclusion, and through remediation, improve their self-esteem. However, this was not supported by the findings presented in Chapter 3. In a meta-analysis, I showed that there is only a weak positive association between self-esteem and incremental theories. If incremental theorists really do constitute learning superheroes, they do not let it go to their heads. So why is the association between self-esteem and implicit theories so small? Perhaps entity theories have their own strategies for self-esteem repair which are effective in their own right.

Incremental and entity theories – strategies for social dominance

Incremental theorists tend to respond differently to failure compared with entity theorists. Rather than avoid challenges, incremental theorists approach them with a view to learn and improve. Researchers have referred to this emphasis on learning as a mastery orientation (Ames, 1995). In contrast, entity theorists often react poorly to failure because they are preoccupied with being seen to perform well. This has been referred to as a performance orientation (Ames, 1995). This makes entity theorists more focused on hiding perceived defects rather than learning. They will even self-sabotage if it will help explain away failures in socially acceptable ways (Ommundsen, 2001). If this is the case, why are

incremental theories not associated with substantially higher self-esteem? Shouldn't a focus on learning rather than performance protect the self from failures and disappointments? Perhaps, but incremental theorists may be just as forgiving of the failures of others, meaning that they stay level headed.

Self-esteem is based on social comparisons (Marsh et al., 2015). People tend to have higher self-esteem when they judge themselves as being more competent and socially accepted relative to others (Leary & Baumeister, 2000; Marsh & Hau, 2003). Incremental theorists tend to have an optimistic orientation towards failure. However this optimism is not restricted to the self, but also afforded to one's rivals (Miller, Burgoon, & Hall, 2007). As a result, incremental theories cause people to become more forgiving of their own failures. But, any benefit to incremental theorists' self-esteem may be lost as their forgiving orientation is extended to others. For example, an incremental theorist may discover following a test that they are a poor performer at mathematics. Because they see their attributes as malleable, they might think that this poor performance is due to a lack of effort rather than a permanent defect. However, this favourable interpretation wouldn't make them think that they're any better at the test relative to other students. After all, those other students can improve their performance as well. As a result, despite this positive outlook, the poor performing incremental theorist may still experience a drop in self-esteem. Incremental theorists are likely to still be sensitive to social comparisons, even though they view themselves and others flexibly. Indeed, the intense drive to remediate shown by incremental theorists may demonstrate that they still find failure threatening (Nussbaum & Dweck, 2008; Park & Kim, 2015).

Perhaps the growth orientation of incremental theorists is a strategy for achieving social dominance, and acceptance by others, rather than being evidence of incremental theorists rising above external comparisons. The responses to failure that incremental and

entity theorists exhibit, may have similar aims. Entity theorists may hide deficits to maximise their social value. Incremental theorists may focus on remediation for the same purpose. It may be that failure is just as motivating for entity theorists as it is to incremental theorists; they may just be motivated to engage in different activities.

This would fit nicely with a study performed by Park and Kim (2015). Park and Kim (2015) induced failure in subjects and then gave them a new task. They told subjects that this new task measured skill in either the same domain they had failed in, or that it measured skill in a new domain. When subjects were told the domain was the same as the one in which they failed, incremental theorists had improved performance relative to entity theorists. However, when they were told the same task was in a novel domain, entity theorists outperformed incremental theorists. It was almost as if incremental theorists could not move on once they had experienced failure. They needed to put it right. In contrast, while entity theorists did not seem to enjoy repeating tasks where they had experienced failure, they could completely engage with tasks in other domains. This finding suggests that entity theorists may not shut down following failure, they may apply just as much effort in other areas of their lives.

These dynamics have been missed in many lab-based studies. A typical protocol used in research in implicit theories gives students a task, provides subjects with failure feedback, and then has them repeat the task in which they failed (e.g. Mueller & Dweck, 1998). The autonomy of entity theorists to move on to other tasks is restricted in order to maintain experimental controls. This may make entity theorists appear more hopeless than they would when they are granted greater freedom. When unconstrained, entity theorists may utilise forms of self-esteem maintenance which are currently not well known. Nussbaum and Dweck (2008) for instance discovered that entity theorists will engage in downward social comparisons following failure. This strategy may be successful in maintaining reasonably higher self-esteem, yet may also come with other drawbacks such as feelings of enmity to

others, or reduced self-compassion which may help explain the findings seen in Chapters 4 and 5 i.e. (stronger incremental theories are linked to higher wellbeing among subjects with low self-esteem.)

In summary, the results of the meta-analysis in Chapter 3 suggest that incremental theories are only modestly associated with higher self-esteem. It's likely that entity and incremental theorists both have strategies which are effective in maintain feelings of social acceptance. Entity theorists tend to focus on downward social comparisons, and demonstrating competence in other domains (Nussbaum & Dweck, 2008), while incremental theorists tend to engage in remediation. It may not make sense to think of incremental theories as always beneficial, and entity theories as always harmful. However what are the results of these two strategies of self-esteem maintenance? While both strategies may be reasonably effective at maintain self-esteem, do they come with any drawbacks? The results presented in Chapters 4 and 5 suggest that incremental theorists tend to maintain higher wellbeing and achievement during times when self-esteem is low.

The interaction of self-esteem and implicit malleability theories

Implicit theories appear unlikely to be a major factor which leads to higher self-esteem. Incremental and entity theorists both have complicated methods of self-esteem repair (Nussbaum & Dweck, 2008; Park & Kim, 2015). The meta-analysis presented in Chapter 3 showed that incremental theories were associated with slightly higher self-esteem. But this association was not strong enough that one would expect to find that either construct would reliably drive change in the other. But what are the consequences of the self-esteem repair strategies that incremental and entity theorists employ?

In Chapter 2 I hypothesised that implicit theories may change the extent to which low self-esteem is associated with negative outcomes. In Chapters 3 and 4 I found evidence that

supported this hypothesis. Implicit theories moderated the links between self-esteem and both wellbeing and achievement. Subjects with high self-esteem had similar levels of wellbeing and achievement, irrespective of implicit theories. However in those with low self-esteem incremental theories were associated with greater wellbeing and achievement. While the causal ordering is still unclear, cross-sectionally, implicit malleability theories appear to flatten the relationship between self-esteem and negative outcomes. Low self-esteem was not as strongly associated with lower wellbeing, poorer grades or with perceived achievement among individuals with higher incremental theories.

Wellbeing

In Chapters 3 and 4, across two large and diverse samples, I found that self-esteem and implicit theories interacted to predict wellbeing. Wellbeing is an extremely important construct. Mental health and wellbeing are essential for societal functioning. In Australia the annual costs of poor mental health are estimated to be as high as \$28.6 billion dollars in combined direct and indirect costs; and an additional \$12 billion a year in lost productivity (National Mental Health Commission, 2014). Nearly every facet of life is affected by our wellbeing. Without good mental health we struggle to turn up to work, care for ourselves or connect with loved ones. Maintaining adequate mental health is not merely a hedonistic concern, but necessary for engaging with life, caring for our friends, families, and broader communities.

The link between self-esteem and wellbeing is strong ($r > .55$ in these samples). When people feel like they are of low social value, they also tend to feel broadly disconnected and unhappy and like life has little meaning. This connection between low self-esteem and low wellbeing is particularly odious and may drive many of the complications experienced with low self-esteem. For instance, the drop in wellbeing could be a driver of suicidal ideation which is associated with low self-esteem (Neumark-Sztainer et al., 1997).

The results in Chapter 4 and 5 showed that the link between self-esteem and wellbeing is dependent on implicit theories. The slope between self-esteem and wellbeing was shallower in participants with stronger incremental theories. Individuals with high self-esteem had similar levels of wellbeing regardless of their implicit theories. However, among those with low self-esteem, people with stronger incremental theories had substantially higher levels of wellbeing. Perhaps relative to entity theorists, incremental theorists with low self-esteem have improved wellbeing as their modes of self-esteem repair are more adaptive.

Research into aspirations has shown that focusing on self-promotion or social recognition tends to be extrinsically motivated, and results in lower wellbeing (Kasser & Ryan, 1996). Conversely, focusing on personal growth tends to be intrinsically motivated and has been found to predict improved wellbeing. Threats to self-esteem tend to result in self-esteem maintenance behaviours which vary based on people's implicit theories (Nussbaum & Dweck, 2008). The way that higher self-esteem is pursued may moderate the extent that low self-esteem leads to negative outcomes (Crocker & Park, 2004). Incremental theorists may be intrinsically motivated to remediate following failures. This may mean that while low self-esteem is still stressful for incremental theorists, the process of improving oneself could be rewarding. In contrast entity theorists may worry about how they are perceived, may become competitive and try to put others down in order to look better (Nussbaum & Dweck, 2008). On top of the stress that comes with low self-esteem, this extrinsically motivated strategy of self-esteem repair may reduce feelings of connection to others, resulting in lower wellbeing.

