UNIVERSITÉ DU QUÉBEC À MONTRÉAL

EVALUATION OF AN EMOTION REGULATION MODEL FOR BODY-FOCUSED REPETITIVE BEHAVIOURS

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LIST OF ABBREVIATIONS AND ACCRONYMS

AAQ Acceptance and Action Questionnaire

AEBT ACT-Enhanced Behaviour Therapy

ACT Acceptance and Commitment Therapy

ANOVA Analysis of Variance

ARS Affective Rating Scale

ARR Affective Regulation Rating

BDD Body Dysmorphic Disorder

BFRB Body-Focused Repetitive Behaviour

CBT Cognitive-Behavioural Therapy

CB Cognitive-Behavioural

CGI Clinical Global Improvement Scale

COM-B Comprehensive Behavioural Model

DSM Diagnostic and Statistical Manual of Mental Disorders

DBT Dialectical Behaviour Therapy

DERS Difficulties in Emotion Regulation Scale

EFT Emotion-Focused Therapy

ER Emotion Regulation

FMPS Frost Multidimensional Perfectionism Scale

GAD Generalized Anxiety Disorder
GSI Global Severity Index (on the SCL 90-R)

HP Hair-pulling

HRT Habit Reversal Training

HTS Hair-pulling Triggers Scale

MAC Minimal Attention Control

MGH-HPS Massachusetts General Hospital Hair-Pulling Scale

MIDAS Milwaukee Inventory for Dimensions of Adult Skin-Picking

MIST-A Milwaukee Inventory for Subtypes of Trichotillomania—Adult Version

MSACL Modified Stress Arousal Checklist

NMR Generalized Expectancy for Negative Mood Regulation

NB Nail-biting

NIMH-TIS National Institute for Mental Health-Trichotillomania Impact Scale

NIMH-TSS National Institute for Mental Health-Trichotillomania Severity Scale

OC Obsessive-Compulsive

OCD Obsessive-Compulsive Disorder

Personality Assessment Inventory (PAI)

PTSD Post-Traumatic Stress Disorder

SCL-90-R Symptom Checklist-90 Revised

SACL Stress Arousal Checklist

SP Skin-picking

SPD Skin-picking Disorder

SPIS Skin-picking Impact Scale

SR Stimulus Regulation

SSRI Selective Serotonin Reuptake Inhibitors

STOP Style of Planning Questionnaire

TTM Trichotillomania

RÉSUMÉ

Les comportements répétitifs centrés sur le corps (CRCC) réfèrent à des comportements tels que s'arracher les poils et les cheveux (trichotillomanie), se gratter la peau (dermatillomanie) et se ronger les ongles (onychophagie). Tandis que bon nombre d'individus adoptent ces comportements à l'occasion et de façon inoffensive, ceux qui souffrent d'un CRCC rapportent une perte de contrôle et des séquelles psychologiques et physiques non négligeables.

Bien qu'ils soient source de détresse, les CRCC semblent calmer une sensation d'envie et procurer une certaine forme de récompense. D'abord, le modèle global de régulation affective postule que les CRCC seraient adoptés afin d'éviter, de moduler ou d'apaiser une émotion considérée déplaisante. La distraction et le soulagement des émotions désagréables viendraient renforcer ces comportements problématiques de sorte qu'ils persistent malgré les conséquences négatives qui en découlent. Le modèle suggère également que les individus aux prises avec des CRCC pourraient souffrir d'un déficit général de la capacité à réguler les émotions. Ensuite, le modèle de l'action contrecarrée ajoute au modèle global de régulation affective en postulant que ceux qui adoptent des CRCC entretiennent un style de planification inadapté qui serait source d'ennui, de frustration, d'impatience et d'insatisfaction. Les CRCC permettraient, selon ce modèle, de soulager ou d'évacuer la tension associée à ces émotions désagréables.

La présente thèse doctorale avait pour objectif de valider empiriquement le modèle global de régulation affective ainsi que le modèle de l'action contrecarrée. Pour ce faire, 24 participants ayant des CRCC (groupe CRCC) et 23 participants sains (groupe de contrôle) ont été comparés à l'aide de questionnaires mesurant la régulation globale des émotions et les habiletés de gestion de certaines émotions spécifiques. Les participants ont ensuite été filmés lors de trois conditions expérimentales destinées à provoquer certaines émotions spécifiques. La fréquence d'apparition des CRCC et l'envie d'adopter des CRCC dans chacune de ces conditions ont été comparées chez les deux groupes.

L'introduction générale offre une introduction aux CRCC. Le modèle global de la régulation affective et le modèle de l'action contrecarrée sont présentés, suivis d'une brève revue des recherches qui les appuient empiriquement. Les objectifs et la méthode du projet de recherche, de même que la structure du document, sont ensuite explicités.

Le chapitre I présente une revue exhaustive de la littérature qui a été publiée dans un périodique scientifique. Cette revue permet de présenter certains termes et concepts qui forment la base des études empiriques présentées aux chapitres subséquents. La conceptualisation, les similarités et les distinctions

phénoménologiques ainsi que les conséquences psychologiques et physiques des trois principaux CRCC sont présentées. Plusieurs modèles sont abordés, dont le modèle de régulation affective, suivis de l'examen des études portant sur la comorbidité et les sous-types de CRCC, les essais cliniques et les recherches menées en milieux naturels et expérimentaux. L'implication de ces écrits scientifiques et les recommandations destinées aux études futures sont discutées.

Le chapitre II présente un deuxième article scientifique soumis pour publication. L'article se penche sur les résultats de questionnaires portant sur la régulation des émotions et administrés aux deux groupes de participants. L'habileté à réguler des émotions spécifiques et la capacité de certaines émotions à provoquer les CRCC ont également été explorées. D'une part, les résultats suggèrent que les participants du groupe CRCC ont davantage de difficulté à réguler les émotions que ceux du groupe de contrôle. D'autre part, ils confirment la contribution de la régulation affective dans l'occurrence et le maintien des CRCC.

Le chapitre III présente un troisième article scientifique soumis pour publication. Cet article présente les résultats d'un protocole expérimental conçu afin d'évaluer l'impact de différentes émotions sur les CRCC et sur l'envie de s'engager dans de tels comportements. Les participants du groupe CRCC et du groupe de contrôle ont été soumis à des conditions expérimentales destinées à provoquer : a) l'ennui/la frustration, b) le stress et c) la relaxation. Tel qu'initialement proposé, les participants des deux groupes ont déclaré un plus grand désir de s'engager dans un CRCC lors de la condition ennui/frustration, mais seulement en comparaison à la condition relaxation. Lors des conditions ennui/frustration et relaxation, l'ennui et l'impatience étaient corrélés avec le besoin de s'engager dans un CRCC chez le groupe CRCC. Enfin, les participants du groupe CRCC ont démontré un style de planification mal adapté ainsi qu'une plus grande impatience et davantage d'insatisfaction dans toutes les conditions en comparaison au groupe de contrôle.

La conclusion générale propose une discussion générale des résultats de cet ouvrage doctoral. En général, les résultats confirment que les individus aux prises avec des CRCC ont une capacité de régulation affective déficitaire. Plus précisément, ils appuient le modèle de l'action contrecarrée et démontre que les CRCC sont liés à un style de planification inadapté, un déficit général dans la capacité à réguler les émotions et à la présence de certaines émotions désagréables, dont l'ennui, la frustration et l'impatience. Les retombées de cette thèse sont discutées et un modèle de l'action contrecarrée révisé est proposé. Enfin, les limites du projet ainsi que les recommandations destinées aux études futures sont présentées.

Mots-clés : comportement répétitif centré sur le corps; trichotillomanie, dermatillomanie, onychophagie; régulation des émotions; régulation affective

ABSTRACT

The term body-focused repetitive behaviours (BFRBs) refers to a group of problematic, injurious, and apparently non-functional behaviours directed toward the body, including hair-pulling (HP), skin-picking (SP), and nail-biting (NB). Although many individuals engage in harmless or occasional body-focused behaviours, individuals with BFRBs report diminished control and a range of physical and psychological sequelae.

