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Solley, Katelyn and Turner, Cynthia

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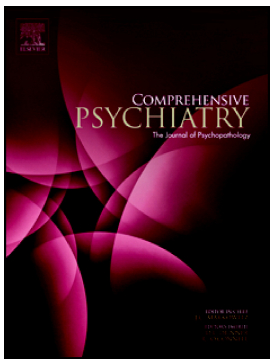

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Katelyn Solley, Cynthia Turner

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Prevalence and correlates of clinically significant body-focused repetitive behaviors in a non-clinical sample

Authors:

Katelyn Solley[1] and Cynthia Turner[1,2 *]

Affiliations:

1. School of Psychology, The University of Queensland
2. School of Psychology, Australian Catholic University, Brisbane

*Corresponding Author:

Dr Cynthia Turner, School of Psychology, Australian Catholic University, 1100 Nudgee Road, Brisbane QLD, Australia.

cynthia.turner@uq.edu.au

ORCID: 0000-0001-6234-2979

Abstract

Background: Body-focused repetitive behaviors (BFRBs) are repetitive, ritualized behaviors focused on the body, involving compulsively damaging one's physical appearance or causing physical injury. They include skin picking, hair pulling, nail biting, and lip or cheek biting and chewing. This study sought to examine prevalence, clinical correlates and quality of life (QoL) impairment associated with these conditions in a non-clinical sample of adults. Method: An online survey was completed by *N* = 1378 participants. Comparisons were made between those self-reporting body-focused repetitive behavior to those without, on a range of clinical correlates (depression, anxiety, obsessive-compulsive symptoms, body dysmorphic symptoms, fear of negative evaluation) and QoL domains. Results: Three-hundred and eighteen participants (23%) reported the presence of a probable BFRB; *n* = 85 (6%) nail biting, *n* = 88 (6%) lip or cheek biting/chewing, *n* = 187 (14%) skin picking, and *n* = 39 (2%) hair pulling. There were significant differences between those with and without a probable BFRB (pBFRB) across all clinical variables investigated, with the pBFRB reported higher levels of symptoms. The BFRB group reported reduced QoL on some domains. Few differences emerged between the BFRB groups, although individuals with probable skin picking reported higher levels of body image concern, than those with other pBFRB conditions, and there was a trend toward probable skin picking to endorse higher levels of OCD symptoms and anxiety. There were no significant differences between the BFRB groups on QoL domains. Conclusion: Although differences were found between those with a pBFRB and those without, there were few differences between the different pBFRB groups, indicating that all BFRB conditions are concerning. Skin picking may be one of the more severe of the BFRB presentations, although the small number of differences between the groups may reflect a single pathological grooming factor underlying the BFRBs. These

findings underscore the importance of recognizing that all body-focused behaviors can cause significant distress, impairment, and reduced QoL, and highlights the need for timely and accurate identification of these conditions by health professionals.

Key Words: Body-focused repetitive behavior; hair pulling; skin picking; nail biting; lip biting; cheek chewing; quality of life.

Highlights:

- All body focused repetitive behavior disorders, including the lesser studied conditions of nail biting and lip or cheek biting and chewing, are examined in a large analogue sample.
- Individuals with any probable BFRB, as compared to those without BFRB, reported higher levels of anxiety, depression, OCD, BDD, and fear of negative evaluation.
- Quality of life was reduced in those with probable BFRBs in the QoL domains tapping psychological and social wellbeing.
- The few differences between BFRB conditions may be reflective of the conditions being different manifestations of a single underlying latent factor.

1.0 Introduction

The creation of the *Obsessive-Compulsive and Related Disorders* chapter in the fifth edition of the Diagnostic and Statistical Manual of Mental Disorders (DSM-5) [1] in 2013, was the result of more than a decade of research and working group debates examining the classification and categorization of mental health disorders [2]. This chapter introduced excoriation (skin-picking) disorder into the DSM, along with a new category of 'other specified obsessive-compulsive and related disorders', which included body-focused repetitive behavior disorder [1]. Body-focused repetitive behaviors (BFRBs) are characterized by recurrent repetitive behaviors that are focused on the body (e.g. nail biting, lip or cheek biting or chewing) and are accompanied by repeated attempts to decrease or stop these behaviors [1]. On weight of evidence, BFRBs were added to the DSM-5, despite concerns by some that habits were being categorized as disorders [3]. These habitual grooming behaviors become pathological when they are repetitive and intentional and result in apparent physical harm and shame due to the inability to control the behavior [4]. Although trichotillomania has had recognition as a body-focused disorder for some time [5, 6], skin picking (excoriation disorder), nail biting (onychophagia), and lip or check biting and chewing have had reduced recognition and few studies have examined these conditions, resulting in limited awareness of the clinical characteristics that are associated with these distressing and problematic behaviors.

Excoriation (skin-picking) disorder is characterized by repetitive skin picking that results in noticeable tissue damage, despite repeated attempts to reduce or stop the behavior [1]. For diagnosis, the skin picking is required to cause significant interference or impairment in functioning. Prevalence rates for skin picking disorder vary and have been found to range

between 2% to 20% [3, 7, 8]. The BFRBs of nail biting and lip or cheek biting/chewing, although having a unique body focus, share clear phenomenological similarity with trichotillomania (hair-pulling disorder) and excoriation disorder, and there is some evidence that these pathological grooming behaviors are best represented by a single underlying latent factor [9]. Although only recently included in the DSM-5, onychophagia [10, 11] is not new to the medical literature. Prevalence rates vary from 6% to 34% of the population [8, 10, 12, 13]. Lip or cheek biting and chewing has received even less attention, although prevalence studies estimate that 6% to 42% of the population are affected [8, 12, 13]. Variation in the prevalence rates of these conditions across studies are likely attributable to the recent consensus regarding clear diagnostic criteria and study-specific methodology.

As these conditions are gaining increasing awareness through their inclusion in the DSM, it is important that research continues into these conditions, and their demographic and clinical correlates, in order to enable health care professionals to screen for, and be aware of, the factors commonly associated with these conditions. Presently very little is known about these conditions in non-clinical samples, although in the recent years, a small number of studies have emerged examining clinical and demographic correlates of BFRBs among community and clinical samples of adults and youths [14-16].

Selles and colleagues have examined prevalence and correlates of BFRBs in samples of clinical and non-clinical youth using a parent-report BFRB measure [14, 16]. In a non-clinical sample of Salvadorian youth (*n* = 315) aged 4-17 years, parents reported that 46% (*n* = 144) had at least one BFRB; most commonly nail biting (35%), followed by skin picking (25%), and hair pulling (11%) [14]. Of those 144 young people with any BFRB, 14% (*n* = 20) experienced

elevated distress and/or interference due to these behaviors [14]. Youth with skin picking and hair pulling, as compared to those with no BFRBs, had increased levels of internalizing and externalizing behavior, poorer adaptive functioning, and more difficulties with inattention [14]. For youth with nail biting alone (without any skin picking or hair pulling behaviors), there were no significant differences from control youth in relation to associations with internalizing or externalizing behavior, adaptive functioning or inattention, suggesting that nail biting may be a less distressing BFRB in young people [14].