Academic grades

In Chapter 4, I showed that self-esteem and grades tended to be positively associated. That is, entity theorists with lower self-esteem tended to receive poorer grades. However, this main effect of self-esteem on grades was totally eliminated by the interaction between self-esteem and implicit theories. In students with stronger entity theories of intelligence, there

was a clear positive relationship between self-esteem and grades. In contrast, for students with stronger incremental theories, there was no relationship between self-esteem and grades whatsoever, the slope was indiscernible from being flat. In this sample, incremental theorists with the lowest self-esteem were just as likely to perform as well as those with the highest self-esteem. Among students with low self-esteem, this dynamic resulted in substantially better grades for participants with strong incremental theories. On average students with low self-esteem and strong incremental theories received grades were 28.8% higher than students with low self-esteem and strong entity theories. Why might this be the case?

It is possible that incremental theories have utility in keeping people engaged with school work at times when they feel low. Entity theorists with low self-esteem may begin to disengage from school when they feel that they are not good as others. Their low status relative to others may be interpreted as being permanent resulting in hopelessness. Entity theorists may even anticipate failure and as a result engage in self-handicapping in order to generate excuses for poor performance (Ommundsen, 2001). If people see that you don't try at school, then failure can be blamed on a lack of interest, rather than a lack of natural ability. In contrast, the results of Chapter 4 suggest that incremental theorists may find low self-esteem less disruptive to their academic performance. As they believe the self to be malleable, they may be more likely to see point in trying to improve themselves. As a result they may stay engaged with activities like schoolwork may not have their performance hampered to the same degree. However, as this is cross-sectional research, a few causal orderings are possible. Before conclusive statements can be made, these causal orderings need to be assessed with experimental and longitudinal research. For instance, poor grades could cause lower self-esteem. In this case, perhaps incremental theories are buffering the extent that self-esteem falls, rather than improving academic achievement.

Striving progress

Incremental theories also moderated the association between self-esteem and perceived achievement in adults. In adults, striving progress was used as a proxy for achievement. Self-esteem was not as strongly associated with progress on strivings among individuals with stronger incremental theories. A major problem with low self-esteem is that it makes people shy away from challenges (McFarlin & Blascovich, 1981). Because people feel worthless they feel any attempt to try anything new will end poorly causing others to realise that they are defective.

The interaction of self-esteem and implicit theories on striving progress suggests that incremental theories could be important in keeping people engaged with valued goals. Low self-esteem may broadly make people feel hopeless, making people disconnect from personal projects. However, perceptions of self-malleability may combat feelings of hopelessness. In this way, appreciation for the ability to change could help people to stay engaged with goals. This could have a wide range of positive effects depending on the nature of the goal. But regardless of the goal type, people have a fundamental need to feel competent (Deci & Ryan, 2000). Just being able to complete a goal, even a simple one, may improve people's wellbeing and help build confidence for them to try other challenges.

In summary, I found that the relationship between self-esteem and wellbeing, and self-esteem and achievement is moderated by implicit theories. For incremental theorists, self-esteem may be merely an uncomfortable transient experience which helps them focus on personal growth. As a result, incremental theorists may be intrinsically motivated in their efforts to repair their self-esteem. This may protect their wellbeing and achievement relative to entity theorists (Kasser & Ryan, 1996). In contrast, low self-esteem may cause entity theorists to become focused on putting down others in order to maintain their appearance (Nussbaum & Dweck, 2008). This mode of self-esteem repair may be extrinsically motivated

and result in lower wellbeing. While low self-esteem is often pathologised, the outcomes of low self-esteem may vary depending on whether the self is perceived to be fixed or malleable. Rather than trying to eliminate low self-esteem, promoting incremental theories may limit the extent that low self-esteem results in negative outcomes. In this way incremental theories may buffer people from the negative effects of low self-esteem enabling them to focus on personal growth. If the moderating effect of incremental theories on the link between self-esteem and wellbeing, and self-esteem and achievement, can be demonstrated causally, incremental theories may have utility in mental health interventions. But is everyone likely to benefit from incremental theories to the same degree? This thesis uncovered evidence that among those with low self-esteem, incremental theories may provide more benefit for males than females.

Self-esteem, self-enhancement and gender

In Chapter 5, I showed that the moderating effect of incremental theories was weaker in females than males. While incremental theories were still more strongly associated with wellbeing among women with low self-esteem than with high self-esteem, the effect was not as large as it was for males. This finding was unexpected. In this section I discuss ways in which this gender effect may be understood in future research. I will introduce two admittedly speculative explanations for this effect. Based on studies of attraction, I suggest that males may have more to gain from improved social status. I will also discuss an alternative (or complementary) explanation that females may be less able to gain social status due to social inequalities. I suggest that due to these dynamics, among people with lower self-esteem, males may be more likely to feel reassured and (or) motivated by perceptions of self-malleability than females.

The need to understand gender effects

Research has found that males and females are similar across most dimensions. Even on traits where men and women have been shown to differ, e.g. on the personality trait agreeableness, or empathy (Ciarrochi, Parker, et al., 2016; Nyhus & Pons, 2005), the majority of these distributions overlap, and large differences are only seen in the tails. Because men and women are so similar it rarely makes sense to include gender in casual models. This is because, gender effects are usually better explained by other constructs which may not have been measured. For instance, males are incarcerated at a much higher rate than females (Freeman, 1996). However it is almost certain that these individuals are not in prison because of their gender, but rather because, relative to the general population, they are higher in traits such as impulsivity and aggressiveness. It just so happens (for a variety of reasons), that there are more males than females who are very high in these traits (Komarovskaya, Loper, & Warren, 2007). Accordingly, gender effects highlight ways in which models are incomplete and warrant further exploration. In the next two sections I speculate why, among low self-esteem individuals, incremental theories may result in higher wellbeing for males than females. In line with expectancy value theory (Wigfield & Eccles, 2000), I suggest that males may receive more benefit from incremental theories as they may have more to gain from acquiring social status. I also offer an alternative explanation that males may find incremental theories more motivating, as they perceive status to be easier to acquire.

Social status and interest in self-enhancement

Implicit theories may buffer the negative effects of low self-esteem to the extent that acquiring social status is valued. As discussed in Chapter 1, self-esteem has been theorised to be a form of social perception. High self-esteem may indicate higher social status (Leary & Baumeister, 2000). High self-esteem individuals tend to be motivated, experience positive

affect, respond better to failure, and are more likely to engage with challenges (McFarlin & Blascovich, 1981; Neumark-Sztainer et al., 1997; Rosenberg et al., 1995). This may be due to high status individuals being safer, such that they can afford to take more risks. They have a social buffer protecting them from a wide range of external threats (Leary & Baumeister, 2000). Having low social status on the other hand is both dangerous and costly (Leary & Baumeister, 2000).

In our evolutionary history, low status individuals were more likely to be ostracised, leaving them vulnerable to starvation and attack from other humans and animals (Leary & Baumeister, 2000). As higher status equates to greater social security, it is likely to be valued similarly by both sexes. Regardless of sex, individuals need to maintain good social bonds with others to protect themselves from the chaos of nature. So why did the results from Chapter 5 show that perceptions of self-malleability in low self-esteem individuals were more strongly associated with improved wellbeing and achievement among males relative to females? Perhaps, low social status tends to be more costly for males. Or perhaps they desire it more, and losing it is experienced as more costly. Incremental theories may buffer the effects of low self-esteem more when acquiring social status is more strongly desired. The literature on human sexual attraction may illustrate how low status can be particularly costly to males.

While men and women both value physical attractiveness in mates, women tend to consider a wider range of traits when judging the suitability of sexual partners (Buss, 1989). Theorists suggest this is due to the relatively higher investment females must make in reproducing (Buss, 1989). Males can end their investment in offspring immediately following copulation. Females however, cannot reproduce again for the duration of their pregnancy. Even after parturition, they are incentivised to continue investing in their child, as otherwise it will not survive, and the evolutionary cost of rearing that child would not be returned

(Dawkins, 2016). Due to this dynamic, reproduction tends to be more costly to females than males across many species. As females invest more in children, they also tend to be more discriminating about when they have a child, and with whom (Buss, 1989).

Evolutionary theorists have argued that females tend to be more discriminating on a wide range of traits in partners, as they are not only looking for healthy partners, but also for partners who can and will dedicate more resources to raising their children (Buss, 1989; Ciarrochi & Heaven, 2009; Ciarrochi, Parker, et al., 2016; Dawkins, 2016). One trait that females tend to discriminate potential partners on is social status (Chu, Farr, Muñoz, & Lycett, 2011). This is thought to be a desirable trait because high status men may have more resources to draw upon in helping to raise children (Buss, 1989). Additionally, any genetic pre-disposition for acquiring and maintaining status may be passed down to their offspring who may also be more likely to pass on their genes.

As status is found to be more appealing by females than by males (Buss, 1989; Wang et al., 2018), low self-esteem should be experienced as more threatening to males (all else being equal). Not only are low status males vulnerable to physical threats of social exclusion, but in addition they are also less likely to find a mate (Chu et al., 2011), or retain one (Buss, Goetz, Duntley, Asao, & Conroy-Beam, 2017). The ability to rise in social status may therefore be more comforting or motivating for males than females.

Perhaps incremental theories are only reassuring to people with low self-esteem, if they desire more status. Even though low self-esteem individuals currently may not have access to security or the resources they might wish to have, if they believe that change is possible, then through effort they may expect a more positive outlook. Given that males *may* have more to gain from increases in social status, the value placed on acquiring more status, when status is low, may be greater. As a result, incremental theories may be more reassuring for males

compared with females, and accordingly lead to disproportionately improved wellbeing and academic performance.