Although BFRBs and their consequences create considerable distress, they also seem to satisfy an urge and deliver some form of reward. The emotion regulation (ER) model proposes that BFRBs function as a maladaptive mechanism for regulating negative emotions. Individuals with problematic body-focused behaviours are hypothesized to engage in BFRBs in an effort to avoid, modulate, or alleviate negative affect. HP, SP, and NB persist despite negative consequences because they are reinforced by distraction or relief from negative emotions. The ER model also suggests that individuals with BFRBs are characterized by a global deficit in ER. The frustrated action model is consistent with the global ER model for BFRBs but proposes a more specific hypothesis: Individuals with BFRBs have maladaptive planning styles that generate boredom, frustration, impatience, and dissatisfaction. These negative emotions generate tension, and the tension and emotions are subsequently released via BFRB.

The objective of this thesis research project was to test the global ER model and the frustrated action model. To meet these objectives, 24 individuals reporting BFRBs and 23 control participants were compared on questionnaire measures of global ER and ability to regulate specific emotions. Next, participants completed a series of experimental tasks and conditions designed to elicit boredom/frustration, stress, and relaxation, respectively. Participants were video-recorded in order to compare the extent to which BFRB activity occurred in each condition; subjective urge to engage in BFRB across conditions was also recorded.

The general introduction section consists of an introduction to BFRBs, the global ER model, and the frustrated action model, as well as a brief review of research that supports the models. The objectives and methods of the research project are outlined, as is the structure of the document.

Chapter I consists of a published comprehensive review of the literature on ER and BFRBs, and introduces many of the terms and concepts used in the studies described in chapters II and III. The three most common BFRBs are described, as are the conceptualization, phenomenological similarities and covariation, and psychological and physical impact of BFRBs. Several psychological models are presented, followed by an in-depth review of the ER model, including a review of

studies of comorbidity in BFRBs, naturalistic and experimental studies, studies of BFRB subtypes, and treatment trials. The implications of the findings are discussed, as are recommendations for further research.

Chapter II consists of a second article submitted for publication; the article presents the results of the comparison of the BFRBs group and the control group on questionnaire measures of ER. In addition to global ER, between-group differences in ability to regulate specific emotions were investigated, as well as the relative power of specific emotions to trigger episodes of BFRB. The results indicated that individuals with BFRBs have significantly greater difficulty with global ER than do controls, providing further evidence for the role of ER in explaining the persistence of damaging body-focused behaviours.

Chapter III consists of a third article submitted for publication; this article presents the results of an experimental protocol designed to evaluate the impact of various emotions on BFRB activity and urge to engage in BFRB. A BFRBs group and a control group were placed in conditions designed to elicit (a) boredom/frustration, (b) stress, and (c) relaxation, and were compared across conditions; it was hypothesized that the boredom/frustration condition would trigger the most BFRB and greatest urge to engage in BFRB. The results revealed that participants in both groups experienced greater urge to engage in HP, SP, and NB in the boredom/frustration condition than in the relaxation condition. No differences in urge between the stress condition and boredom condition were reported. In the BFRBs group, boredom and impatience were correlated with urge to engage in BFRBs in the boredom/frustration and relaxation conditions. Finally, the BFRBs group demonstrated greater maladaptive planning styles and experienced greater impatience and dissatisfaction across all experimental conditions than did the control group. The results support the frustrated action model; implications of the findings are discussed.

The general conclusion constitutes the discussion of the results of the thesis research project. Overall, the results are consistent with prior research in confirming that individuals with BFRBs suffer from global deficits in capacity for ER. More specifically, the results support the frustrated action model by indicating that BFRB may be triggered by a combination of maladaptive planning styles, deficits in ER, and the presence of key emotions such as boredom, frustration, and impatience. The implications of the research project are discussed and a revised frustrated action model is proposed. The limitations of the project are discussed and recommendations are made for future studies.

Keywords: Body-focused repetitive behaviour; trichotillomania; hair-pulling; skin-picking; nail-biting; emotion regulation; affect regulation

INTRODUCTION

The term body-focused repetitive behaviours (BFRBs) refers to a group of problematic, injurious, and non-functional behaviours directed toward the body, including hair-pulling, skin-picking, and nail-biting (O'Connor, Lavoie, Robert, Stip, & Borgeat, 2005; Teng, Woods, Marcks, & Twohig, 2004; Snorrason et al., 2012). Although many individuals engage in harmless or occasional body-focused behaviours that do not cause distress, the term BFRBs refers to behaviours that fall on the maladaptive end of the continuum (Teng et al., 2004). Individuals with BFRBs report diminished control over the behaviour (Schreiber, Odlaug, & Grant, 2011) and a range of physical and psychological sequelae (Diefenbach, Tolin, Hannan, Crocetto, & Worhunsky, 2005).

The present research project focuses exclusively on hair-pulling, skin-picking, and nail-biting to the exclusion of other BFRBs because these three problems are the most clearly defined and have received the most research attention. Pathological hair-pulling and skin-picking are included in the fifth edition of the Diagnostic and Statistical Manual (DSM-5; American Psychiatric Association [APA], 2013) of Mental Disorders as Trichotillomania (Hair-Pulling Disorder; HPD) and Excoriation Disorder (Skin-Picking Disorder; SPD), respectively. Although the sample in the current project includes individuals who did not meet DSM criteria for TTM or SPD, all references to BFRBs in this document refer to chronic behaviour that causes significant distress or impairment in functioning.

Hair-pulling is part of the DSM disorder called trichotillomania (TTM). As per DSM-IV-TR, TTM is characterized by chronic hair-pulling (HP), often resulting in noticeable hair loss; tension immediately prior to pulling; pleasure, gratification, or relief when pulling out hair; and significant distress or dysfunction related to HP. Hair may be pulled out from any area of the body, including the scalp, eyebrows, arms, legs, and pubic area (APA, 2000). The prevalence of TTM using these criteria

is approximately 0.6% (Christenson, Pyle, & Mitchell, 1991; Duke, Bodzin, Tavares, Geffken, & Storch, 2009). However, a considerably greater proportion of the population reports HP that causes distress and impairment but does not meet all the criteria (Duke et al., 2009; Stanley, Borden, Bell, & Wagner, 1994). Furthermore, the criteria for TTM in DSM-5 (APA, 2013; published shortly after this project was completed) no longer include tension prior to pulling relief or gratification after pulling, and the clinical prevalence rate may fluctuate as a result of this change.

Skin-picking is part of the DSM disorder called Excoriation Disorder (Skin-Picking Disorder). As per DSM-5, Skin-Picking Disorder (SPD) refers to recurrent skin-picking (SP) resulting in lesions, with repeated attempts to decrease or stop SP. Symptoms cause clinically significant distress; impairment in social, occupational or other important areas of functioning; and are not better explained by the presence of another mental disorder (APA, 2013). Common sites for picking include easily accessible areas such as the face, upper body, cuticles, and extremities (Arnold, Auchenbach, & McElroy, 2001; Calikuşu, Yücel, Polat, & Baykal, 2003; Wilhelm et al., 1999). The prevalence of SP ranges from 1.4% to 5.4% in various populations (Hayes, Storch, & Berlanga, 2009; Keuthen et al., 2000; Keuthen, Koran, et al., 2010). Prevalence rates must be interpreted with caution due to inconsistent diagnostic criteria across studies; all of the studies on SP listed here were conducted prior to the publication of DSM-5, the first version to formalize the diagnostic criteria for SPD.

Many individuals occasionally use the teeth to replace nail clippers; however, nail-biting (NB) as a BFRB involves recurrent biting past the nail bed and cuticles, often drawing blood, creating scarring, or resulting in red, sore, and infected fingers (Penzel, 1995; Wells, Haines, & Williams, 1998). Reports of NB prevalence are limited by dated research and inconsistent operational definitions across studies. Snyder and Friman (2012) reviewed the literature and tentatively concluded that NB

peaks at puberty, with prevalence rates of 25%-60%, and subsequently declines to 10%-25% in young adults and below 10% in adults over 35. Nail-biting does not constitute an official disorder in DSM-5, but is mentioned in the category of Obsessive-Compulsive and Related Disorders Not Otherwise Specified (NOS).

BFRBs are prevalent and their physical and psychological consequences are considerable (Diefenbach, Mouton-Odum, & Stanley, 2002; Diefenbach et al., 2005; Woods, 2002; Woods, Friman, & Teng, 2001). Chronic HP can result in hair loss, follicle damage, scalp irritation, and changes in the structure and appearance of regrown hair (Christenson & Mansueto, 1999); chronic SP can create scarring, sores, and infections (Woods, Friman, & Teng, 2001); and chronic NB can damage fingers (Salmon-Ehr, Mohn, & Bernard, 1999), gums, (Krejci, 2000), and teeth (Johansson, Fareed, & Omar, 1991).