Among a clinical sample of 93 youth diagnosed with either an anxiety disorder or obsessive-compulsive disorder (OCD), Selles and colleagues found that 55% (*n* = 52) of these young people were identified to have any BFRB, with 27% (*n* = 25) of the sample experiencing moderate to high levels of distress and/or interference as a result [16]. Parents rated their children with BFRBs, as compared to those without, as more avoidant of anxiety-provoking stimuli, suggesting that BFRBs may serve an emotion regulatory function [16]. BFRBs were equally common among youth with anxiety disorders as they were in youth with OCD, and no gender differences in BFRBs were evident [16].

With regard to understanding clinical correlates in adults with BFRBs, Pacan and colleagues examined nail biting behaviors in a group of undergraduate students (*n* = 343), also assessing the co-occurrence of anxiety and OCD [17]. Of those reporting nail biting behavior (47%, *n* = 160), there were significantly more females (59%) than males (41%), although the majority of participants (*n* = 93) reported that they ceased nail biting during their teenage years [17]. Singal and Daulatabad examined sixty-seven individuals (19% of total sample) who reported ongoing nail biting, and among these individuals, *n* = 17 received a diagnosis

of either OCD or an anxiety disorder, with no differences in prevalence between these conditions [18]. Of importance however, is that there were no differences in disorder prevalence between those with and without nail biting, again suggesting that nail biting may occur independently of psychiatric morbidity and may be a less distressing BFRB [18].

Hair pulling and skin picking, on the other hand, appear to be more distressing conditions. For example, Grant and Chamberlain assessed clinical correlates of skin picking disorder and found that skin picking was associated with anxiety disorders, cognitive and motor impulsivity, anxiety and depressive symptoms, and a lifetime history of substance use disorder [19]. The more severe the skin picking disorder, the more elevated the comorbidity [19]. Earlier studies have similarly highlighted that skin picking and hair pulling disorders are highly comorbid with mood and anxiety disorders and OCD [20-22].

Studies investigating skin picking behavior in non-clinical samples have largely reported similar results. For example, Machado et al. recruited a large non-clinical sample of adults reporting skin picking behavior [15]. Significantly more females than males reported engaging in skin picking, which was associated with depression and suicidal ideation, substance use, obsessive-compulsive symptoms, and impaired quality of life (QoL) [15]. Although anxiety was not assessed in this study, there was a negative association between skin picking and interpersonal sensitivity, highlighting the need to better understand the relationship between skin picking and interpersonal sensitivities such as social anxiety and fear of negative evaluation [15].

In sum, the BFRBs as a diagnostic group have been under researched and they remain poorly understood. There is increasing evidence that hair pulling and skin picking in adult samples are frequently comorbid with anxiety, depression and often OCD, and these findings appear consistent across both clinical and non-clinical samples. Converging evidence suggests that the more severe the BFRB, the stronger the association with comorbid mental health symptoms. However, relatively little is known about the lesser studied BFRBs of nail biting and lip or check biting/chewing. In particular, information about the prevalence and clinical correlates of these BFRBs in non-clinical populations is required in order to advance knowledge, to understand the clinical correlates and impairment associated with these conditions, and to understand whether they may be less impairing BFRBs than hair pulling and skin picking.

The current study, therefore, sought to investigate probable cases of body focused repetitive behavior disorder (pBFRB) in a large sample of non-clinical individuals, including university undergraduate students. An online survey methodology was chosen in order to maximise participant recruitment. It was of interest to examine the prevalence, demographic correlates and clinical correlates of each BFRB (hair pulling, skin picking, nail biting, lip or cheek biting/chewing) using this analogue design. Specific aims were: (1) to estimate the prevalence of probable nail biting and probable lip or cheek chewing/biting in a non-clinical population; (2) to examine the percentage of the sample reporting multiple body-focused repetitive behaviors at clinically significant levels; (3) to investigate whether those reporting any probable BFRB (hair pulling, skin picking, nail biting, and lip or check biting/chewing) differed from those not reporting these conditions (healthy controls) with regard to their association with the most common clinical comorbidities of anxiety and

depression, in addition to symptoms of other obsessive compulsive and related disorders, particularly OCD and body dysmorphic disorder (BDD); and (4) to investigate whether there were significant differences between the pBFRB groups in relation to their associations with these clinical variables.

The diagnostic requirement that excoriation disorder and the BFRB conditions cause clinically significant distress or impairment in functioning has generated some debate regarding the operationalization of this criteria [3, 23, 24], however QoL is often used as a way of determining impairment [25]. QoL assesses physical functioning, psychological impairments, and social functioning through the subjective experiences of the individual [26]. Only one study has examined QoL in those with nail biting behavior, finding nail biting predominantly associated with mild QoL impairment, although a small subset (3%) of their *N* = 343 sample reported a moderate or greater impairment to QoL [17]. No studies have yet examined QoL associated with lip or cheek biting and chewing. Therefore, a fifth aim was to examine QoL impairment associated with pBFRB disorder, and to determine whether there were differences with regard to level of impairment between the pBFRB groups. Finally, it was of interest to examine the association between the BFRBs and fear of negative evaluation (FNE) given that previous research has indicated that nail biting may be a less distressing BFRB [14, 17], and therefore may not be associated with social evaluative concerns to the same extent that skin picking and hair pulling may be.

With regard to demographic characteristics, skin picking and hair pulling has been shown to have a female preponderance in adult samples. Given this, it was hypothesized that there would be a greater percentage of females than males reporting pBFRBs in all BFRB groups

(hair pulling, skin picking, nail biting, and lip or check biting/chewing). With regard to clinical correlates, it was hypothesized that symptoms of anxiety, depression, OCD, BDD and FNE would be elevated among individuals with pBFRB in comparison to those without pBFRBs (healthy controls). With regard to differences between the pBFRB conditions, we hypothesized that nail biting and lip or cheek biting/chewing may be less distressing than hair pulling and skin picking and therefore we expected that there would be between group differences with regard to their associations with anxiety, depression, OCD, BDD and FNE. Finally, it was hypothesized that QoL impairment would be higher among those with a pBFRB when compared with healthy controls, and that nail biting and lip or cheek biting/chewing would be associated with lower levels of impairment than hair pulling and skin picking.