This hypothesis could be tested relatively easily. If true, then the gender effect should disappear after controlling for interest in self-improvement, or desire to acquire status. Other variables of interest may include current romantic status, and perceptions of how sexually desirable they perceive themselves to be. In this section I have speculated about why males with low self-esteem might value self-enhancement more, and as a result receive more benefit from incremental theories. A second possible explanation for this gender effect, is that incremental theories may provide greater comfort to individuals who perceive acquiring status to be easier. I discuss this alternative explanation for this gender effect in the next section.

Status, implicit theories and internal locus of control

Expectancy value theory suggests that people are more likely to engage in behaviours not only when they place more value on the outcome, but also when they perceive success to be more likely (Wigfield & Eccles, 2000). In the previous section, I argued that males may value rising up social ranks more than females because they are penalised more for having low status. However, it is possible that men and women value status similarly but, due to social inequalities, higher status is perceived to be more difficult for women to obtain. I argue in this section that perceptions of self-malleability may not be as comforting in individuals with an external locus of control.

Social-constructivists have claimed that differences between men and women emerge largely due to social processes (e.g. Lorber & Farrell, 1991). For instance, adults have been observed to play differently with infants based on their sex. (Frisch, 1977). Specifically, some adults have been observed to be more encouraging with infants they perceive to be boys even

when the true sex of the child was female (Frisch, 1977). Theorists have argued that due to different treatment, girls are not taught to expect to inhabit high status positions in society. This in turn is thought to reduce the extent to which women engage with careers which are likely to be highly paid (Arulampalam, Booth, & Bryan, 2007; Schwanke, 2013). (Arulampalam et al., 2007). Further, some theorists have claimed that due to historical sex differences in industries, male-dominated cultures have been created in some high status industries which disadvantage women (e.g. Reskin, 1993).

Historical segregation on the basis of sex has meant that in many sectors females have been prevented from inhabiting positions of power. This may mean that females are less likely to pursue high status positions as they are perceived as being less obtainable. For instance, women are less likely to sign up to STEM courses at university, and less likely to persist once entered (Griffith, 2010). Experimental evidence suggests that this may partly be due to stereotype threat (Flore & Wicherts, 2015). Stereotype threat refers to psychological stress induced by fear about confirming a negative stereotype associated with an aspect of one's identity (Smith, 2004). Theorists have suggested that women are less likely to enter into STEM careers because they have been socialised to believe those careers are better suited to men. As a result, they may be less likely to expect success (Cheryan, Siy, Vichayapai, Drury, & Kim, 2011). The threat of confirming these stereotypes compromises the performance of those who successfully enter STEM fields. This has been shown experimentally. Men have typically been found to perform better in mathematics tests (Spencer, Steele, & Quinn, 1999). However this may partly be due to stereotype threat. In one study merely telling participants that a math test had never shown gender differences in the past, totally eliminated the gap in male and female performance relative to controls (Spencer et al., 1999). A meta-analysis of similar studies confirmed the presence of stereotype threat, however, it also found evidence of publication bias which has called such findings into question and raised the need for large

scale replication studies (Flore & Wicherts, 2015). Regardless, both expectancy value (Wigfield & Eccles, 2000), and self-efficacy theory (Bandura, 1982) would predict that the extent to which gender stereotypes contribute to expectations of success, is likely to contribute to career decisions.

While we live in a society where gender norms are currently shifting. It is still true that positions of power are currently dominated by men. This may have the effect of reducing the extent to which females feel they are able, or likely, to acquire status. In other words, when it comes to pursuing self-esteem, females may be more likely to have an external locus of control. Females may not feel that their low self-esteem is due to any personal deficiency, but rather due to the way that others are treating them. In other words, while they perceive the self to be malleable, they still have an external locus of control. In other words, if females believe their low self-esteem is not due to their personal qualities, then belief in the ability to change is unlikely to be comforting or motivating. This may cause enduring hopelessness despite a sense of personal malleability.

These two explanations are admittedly speculative. Gender has been linked with large effect sizes in a wide range of research. However the effect of gender is often highly contextual (Hyde, 2005) and the underlying mediational pathways behind these effects may be complex. To establish why gender moderates the interaction between self-esteem and implicit theories, more research needs to be done. To discredit the first of my hypotheses (men have more to gain from status so may find self-malleability more reassuring or motivating), one could see if the extent to which social status is valued mediates this gender effect. To discredit the second hypothesis (that women perceive structural barriers preventing the acquisition of status), one could see if this interaction can be explained by internal locus of control.

Promoting incremental theories, a better way to respond to low self-esteem?

This thesis has focused on the role of incremental theories in improving wellbeing and achievement in individuals with low self-esteem. But in these models, the contribution of incremental theories relative to self-esteem tended to be modest. For instance, in Chapter 4, I showed that strong incremental theories were associated with wellbeing scores which were 32.5% higher in individuals with low self-esteem. But, given the large correlation between self-esteem and wellbeing ($r = .67$ and $r = .55$ in Chapter 4 and 5, respectively), one could argue that it is simpler just to focus on self-esteem and forget incremental theories entirely. There are a few problems with this approach.

First, while the overall impact of incremental theories may be small, some individuals are likely to benefit more than others. The interaction between self-esteem and implicit theories, shows that self-esteem has different consequences depending on implicit theories. While the results presented have shown that having high self-esteem is almost always associated with positive outcomes, the inverse is not true for low self-esteem. The outcomes associated with low self-esteem are contextual (Marshall et al., 2015; Metalsky et al., 1993). The results presented in this thesis suggests that incremental theories may buffer people from the harms of low self-esteem. The effects of incremental theories may modest across populations, but benefits of these theories may be concentrated among individuals who are the most vulnerable.

Second, self-esteem may be a poor intervention target. While targeting specific self-concepts has been shown to improve academic outcomes (Marsh & Craven, 2006), self-esteem is based on social comparison (Marsh, 1990a; Marsh & Hau, 2003), which means that self-esteem may be difficult to change at population levels. This may explain why interventions aiming to improve global self-esteem have not been successful (Baumeister et

al., 2003). As such, even if self-esteem constitutes a causal behemoth, if it cannot easily be intervened on at a population level, it may be important to consider the positive effects of other mutable constructs like implicit theories (Miu & Yeager, 2015; Yeager, Miu, et al., 2013).

The power of interventions on mutable constructs

It is natural to assume that the most potent constructs make for the best intervention targets. Theoretically this may well be true. All else being equal, one is more likely to successfully influence an outcome of interest, if an intervention targets a central node in a causal model. Interventions which target constructs more distally related to outcomes are less likely to be impactful. Practically, the strongest predictors of outcomes may not always be the best intervention targets. For instance, IQ has been found to be an incredibly good predictor of a wide range of desirable outcomes. IQ is associated with less crime, and greater income (Neisser et al., 1996). And yet, general intelligence is stable over time (Neisser et al., 1996) and so may be a poor intervention target. Similarly, the five factors of personality explain an incredible amount of variance in most psychological phenomena. But like intelligence, personality tends to not be responsive to interventions (Cobb-Clark & Schurer, 2012).

Many of the most predictive constructs in psychology are also the most stable. This may be the case for the present constructs. Self-esteem may be more predictive of outcomes, but implicit theories, due to its mutability (Yeager et al., 2014), may be a better intervention target. The mutability of implicit theories is somewhat surprising given how resistant most beliefs are to reassessment. In the next section I discuss why implicit theories may be responsive to intervention.

Implicit theories can be changed

Generally, once established, explicitly held beliefs become resistant to change (Baron, 2008). This is because we tend to have a lot riding on our beliefs. They are not just a framework with which to understand the world, but also offer us access to social orders (McPherson, Smith-Lovin, & Cook, 2001). Political beliefs, for instance, demarcate tribes. A change of opinion may not merely represent a new understanding of the external world, but a breaking of important social bonds. Research by Cohen (2003) found that people tend to be more supportive of policies from their self-identified political party, even if the content of that policy is contrary to their political values. Cohen (2003) suggests that when it comes to politics, people often blindly follow the party line because it is easier to adjust their own political instincts than to have their membership in their political tribe threatened.

In addition to giving us access to social orders, beliefs provide information about ourselves. Beliefs can often be an indicator of worth. For instance confusion around basic scientific or literary concepts may make someone appear inadequate to others (Baron, 2008). To reappraise a closely held belief is to reappraise yourself (Bem, 1967). This means that we tend to have a lot riding on the way we view the world. For this reason, having your beliefs challenged can be highly threatening. Psychologically, dealing with this amount of dissonance is a big task. The simple solution is to reject the new information, or to seek opposing views in a process called confirmation bias (Nickerson, 1998).

Implicit theories may be more vulnerable to re-evaluation than explicit beliefs

Due to confirmation bias, it would be reasonable to expect that implicit malleability beliefs would, like other beliefs, be highly resistant to change (Nickerson, 1998). An entity theorist who encounters information about neuroplasticity should attempt to find contrasting evidence in order to support their perspective that human attributes are static. This would

mean that in experimental conditions, attempts to alter implicit theories would not be effective, or be short lasting. This however does not seem to be the case (Miu & Yeager, 2015). Research has shown that implicit malleability beliefs are vulnerable to reappraisal.