The social and psychological consequences of BFRBs are also significant. Individuals with TTM often feel unattractive and ashamed of their hair, and may go to significant lengths to camouflage cosmetic damage with makeup, hairstyles, scarves, or wigs. They may avoid swimming, visiting the hairdresser, sexual intimacy, and exposure to windy weather and well-lit areas (Townsley-Stemberger, Thomas, Mansueto, & Carter, 2000). In addition to guilt, shame, and embarrassment about appearance (Bohne et al., 2002), individuals who pick skin report significant social and occupational difficulties as a function of SP (Arnold et al., 2001; Swedo & Rappoport, 1991). Individuals who bite nails may have infected and scarred fingertips (Penzel, 1995), and may be self-conscious and reluctant to show their hands (Williams, Rose, & Chisholm, 2006). Finally, individuals with BFRBs may avoid seeing doctors or dentists out of shame or fear of discovery, resulting in an exacerbation of medical problems associated with BFRBs (Bohne, Keuthen, & Wilhelm, 2005).

To observers, BFRBs are difficult to rationalize: HP, SP, and NB appear to be painful; they produce physical consequences that result in shame and distress; and they seem to be a distraction and a waste of time. However, although BFRBs and their consequences create considerable distress (Bohne et al., 2002; Diefenbach et al., 2005; Diefenbach et al., 2002; Woods, 2002; Woods, Friman, & Teng, 2001), they also seem to satisfy an urge and deliver some form of gratification or reward (APA, 2000; Penzel, 1995). This paradox has prompted researchers to explore etiological models to explain the development and maintenance of BFRBs. One model receiving recent research attention is the emotion regulation (ER) model.

ER refers to the ways in which individuals identify and respond to emotional experiences (Diefenbach et al., 2008). ER can be further understood as the process through which individuals influence the presence, experience, and expression of emotions (Gross, 1998). The ER model for BFRBs proposes that BFRB functions as a maladaptive mechanism for regulating emotion. That is, individuals with problematic body-focused behaviours have difficulty regulating emotions and engage in BFRB in an effort to avoid, decrease, or attenuate negative affect. BFRBs persist despite aversive consequences because they are negatively reinforced by relief from unpleasant emotions (Roberts, O'Connor, & Bélanger, 2013; Teng, Woods, Marcks, & Twohig, 2004). The ER model further suggests that individuals with BFRBs are characterized by global deficits in ER (Shusterman, Feld, Baer, & Keuthen, 2009; Snorrason, Smári, & Ólafsson, 2010). See Figure 1.1

The ER model has been supported by studies that demonstrate change in affective states over the course of BFRB episodes. In clinical and non-clinical samples, individuals with HP and SP consistently report that emotions such as boredom, anxiety, tension, and frustration are present prior to BFRB and decrease during or after episodes of HP or SP (Roberts, O'Connor, & Bélanger, 2013). Guilt, shame, sadness, and anger may develop subsequent to episodes of BFRB, but feelings

of satisfaction, indifference, and relief are often present as well (e.g., Diefenbach, Mouton-Odum, & Stanley, 2002; Neal-Barnett & Stadulis, 2006; Wilhelm et al., 1999; Bohne et al., 2002; Duke et al., 2009; Mansueto, Thomas, & Brice, 2007).

Reported changes in affect subsequent to BFRB support the ER model but do not provide information about the global ability of individuals with BFRBs to regulate affect. Two studies have directly tested the ER model by comparing ER in controls and individuals with BFRBs. In their online sample of 1162 individuals reporting HP and 175 control participants, Shusterman and colleagues (2009) found that hair-pullers reported more difficulty "snapping out" of affective states such as boredom, tension, anxiety, and guilt than did controls. The authors further reported that capacity for ER was correlated with HP severity, and that difficulty regulating particular emotions predicted the degree to which those emotions triggered HP. Snorrason and colleagues (2010) compared individuals with SP and a control group on measures of ER and emotion reactivity (the tendency to experience emotions frequently, intensely, and persistently), and reported that the SP group reported greater difficulties with ER and greater emotion reactivity than did controls.

To date, the literature on emotions and ER in BFRBs has focused on a wide variety of affective states, including but not limited to anxiety, anger, sadness, guilt, shame, tension, frustration, and boredom. However, as the research in this area grows, certain types of emotion have emerged as more relevant than others.

In prior studies, O'Connor and colleagues (O'Connor et al., 2001; O'Connor, Gareau, & Blowers, 1994; O'Connor, Gareau, & Borgeat, 1997; Pélissier & O'Connor, 2004) observed that many individuals with tics and BFRBs demonstrate a style of planning characterized by unwillingness to relax and difficulty with appropriate pacing of tasks. Individuals with this maladaptive planning style often try to do too much at once and feel the need to always be productive. They are consequently susceptible to frustration, impatience, and dissatisfaction when

standards are not met, and to boredom when productivity is impossible. According to O'Connor and colleagues (O'Connor, 2002; O'Connor, 2005), one of the functions of BFRBs may be to release the tension generated by frustrated action. That is, impatience, boredom, frustration, and dissatisfaction build, creating tension; tension and negative emotions are subsequently released or diminished through BFRBs. The term "frustrated action" refers to the sense of being thwarted, inhibited, or hindered (i.e., frustrated) in completing a desired action. Once BFRB is initiated, it is subsequently negatively reinforced by a decrease in negative affect and positively reinforced by the feeling of 'taking action' (i.e., engaging in BFRB) when the initial desired action was thwarted.

The frustrated action model has received indirect research support. Studies that used questionnaire measures to evaluate participants' emotional state during BFRB have found that individuals with BFRBs engage in HP, SP, and NB when they are bored, frustrated, or inactive (Bohne et al., 2002; Diefenbach et al., 2002; Duke, Keeley, Ricketts, Geffken, & Storch, 2010). Results from the few studies that experimentally manipulated emotion in individuals with BFRBs also suggest that boredom and frustration may be more likely than are other emotions to trigger an episode of BFRB, and may be the emotions most likely to be modulated by BFRB (Teng, Woods, Marcks, & Twohig, 2004; Williams, Rose, & Chisholm, 2006).

O'Connor and colleagues (O'Connor, Brisebois, Brault, Robillard, & Loiselle, 2003) asked participants with tics and various BFRBs (TTM, NB, skin-scratching, teeth-grinding) to list the activities during which they were at the greatest and the least risk of engaging in BFRB. Participants reported that BFRB often occurred during sedentary activity. The highest risk activities were passive attendance (e.g., watching TV), study activity (e.g., attending class), transit (e.g., coming home from work), and waiting (e.g., in line); the lowest risk activities were physical exercise, socializing, eating, and manual work. Participants were further asked to appraise the

activities or situations that tended to precipitate BFRB. Individuals with TTM and skin-scratching appraised high-risk activities as boring; individuals with NB appraised high-risk activities as inactive, and individuals with teeth-grinding appraised high-risk activities as unsatisfying. The majority of participants associated tic or BFRB onset with a state of tension.

The frustrated action model hypothesis (i.e., that boredom, frustration, impatience, and dissatisfaction trigger BFRBs) contradicts the popular conceptualization of HP, SP, and NB as 'nervous habits,' and ascribes a more complex nature to BFRBs. This model is nonetheless consistent with the global ER model. The global ER model suggests that individuals with BFRBs have deficits in ER. When a trigger event or situation provokes negative emotions, BFRB functions to alleviate or modulate unpleasant affect, and is negatively reinforced. The frustrated action model also implies that individuals with BFRBs have deficits in ER and that BFRBs are triggered by negative emotions. However, the frustrated action model situates the cycle of trigger event, negative emotion, and BFRB in the context of maladaptive planning styles, specifying that the trigger event or situation involves some form of thwarted or frustrated action. Frustrated action generates feelings of boredom, frustration, impatience, and dissatisfaction, and BFRB serves to modulate the tension generated by these emotions (O'Connor, 2002; O'Connor, Brisebois, Brault, Robillard, & Loiselle, 2003). The frustrated action model thus refines the global ER model and clarifies the processes hypothesized to be at play during an episode of BFRB.