2.0 Method

2.1 Participants and Demographics

In total, 1520 participants completed the online survey, however 119 participants were excluded due to violation of the minimum age requirement of 18 years, leaving 1401 eligible participants. Of these, *n* = 1008 (72%) were female and the mean age was 33.39 (*SD* = 14.38), with a range from 18-91 years. Participants were recruited through a Massive Open Online Course (MOOC) in psychology run by the University of Queensland (*n* = 1077, 78%), and through the first-year psychology student research participation scheme at the University of Queensland and Australian Catholic University (*n* = 301, 22%). The first-year psychology participants received 0.5% course credit for participation, while the MOOC participants participated out of interest in the research. Of the *N* = 1401 sample, 15 participants omitted 50% or more of the survey and 8 participants omitted the key BFRB

measures, therefore data for these 23 participants (2%) were removed, leaving 1378 participants.

Table 1 provides demographic and clinical information for all *N* = 1378 participants. Participants recruited via MOOC or the undergraduate student research participation schemes were compared on all demographic and clinical variables, using chi-square analyses for categorical variables and t-tests for continuous variables. Undergraduate students and MOOC participants differed significantly on demographic variables and many clinical and QoL variables, providing confidence that the total sample recruited are representative of a broad non-clinical adult population.

2.2 Ethics

Ethical approval was provided by the University of Queensland (UQ) School of Psychology [17-PSYCH-4-07-JS], and from the Australian Catholic University Human Research Ethics Committee [2017-80E], and the study was completed in accordance with the ethical standards laid down in the 1964 Declaration of Helsinki and its later amendments.

2.3 Procedure

Participants completed the survey online via Qualtrics survey software between March 2017 and December 2017. Informed consent was obtained from participants prior to commencing the survey, all participants were advised that participation was voluntary, and they were free to withhold answers or stop completing the survey at any time. Demographic questions were asked first, followed by the measures of interest, randomized in their order of presentation.

2.4 Measures

This study was completed as part of a larger study investigating all obsessive compulsive and related disorders, therefore only the measures relevant to this study will be reported.

2.4.1 Skin Picking Scale-Revised

The Skin Picking Scale-Revised (SPS-R) was used to examine skin picking behavior. This eight item self-report measure utilizes a five-point Likert-scale, with response options reflecting increasing severity of the behaviors; total scores range from 0 to 32 [27]. Psychometric properties for this scale indicate acceptable internal consistency ($\alpha = .83$) and convergent validity [27]. Given the similarities between the SPS-R and the Skin Picking Scale (SPS), a cut-off of nine was chosen as the score to indicate probable skin picking disorder (caseness), which reflects participants endorsing a score of 1 or above on each question, and at least one question being scored as 2 [28]. The internal consistency for this sample was excellent ($\alpha = .94$).

2.4.2 Massachusetts General Hospital-Hairpulling Scale

The Massachusetts General Hospital-Hairpulling Scale (MGH-HPS) was used to assess hair pulling behavior. This is a seven-item measure that utilizes four-option Likert-scales, with response options reflecting increasing severity of the behavior; total scores range from 0 to 28 [29]. Psychometric properties are sound, with an internal consistency of $\alpha = .89$ [29], and acceptable discriminant and convergent validity [30]. For this study, a score of 17 or higher was used to determine hair pulling caseness [28]. The internal consistency for this sample was excellent ($\alpha = .94$).

2.4.3 A modified scale for nail biting

Due to a lack of standardized measures for examining nail biting behavior, the Massachusetts General Hospital-Hair Pulling Scale (MGH-HPS) was modified to examine nail biting behaviors. The modifications involved replacing all references to 'hair pulling' with 'nail biting'. The use of a modified MGH-HPS for nail biting is consistent with previous nail biting research [31]. This modified seven-item self-report scale (referred to as NBS) examined urges to engage in the behavior, control the behavior, and the subjective distress caused by the nail biting behavior. Four-item Likert-scales were used and each question had a specific response scale. Scores for the NBS ranged from 0 to 28. Cronbach's alpha for this scale in the current sample was excellent, $\alpha = .96$. As this scale was modelled on the MGH-HPS, a cut-off score of 17 or higher was used to determine probable nail biting caseness.

2.4.4 A modified scale for lip or cheek biting and chewing

No standardized measures exist for lip or cheek biting and chewing, therefore the MGH-HPS was also modified to examine this behavior (scale hereafter referred to as LIPS). The modification was done by replacing any references to 'hair pulling' with 'lip or cheek biting/chewing'. The response options and total score range were identical to those reported for nail biting behavior. In this study, Cronbach's alpha for the scale was excellent, $\alpha = .94$, and a score of 17 or higher was again used to determine caseness.

2.4.5 Short Form – 36

The Short Form – 36 (SF-36) is a self-report measure assessing participants' quality of life. Developed by RAND Health as part of the Medical Outcomes Study, this measure assesses multiple domains of QoL [32, 33]. The domains of QoL assessed in the SF-36 are: physical

functioning, social functioning, emotional wellbeing (or general mental health), energy (or vitality, which examined subjective wellbeing), limitations due to emotional problems, limitations due to physical health problems, pain, and health change. The SF-36 includes 36 items, each assessed on a Likert-scale that varied across the different items. Scores for each subscale vary from 0 to 100 [32]. Brazier and colleagues reported sound psychometric properties [34]. The internal consistency for this sample was acceptable to excellent, with internal consistencies ranging from α = .79 to α = .91 (physical functioning α = .91; role limitations due to physical health α = .84; role limitations due to emotional problems α = .83; energy α = .79; emotional well-being α = .86; social functioning α = .79; pain α = .83; and general health α = .82).

2.4.6 Patient Health Questionnaire – 9

The Patient Health Questionnaire (PHQ-9) is the nine-item depression module from the larger Patient Health Questionnaire and was used to determine depression symptoms and severity [35, 36]. Total scores ranged from 0 to 27. With a cut off score of 10, specificity and sensitivity is 88% [35]. The scale has sound psychometric properties [36, 37]. The internal consistency for the current study was excellent (α = .91).

2.4.7 Depression Anxiety Stress Scale-Anxiety Scale

The seven-item anxiety subscale (DASS-A) from the Depression Anxiety Stress Scale-21 was used to assess the physiological experience of anxiety [38]. Scores on this scale ranged from 0 to 21. Sound psychometric properties for this subscale have been demonstrated in both clinical and community samples [39]. The internal consistency for our sample was good (α = .85).

2.4.8 Generalized Anxiety Disorder-7

The Generalized Anxiety Disorder-7 (GAD-7) was used to measure generalized anxiety or worry [40]. It contains seven items scored on a four-point Likert-scale, with total scores ranging from 0 to 21. Good psychometric properties have been reported [40], and internal consistency for the current sample was excellent (α = .93).