Implicit theories can be changed, at least in the short term, simply by exposing people to new information. Incremental interventions have helped people respond better to failure in a broad number of domains (Dweck, 2000). Researchers have been able to change participants resilience in the face of failure through effort versus ability praise (Mueller & Dweck, 1998), by having subjects read scientific articles on the flexibility of traits (Halperin et al., 2011; Hu et al., 2015; Miller et al., 2007; Niiya et al., 2004a; Park & Kim, 2015; Yeager, Miu, et al., 2013), or having participants read single paragraphs which suggestive that human traits are malleable (Burkley et al., 2014; Halperin et al., 2011; Hong et al., 1999; Hu et al., 2015; Martocchio, 1994; Park & Kim, 2015; Schroder et al., 2014; Wood & Bandura, 1989).

It is possible that malleability beliefs are more vulnerable to alteration as they have never been vocalised. People find making mistakes in public domains highly threatening and will argue furiously for a previously stated belief in order to not find themselves on the wrong side of the ‘truth’ of the matter (Baron, 2008). But what if you never vocalised your opinion? Would these same cognitive biases come into play? Research by Asch (1956) suggests that people are quite able to disregard their points of view if they have not been argued for. Asch (1956) instructed participants in a group to identify which of a series of lines was shortest. He found that while participants could easily tell which line was shortest, if they were among a group of confederate participants who all voiced the incorrect answer, participants would conform to the views of the group. Even though these participants almost certainly had the ability to see which line was shortest, they were able to easily adjust their point of view in

order to align with the group consensus. This may happen because they had not vocalised their perspective, meaning changing their view did not cause social embarrassment.

Similarly, implicit theories tend to be unspoken and so may be adjusted without causing cognitive dissonance. While perceptions of malleability can be important motivational factors, many people may never have considered whether or not they believe their traits to be fixed or malleable. While someone may have an underlying concept of having either fixed or malleable traits, if they have never argued this point, they may not be defensive or embarrassed when their implicit theories are challenged. In some cases being challenged on these implicit assumptions has even been shown to be welcome.

People with low self-esteem may be susceptible to incremental theory interventions

Failure tends to be a painful experience as it can be used as evidence that you lack certain competencies. Failure is all the more threatening however, if one believes their traits to be fixed. In this case, their state of incompetence may be a permanent one. Leith et al. (2014) found that, following failures, people become more receptive to messages promoting incremental theories. The idea of being able to change, or be reborn may be a good news story to those with feelings of inadequacy. If this is indeed the case, then the effects of an incremental theory intervention may be highly potent for low-self-esteem individuals. People with low self-esteem may be highly receptive to messages that their predicament is temporary. When people are dissatisfied with themselves, the idea that they could change may be a highly attractive idea (Leith et al., 2014). The evidence in this thesis also suggests that part of the benefit to incremental theory interventions is in reducing the harmful effects of low self-esteem. If proven longitudinally this would mean that low self-esteem participants are likely to disproportionately benefit from incremental theory interventions.

In summary, unlike most beliefs, implicit malleability theories may be especially vulnerable to re-appraisal. This means that unlike self-esteem, incremental theories are highly mutable. Implicit theories may be even more vulnerable to re-appraisal in low self-esteem individuals (Leith et al., 2014). Coupled with research in this thesis which show that implicit theories moderate the negative effects of low self-esteem, incremental theory interventions could prove to be a powerful way to manage problems associated with low self-esteem.

Implications for incremental theory interventions in educational settings

The potential for incremental theory interventions to reduce the negative effects of low self-esteem has direct implications for the educational system. Teenagers are a particularly vulnerable demographic with one of the highest burdens of mental illness (Costello, Mustillo, Erkanli, Keeler, & Angold, 2003). Teenagers are also constantly testing the limits of their abilities (Furby & Beyth-Marom, 1992; Steinberg, 2007) and need to be able to recover quickly from failures. As incremental theories can promote more adaptive responses to failure, teenagers may benefit greatly from implicit theory interventions. For these reasons high schools have been an active testing-ground for implicit theory research (e.g. Blackwell, Trzesniewski, & Dweck, 2007; Miu et al., 2014; Paunesku et al., 2015; Yeager et al., 2014; Yeager et al., 2016; Yeager, Miu, et al., 2013). Schools however have limited time to host interventions, meaning that interventions compete with each other for airtime. In this section I discuss how incremental theory interventions relate to the needs of education systems, and why they may be attractive to policy makers.

Adolescence is a critical developmental period

Adolescence and young adulthood are key developmental periods. The brain over produces dendrites with a peak in grey matter at the age of 11-12 (Johnson, Blum, & Giedd, 2009). This results in increased neuroplasticity, with the increased interconnectivity of the

brain being selectively pruned based on behaviour. (Johnson et al., 2009) The adolescent brain remains in this heightened state of neuroplasticity until full development is reached in ones early to mid-twenties (Pujol, Vendrell, Junqué, Martí-Vilalta, & Capdevila, 1993). This intense learning helps reform adolescents into their adult roles. But it also means that bad habits can quickly take root causing lasting difficulties (Chambers, Taylor, & Potenza, 2003). Habits can include overt behaviours such as addiction to drugs and alcohol, as well as more subtle behaviours like patterns of thought. Problematic ways of relating to the self and others learned in adolescence can endure and cause distress and social difficulties. For these reasons adolescence is considered both a critical, and difficult transition period (Ciarrochi, Parker, Kashdan, Heaven, & Barkus, 2015).

In addition to this, adolescents face rapidly changing social roles as they transition from of children to adults (Arnett, 2000). This makes their social hierarchies unstable and competitive. Rather than being placed in social networks which centre on their families, they increasingly identify with their network of peers which are generally less nurturing and more competitive (Hayes & Ciarrochi, 2015). This is a high stakes and stressful process.

Adolescents are essentially discovering what their capabilities are, how they compare to, and are connected with others; in essence, who they are. These processes may partly explain why adolescents and young adults have the highest burden of mental illness in western populations. In the United States of America, one in every five teenagers suffers from some form of mental illness in any given year (Merikangas et al., 2010). As teenagers progress through this period they tend to experience drops in self-esteem (Heaven & Ciarrochi, 2008; Marshall et al., 2014), mental health and hope (Ciarrochi et al., 2015). The ways in which individuals respond to drops in self-esteem during this period vary. While some adolescents are able to recover, others may enter downward spirals, with lower self-esteem leading to worse wellbeing, which in turn leads to lower self-esteem (Ciarrochi et al., 2007).

Competition for integration with the education system

Due to the increased burden of mental illness and the lasting importance of positive change, adolescents are highly-sought targets for interventions. Successful interventions among this population are generally highly cost-effective. This is because positive change not only resolves short-term distress, but may prevent the development of more serious conditions later in life (Kessler et al., 2009). For this reason, many researchers try to engage with high-schools to target this demographic. In addition to giving access to this sought after group, the educational system is sought after as it constitutes a captive audience. That is, while most sample pools are made up of voluntary members, all people must pass through the school system (Bartlett, 1981). This means that entire generations can participate in interventions delivered by educational systems. However, as a result the educational system often is faced with a lot of pressure to host many different types of interventions. The challenge for researchers is then not merely to make interventions which are effective. After all, countless effective interventions have already been developed by psychologists and researchers in other fields. Instead, the challenge is to create interventions which are both effective and appeal to politicians and to school administrators.

Schools have only limited resources. Any time given to one intervention prevents the pursuit of another, as well as impacts the conduct of day to day operations. Interventions must help schools meet their own aims efficiently, in addition to meeting any independent aims which researchers see as desirable. While promoting characteristics such as empathy or self-compassion may seem like desirable aims, if they do not impact a key performance indicator for a politician or a school administrator, an intervention is unlikely to be adopted. Incremental theory interventions may have an advantage in this regard as there is some evidence that they improve academic performance (e.g. Blackwell et al., 2007; Yeager et al., 2014)

Another issue with many interventions being widely adopted is their economics. Many psychological interventions require a lot of babysitting. Workshops as described in journals are often closely overseen by trained researchers, or require one-on-one interactions. In some cases these workshops do not replicate, or have much weaker effects when applied to new contexts, or without the original researcher's guidance (McDonald, Keesler, Kauffman, & Schneider, 2006). Even if these programs fulfil their stated aims, the cost of administration at scale can dwarf any return on positive outcomes. This makes them unlikely to be broadly adopted. In summary, in order to be broadly adopted, successful interventions must be cost efficient, scalable, and improve outcomes that are desirable to policy makers.

Incremental theory interventions in schools

While some incremental theories fall into the traps described above, others have proven to be scalable and of interest to schools. In this section I describe existing incremental theory interventions, and how they may be relevant to policy makers. In particular I draw attention to the fact that incremental theory interventions can be delivered electronically and have been shown to have longitudinal effects lasting more than nine months. This may make them cost effective ways for combating the harmful effects of low self-esteem.