The objective of this thesis research project is to evaluate the global ER model for BFRBs and to experimentally test the frustrated action model. This overall goal is divided into three smaller objectives: a review of the literature, a questionnaire study on the global ER model, and an experimental study on the frustrated action model.

Recognition of the physical and psychological impact of BFRBs has prompted clinicians and researchers to investigate the role of emotion in triggering and maintaining maladaptive body-focused behaviours, generating a body of work that had yet to be summarized and concisely presented. The first objective of this project was to provide an up-to-date synthesis of the research on ER and BFRBs in adults. Databases PsychInfo and MedLine were searched for articles about BFRBs published in the last two decades, limiting the search to articles about HP, SP, and NB. The database search was conducted several times over the course of 1.5 years and over one hundred studies were retrieved. Articles deemed relevant to the scope and objective of the paper were retained. The resulting article focuses on the ER model, with an in-depth review of studies of BFRBs and comorbid psychological symptoms and disorders, naturalistic studies, experimental studies, studies of 'high-risk' emotions, studies of BFRB subtypes, and treatment trials. The article is the first comprehensive narrative review of the empirical data on ER and BFRBs.

The second objective of this research project was to test the global ER model, which proposes that individuals with BFRBs are characterized by deficits in ER and engage in damaging body-focused behaviours to avoid or alleviate negative emotions. To achieve this objective, we compared individuals with BFRBs and a control group on the Difficulties in Emotion Regulation Scale (DERS; Gratz & Roemer, 2004) and the Affective Regulation Scale (ARS; Shusterman, Feld, Baer, & Keuthen, 2009). In addition, we used the ARS to explore between-group differences in ability to regulate specific emotions such as boredom, tension, and anxiety, and used the Hair-Pulling Triggers Scale (Shusterman et al., 2009) to measure the power of specific emotions to trigger episodes of BFRB.

The third objective of this research project was to test the frustrated action model for BFRBs, which suggests that individuals with BFRBs have maladaptive planning styles that predispose them to impatience, boredom, frustration, and

dissatisfaction. These emotions generate tension and the tension and emotions are subsequently released via BFRB. To achieve this objective, we compared BFRB activity and urge to engage in BFRB in a BFRBs group and a control group in experimental conditions designed to elicit boredom/frustration, stress, and relaxation, respectively. We also identified emotions that correlated with the urge to engage in BFRB and compared the intensity of emotion across conditions in the two groups. Finally, we explored between-group differences in style of planning and the relationship between style of planning and capacity for ER.

Chapter I consists of the published comprehensive review of the literature on ER and BFRBs. The article introduces many of the terms and concepts discussed in the thesis, and forms the foundation for the studies described in chapters II and III. The three most common BFRBs are described, as are the conceptualization, phenomenological similarities and covariation, and psychological and physical impact of BFRBs. Several psychological models are presented, followed by an in-depth review of the ER model, including a review of studies of comorbidity in BFRBs, naturalistic and experimental studies, studies of 'high-risk' emotions, studies of BFRB subtypes, and treatment trials. The implications of the findings are discussed, as are recommendations for further research.

Chapter II presents the results of the comparison between the BFRBs group and the control group on questionnaire measures of ER. In addition to global ER, group differences in ability to regulate specific emotions were investigated, as well as the relative power of certain emotions to trigger episodes of BFRB. The results indicate that individuals with BFRBs have significantly greater difficulty with global ER than do controls, providing further evidence for the role of ER in explaining the persistence of injurious body-focused behaviours.

Chapter III presents the results of an experimental protocol designed to test the frustrated action model for BFRBs. A BFRBs group and a control group were compared across conditions designed to elicit boredom/frustration, relaxation, and stress; the primary outcome measure was subjective urge to engage in BFRB. Participants in both groups reported greater urge to engage in BFRB in the boredom/frustration condition than in the relaxation condition. Furthermore, impatience and boredom were correlated with urge to engage in BFRBs, and the BFRBs group had significantly higher scores than did controls on a measure of maladaptive planning style. Finally, the BFRBs group experienced greater impatience and dissatisfaction than did the control group in each experimental condition.

The three scientific articles presented in this thesis project are followed by a general conclusion and discussion of the results of the thesis research project. The three objectives of the project are reviewed and the implications of the results of the articles presented in chapters I, II, and III are discussed. Whereas the literature review (Chapter I) constitutes the first published effort to compile and summarize the literature in this area, the two empirical articles (Chapters II and III) yielded original data that raise new points and generate new avenues for future research. The results of the first empirical study confirm that individuals with BFRBs suffer from global deficits in capacity for ER and that negative affective cues trigger BFRB, providing further evidence for the role of ER in the development and persistence of HP, SP, and NB. The results of the second empirical study demonstrate that BFRBs are not simply "nervous" habits, but rather are complex behaviours triggered by a combination of maladaptive planning style, difficulties with ER, and the presence of key emotions. The general discussion reviews these results in light of the general ER model for BFRBs and the proposed frustrated action model. A refined frustrated action model based on the findings of the research project is introduced. Clinical implications of the model are proposed, and the general discussion concludes with a discussion of the limitations of the project and recommendations for future research.

CHAPTER I

ARTICLE I – EMOTION REGULATION AND OTHER PSYCHOLOGICAL MODELS FOR BODY-FOCUSED REPETITIVE BEHAVIOURS

Abstract

The term body-focused repetitive behaviours (BFRBs) refers to a group of recurrent, problematic, injurious behaviours directed toward the body, including hair-pulling, skin-picking, and nail-biting. Individuals with BFRBs report diminished control over the behaviour and a range of physical and psychological sequelae. Recent research on psychological models for BRFBs has investigated the role of emotion regulation (ER), and many authors in this area have conceptualized problematic body-focused behaviour as a maladaptive ER mechanism. This article organizes and reviews the empirical research on the ER model for BRFBs. First, the three most common BFRBs are described, as are the conceptualization, phenomenological similarities and covariation, and psychological and physical impact of BFRBs. Next, psychodynamic models and several cognitive-behavioural (CB) models are described. The article focuses on the ER model, including a review of studies of comorbidity in BFRBs, naturalistic and experimental studies, studies of subtypes of BFRBs, and treatment trials. The implications of the findings are discussed and the authors make recommendations for future research. The article concludes with a discussion of the limitations of psychological models for BFRBs and the limitations of the review.

Keywords: Body-focused repetitive behaviours; psychological model; emotion regulation; affect; trichotillomania; skin-picking; nail-biting; literature review

1.1 Introduction

The term body-focused repetitive behaviours (BFRBs) refers to a group of problematic, injurious, and apparently non-functional behaviours directed toward the body, including hair-pulling (trichotillomania; TTM), skin-picking, and nail-biting, (Hansen, Tishelman, Hawkins, & Koepke; O'Connor, Lavoie, Robert, Stip, & Borgeat, 2005; Snorrason et al., 2012). BFRBs are recurrent, undesired, and often designed to remove part of the body (e.g., a hair, scab, or nail) (Snorrason, Belleau, & Woods, 2012). Although many individuals engage in harmless "nervous habits" that do not cause them distress, individuals with BFRBs report diminished control over the behaviour (Schreiber, Odlaug, & Grant, 2011) and a range of physical and psychological sequelae (Diefenbach, Tolin, Hannan, Crocetto, & Worhunsky, 2005).

Research into BFRBs has been limited in comparison to research into other psychiatric conditions. Between 1975 and 2000, *PsychLit* database contained 32,471 articles about schizophrenia and 2,489 about bipolar disorder, in comparison to 309 about TTM and fourteen about other BFRBs or about stereotypic movement disorders (Woods & Miltenberger, 2001). However, the past two decades have witnessed a significant increase in research on BFRBs; in particular, there has been increased interest in exploring psychological models for these problems. To date, hair-pulling and skin-picking are the BFRBs that have received the most research attention.

The objective of this article is to provide an up-to-date synthesis of the research on psychological models for BFRBs in developmentally normal adults. The current explosion of interest in acceptance-based treatments for psychological disorders has prompted clinicians and researchers to look more closely at the role of emotion expression, avoidance, and regulation in maladaptive behaviours.