2.4.9 Obsessive Compulsive Inventory – Revised

The Obsessive Compulsive Inventory-Revised (OCI-R) represents a well-used revision of its predecessor, the Obsessive Compulsive Inventory (OCI), for assessing obsessive-compulsive symptoms [41]. Good psychometric properties are reported in clinical and community samples [41]. Internal consistency in the current sample was excellent (α = .92).

2.4.10 Social Interaction Anxiety Scale and Social Phobia Scale

The short form of the Social Interaction Anxiety Scale (SIAS-6) and Social Phobia Scale (SPS-6) combine to form a composite 12 item measure assessing symptoms of social phobia and anxious feelings in relation to social interactions [42]. Good psychometric properties have been identified [42, 43]. For the SIAS-6, internal consistency was good in the current sample (α = .87) and for the SPS-6 the internal consistency was excellent (α = .91).

2.4.11 Brief Fear of Negative Evaluation Scale

The 12-item brief Fear of Negative Evaluation Scale (bFNE) was used to examine fear of negative evaluation [44]. The bFNE is measured on a five-point Likert-scale and has

demonstrated acceptable psychometric properties [44]. Internal consistency in the current sample was excellent (α = .91).

2.4.11 Body Image Concerns Inventory

The Body Image Concerns Inventory (BICI) assess dysmorphic concern with a 19-item self-report questionnaire [45]. The measure is scored on a five-point Likert-scale. Internal consistency was found to be excellent (α = .93)[45]. Internal consistency in the current sample was excellent (α = .95).

3.0 Results

Of the *N* = 1378 participants, 156 participants (11%) were missing at least one measure (Little's MCAR test non-significant; χ^2 = 920.49, *df* = 20455, *p* >.999). Pairwise deletion was used in statistical analyses to maintain the largest pBFRB sample possible. Given the zero-inflated data received for the BFRB measures, winsorising was applied to a small number of outlying data points (<1%) to support the use of parametric tests [46].

3.1 Prevalence

In order to establish prevalence of those with pBFRB, and in particular, those with probable nail biting and probable lip or cheek chewing/biting, groups were created using the cut-off scores identified above on the SPS-R, MGH-HPS, NBS and LIPS. There were 318 participants (23%) who exhibited any pBFRB on at least one of the 4 relevant scales; *n* = 85 (6%) reported probable caseness for nail biting, *n* = 88 (6.4%) reported probable caseness for lip or cheek biting/chewing, *n* = 187 (14%) reported skin picking, and *n* = 39 (2%) reported hair pulling. Of the *n* = 318, 71 participants (5% of the *n* = 1378 sample) scored above the cut-off

on two or more measures. There were 1060 participants (77%) who did not report a BFRB score above the cut-off scores identified.

To allow clear comparisons between those with pBFRB (*n* = 318) and those without any pBFRB (healthy controls), an equivalently sized healthy control group (*n* = 318) was randomly drawn from the *n* = 1060 participants who did not report clinically significant BFRB levels. Table 2 presents the demographic and clinical characteristics of the pBFRB group, as well as the characteristics of the full control sample and the randomly drawn control sample. There were no significant differences in clinical or demographic characteristics between the full control and randomly drawn control samples.

Demographic differences between those with a pBFRB (n=318) and without a pBFRB (*n* = 318) were compared. Results indicated that those reporting any pBFRB were younger (*M* = 28.88, *SD* = 11.66) than those who did not report a pBFRB (*M* = 35.36, *SD* = 14.35). This difference (-5.97, BCa 95% CI [-8.05, -3.98]; *t{*554.34} = -5.40, *p* < .001), was significant and represents a small to moderate effect size, *d* = .46. Participants with a pBFRB were also more likely to be female, χ^2 (1, *N* = 632) = 11.34, *p* =.001. Furthermore, they were less likely to have completed a university degree than those who did not report a pBFRB, χ2 (4, *N* = 633) = 10.48, *p* = .033.

A four-way between group comparison of demographic characteristics was undertaken for those reporting any one of the pBFRBs. This revealed no significant difference in age for those with hair pulling (*M* = 31.45, *SD* = 13.06), skin picking (*M* = 29.19, *SD* = 11.48), nail biting (*M* = 30.88, *SD* = 13.19), or lip or cheek biting and chewing (*M* = 29.39, *SD* = 11.75),

$F(3, 242) = 1.029$, $p = .381$. There were no significant differences in the gender of those who reported one pBFRB, $\chi^2 (3, N = 246) = 0.79$, $p = .852$. There was a significant difference among the pBFRB groups with regard to education in this sample; those reporting probable hair pulling were more likely to have a university degree, those with probable lip or cheek biting/chewing were less likely to have a university degree, $\chi^2 (3, N = 247) = 10.97$, $p = .012$.

3.2 Associations with clinical characteristics

3.2.1 Comparison between pBFRB and healthy control sample

Given the significant differences between the pBFRB and healthy control sample on the demographic variables (age, sex, and level of education), analyses of covariance (ANCOVAs) controlling for these variables were utilized to compare clinical characteristics. Means and standard deviations for all variables are found in Table 2.

There were significant differences between the two groups on all clinical variables: DASS-A, $F (1, 613) = 39.81$, $p < .001$, $\eta^2 = .02$; GAD-7, $F (1, 614) < .001$, $\eta^2 = .03$; PHQ-9, $F (1, 613) = 57.83$, $\eta^2 = .03$; OCI-R, $F (1, 606) = 37.22$, $p < .001$, $\eta^2 = .02$; SPS-6, $F (1, 611) = 37.22$, $p < .001$, $\eta^2 = .02$; SIAS-6, $F (1, 610) = 49.25$, $p < .001$, $\eta^2 = .03$; bFNE, $F (1, 613) = 35.50$, $p < .001$, $\eta^2 < .01$; and the BICI, $F (1, 612) = 40.27$, $p < .001$, $\eta^2 = .01$. Those with a pBFRB scored higher than those without on all measures.

Odds ratios were generated to compare the number of individuals in the pBFRB and the healthy control random sample who reached clinical cut-off scores on the clinical variables of interest. Those with a pBFRB were 3.46 times more likely to have a clinical score on the DASS-A, 4.46 times more likely to have a clinical score on the GAD-7, 3.24 times more likely

to have a clinical score on the SIAS-6, 2.78 times more likely to have a clinical score on the SPS-6, 4.37 times more likely to have a clinical score on the PHQ-9, 2.60 times more likely to have a clinical score on the OCI-R, 2.72 times more likely to have a clinical score on the bFNE, and 4.09 times more likely to have a clinical score on the BICI.