In addition to short-term priming effects, interventions which try and teach incremental theories have been found to have lasting changes. A range of interventions have been developed with varying success in many domains. The most intensive programs have been workshops. Workshops have been used to target a range of outcomes such as mental health, improved grades, and social skills. Workshops typically provide information about the malleability of traits. This is achieved either through the promotion of scientific concepts such as neuroplasticity. Or through providing participants with case studies, where people appeared to have hit a wall, and then later improved (e.g. Burnette & Finkel, 2012). For instance, Blackwell et al. (2007) taught participants that the brain was like a muscle which

can grow and change through effort. Incremental theory workshops have been found to have enduring effects for a range of outcomes. For instance Yeager, Trzesniewski, et al. (2013) found that high school students (grade 9 & 10) exhibited fewer conduct problems three months after a workshop which promoted incremental theories of personality. In the domain of weight-loss, an incremental theory workshop has been found to provide protection against setbacks. Three months following a five-session workshop, participants who were taught about the malleability of the self were less affected by previous weight-loss failures relative to a health education condition (Burnette & Finkel, 2012). Workshops have also been found to improve grades relative to controls for up to one year (Blackwell et al., 2007).

Workshops can be costly however and are limited by scalability. Unless very strong effect sizes are obtained, they are unlikely to be rolled out as part of national policies. Incremental theories interventions have also shown promise with less costly designs. For instance, computer based modalities have been developed which can be completed in one to two sessions. For example Miu and Yeager (2015) utilised a self-directed intervention which blended psychoeducation on neuroplasticity with case studies, and then asked students to write an email to another student arguing that the self can be changed based on their experience. This twenty-five minute intervention was found to reduce rates of depression in the intervention group by 40% nine months later. This pen-pal paradigm has previously been shown to improve grades one year later, especially for disadvantaged black students (Aronson, Fried, & Good, 2002). Similar interventions have also been shown to reduce aggressive desires (Yeager, Miu, et al., 2013), and improve academic grades (Yeager et al., 2014) relative to controls, one year later.

A common trend behind these effects is that they tend to be greater when the subjects are disadvantaged or facing challenge (Blackwell et al., 2007; Burnette & Finkel, 2012). On some level, change must be needed for perceptions of malleability to be beneficial. This may

explain why incremental theories and self-esteem interact to predict outcomes. High self-esteem individuals may be less likely to want to make personal changes, and so a perception of self-malleability is not particularly beneficial.

In summary, incremental theory interventions have been found to have promise. Implicit theories are malleable and their promotion has been found to have enduring effects in a wide range of domains. Future incremental interventions may be more potent if they are designed for disadvantaged students e.g. those with low self-esteem. But are these effects large enough to attract the attention of policy makers? While incremental theory workshops are resource intensive, and in many cases impractical for widespread distribution, more scalable modes have been developed. As discussed, 15-30 minute computer-based reading and writing tasks have in many cases have proven to be just as effective as workshops (David S Yeager, Miu, et al., 2013). This mode of transmission is highly scalable. Policy makers could potentially concentrate resources into building a robust online platform once, rather than constantly training and redesigning workshops. These online platforms could then be widely dispersed at low additional cost.

Doubt over the mechanism behind incremental theory interventions

As described, prior work suggests that incremental theory interventions can have long lasting effects. They can be cost effective, being able to be delivered online. While the research in this thesis is preliminary, this may mean that incremental theory interventions could be good ways to manage the negative effects of low self-esteem. However more work needs to be done. While incremental theory interventions have been successful in improving a wide range of outcomes in schools, the mechanisms behind these interventions is not perfectly understood. For instance, a recent meta-analysis found that while many incremental theory interventions do improve academic performance, in many cases this was happening even when manipulation checks failed, or were not reported (Sisk, Burgoyne, Sun, Butler, &

Macnamara, 2018). In other words, the effectiveness of these interventions may not actually be due to a change in one's implicit malleability theories. Instead they may be working through some other mediational pathway. This ambiguity as to how successful incremental theory interventions are working is a limitation for the field of research. Without understanding exactly how incremental theory interventions work, it will be difficult to develop protocols which are reliably effective. One of the more consistent findings of incremental theory manipulations is that they encourage persistence (Mueller & Dweck, 1998). But the value of persistence depends on the nature of the task.

Is persistence always good?

Persistence for its own sake is often glorified, particularly in the west (Wrosch, Scheier, Carver, & Schulz, 2003). The idea that you can achieve all your hopes and dreams just as long as you never give up is deeply appealing to many. However, one only has to watch a couple of minutes of any reality TV show where people compete for singing careers to see that sometimes letting go of current aspirations isn't always a bad outcome (especially for those around you). Persistence is not always desirable. In cases where there is no hope of remediation persistence merely results in wasted effort (Baumeister et al., 2003; Wrosch et al., 2003).

Although giving up has negative connotations, in some cases it can also open up new opportunities. A good example of this is presented by MacAskill (2015). In the early 2000s a charity rose to prominence called 'Play Pumps International'. The idea behind the charity was to build roundabouts in poor communities in South Africa. These roundabouts would pump water from wells while children played on them (using a mechanism similar to how windmills operate). Advertising on the equipment would pay for maintenance. The idea was to 'kill two birds with one stone' — ensuring children had play equipment and communities had access to clean water. In reality however, nobody wished to advertise to poor

communities, the equipment frequently broke down, and the children didn't find them fun to play on due to the force required to turn them. As a result the old women of the villages were forced to push the play equipment around to pump water. Unfortunately these 'play pumps' were far more expensive, and took up to five times as much physical exertion to operate than simple hand pumps (MacAskill, 2015). Despite these fatal flaws 'Play Pumps International' continues to operate and collect money. Misplaced persistence can be damaging. In some cases it is better to try something new rather than apply further effort.

This double edged nature of persistence has been shown to negatively affect incremental theorists. In the domain of beauty entity theorists seem to be fairly accepting of their physical features. In contrast, incremental theorists tend to place more of their self-worth on their appearance, have increased appearance related anxiety and more interest in cosmetic surgery (Burkley et al., 2014). Similarly incremental theories can cause issues in some relationships. While incremental theorists can initially be very understanding with the flaws of their partners (as they assume their partner can easily be improved on), they can be resentful if their partner fails to change (Kammrath & Peetz, 2012). Similarly, incremental theories can lead people to be more judgemental of people with obesity (Hooper, Crumpton, Robinson, & Meier, 2018) or of those who experience repeated failures (Ryazanov & Christenfeld, 2018). So while incremental theories can help people persist following failure, the value of persistence is highly contextual. It depends on what you're persisting with, and what the opportunity costs you are suffering. Sometimes giving up and trying something new is not maladaptive. As such, the mechanisms behind incremental theory interventions need to be further studied.

By helping people see themselves more fluidly, incremental theories may change the way people relate to the self and their failings. While incremental theories across the board seem to have positive effects, more attention needs to be paid to whether they can sometimes

cause psychological inflexibility. Incremental theory interventions may be improved if more is known about how implicit theories in specific domains, affect specific outcomes. This research would benefit from improved understandings of the hierarchical structure of implicit theories.

The psychometrics of implicit theory scales

While implicit theory research has a rich experimental tradition, the psychometrics of implicit theories are still developing. In many interventions, incremental theory manipulations effectively change outcomes, and yet manipulation checks based on these scales fail (Sisk et al., 2018). In other words, while the intervention had the desired effect, it is not clear if implicit theories were effectively changed. It is not clear if this inconsistency is due to the interventions targeting other mediating factors, e.g. hope, or if current scales of implicit theories are not adequately representing the broader construct as described by the literature. In this section I discuss the psychometric limitations of implicit theory scales, and potential future directions.

Are implicit theories entity and incremental theories unidimensional?

Implicit theory researchers have long assumed that implicit theory scales put people on a single scale with stronger entity theories on one end, and stronger incremental theories on the other. For instance, many studies have used median splits to compare the attributes of incremental and entity theorists. Certainly this approach has a great deal of face validity. It is hard to imagine a participant who could reject an entity theory statement e.g. “my attributes are fixed”, who would not simultaneously endorse an incremental theory statement e.g. “my attributes are malleable”. And generally, entity items and incremental items tend to be strongly negatively correlated. In one study they were found to be related between $r = -.69$ and $-.86$ (Hong et al., 1999; Levy et al., 1998). This means that disagreement with entity

statement related to endorsement of incremental statements. However, other studies have found the relationship between incremental and entity items to be weaker. Dweck et al. (1995) explained this phenomenon by suggesting that incremental items may be so socially desirable that, everyone agrees to incremental items regardless of their true implicit beliefs. This would mean that responses to incremental items were meaningless. But in Chapter 3 I showed that contrary to this, incremental items were better predictors of self-esteem than entity items.

The fact that the association between both entity and incremental items and self-esteem were substantially different was unexpected. This draws into question the unidimensionality of incremental and entity items. Are entity and incremental theories separate constructs? Can someone be an implicit theory compatibilist? That is, is it possible to simultaneously believe that an attribute is both fixed and malleable? As all attributes are multi-faceted to some degree, participants could consider traits to be simultaneously fixed and malleable. Intelligence is an example of this.