Researchers who study BFRBs have pursued this area, and a number of authors have conceptualized problematic body-focused behaviour as a maladaptive

emotion regulation (ER) mechanism (e.g., Diefenbach, Tolin, Meunier, & Worhunsky, 2008; Shusterman, Feld, Baer, & Keuthen, 2009; Snorrason, Smári, & Ólafsson, 2010; Woods, Wetterneck, & Flessner, 2006), generating a body of work that has yet to be summarized and concisely presented. The present review constitutes the first effort to compile and review the empirical research on the ER model for BFRBs. First, the three most common BFRBs are described, as are subtypes, similarities and covariation between BFRBs, and the psychological and physical impact of BFRBs. Next, to introduce psychological models for these disorders, the psychodynamic model and several cognitive-behavioural (CB) models are described. The article focuses on the ER model, with an in-depth review of studies of BFRBs and comorbid psychological symptoms and disorders, naturalistic studies, experimental studies, studies of particularly relevant emotions, studies of BFRB subtypes, and treatment trials. The implications of findings based on the ER model and recommendations for future research are made. Finally, the article discusses the limitations of psychological models for BFRBs, as well as the limitations of this review.

Databases PsychInfo and MedLine were searched for articles about BFRBs published between 1980 and 2012, using the following search keywords: *emotion regulation* or *affect regulation* or *affective regulation* or *emotion* or *affect* and *trichotillomania* or *TTM* or *hair-pulling* or *skin-picking* or *neurotic excoriation* or *nail-biting* or *onychophagy* or *body-focused repetitive behaviour* or *BFRB*. The search was limited to articles about hair-pulling, skin-picking, and nail-biting because they have received the most research attention and are therefore better defined and documented than are other body-focused behaviours. This search was conducted several times over the course of 1.5 years and over one hundred studies were retrieved. All abstracts were reviewed, and articles deemed to be relevant to the scope and objective of the paper were retained, including articles that provided background or statistical information about BFRBs. The references of retained articles were

reviewed for further relevant articles. Dissertations and non-English-language papers were not retained; papers that did not focus on BFRBs as a primary or comorbid diagnosis were also excluded.

1.2 Body-focused repetitive behaviours

1.2.1 Trichotillomania

Trichotillomania (TTM) is characterized by chronic hair-pulling (HP), often leading to alopecia (i.e., hair loss or baldness). Hair may be pulled out from any area of the body, including the scalp, eyebrows, arms, legs, and pubic area (American Psychiatric Association [APA], 2000). TTM was the only BFRB listed in the fourth edition of the Diagnostic and Statistical Manual of Mental Disorders (DSM-IV-TR; APA, 2000). The diagnostic criteria for TTM in DSM-IV-TR are the following: recurrent pulling out of one's own hair, resulting in noticeable hair loss; feeling of tension immediately prior to pulling out or attempting to pull out hair; sense of pleasure, gratification, or relief when pulling out hair; HP is not better explained by another diagnosis; and HP causes significant distress or dysfunction (APA, 2000). TTM can involve a variety of behaviours not included in the DSM criteria for this disorder; common behaviours include playing with the hair, stroking the hair against the face or mouth, pulling or biting off the bulb at the end of the hair, and swallowing the hair (trichophagia) (Christensen, Pyle, & Mitchell, 1991).

Not every individual who reports HP endorses the criterion of tension prior to pulling and it is not clear whether this criterion refers to tension generated by external factors or to tension generated by efforts to resist the urge to pull. In 1991, Christenson, Pyle, and Mitchell explored the prevalence of TTM in 2579 college students. The authors reported that 0.6% of participants (n = 15) met the DSM diagnostic criteria for current or lifetime TTM; however, when the criteria of tension prior to pulling and gratification or relief from tension after pulling were removed,

1.5% of males (n = 17) and 3.4% of females (n = 47) met the diagnostic criteria. A 1994 survey of 288 college students (Stanley, Borden, Bell, & Wagner, 1994) found that 15.3% reported some form of HP; a more recent study of 830 adults also reported that 0.6% of the sample met the full criteria for TTM, although 6.51% of the sample acknowledged HP unrelated to grooming (Duke, Bozdin, Tavares, Geffken, & Storch, 2009). Discrepancies in the data on TTM prevalence can be attributed to small sample sizes and to differences in diagnostic criteria between studies. It seems prudent to conclude that the prevalence rate of TTM as described by DSM-IV-TR criteria is approximately 0.6%, but that a considerably greater proportion of the population reports subclinical HP. To reflect a more inclusive definition of TTM, an American Psychiatric Association (APA) work group for DSM-5 recommended the removal of the criteria of arousal or tension prior to pulling and relief or gratification following pulling (Stein et al., 2010). The two criteria were removed in DSM-5 (APA, 2013) and the new diagnostic criteria for TTM may yield higher prevalence rates in future studies.

Many studies have reported a higher incidence of TTM in females, but this finding may reflect a treatment-seeking bias. Further, because male hair loss is relatively common, male alopecia caused by HP may not be recognized or treated as TTM (Christenson & Mansueto, 1999). TTM often develops in early adolescence (Christenson, MacKenzie, & Mitchell, 1991; Cohen, Stein, Simeon, et al., 1995). Some research has supported a bimodal distribution of onset, with a peak at the beginning of puberty and an earlier peak between ages two and six years; however, HP in young children tends to remit spontaneously, whereas adolescent HP tends to persist if left untreated (Wilhelm & Margraf, 1993). TTM is considered to be a chronic disorder that fluctuates over time (Flessner, Woods, Franklin, Keuthen, & Piacentini, 2009) and varies from individual to individual (Keuthen, O'Sullivan, & Sprich-Buckminster, 1998).

1.2.2 Skin-picking

Pathological skin-picking (SP) refers to repetitive picking of skin or scabs, causing tissue damage and distress or impairment, in the absence of a dermatological condition (Grant & Odlaug, 2009; Keuthen et al., 2000; Keuthen, Koran, et al., 2010; Stein et al., 2010). Common sites for picking include easily accessible areas such as the face, upper body, cuticles, and extremities (Arnold, Auchenbach, & McElroy, 2001; Calikuşu, Yücel, Polat, & Baykal, 2003). SP may begin as a grooming routine in which small blemishes or skin irregularities are removed; however, in severe cases, individuals create visible damage by using tweezers, pins, or other small instruments to dig into their skin (Keuthen et al., 2000; Penzel, 1995; Wilhelm et al., 1999). SP can be time-consuming, with studies reporting that individuals spend from one hour (Neziroglu, Rabinowitz, Breytman, & Jacofsky, 2008) to nearly three hours (Flessner & Woods, 2006) to over eight hours per day (Arnold et al., 1998) picking skin.

SP was not included as an official diagnosis in DSM-IV, the manual in use at the time this research was conducted. Various diagnostic criteria were proposed, all of which included recurrent or repetitive SP that causes tissue damage or skin lesions, and creates significant distress or impairment (e.g., Arnold et al., 2001; Stein et al., 2010). SP is included as an independent diagnosis in DSM-5, listed as Excoriation Disorder (Skin-Picking Disorder) in the category of Obsessive-Compulsive Spectrum Disorders (APA, 2013).

SP prevalence rates of 1.4% to 5.4% have been reported in various populations, including community samples, college students, dermatology clinic patients, and a large US population sample (Bohne, Wilhelm, Keuthen, Baer, & Jenike, 2002; Hayes, Storch, & Berlanga, 2009; Keuthen et al., 2000; Keuthen et al., 2010). However, reports of the prevalence of SP must be interpreted with caution because all reports were published prior to the publication of DSM-5, that is, prior to the establishment of official diagnostic criteria for SP. SP appears to have a trimodal

age of onset, with SP appearing before age 10, during adolescence or early adulthood (15-21 years), or between ages 30 and 45 years; onset in childhood and adolescence appears to be most common (Odlaug & Grant, 2012). SP appears to be more common among females (Teng, Woods, Twohig, & Marcks, 2002), although this finding may reflect a treatment-seeking bias.

1.2.3 Nail-biting

Nail-biting (NB) refers to an insertion of the fingers into the mouth, with contact between the nails and teeth. Many individuals occasionally use the teeth to replace nail clippers in grooming; however, severe or clinical NB involves biting past the nail bed and cuticles, drawing blood and resulting in chronic scarring, or in red, sore, and infected fingers (Penzel, 1995; Wells, Haines, & Williams, 1998). NB is widely accepted as a simple habit when it does not have negative or distressing consequences, but falls into the category of BFRBs when it leads to social problems or to significant tissue or nail damage (Snyder & Friman, 2012).