3.2.2 Comparison between probable BFRB groups

ANCOVAs (controlling for age, sex, level of education) were conducted to examine clinical differences between the four pBFRB groups. Table 3 provides the means and standard deviations, ANCOVA results, and effect sizes. Post-hoc analyses revealed that those reporting probable skin picking reported a higher level of co-occurring body image concern than those reporting probable hair pulling, nail biting, or lip and check biting or chewing. Those with probable skin picking endorsed a higher level of obsessive-compulsive symptoms than those with probable nail biting, and a higher level of co-occurring social anxiety than those reporting probable nail biting or lip and cheek biting or chewing.

3.3 Gender differences

Given the preponderance of females in the sample, no statistical gender comparisons were undertaken. The percentage of females and males within each of the pBFRB groups is reported in Table 4. The gender distribution of males and females meeting pBFRB criteria is also expressed in Table 4 as a percentage of the entire (*N* = 1378) sample.

3.4 Quality of Life

3.4.1 Comparisons between pBFRB and healthy control sample

ANCOVAs (controlling for age, sex, level of education) were conducted to examine differences between the pBFRB and the healthy control groups on the SF-36 QoL subscales (see Table 2 for means and standard deviations). There were significant differences between the groups on the subscales examining: physical functioning, F (1, 613) = 11.95, p = .001, $\eta^2 < .01$; limitations due to emotional problems, F (1, 614) = 27.23, p <.001, $\eta^2 = .02$; emotional wellbeing, F (1, 613) = 62.70, $p < .001$, $\eta^2 = .01$; energy, F (1, 607) = 35.79, p < .001, $\eta^2 = .01$; social functioning, F (1, 614) = 25.30, $p < .001$, $\eta^2 = .01$; and general health, F (1, 612) = 13.06, $p < .001$, $\eta^2 < .01$. Across all these domains, the pBFRB group reported experiencing a lower QoL than the healthy control group. There were no significant differences found on the subscales examining limitations due to physical health, F (1, 614) = 4.32, p = .038, $\eta^2 < .01$; pain, F (1, 614) = 4.59, p = .033, $\eta^2 < .01$; and health change, F (1, 614) = 1.75, p = .187, $\eta^2 < .01$.

3.2.2 Comparison between probable BFRB groups

ANCOVAs (controlling for age, sex, level of education) were conducted to examine differences on the SF-36 QoL subscales between the four pBFRB groups. Table 5 provides the means and standard deviations, ANCOVA results, and effect sizes. There were no significant differences between the groups.

4.0 Discussion

This paper presents data drawn from a non-clinical sample of adults to consider the prevalence of probable BFRB disorders, that is, hair pulling, skin picking, nail biting, and lip or cheek biting and chewing. The study also sought to examine the relationship between these conditions on a range of clinical correlates and QoL variables. From the total sample

of *N* = 1378, 23% reported any probable BFRB, with 14% reporting probable skin picking (excoriation), 3% reporting probable hair pulling (trichotillomania), 6% reporting probable nail biting, and 6% reported probable lip or cheek biting and chewing. Comparison of prevalence rates between this study and others is complicated by a lack of standardized measures across studies, and the use of a modified version of the MGH-HPS to identify nail, lip and cheek biting and chewing highlights this difficulty. However, these prevalence rates are broadly similar to those reported by Siddiqui et al. who examined prevalence of BFRBs in medical students [12]. They found 22% of their sample reported any BFRB, with 9% of participants engaging in skin picking, 6% in nail biting, and 13% in hair pulling [12]. Other studies provide prevalence data in line with these estimates [7, 8, 10, 13], although differences between studies are likely attributable to methodological differences such as the measures used, samples recruited and the settings for assessment.

Within the current sample, 5% (*n* = 71) reported multiple body-focused behaviors, indicating a significant co-occurrence between the BFRBs. Although the sample size precluded closer examination of these co-occurring body-focused behaviors, these data highlight that BFRBs at pathological levels are not uncommon behaviors in non-clinical populations, and whether one or more BFRBs are reported, they are associated with distress and impairment, therefore deserving further attention.

This paper also sought to determine whether those reporting any pBFRB differed from those not reporting these conditions with regard to demographic variables and their associations with anxiety, depression, OCD, BDD, and fear of negative evaluation. There were some unexpected demographic differences between the pBFRB and healthy control groups, with

the pBFRB group having a female preponderance, being younger and less likely to have a university degree. These demographic variables were controlled in subsequent analyses examining clinical correlates between those with and without pBFRB. In line with hypotheses, the pBFRB group significantly differed from the healthy control group on all clinical constructs of interest. Higher rates of anxiety, depression, OCD symptoms, BDD symptoms, and fear of negative evaluation were found. These findings are consistent with studies conducted with both non-clinical and clinical samples [15, 19-22]. For example, Hayes and colleagues examined correlates of clinically significant skin picking, finding associations with anxiety, depression, OCD symptoms, impulsivity and psychosocial impairment [47]. Houghton and colleagues examined comorbidities associated with hair pulling, finding that 38% had another current psychiatric diagnosis and 79% had another lifetime (present and/or past) psychiatric diagnosis [48]. Hair pulling showed substantial overlap with depression, anxiety, addictive behaviors, and other BFRB disorders [48].

Odd ratios were calculated to examine the association between having any BFRB and scoring above the clinical cut-off on the clinical constructs interest. The presence of a BFRB places an individual at 2-4 times greater risk of having significant mental health symptoms across all the constructs examined.

The examination of clinical correlates between the different pBFRB groups revealed some surprising differences. It was hypothesized that nail biting and lip or cheek biting/chewing may show a reduced association with anxiety, depression, OCD, BDD and FNE, given that they may be considered more normative behaviors and perhaps less pathological than hair pulling or skin picking. To the contrary, there were no differences between hair pulling, nail

biting and mouth chewing behaviors. Post hoc analyses revealed that individuals reporting skin picking reported greater levels of body image concern than those in other pBFRB groups. Individuals with pathological skin picking reported higher levels of obsessive-compulsive and social anxiety symptoms as compared to individuals reporting pathological nail biting; and higher levels of social anxiety symptoms as compared with those with lip or cheek chewing behaviors. One possible explanation for these results is that skin picking is one of the more impairing of the BFRB disorders, rather than nail biting and lip or cheek biting and chewing being least impairing. Although extant research highlights that excoriation disorder is a highly distressing condition (e.g. [19]), few studies have allowed for comparison between the different BFRB conditions. Ongoing investigation into similarities and differences within clinically diagnosed groups of individuals with BFRBs may be a worthwhile endeavor, offering potential to inform further development and differentiation of treatment approaches.