Intelligence seems to have a strong, genetic basis. Intelligence testing has found that performance is highly heritable with estimates ranging from .5 to .8 (Plomin, 1990). Further, IQ tend to be highly stable over time (Neisser et al., 1996). Intelligence quotients measures many aspects of intelligence. And while IQ itself is stable, through effort its component parts tend to be malleable to some degree. For instance, the ability to mentally rotate objects has a large genetic basis, and yet experimental studies have shown that it can be improved through interacting with video games (Terlecki, Newcombe, & Little, 2008). Further, some aspects of intelligence tend to be drawn from experience rather than pure natural talent. Theorists have drawn a distinction between the basic mechanics of people's intelligence which enable them to learn (fluid intelligence) and then the content which is learned (crystalized intelligence). While fluid intelligence on the whole is mostly stable (although it declines as we age),

crystallized intelligence is composed of facets such as general knowledge and vocabulary which, through our behaviour, may expand to different degrees (Sheppard & Vernon, 2008). As all our abilities are nuanced such as this, entity and incremental items may tap into our theories about different facets of a trait. Is intelligence stable? Yes it is. Can it be improved through effort? Yes, some aspects of it can. It is not clear how people think about their traits when responding to these items.

When someone strongly disagrees with an entity item like “People can do things differently, but the important parts of who they are can’t really be changed”, they may merely be stating emphatically that personal change is possible. The ease of that change, or the degree that the respondent believes they can change may not have been addressed. They may simultaneously believe that achieving that change is incredibly difficult or rare. To try and adjust for this some items ask about the ease of change rather than the possibility. Perhaps incremental items relate more closely to self-esteem, because they tap into people’s confidence in being able to change. In contrast, entity items may only tap into whether change is perceived to be possible (even if change is simultaneously considered to be unlikely).

Self vs other focused items

Most research on implicit theories has focused on personal achievements, that is, on how belief in self-malleability helps people respond to failures. The extent to which it is believed that others are malleable is also relevant as people are constantly coming into contact with others. If traits are fixed, then people will tend to make trait attributions to others (Levy et al., 1998). This has direct implications for how people respond to transgressors. If someone believes a person who has wronged them has fixed traits, then that witnessed behaviour is more likely to be used to paint that transgressor as intrinsically bad (Yeager et al., 2011). But do people hold different malleability theories for selves and others? Is it

possible that a respondent could believe other's to be fixed, but themselves to be malleable, or visa versa? Could someone believe that disadvantaged youth are full of potential, but a violent criminal is beyond remediation? Would this effect the way they treat these individuals?

In Chapter 3 I found that studies which used self-focused scales of implicit theories, reported stronger relationships between incremental theories and self-esteem. Unfortunately, only a few studies have used these scales, making it hard to make reliable assessments of their effectiveness. Regardless, these studies suggest that by asking only about the malleability of people generally, the field of research may be missing meaningful variance. For instance, as discussed earlier, prior research suggests that incremental theorists tend to be more interested in behavioural treatments for mental illnesses (Schroder et al., 2014). In contrast, entity theorists are more interested in pharmaceutical interventions. It would follow from this research that an intervention which tries to teach people about the malleability of the self may increase engagement with behavioural therapy. But it may be possible for people to believe that while most people can change, that there is something special about them that means that their predicament is uniquely hopeless. For example, someone might understand research into neuroplasticity, while also feeling that they have been so previously traumatised that they are a lost cause. Scales which only reference people generally (which are in wide usage) may miss this dynamic.

Ironing out these issues may have benefits for psychometricians and interventionists alike. There is a clear need for large scale studies which examine the structure of implicit theories. While there has been a rich experimental tradition in this field, psychometrically the field is lagging behind other mainstream constructs. Future research is needed to clarify the structure of implicit theories. What is its hierarchical structure? Is there a global factor? To

what extent do people hold multiple theories for various people and groups? And how do implicit theories relate to other psychological constructs like self-esteem?

The politics of growth mindset

It is clear that while implicit theories is an exciting area of research, more work still needs to be done. Experimentation has shown that incremental theory interventions may be an effective way to improve resilience in schools. But exactly who benefits and why is not clear. This thesis has helped show that while incremental theories may be protective, that they are not always going to be helpful in every context. Specifically, I found that incremental theories were more strongly linked with wellbeing and achievement among individuals with low self-esteem. Belief in a malleable-self seemed to offer little advantage when people had high self-worth. These results fit nicely with prior research that have shown that incremental theories offer more benefit to people who are disadvantaged (Aronson et al., 2002)

The limitations of incremental theories has however often been missed by the lay community. Accordingly, one of the greatest risks to research into implicit malleability theories is its popularity. ‘Growth mindset’ as this construct is more broadly known has become a hot topic, especially in educational institutions. It is lauded on television and radio, and promoted in schools with near religious fervour (Gross-loh, 2016). This is both a blessing and a curse. On the one hand, interest in incremental theories by schools means that researchers can more easily engage with school systems to leverage resources to conduct studies. But on the other, enthusiasm from the general public means that impoverished understandings of the construct can travel broadly, presenting strawmen to be struck down by critics.

Researchers have claimed that these enthusiastic promoters of growth mindsets have misunderstood the research (Gross-loh, 2016). Rather than promoting notions that the self is

malleable, some teachers have reportedly begun praising effort, even when it is not exhibited, expecting students' mindsets magically improve (Gross-loh, 2016). This inattention to detail and broad popularity is in some ways reminiscent of the self-esteem movement.

Perhaps this fervour around growth mindset is partly because the concept broadly gels well with the excesses of both sides of the political landscape. On the political left, the malleability of traits can be taken to mean that everyone has the same basic set of attributes, and poorer performance is due to disadvantage or some form, or trauma. On the right, the malleability of attributes can be used to suggest that struggling students are in some way lazy or just have the wrong attitude. In reality, incremental theories cannot be used in either way. This is because the benefit of incremental theories is contextual (Yeager & Walton, 2011). When used appropriately, incremental interventions may be powerful ways to improve social functioning, wellbeing and achievement (Yeager et al., 2014). However, incremental theories cannot be considered to be a complete explanation of success or failure. In order to maximise the value of incremental theories, their limitations must also be acknowledged. In this vein, in the next section I discuss the limitations of this thesis.

Limitations

In this thesis, I have shown that implicit theories moderate the relationship between self-esteem and wellbeing, and between self-esteem and achievement. The association between low self-esteem and negative outcomes was weaker in individuals with stronger incremental theories. This is novel research as little work has studied the relationship between the constructs of self-esteem and implicit theories. However, this research is far from conclusive and has limitations which must be appreciated. In this section, I map out the limitations of this body of work and make suggestions for future directions.

The links between implicit theories and various self-concepts needs to be explored

Researchers have theorised that the majority of benefit received from higher self-esteem arises from specific domains of self-concept (e.g. Marsh, 1993). This means that any mechanism found to involve self-esteem may actually be better explained by a specific self-concept. In Chapters 4 and 5 I showed that self-esteem and implicit theories interact to predict wellbeing and achievement. As specific domains of self-concept were not included, it is not clear if these models are best described with self-esteem. For instance, in Chapter 4, I found that self-esteem and incremental theories interact to predict GPA. Are implicit theories moderating the effects of self-esteem, or is this relationship due to another unmeasured variable such as academic self-concept? If the latter, then interventions seeking to make use of this mechanism would be more effective if they targeted individuals with low academic self-concept, rather than self-esteem.

To clarify this, future studies would be improved if they examined the relationship between specific domains of self-concept and implicit theories, as opposed to merely global self-esteem. In Chapter 3 I explored the association between implicit theories and self-esteem across domains. I hoped to show that implicit theories and self-esteem were more strongly associated in more similar domains. While this was true in some domains, across the board this pattern did not conclusively emerge. This was partly due to a lack of studies measuring both implicit theories and specific self-concepts. This meant that the domain specificity principal could not be fully explored. In future work the inclusion of specific self-concepts into theoretical models may help researchers understand how implicit theories are beneficial.

Use of entity items which referenced people generally

In Chapter 3, I presented meta-analytic evidence that incremental items were more closely related to self-esteem than entity items. This finding was not anticipated.

Additionally, the results of my first study suggest that items which reference the self rather than people generally are more strongly related to self-esteem.

These findings suggest that for the study of self-esteem, implicit theory scales which include more incremental items, and which reference the self may be more appropriate. If these items had been used, it's possible that the interactions between self-esteem and implicit theories would have been stronger. Unfortunately the datasets used in this thesis were opportunistically collected prior to the completion of this moderation analysis. As a result, only entity items were used. These items were selected as they mirror those which are commonly used by researchers studying implicit theories. However, future research into this topic would benefit from using scales with incremental items, and which reference the self rather than people generally.

Cross-sectional research prevented assessment of causal relationships

A clear limitation of this work is that it is cross-sectional in nature. This means that it is impossible to clarify causal orderings in the models presented. While this work has shown that implicit theories and self-esteem are positively related, it is impossible to conclusively say why. Do beliefs in self-malleability make people feel more positive, resulting in higher self-esteem? Does higher self-esteem result in beliefs that personal change is easy? Or, is this association better explained by another unmeasured variable? Theory may provide clues about which one of these scenarios is more likely, but data is required to clarify these points. Similar questions arise when assessing the interaction of self-esteem and implicit theories. Are incremental theories less valuable to people with high self-esteem? Or are the consequences of low self-esteem buffered by incremental theories? Are other mediating constructs behind these interactions? Future longitudinal research using cross-lag models may be able to clarify these points.