The data about the prevalence of NB are inconsistent. Snyder and Friman (2012) reviewed the literature on NB and concluded that the prevalence increases in four- to six-year-olds and peaks during puberty, with a reported prevalence rate varying between 25% and 60%. Between late adolescence and age 35 years, prevalence rates range from 10% to 30%, falling below 10% after age 35. However, much of the literature on this topic is out of date; operational definitions of NB are not clear and the studies may have included NB did not cause distress or injury. In a survey of 286 college students about "repeated actions that appear to serve no useful purpose but that you continue to engage in anyway" (p. 69), Hansen et al., (1990) reported that NB was the second most common behaviour; 63.6% of students endorsed this behaviour, and 14.8% rated it as severe.

1.3 Conceptualization

BFRBs have been variably conceptualized as obsessive-compulsive spectrum disorders (e.g., Bienvenu et al., 2000) and impulse control disorders (APA, 2000). The designation of obsessive-compulsive spectrum disorders is not implausible. Repetitive motor symptoms in BFRBs share features with the repetitive compulsive rituals observed in individuals with obsessive-compulsive disorder (OCD); further, like individuals with OCD, individuals who suffer from HP, SP, or NB perceive the behaviour as difficult to resist, despite aversive consequences (Bohne, Keuthen, & Wilhelm, 2005).

However, differences between BFRBs and OCD have been reported in terms of phenomenological experiences and situational triggers for the behaviour. For example, obsessive thoughts are a prominent feature of OCD, but are less commonly associated with TTM (Keuthen, O'Sullivan, & Sprich-Buckminster, 1998). Individuals with BFRBs report that episodes of body-focused behaviour are likely to occur during sedentary activity (O'Connor et al., 2003; O'Connor, Gareau, & Blowers, 1993) or in the presence of specific emotions (e.g., Duke, Keeley, Ricketts, et al., 2010). In contrast, individuals with OCD report that their repetitive or ritualistic behaviour is often precipitated by 'danger cues' such as dirt or germs (Keuthen, O'Sullivan, & Sprich-Buckminster, 1998); the cues may or may not be accompanied by negative emotion. BFRBs are conceptualized as impulse control disorders because individuals with these problems report diminished control over the behaviour and an urge or craving prior to engaging in the behaviour. Some individuals also report pleasure during BFRB (Schreiber, Odlaug, & Grant, 2011).

1.4 Phenomenological similarities and covariation

There is considerable overlap in phenomenology between HP, SP, and NB. All three behaviours can be triggered by tactile or visual cues (e.g., a kinky hair, a

scab, or a hangnail) and certain postures (e.g., leaning on a table with head or face in hand). All three behaviours are performed primarily when individuals are alone or are not engaged interpersonally, and when the hands are idle (Christenson, MacKenzie, & Mitchell, 1991; Wilhelm et al., 1999; Wilhelm & Margraf, 1993). Episodes of BFRB may occur daily or fluctuate over the course of weeks and months, with periods of limited BFRB, followed by relapse. When engaged in BFRBs, individuals may perform the behaviour unconsciously or may follow a ritual of tactile stimulation wherein picked or pulled pieces of hair, skin, and nail are manipulated (e.g., rolled between the fingers, stroked across the lips) or swallowed (Arnold et al., 1998; Snorrason, Belleau, & Woods, 2012; Wilhelm & Margraf, 1993). Individuals with HP often seek a certain type of hairs to pull, and those with SP often focus on certain types of skin imperfection. In both groups, the sight or the feel of the preferred type of hair or imperfection triggers BFRB episodes (Arnold et al., 1998; Odlaug & Grant, 2008b).

There is frequent covariation between BFRBs (i.e., multiple BFRBs reported by the same individual). Individuals with TTM have been demonstrated to have an elevated incidence of SP and other BFRBs (Christenson & Mansueto, 1999; Simeon et al., 1997), and individuals with SP have an elevated incidence of TTM, among other disorders (Arnold et al., 1998; Odlaug & Grant, 2008b). Stein et al. (2008) investigated body-focused behaviours in individuals who endorsed clinical or non-clinical HP. Seventy percent of their sample reported a second body-focused behaviour; the most common were SP (51%) and NB (30%). Participants also reported lip-biting or cheek-biting (26%), nose-picking (12%), and other behaviours involving the mouth, eyes, skin, and skeleton (e.g., knuckle-cracking, head-banging). In 34 individuals reporting chronic SP, Arnold and colleagues (1998) found that three subjects also reported HP and two subjects reported problem NB. Odlaug and Grant (2008a) found that 25% of skin-pickers and 21.2% of hair-pullers reported problem NB; in a separate sample, 38.3% of adults with pathological SP also reported a

lifetime diagnosis of TTM (Odlaug & Grant 2008b). Du Toit and colleagues (du Toit, van Kradenburg, Niehaus, & Stein, 2001) reported that 63.8% of their sample of clinical and non-clinical hair-pullers reported other self-injurious behaviours such as SP, NB, and lip-biting. Most recently, Snorrason et al. (2012) investigated rates of various BFRBs in a large online sample of individuals reporting SP, in comparison with a sample of college students who did not report SP. The authors found that the prevalence rate of each BFRB measured (HP, NB; nose-picking, cheek-biting) was higher in the SP group than in the comparison group; 29.7% of the SP group reported symptoms consistent with a DSM diagnosis of TTM, and 83.4% of the SP sample reported a lifetime history of at least one additional BFRB.

Some of the studies described in this section suffered from methodological considerations such as failure to include a control group or failure to carefully define HP or SP. Snorrason, Belleau, and Woods (2012) carefully evaluated studies that reported the prevalence of SP in HP samples, as well as studies that reported the prevalence of HP in SP samples, and tentatively concluded that the rate of covariation is greater than what could be expected by chance.

The topographical similarities and frequent covariation across BFRBs supports the conceptualization of BFRBs as a group of related problematic body-focused behaviours that share phenomenology, and highlights the relevance of research into etiological models that apply to BFRBs as a cohesive group.

1.5 Impact

The disparity in the quantity of research about BFRBs and research about other psychiatric disorders may reflect the perception that BFRBs are less severe than are other conditions, a perception that may account for delays and deficits in research and treatment (Duke, Keeley, Geffken, et al., 2010). However, BFRBs are prevalent and their physical and psychological consequences can be serious (Diefenbach,

Mouton-Odum, & Stanley, 2002; Diefenbach et al., 2005; Woods, 2002; Woods, Friman, & Teng, 2001). Physically, chronic HP can result in hair loss, follicle damage, scalp irritation, changes in the structure and appearance of regrown hair, enamel erosion and gingivitis (from hair mouthing; Christenson & Mansueto, 1999), and repetitive strain injuries such as carpal tunnel syndrome (O'Sullivan, Keuthen, Jenike, & Gumley, 1996). Chronic SP can create scarring, sores, and infections (Woods, Friman, & Teng, 2001). In an online study of SP impact, nearly 75% of participants reported that SP had resulted in "moderate" skin damage (Tucker, Woods, Flessner, Franklin, & Franklin, 2011). In addition to damaging the nails, NB can damage fingers (Salmon-Ehr, Mohn, & Bernard, 1999), gums, (Krejci, 2000), and teeth (Johansson, Fareed, & Omar, 1991).

Although the physical sequelae of BFRBs are significant, the social and psychological consequences are also of concern. Individuals with TTM often feel unattractive and ashamed of their hair, and may go to significant lengths to camouflage cosmetic damage with hairstyles, make-up, and headscarves or wigs. They may avoid swimming, visiting the hairdresser, sexual intimacy, and exposure to windy weather and well-lit areas (Townsley-Stemberger, Thomas, Mansueto, & Carter, 2000). A 2006 internet survey of 1697 individuals with self-reported symptoms consistent with TTM found that HP interfered mildly to moderately with work and academic functioning, household tasks, and interpersonal relationships (Woods, Flessner, et al., 2006; Woods, Wetterneck, & Flessner, 2006). In addition to guilt, shame, and embarrassment about appearance (Bohne et al., 2002), individuals who pick skin report significant social and occupational difficulties as a function of SP (Arnold et al., 2001; Swedo & Rappoport, 1991). In a 2011 online survey of 760 individuals reporting pathological SP, 62.5% reported avoiding social events and 57.7% reported some avoidance of going out in public (Tucker et al., 2011). For their part, individuals who bite their nails may have red, infected, and scarred fingertips (Penzel, 1995), and may be self-conscious and reluctant to show their hands

(Williams, Rose, & Chisholm, 2006). Finally, individuals with BFRBs may avoid seeing doctors or dentists out of shame or fear of discovery, resulting in an exacerbation of medical problems associated with BFRBs (Bohne, Keuthen, & Wilhelm, 2005). Given these findings, it is intuitive that individuals with BFRBs report elevated rates of affective distress and symptoms of psychological disorders (e.g., Arnold et al., 1998; Calikuşu et al., 2003; Duke et al., 2009; Hajcak, Franklin, Simons, & Keuthen, 2006; Teng, Woods, Marcks, & Twohig, 2004).