Another possibility is that the BFRBs, rather than being separate entities, are different manifestations of a single underlying latent tendency. This is a relatively new conceptualization, although certainly one with emerging empirical support and one that accounts for the comorbidity frequently observed between the BFRB conditions. Maraz et al. examined hair pulling, skin picking and nail biting in a non-clinical population, finding that these behaviors were best represented by a single underlying latent factor which these authors termed a pathological grooming factor [49]. Monzani et al. reported a similar finding [50]. They investigated a broader range of obsessive-compulsive and related disorders (OCRDs) in a large sample of adults from the TwinsUK adult population-based twin register (OCD, BDD, hoarding disorder, hair pulling and skin picking) [50]. They found a

model with two underlying latent factors provided the best fit to the data; the first factor with substantial loadings on all included OCRDs, although hair pulling and skin picking had substantially weaker loadings on this factor than the other conditions [50]. However, the second latent factor, strongly genetically influenced, loaded exclusively on hair pulling and skin picking, suggesting genetic influence exclusive to these two conditions (other BFRBs were not tested)[50]. In line with Maraz et al. [49] the authors concluded that the BFRBs may represent alternative phenotypic expressions of the same condition [50].

Unfortunately, statistical gender comparisons were unable to be made due to the large preponderance of female participants within the sample. We hypothesized that more females than males would engage in all BFRB behaviors. The frequency data for those with any probable BFRB suggests that there is a female preponderance. However, when looking at gender rates of each probable BFRB, expressed as a percentage of the whole sample, it appears that females are more likely to engage in hair pulling and skin picking than males, and this is consistent with other studies (e.g. [15, 47]). The trend in our data suggests that males may be equally likely to engage in pathological nail biting and lip or cheek biting and chewing, and this is consistent with data reported by Pacan et al. [17]. Gender differences in all BFRBs need to be corroborated in future research with a sample that succeeds in recruiting an equal number of male and female participants.

The final aim was to examine whether the BFRBs were associated with impairment in QoL. We expected that those with any pBFRB would experience a reduced QoL in comparison to healthy controls. This hypothesis was partially supported. Results indicated that those reporting pBFRB experienced reduced QoL compared to controls in the domains of physical

functioning, limitations due to the role of emotional problems, emotional wellbeing, social functioning, energy, and general health. From the design of the current study, it is impossible to conclude with any certainty whether reduced QoL occurs as a result of the BFRBs, or perhaps as a result of the many co-occurring mental health symptoms that individuals with probable BFRBs experience. For example, there is preliminary evidence to suggest that depressive symptoms were the only significant predictor of QoL impairment in individuals with hair pulling disorder [48]. Further research is therefore required to examine the QoL impairment attributable to BFRBs once variability associated with co-occurring mood and anxiety symptoms are partialled out.

Somewhat surprisingly, there were no significant differences between the pBFRB and healthy control group on the QoL domains of limitations due to physical health, pain, and health change. Perhaps this reflects the nature of the conditions themselves, in that the BFRB conditions are associated with emotional distress and reduction in socio-emotional QoL indicators, rather than physical health impairment. When the QoL domains were compared between each of the probable BFRB conditions, there was no significant differences observed. Again, this was somewhat surprising, however it may reflect the fact that this study focused particularly on pathological levels of body-focused behaviors and once this threshold is reached, QoL is impaired regardless of the type of pathological grooming behavior that individuals engaged in.

In practice, when a clinician is presented with a person who exhibits any BFRB, this study indicates that there will be a greater likelihood of significant anxiety, depression, OCD, BDD, and fear of negative evaluation than that observed in the general population. Furthermore,

there is also likely QoL impairments to the individual's emotional wellbeing, social functioning and general health. Therefore, individuals presenting with any BFRB should be carefully screened for presence of other comorbid disorders. This screening should not differ based on the behavior presented as the data contained herein suggests that impairment and comorbidities are essentially the same for those with pathological hair pulling and skin picking, as well as those with the lesser known BFRBs of nail biting or lip or cheek biting and chewing. Grooming behaviors at a pathological level are clearly associated with co-occurring symptoms and reduced QoL.

What is unknown from this research, given the cross-sectional nature of the study, is whether the BFRBs make an individual vulnerable to the later development of co-occurring mental health symptoms or disorders, or indeed, whether the presence of symptoms of more common mental health disorders make individuals more vulnerable to engage in pathological grooming behaviors. It is possible that individuals with anxiety or mood symptoms are highly vulnerable to engaging in body focused repetitive behaviors as a means of regulating negative emotions, and there is some evidence to indicate that BFRBs may serve an emotion regulation function [51, 52]. Alternatively, it may be that BFRBs are driven by a genetic vulnerability to engage in pathological grooming behavior [49, 50], which then contributes to the development of negative emotions such as guilt, shame, and anxiety. Thus, BFRBs may contribute to the etiology of internalizing mental health disorders. Longitudinal research with a large sample of individuals would be required to establish causal pathways, and it is highly likely that there are bidirectional relationships between BFRBs and other mental health conditions.

4.1 Strengths and Limitations

There are a number of significant strengths to this study, including the recruitment of a large sample of participants, and assessment of the lesser studied BFRBs in a non-clinical sample. The paper also reported comparisons between the BFRB conditions, revealing that at pathological levels, all BFRBs are associated with significant symptoms of mental health distress and reduced QoL. Although we found few differences between the BFRB groups with regard to their association with mental health symptoms and QoL domains, it would be helpful for future research to further investigate this with clinically diagnosed participant groups, as there were trends in the data to indicate that nail biting may show less of an association with clinical variables, while skin picking may show increased association.

There are several limitations to this study which deserve mention. Given the lack of psychometrically sound measures of nail biting and lip or cheek biting and chewing, a modified version of the MGH-HPS scale was used to identify these behaviors. Although we used the cut-off scores previously applied to pathological hair-pulling, to the identification of those with pathological nail biting and lip or cheek biting, the use of the same criterion to these behaviors has not been previously established. However, as the percentage of our sample who fell beyond the cut-off identified was toward the low end of previously reported prevalence rates, the cut offs used here may be conservative and are likely to indicate that the participants did indeed exhibit a pathological level of the behavior. Similarly, no clinical cut-off has been established for the SPS-R; the cut off score associated with the SPS was applied to the SPS-R, revealing a prevalence of skin picking behavior that falls within previously reported prevalence rates.

Another limitation to the online method of data collection was that it precluded any opportunity to conduct more rigorous face-to-face or telephone interviews to determine possible diagnosis, and participants may not have taken as much care as they would have had they been taking the survey in a room with a researcher. However, this limitation has recently received attention, with studies finding similar responses from online and pencil-and-paper tests (e.g. [53-55]). Furthermore, results herein indicate that online survey methods may be used to identify those who could then be followed up to assess the behaviors of concern in greater depth.