Striving progress

In order to replicate the moderating effect of incremental theories on the relationship between self-esteem and achievement in adults, striving progress was used. This was not an ideal proxy. There are clear differences between academic grades obtained in the school system and the progress one makes upon their goals. For one, academic success is defined similarly for all people within a school. Success conditions are generally clearly defined to enhance objectivity. The finding that low self-esteem individuals generally reported making more progress on personal strivings was important in its own right; but further replication is required to confirm both of these effects.

Need for a scale of implicit theories of status

Finally, this thesis investigated the psychometric relationship between implicit theories and self-esteem. This work found that they are weakly related, yet interact to predict wellbeing and achievement. To conduct this work I tried to identify existing scales of implicit theories which would broadly map on to self-esteem. To this end I relied upon implicit theories of personality. Implicit theories of personality were selected as they cover broad aspects of the self and so may be more relevant to self-esteem. The analogue is however not perfect. If people believe their status in their social hierarchies is fixed, then whether or not their personal features are malleable may be somewhat irrelevant.

Given the importance of social status, and acceptance to self-esteem (Leary & Baumeister, 2000), an implicit theories scale which addressed these facets of the self would have been optimal. While such a scale is not currently in common usage, this would be an interesting idea to test in future research. Such a scale would best be devised in the context of building a more hierarchical structure of implicit theories. The tendency for researchers to create implicit theory measures on an as needed basis has resulted in a confusing array of subscales. These subscales, of which there are countless variants, have not been related to any

broader construct. Ideally, the creation of further implicit theory scales would also involve a consolidation and restructuring of previous scales and items, rather than treating it as a separate enterprise.

CONCLUSION

Self-esteem and incremental theories should be considered together

This thesis has presented original research that shows cross-sectionally, that implicit theories and self-esteem tend to be associated with each other. While the correlation is small, incremental theorists tend to have higher self-esteem than entity theorists. More importantly, I demonstrated in this thesis that implicit theories moderate the link between self-esteem and wellbeing, and self-esteem and achievement.

Low self-esteem remains a serious issue with wide ranging consequences (McGee & Williams, 2000). However, this thesis has demonstrated that the effects of low self-esteem are context dependent. Low self-esteem does not tend to be associated with negative outcomes as strongly, when people perceive the self to be more malleable. This may provide future researchers and interventionists with additional ways to manage low self-esteem. It is possible that incremental theories are buffering the negative effects of low self-esteem. In which case, interventions which boost incremental theories may be especially beneficial to people with low self-esteem.

Conversely, this thesis has also shone light on the limits of incremental theories. The interaction between self-esteem and implicit theories suggests that incremental theories are not likely to be beneficial in every situation. Incremental theories were associated with little benefit among people with high self-esteem. As a result, future research may confirm if implicit theory interventions are more effective when targeted at individuals with low self-

esteem. In order to better understand the limits of incremental theories, and the mediational pathways which account for their positive effects, more work remains to be done.

Experimental designs have been key in establishing that implicit theories can be manipulated to positive effect. But the exact mediational path that leads to positive effects is still being unpacked (Sisk et al., 2018). To aid this, the field would benefit from more work exploring the relationship between implicit theories and other constructs. While the research in this thesis has started some of this work, far more needs to be done.

The importance of self-views

In conclusion, it is clear that self-esteem plays a critical role in human emotions and behaviours (Guindon, 2009; Marsh, 1990b). Self-esteem is a major driver of human wellbeing and behaviour. And yet, the promotion of positive self-concepts is complex. Because self-esteem relies on social comparisons (Marsh et al., 2015), it is hard to improve one individual's self-image without lowering that of another. The promotion of self-concept may inflexible clinging to one's sense of specialness or importance (Mueller & Dweck, 1998), resulting in maladaptive behaviours when those self-concepts are challenged (Dweck, 2000; Neff, 2009). Such pitfalls can perhaps be avoided by promoting positive self-concepts while also helping people to recognise personal malleability.

The results in this thesis suggest that incremental theories are especially protective among individuals with low self-esteem. Perhaps in some way, self-critical thoughts lose their potency when the self is viewed flexibly. While low self-esteem was experienced by students and adults high and low in incremental theories, the extent to which low self-esteem was tied to lower wellbeing and achievement was lessened for those with stronger incremental theories. Having incremental theories is unlikely to stop people from experiencing hard times. Even when people know they can change, not fulfilling their

potential may still be painful. However, by seeing the self as malleable, incremental theories may help people realise that pain passes and that things can get better. Belief in self-malleability may help people foresee a positive future in times of distress, thereby preventing drops in wellbeing and helping people stay engaged with the things that they care about.

APPENDIX A

Search terms for meta-analysis

The search terms below were used to extract references from their respective databases.

Eric

("implicit theory" OR "implicit theories" OR "incremental theory" OR "incremental theorist" OR "entity theorist" OR "entity theory" OR "entity theories" OR "Dweck" OR "fixed mindset" OR "growth mindset") AND ("self-esteem" OR "self esteem" OR "self-concept" OR "self concept" OR "self-perception" OR "self perception" OR "self-perceptions" OR "self perceptions" OR "self-appraisal" OR "self-image" OR "self image" OR "self-worth" OR "self-worth" OR "self-attribution" OR "self attribution")

Psych info

(implicit-the* OR incremental-theor* OR entity-theor* OR fixed-mindset OR growth-mindset OR Dweck) AND (self-esteem OR self-concept OR self-perception OR self-appraisal OR global-self-esteem OR self-worth OR self-attributions OR self-image)

Scopus

("implicit theories" OR "implicit malleability theories" OR "incremental theories" OR "incremental theory" OR "incremental theorist" OR "entity theory" or "entity theorist" OR "Dweck" OR "fixed mindset" OR "growth mindset") AND ("self-esteem" OR "self esteem" OR "self-concept" OR "self concept" OR "self-perception" OR "self perception" OR "self-perceptions" OR "self perceptions" OR "self-appraisal" OR "self-worth" OR "self worth" OR "self-attributions" OR "self attributions" OR "self-image" OR "self image")

Web of science

("implicit theories" OR "implicit malleability theories" OR "incremental theories" OR "incremental theory" OR "incremental theorist" OR "entity theory" OR "entity theorist" OR "Dweck" OR "fixed mindset" OR "growth mindset") AND ("self-esteem" OR "self esteem" OR "self-concept" OR "self concept" OR "self-perception" OR "self perception" OR "self-perceptions" OR "self perceptions" OR "self-appraisal" OR "self-worth" OR "self worth" OR "self-attributions" OR "self attributions" OR "self-image" OR "self image")

APPENDIX B. EXCLUSION CRITERIA

1. Includes implicit malleability theory and self- concept measures

Studies were included provided they had at least one quantitative measure of implicit malleability theories in any domain AND at least one measure of self-esteem including measures of self-concept in any domain. Constructs must not be mixed with items from other measures, such as, composite measures of academic self-concept combined with academic achievement.

2. Full-text English language available

Articles were excluded when full-text English copies were not available as reliable translation services were not available.

3. Original data

To prevent including data sources multiple times only research which presented new findings was considered.

4. Publication date

No restrictions were placed on publication date.

5. Publication Type

Published and unpublished research articles, conference papers and research theses were eligible for inclusion.

Table S1.
Reasons for exclusion (Study 1)

Reason	n
Both constructs missing	105
No self-esteem	70
Not original research	32
No implicit theories	22
Effect sizes not reported	12
Implicit theories manipulated before measurement	6
Constructs mixed with other measures	4
Constructs not measured in same participants	2
Implicit theories treated as a categorical variable	2
Not available in English	2
Qualitative research	2

APPENDIX C. MODERATOR CODING

Table S2.
Moderator coding (Study 1)

Moderator	Categories
Implicit theory frame	<ol style="list-style-type: none"> 1. Personal e.g. “my attributes are malleable” 2. People e.g. “your attributes are malleable”
Implicit theory item content	<ol style="list-style-type: none"> 1. Entity items 2. Both entity and incremental items 3. Incremental items
Effect sizes not listed	<ol style="list-style-type: none"> 1. Effect sizes provided in published material 2. Effect sizes requested from author
Mean age	<ol style="list-style-type: none"> 1. Children: < 12 2. Adolescents: 12 – 18 3. Young adults: 18 – 25 4. Adults: > 25
Decade	<p>Study published:</p> <ol style="list-style-type: none"> 1. 1990 - 1999 2. 2000-2009 3. 2010 - 2017
Reliability	<p>Alpha:</p> <ol style="list-style-type: none"> 1. $\geq .7$ 2. $< .7$ or not reported
Gender	<p>Proportion of females:</p>

1. < 0.33
2. $0.33 - 0.66$
3. > 0.66

Education

Population drawn from:

1. Elementary school
 2. High school
 3. University
 4. Other
-

APPENDIX D. STUDY 2 & 3 QUESTIONNAIRE ITEMS

**(R) indicates reverse items*

Implicit theory of intelligence (Dweck et al., 1995): Study 2 & 3

1. You have a certain amount of intelligence and you really can't do much to change it
2. Your intelligence is something about you that you can't change very much
3. You can learn new things, but you can't really change your basic intelligence

Implicit theory of personality (Erdley et al., 1997): Study 2

1. You have a certain personality, and it is something that you can't do much about
2. Your personality is something about you that you can't change very much
3. Either you have a good personality or you don't and there is really very little you can do about it

Implicit theory of person & morality (Dweck et al., 1995): Study 3

1. The kind of person someone is is something very basic about them and it can't be changed very much
2. People can do things differently, but the important parts of who they are can't really be changed
3. A person's moral character is something very basic about them and it can't be changed much
4. Whether a person is responsible and sincere or not is deeply ingrained in their personality. It cannot be changed very much
5. There is not much that can be done to change a person's moral traits (e.g. conscientiousness, uprightness and honesty.)