1.6 Etiology and psychological models

To observers, BFRBs are difficult to rationalize: HP, SP, and NB appear to be painful; they produce physical consequences that result in shame and distress; and they seem to be a distraction and a waste of time. However, although BFRBs and their sequelae create considerable distress (Bohne et al., 2002; Diefenbach et al., 2005; Diefenbach et al., 2002; Woods, 2002; Woods, Friman, & Teng, 2001), they also seem to satisfy an urge and deliver pleasure or gratification (APA, 2000; Penzel, 1995), and do not necessarily cause physical pain. Psychological models for BFRBs have sought to include each of these elements in the explanation of the development and maintenance of the behaviour.

Although comparison of multiple types of etiological model constitutes a valuable exercise, to adequately review psychological models for BFRBs, this article does not address ethological or neurobiological models. Psychodynamic and cognitive-behavioural (CB) models are presented, followed by an in-depth discussion of one CB model: the ER model. Although much of the literature focuses on HP and SP, the discussion here applies to all BFRBs.

1.6.1 Psychodynamic model

Etiological models based on the psychoanalytic perspective conceptualize TTM and other BFRBs as a symbolic representation of unresolved unconscious conflicts (e.g., Greenberg & Sarner, 1965, Tattersall, 1992), or as the result of disrupted psychosexual development, (e.g., Friman, Finney & Christophersen, 1984). Psychodynamic models based on object relations propose that BFRBs represent an effort to cope with real or threatened object loss (e.g., Krishnan, Davidson, & Guajardo, 1985). In these models, BFRB symbolizes hatred, self-castration, or the replacement of a love object (Friman, Finney, & Christophersen, 1984). Some researchers (e.g., Singh & Maguire, 1989) have proposed a relationship between TTM and childhood trauma such as physical or sexual abuse, but this hypothesis has not been substantiated (e.g., Christenson, MacKenzie, & Mitchell, 1992). A 2006 study of the relationship between trauma, post-traumatic stress disorder (PTSD), and TTM found that the rate of trauma (76%) in the sample of individuals with TTM (N = 42) was similar to that observed in the general population, and that the rate of PTSD (19%) was similar to that observed in general psychiatric populations (Gershuny, Keuthen, Gentes, et al., 2006). A negative relationship between TTM symptoms and PTSD symptoms was observed, and the authors hypothesized that TTM may constitute a form of self-soothing, effectively reducing PTSD symptoms. Overall, there is little empirical data to support the psychodynamic model for BFRBs.

1.6.2 Behavioural and cognitive-behavioural models

Behavioural models for BFRBs explain how seemingly self-defeating and self-punishing behaviour is maintained by learning, practice, and repetition. Cognitive-behavioural (CB) models add that maladaptive behaviours are often triggered by distorted or unhelpful thoughts; the thoughts are generated in certain situations, and subsequently trigger negative emotions and/or maladaptive behaviour.

Behavioural and CB models for psychopathology further assume that maladaptive behaviour is maintained by positive or negative reinforcement.

The three models discussed here are the Comprehensive Behavioural (ComB) (Mansueto, Stemberger, Thomas, & Golomb, 1997; Stemberger, Stein, & Mansueto, 2003) model, the Emotion Regulation (ER) model, and the Stimulus Regulation (SR) model (Penzel, 2002). The ComB model is an inclusive model that proposes that the urge to engage in BFRB is triggered by internal and external cognitive, affective, and environmental cues; facilitated or inhibited by the internal or external environment; and positively and negatively reinforced via positive emotion and relief from negative emotion. The ER model similarly acknowledges that BFRBs may provide positive reinforcement via tactile stimulation. However, this model focuses on negative reinforcement of BFRB through relief from painful or unpleasant affect, and further proposes that individuals with BFRBs suffer from global deficits in ER. The SR model also proposes a key role for reinforcement, but suggests that rather than alleviating negative emotions, BFRB provides distraction and relief from overstimulation, and provides stimulation for individuals who are understimulated. In both cases, the behaviour is reinforced by the reward it produces. The behavioural/CB models described here are not mutually exclusive.

ComB model. The ComB model (Mansueto et al., 1997; Stemberger, Stein, & Mansueto, 2003) was developed by Mansueto and colleagues to explain TTM. The model does not attempt to explain why an individual initially begins to pull hair, pick skin, or bite nails; rather, it incorporates internal and external triggers for episodes of BFRB, factors that facilitate or inhibit the behaviour, and positive and negative reinforcement of the behaviour once it has been initiated.

Individuals with TTM, SP, and NB report that the urge to pick, pull, or bite occurs more frequently under certain conditions, and that various external or internal cues trigger the urge (Diefenbach, Mouton-Odum, & Stanley, 2002; Duke, Keeley,

Geffken, et al., 2010; Mansueto et al., 1997; Williams, Rose, & Chisholm, 2006). External triggers for episodes of BFRB include implements (e.g., hairbrush, tweezers) and settings (e.g., the bedroom). Internal triggers may be sensory, motor, cognitive, or affective. Sensory triggers include physical sensations such as the feeling of a coarse hair between the fingers, the texture of a hard scab, or the rough edge of a hangnail. Motor triggers refer to behaviours like driving or talking on the telephone. Cognitive and meta-cognitive triggers are thoughts or beliefs that provoke the urge to pull, bite, or pick (e.g., "Why are my eyebrows so bushy?" and "I'll never be able to stop biting my nails, so why try" (Mansueto et al., 1997). Affective triggers include such states as frustration, depression, boredom, anxiety, or tension. These emotions may be generated by an external event or by cognitions such as those described above. The emotions may directly trigger an episode of BFRB; alternatively, the urge to engage in the behaviour may be triggered by an external or environmental cue, and the effort to control the urge (i.e., to not pick, bite, or pull) may provoke further difficult emotions, creating a vicious cycle of emotions and BFRB.

Facilitators and inhibitors are objects, places, people, thoughts, and emotions that respectively encourage or discourage an episode of BFRB. For example, the presence of a mirror can facilitate HP and SP, whereas the presence of another person may inhibit the behaviour. A thought (e.g., "No one's watching; I can pull all I want") can be a cognitive facilitator, whereas an emotion such as shame about physical appearance can inhibit an episode of BFRB.

Once an individual engages in an episode of BFRB, positive and negative reinforcement increase the likelihood of continued pulling, biting, or picking. Pleasure or relief immediately afterward provides sensory positive reinforcement, and satisfaction and the feeling of achievement gained from the removal of a certain type of hair (e.g., kinky, split, wrong color), skin (e.g., rough or scabbed), or nail (e.g., broken, rough, too long) provides affective and cognitive reinforcement. The pleasure

or satisfaction that follows a pulled hair, or a picked scab or nail may also create relief from negative emotions; relief is a powerful negative reinforcer, and BFRBs may be consistently used to keep negative emotions at bay (Mansueto et al., 1997).

Episodes of BFRB are often idiosyncratic and follow an observable sequence. For example, one case study described a female TTM patient who pulled out her hair when she was waiting or felt like she was wasting time. She was able to identify frustration and impatience as the dominant emotions present during HP and to identify trigger thoughts such as "I'm not fast enough" and "I'm not performing well." These thoughts increased her tension level and provoked HP (Pélissier & O'Connor, 2004).

Emotion regulation model. Emotion regulation (ER) refers to the ways in which individuals identify (i.e., attend to, label, evaluate) and respond to (i.e., express, try to modify) emotional experiences (Diefenbach et al., 2008). ER can be further understood as the process through which individuals influence the presence and timing of certain emotions, when emotion appears, and how emotion is experienced and expressed (Gross, 1998).