In examining the gender analyses, this study did not include participants who indicated they were gendered 'other', due to the small number of participants who responded as such. However, due to the growing literature indicating LGBTIQA people suffer from significant mental health problems (e.g. [56-58]), an important direction for future research would be exploring the associations between sexual orientation, gender identity and BFRBs. Female participants outweighed male participants in this study, possibly due to the higher number of females who were interested in the study description, were interested in participating in the research or were enrolled in psychology at the universities involved. However, future research could also more carefully investigate gender differences on each of the BFRBs as our preliminary evidence suggests that there may not the be same female preponderance in nail biting and lip or cheek biting as is frequently observed in hair pulling and skin picking.

5.0 Conclusion

In conclusion, this study sought to examine clinical correlates and prevalence rates of probable BFRBs of hair pulling, skin picking, nail biting, and lip or cheek biting and chewing.

Using a large non-clinical sample, there were significant differences between those with pBFRB and those without across all correlates considered. Participants with any pBFRB reported greater levels of anxiety, depression, OCD, BDD, and fear of negative evaluation. The impairments to QoL were domain specific, although broadly indicated that those with any pBFRB experienced reduced QoL in comparison to those without. No differences in the QoL domains of physical health and pain were found, perhaps because BFRBs have a greater impact upon social-emotional health than on physical health. Unexpectedly, demographic differences were observed between those with pBFRBs and those without, and any BFRB was associated with being female, younger, and less likely to have a university degree. The expected differences between the pBFRB conditions were not observed. There were few significant differences between the BFRBs on the associations with the clinical variables, although results suggest that skin picking may be associated with slightly greater levels of body image concern, social anxiety, and obsessive-compulsive symptoms. No QoL differences were observed between the pBFRB conditions. The most parsimonious explanation for the results may be that the BFRBs are different manifestations of a single underlying genetic vulnerability. Given the cross-sectional nature of the study, the direction of effect between BFRBs and mental health symptoms cannot be determined, nonetheless, it is highly likely that there are reciprocal and bidirectional associations between BFRBs and the negative emotional states of anxiety, depression, OCD and BDD. Longitudinal research would be a welcome contribution to this field. These results underscore the importance on ongoing research and clinical inquiry into the BFRB conditions in order to better understand vulnerability and etiological factors, as well as developing targeted treatments.

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Table 1

Participant demographic and clinical characteristics for the total N = 1378 sample (with calculated probability for comparison between participants recruited via MOOC or via undergraduate student research participation schemes).

Characteristic	*N* = 1378	Recruitment Method		
		Undergraduate psychology students (*n* = 301)	MOOC participants (*n* = 1077)	Calculated probability of difference between undergraduate students and MOOC participants (*p*)
Sex, % (*n*)				
Male	27% (377)	18% (55)	30% (322)	<.001
Age, years				
Mean (*SD*)	33.35 (14.34)	23.05 (8.77)	36.27 (14.27)	<.001
Level of education, % (*n*)				
Completed university degree	56% (774)	15% (44)	68% (730)	<.001
BFRB Measures, mean (SD)				
MGH-HPS	1.97 (4.55)	2.24 (4.68)	1.89 (4.51)	.23
SPS-R	3.11 (4.96)	3.59 (5.37)	2.98 (4.83)	.07
NBS	3.39 (6.09)	5.88 (6.71)	4.14 (6.27)	.05
LIPS	4.52 (6.41)	4.02 (6.54)	3.21 (5.94)	<.001
Clinical characteristics, mean (SD)				
DASS-A	4.18 (4.00)	4.84 (3.96)	3.99 (3.99)	.001
GAD-7	6.85 (5.67)	7.59 (5.77)	6.64 (5.63)	.010
PHQ-9	8.08 (6.52)	8.72 (6.49)	7.90 (6.52)	.055
OCI-R	16.00 (12.58)	19.04 (13.98)	15.14 (12.03)	<.001
SIAS-6	6.02 (5.31)	6.70 (5.49)	5.83 (5.24)	.012
SPS-6	5.16 (5.82)	6.22 (6.02)	4.87 (5.73)	<.001
bFNE	35.67 (11.13)	38.31 (10.38)	34.94 (11.23)	<.001

BICI	46.23 (17.43)	52.73 (17.94)	44.41 (16.85)	<.001
Quality of life sub-scales, mean (SD)				
Physical functioning	86.30 (19.78)	88.49 (17.67)	85.68 (20.30)	.019
Limitations due to physical health	76.09 (34.69)	77.91 (33.45)	75.58 (35.03)	.304
Limitations due to emotional problems	58.59 (42.06)	57.36 (42.71)	58.93 (41.89)	.568
Emotional wellbeing	62.17 (22.17)	60.31 (20.82)	62.69 (22.52)	.085
Energy	46.42 (21.71)	41.98 (19.31)	47.68 (22.20)	<.001
Social functioning	71.44 (26.18)	72.01 (24.40)	71.28 (26.67)	.651
Pain	77.04 (21.48)	79.52 (19.44)	76.35 (21.98)	.016
General health	62.62 (21.90)	59.58 (20.04)	63.47 (22.32)	.004
Health change	57.57 (24.49)	55.65 (24.61)	58.11 (24.45)	.125

N.B. Higher scores on all BFRB measures and clinical variables indicate greater severity. Higher scores on the QoL scales indicate a higher [better] QoL. BFRB: Body focused repetitive behavior; DASS-A: Depression Anxiety Stress Scale – Anxiety Scale; GAD-7: Generalized Anxiety Disorder – 7; PHQ-9: Patient Health Questionnaire – 9; OCI-R: Obsessive Compulsive Inventory – Revised; SIAS-6: Social Interaction Anxiety Scale; SPS-6: Social Phobia Scale; bFNE: Brief Fear of Negative Evaluation Scale; BICI: Body Image Concerns Inventory.

Table 2

Means and standard deviations of the probable BFRB group, healthy control group and random sample of healthy controls (with calculated probability for comparisons between the full and randomly generated healthy control samples).