Wellbeing (Keyes, 2006a): Study 2 & 3

During the past month how often did you feel:

1. Happy
2. interested in life
3. satisfied with life
4. that you had something important to contribute to society
5. that you belonged to a community (like a social group, your neighbourhood or school)
6. that our society is a good place, or is becoming a better place, for all people
7. that people are basically good
8. that the way our society works makes sense to you
9. that you liked most parts of your personality
10. good at managing the responsibilities of your daily life
11. that you had warm and trusting relationships with others
12. that you had experience that challenged you to grow and become a better person
13. confident to think or express your own ideas and opinions
14. that your life has a sense of direction or meaning to it

Self-esteem (Rosenberg, 1965): Study 2 & 3

1. On the whole, I am satisfied with myself.
2. At times, I think I am no good at all. (R)
3. I feel that I have a number of good qualities.
4. I am able to do things as well as most other people.
5. I feel I do not have much to be proud of. (R)
6. I certainly feel useless at times. (R)
7. I feel that I'm a person of worth at least on an equal plane with others.

8. I wish I could have more respect for myself. (R)
9. All in all, I am inclined to feel that I am a failure. (R)
10. I take a positive attitude towards myself.

Personal strivings (Emmons & McAdams, 1991)

“In this part of the questionnaire, we would like you to describe some of your personal strivings. You can think of personal strivings as the goals that you typically try to obtain in your life. For example, two strivings might be: Trying to be physically attractive or trying to seek new and exciting experiences. Spend a few minutes thinking about your goals as personal strivings, then enter them in the space provided. Try not to make them too specific (e.g., I will clean the car today) but a little more general like the examples given above. For each striving that you list, please answer the questions that follow...”

1. In the past 10 weeks I have made progress on this striving

*repeated for four separate strivings

APPENDIX E

SUPPLEMENT TO STUDY 3

In Chapter 3, I demonstrated that self-esteem and implicit theories interact to predict grades. However these effects are nested under school cohorts. I demonstrate in Table S2 that this effect persists even when school cohort is controlled for.

Table S3.

GPA as predicted by ITI and Self-esteem controlling for school year

Item	B	SE	t	95% CI
Intercept	-0.06	0.12	-0.49	[-0.28, 0.17]
ITI	0.18	0.05	3.41	[0.08, 0.28]*
SE	0.09	0.05	1.70	[-0.01, 0.2]
year 8	0.11	0.15	0.72	[-0.19, 0.41]
year 9	0.22	0.16	1.36	[-0.1, 0.54]
year 10	0.19	0.17	1.10	[-0.15, 0.53]
year 11	0.10	0.17	0.59	[-0.23, 0.43]
ITI*SE	-0.09	0.05	-2.06	[-0.18, -0.00]*

Note. ITI = implicit theory of intelligence, SE = self-esteem.

* $p < 0.05$.

APPENDIX F

STUDY 3 SUPPLEMENTARY MATERIALS

Clarification of implicit theory scale structure

In Chapter 5 a clerical error meant that only two items from the implicit theory of personality measure were included. The alpha reliability of this scale was poor in the current sample ($\alpha = 0.58$). The implicit theories of personality and morality scales are conceptually similar. For instance wouldn't your moral qualities partly depend upon features of your personality? I tested the factor structure and demonstrated that a two factor solution, was superior to a three, or one factor solution. That is, theories and personality and morality loaded onto one factor, and theories of intelligence items loaded on the other. The resulting scale was a more reliable construct.

Method

Instruments

Implicit theory items were included from Chapter 5.

Analysis

To test this hypothesis a series of confirmatory factor analyses were performed (Table S2). Three models were tested. Model A loaded all items on their original factors (i.e. three items on implicit theory of intelligence, two on implicit theory of personality, and there on implicit theory of morality. Model B tested the hypothesised model i.e. intelligence items on implicit theory of intelligence, and morality and personality on the second factor labelled 'implicit theory of personality'. Finally Model C tested a one factor solution.

Results

All results are presented in Table S2. The only model which did not provide adequate fit was the 1 factor solution, Model C (RMSEA = 0.04; CFI = 0.88; TLI = 0.83). Model A and B were very similar, but Model B the simpler solution was slightly improved ($\Delta\text{BIC} = 17$). As such, Model B (Figure S1) was selected for analysis.

Table S4.

Fit statistics for implicit theory models.

Model	X^2	df	BIC	RMSEA A	CFI	TLI	ΔBIC	ΔRMSEA A	ΔCFI I	ΔTLI
A	37.11	17	47205	0.01	0.99	0.98				
B	38.07	19	47189	0.01	0.99	0.98	17	0.00	0.00	0.00
C	229.41	20	47371	0.04	0.88	0.83	183	0.03	0.11	0.16

Note. Model A = 3 factors; Model B= 2 factor with ITP and ITM combined; Model C = 1 factor model.

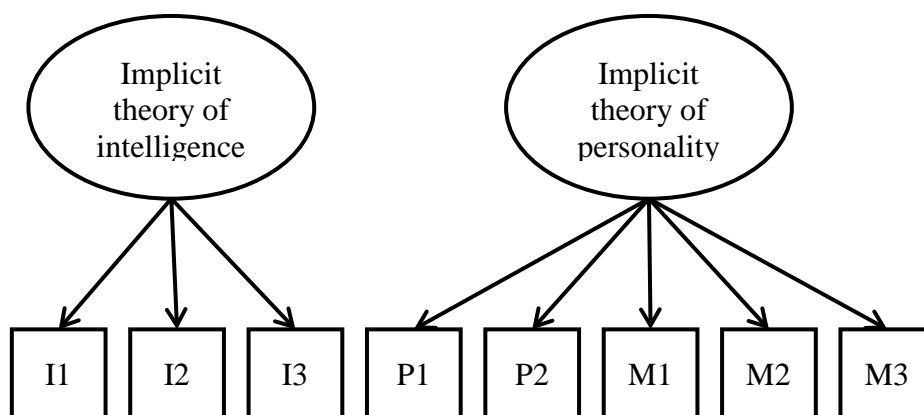


Figure S1. Path model of Model B

Note. I = Implicit Theories of intelligence items, P = Implicit theory of personality items, M = Implicit theories of morality items.

Study 3 results replicated with ITP items only

A two-factor solution that loaded personality and morality items onto a single factor was preferred. However, it is important to note that the results hold even if the two personality items are used in place of the psychometrically superior combined measure. Results from Chapter 5 are not substantially changed using a three factor model of implicit theories rather than the superior 2 factor model. In this section all analyses in Chapter 5 are repeated for ITP using only the two implicit theory of personality items.

Table S5.

Summary of intercorrelations means and standard deviations for variables

	1	2	3	4	5	<i>M</i>	<i>SD</i>
1. ITP	-					3.49	1.09
2. ITI	.39*	-				3.92	1.23
3. Self-esteem	.09*	.17*	-			6.52	1.54
4. Wellbeing	.22*	.19*	.55*	-		3.81	0.88
5. Progress	.15*	.13*	.31*	.44*	-	4.40	1.04

Note.

* $p < 0.01$

Table S6.

Wellbeing as predicted by implicit theories, self-esteem and gender

	β	<i>SE</i>	<i>T</i>	95% CI
Intercept	0.01	0.02	0.37	[-0.03, 0.04]
ITP	0.23	0.03	8.87	[0.17, 0.28]*
SE	0.48	0.02	27.87	[0.45, 0.52]*
Female	0.00	0.03	0.10	[-0.05, 0.06]
SE * ITP	-0.10	0.02	-6.09	[-0.14, -0.07]*
SE * Female	0.09	0.02	4.32	[0.05, 0.14]*
ITP * Female	-0.10	0.02	-4.05	[-0.15, -0.05]*
SE * ITP * Female	0.07	0.02	3.09	[0.03, 0.12]*

Note. ITP = implicit theory of personality, SE = self-esteem.

* $p < 0.05$

Table S7.

Striving Progress as predicted by implicit theories and Self-esteem

Item	β	<i>SE</i>	T	95% CI
Implicit theory of personality				
Intercept	0.00	0.01	0.26	[-0.02, 0.02]
ITP	0.13	0.02	7.21	[0.09, 0.16]*
SE	0.30	0.02	16.74	[0.26, 0.33]*
ITP * SE	-0.03	0.01	-2.73	[-0.06, -0.01]*

Note. ITP = implicit theory of personality, SE = self-esteem.

* $p < 0.05$.

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