Demographic and clinical characteristic	Probable BFRB group (*n* = 318)	Healthy control group (*n* = 1060)	Random sample of healthy control group (*n* = 318)	Calculated probability of difference between full healthy control sample and randomly generated healthy control samples (*p*)
Sex, % (*n*)				
Male	19% (60)	30% (317)	30% (96)	.923
Age, years				
Mean (*SD*)	28.88 (11.66)	34.71 (14.80)	35.36 (14.35)	.489
Level of education, % (*n*)				
Completed university degree	48% (152)	59% (622)	59% (187)	.911
BFRB Measures, mean (SD)				
MGH-HPS	5.02 (7.06)	1.05 (2.91)	1.09 (2.92)	.830
SPS-R	8.89 (6.74)	1.37 (2.30)	1.23 (2.25)	.339
NBS	8.13 (8.97)	1.96 (3.90)	2.07 (3.95)	.660
LIPS	9.71 (8.32)	2.96 (4.70)	2.50 (4.36)	.120
Clinical characteristics, mean (SD)				
DASS-A	6.28 (4.58)	3.55 (3.57)	3.27 (3.62)	.278
GAD-7	9.93 (6.06)	5.93 (5.20)	5.31 (4.88)	.059
PHQ-9	11.49 (6.81)	7.06 (6.07)	6.45 (5.52)	.109
OCI-R	22.00 (14.63)	14.22 (11.32)	13.79 (11.46)	.554
SIAS-6	8.60 (5.92)	5.24 (4.86)	4.99 (4.73)	.418
SPS-6	7.90 (6.40)	4.34 (5.37)	4.52 (5.50)	.602

bFNE	40.38 (10.85)	34.26 (10.83)	34.28 (10.91)	.977
BICI	56.31 (17.38)	43.20 (16.28)	43.22 (16.71)	.985
Quality of life sub-scales, mean (SD)				
Physical functioning	82.70 (21.57)	87.38 (19.09)	87.98 (16.94)	.614
Limitations due to physical health	69.48 (37.22)	78.07 (33.66)	75.00 (35.52)	.159
Limitations due to emotional problems	42.17 (42.09)	63.51 (40.81)	65.62 (40.31)	.418
Emotional wellbeing	50.42 (21.73)	65.69 (21.08)	67.65 (20.92)	.145
Energy	37.40 (19.32)	49.13 (21.67)	50.32 (20.58)	.385
Social functioning	60.41 (27.83)	74.74 (24.74)	74.80 (25.07)	.970
Pain	71.73 (23.13)	78.63 (20.72)	76.26 (21.54)	.077
General health	54.84 (22.03)	64.95 (21.32)	65.05 (29.79)	.947
Health change	56.29 (26.71)	57.96 (23.79)	56.23 (23.34)	.254

N.B. Higher scores on all BFRB measures and clinical variables indicate greater severity. Higher scores on the QoL scales indicate a higher [better] QoL. BFRB: Body focused repetitive behavior; DASS-A: Depression Anxiety Stress Scale – Anxiety Scale; GAD-7: Generalized Anxiety Disorder – 7; PHQ-9: Patient Health Questionnaire – 9; OCI-R: Obsessive Compulsive Inventory – Revised; SIAS-6: Social Interaction Anxiety Scale; SPS-6: Social Phobia Scale; bFNE: Brief Fear of Negative Evaluation Scale; BICI: Body Image Concerns Inventory.

Table 3

Comparison between pBFRB groups on clinical variables.

Measure	Mean scores (*SD*)				Differences between groups		
	Probable hair pulling (trichotillomania)	Probable skin picking (excoriation disorder)	Probable nail biting	Probable lip or cheek biting and chewing	*F*	*p*	η^2
DASS-A	6.22 (4.68)	6.09 (4.33)	4.14 (3.51)	6.33 (4.73)	1.76	.155	.01
GAD-7	9.00 (7.58)	9.11 (5.22)	8.37 (5.99)	9.82 (6.34)	0.84	.473	<.01
PHQ-9	9.30 (8.15)	11.12 (5.91)	9.08 (5.88)	10.56 (7.05)	0.84	.471	<.01
OCI-R	16.86 (13.07)	21.90 (13.64)[b]	14.72 (10.96)[a]	20.74 (14.00)	3.50	.016	.01
SIAS-6	8.61 (5.24)	8.93 (5.66)	6.55 (5.86)	8.49 (6.21)	1.90	.130	.01
SPS-6	8.61 (6.35)[a]	8.13 (6.08)[b]	5.43 (5.25)[a]	7.85 (6.67)[a]	3.04	.030	.01
bFNE	41.61 (8.75)	39.92 (10.80)	37.39 (10.58)	40.00 (10.20)	1.26	.288	<.01
BICI	50.87 (20.86)[a]	56.87 (15.17)[b]	50.49 (15.89)[a]	52.21 (18.11)[a]	4.75	.003	<.01

N.B. DASS-A: Depression Anxiety Stress Scale – Anxiety Scale; GAD-7: Generalized Anxiety Disorder – 7; PHQ-9: Patient Health Questionnaire – 9; OCI-R: Obsessive Compulsive Inventory – Revised; SIAS-6: Social Interaction Anxiety Scale; SPS-6: Social Phobia Scale; bFNE: Brief Fear of Negative Evaluation Scale; BICI: Body Image Concerns Inventory.

Table 4

Percentages (and number) of males and females in the pBFRB conditions (also expressed as a percentage of the entire sample).

	pBFRB Group (*n* = 318)		Total Sample (*N* = 1378)	
BFRB	Males	Females	Males (*n* = 377)	Females (*n* = 996)
Probable hair pulling (trichotillomania)	14% (*n* = 3)	86% (*n* = 19)	<1%	2%
Probable skin picking (excoriation disorder)	19% (*n* = 26)	81% (*n* = 110)	7%	11%
Probable nail biting	22% (*n* = 11)	78% (*n* = 38)	3%	4%
Probable lip or cheek biting and chewing	21% (*n* = 8)	80% (*n* = 31)	2%	3%

Table 5

Comparison between pBFRB groups on the QoL sub-scales from the Short Form-36.

Measure	Mean scores (*SD*)				Differences between groups		
	Probable hair pulling (trichotillomania)	Probable skin picking (excoriation disorder)	Probable nail biting	Probable lip or cheek biting and chewing	F	*p*	η^2
Physical functioning	85.65 (19.27)	81.48 (21.66)	86.15 (21.71)	83.16 (21.13)	0.91	.435	<.01
Limitations due to physical health	69.57 (42.62)	68.15 (37.21)	79.60 (30.48)	70.51 (37.55)	1.46	.226	<.01
Limitations due to emotional problems	52.17 (46.95)	42.17 (40.74)	49.31 (40.67)	42.98 (44.46)	0.18	.909	<.01
Emotional wellbeing	53.74 (25.44)	52.42 (18.85)	55.42 (20.61)	52.11 (22.94)	.243	.867	<.01
Energy	46.52 (20.53)	39.02 (19.41)	40.63 (16.16)	33.55 (21.90)	1.02	.386	<.01
Social functioning	54.89 (29.37)	61.27 (25.09)	73.70 (24.49)	61.84 (29.49)	2.13	.098	<.01
Pain	77.07 (17.49)	72.70 (21.78)	76.38 (21.06)	69.74 (26.77)	0.83	.476	<.01
General health	58.70 (19.78)	54.09 (21.18)	59.38 (21.19)	56.71 (26.18)	0.92	.432	<.01
Health change	58.70 (28.81)	55.51 (27.16)	57.14 (25.52)	62.18 (26.20)	2.19	.090	<.01

N.B. Higher scores on QoL measures indicate a better QoL.