Some conceptualizations of ER emphasize the ability to decrease and control negative emotions and reduce arousal, whereas others suggest that ER is defined by the ability to experience, differentiate between, and respond spontaneously to the full range of emotional experiences (Gratz & Roemer, 2004). The latter definitions imply that awareness and understanding of emotions in turn improves ability to monitor, experience, accept, and modify both positive and negative affect (Gratz & Roemer, 2004). Some literature suggests that psychological symptoms may arise in response to efforts to control emotional experience, and avoidance or rejection of uncomfortable emotions. In this case, adaptive ER may require acceptance of both pleasant and unpleasant emotional responses (Hayes, Wilson, Gifford, Follette, & Strosahl, 1996; Linehan, 1993).

Finally, some research suggests that ER can only be understood within the context and demands of a given situation. Adaptive ER therefore requires context-dependent flexibility, and strategic modulation of arousal in order to maintain goal-directed activity and inhibit impulsive behaviour when negative emotions develop (Gratz & Roemer, 2004). Modulation implies altering the intensity or duration of arousal, rather than changing or eliminating the emotion that is experienced.

The ER model for BFRBs focuses on negative reinforcement: the function of BFRBs is presumed to be alleviation or relief from negative emotions, and the relief reinforces and perpetuates the behaviour. This model combines the role of uncomfortable emotional experiences in triggering an episode of BFRB, the role of the body-focused behaviour in modulating emotional arousal, and the role of relief from negative emotional arousal in maintaining and reinforcing the behaviour. Adapted from research on ER in TTM, the ER model for BFRBs proposes that individuals with BFRBs have difficulty controlling certain emotions and engage in body-focused behaviour to avoid, decrease, or attenuate aversive affect; HP, SP, and NB persist despite negative consequences because they are negatively reinforced by distraction or escape from undesired emotions or difficult events. In this, the ER model is consistent with the broader ComB model described above wherein affective cues, among others, trigger episodes of BFRB and reinforce the behaviour. However, the ER model further suggests that individuals with BFRBs are characterized by a general deficit in ER that promotes the adoption of maladaptive coping methods (Snorrason, Smári, & Ólafsson, 2010). Episodes of BFRB result from a drive to stop experiencing a given affective state, and a lack of alternative methods for coping with the state (Shusterman et al., 2009). Deficits in ER may stem from many factors, including problems with impulse control, and difficulty identifying, understanding, or accepting emotions (Gratz & Roemer, 2004). Snorrason, Smári, & Olaffson (2010) further hypothesized that individuals with SP may experience greater emotion

reactivity, that is, they tend to frequently experience intense and persistent emotions (Nock, Wedig, Holmberg, & Hooley, 2008).

Applied to all problematic body-focused behaviours, Snorrason and colleagues' model implies that, in individuals with BFRBs, chronically high levels of emotional arousal are coupled with a fundamental deficit in ER, prompting the adoption of maladaptive ER strategies such as HP, SP, and NB. It is unclear whether the anxiety, tension, or other negative affect that can precede episodes of BFRB are produced by external stressors, or whether increase in tension is produced by efforts to avoid engaging in BFRB.

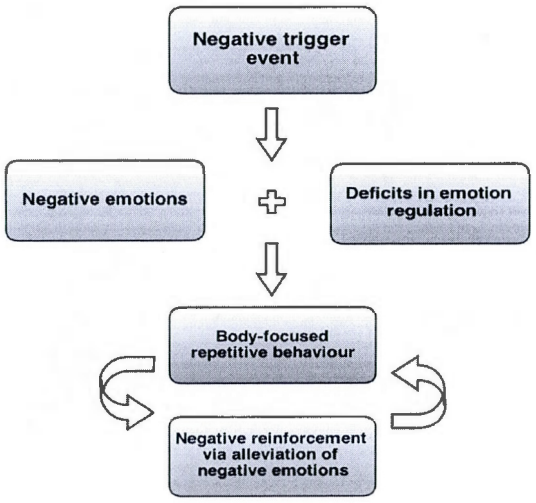

Figure 1.1 The global ER model

It has been demonstrated that individuals who pull out hair and pick skin have elevated rates of comorbid psychiatric disorders (57% for TTM; 55% for SP; Flessner, 2012), often anxiety and depression. Such findings suggest that stress is generated by external causes and subsequently maladaptively regulated through BFRBs. This possibility is reinforced by Teng and colleagues' report that individuals with BFRBs demonstrate greater trait anxiety (Teng, Woods, Marcks, & Twohig, 2004). However, it seems likely that, in some individuals, efforts to avoid engaging in

an episode of BFRB may create further emotional arousal, compounding the problem and creating a cycle of elevated tension or emotional arousal, difficulty regulating emotion, and BFRBs.

Stimulus regulation model. The ER model fails to explain the initial development of the use of BFRBs as a means of regulation. Penzel (2002) proposed a stimulus regulation (SR) model based on his clinical work with individuals with TTM. The SR model is based on Penzel's observations in his clinical practice that individuals with TTM pull out hair both when they are overstimulated (due to stress or to positive or negative excitement) and understimulated (due to inactivity or boredom), Penzel hypothesized that individuals with BFRBs experience malfunctions in nervous system mechanisms that balance internal levels of stress. According to the SR model, BFRBs represent an effort to externally regulate an internal state of sensory imbalance. Although individuals with BFRBs are exposed to the same levels of environmental stimulation as are individuals without BFRBs, the former group's nervous systems have a different threshold for physiological stimulation (Penzel, 2002). The model proposes that individuals with BFRBs experience pleasure from behaviour that others experience as painful. In individuals who are understimulated, the intensity of the physiological sensation of pulling, picking, or biting provides relief; in individuals who are overstimulated, the sensations provide distraction from the source of overstimulation.

The SR model adds to the ER model by explaining why individuals resort to this particular behaviour to regulate levels of stimulation. According to Penzel (2002), BFRBs develop because: (a) hair, skin, and nails are plentiful and are within reach at all times; (b) the areas on the body where HP (and to a lesser extent, SP and NB) occur are rich sites of nerve endings, providing good sources of stimulation; (c) hair, skin, and nails are very interesting and stimulating to touch; (d) genetic predispositions to BFRBs may be present in the brain as part of an old grooming

program and BFRBs can therefore be performed nearly automatically and without much attention; (e) BFRBs can be extremely rewarding and pleasurable; and (f) BFRBs can be performed both alone and in the company of others.

1.7 Empirical research on ER and BFRBs

To date, studies on BFRBs have explored the ER model both directly and indirectly. Research in this area has explored the rate of comorbid psychopathology and psychological symptoms in individuals with BFRBs, correlations between BFRB severity and severity of other psychological symptoms, and capacity for ER in individuals with BFRBs. Naturalistic studies have identified the emotional experiences of individuals prior to, during, and after engaging in HP, SP, and NB, and evaluated change in emotion over the course of an episode of BFRB. Experimental research on the ER model for BFRBs has explored the frequency of the behaviour in diverse experimentally induced affective states, and measured the presence and intensity of various emotions during experimentally elicited BFRB. Further studies in this area have attempted to identify situations in which individuals with BFRBs are at elevated risk of engaging in the behaviour, and still others have focused on BFRB subtypes. Finally, several research teams have published treatment trials of psychotherapies for BFRBs designed to target ER.

1.7.1 Psychopathology and psychological symptoms

A number of studies have endeavoured to establish the rates of various psychological symptoms and disorders in individuals with BFRBs, and the relationship between BFRB severity and psychological symptom severity. Studies in this area explored the relationships in HP, SP, and NB in both clinical and non-clinical samples.

Hair-pulling. Woods, Wetterneck, and Flessner (2006) found that 28.6% and 10.7% of a sample of treatment-seeking adults with TTM suffered from major depression and OCD, respectively. Diefenbach, Mouton-Odum, & Stanley (2002) reported that 55% of their sample of 44 individuals with TTM had a co-existent mood or anxiety disorder; the most common diagnoses were generalized anxiety disorder (GAD), social phobia, and specific phobia. Christenson, MacKenzie, and Mitchell (1991) reported that 82% of a sample of 60 adult hair pullers (50 of who met the DSM-III criteria for TTM) met the diagnostic criteria for another past or current DSM Axis I disorder.

Thirty-four percent of respondents (N = 1697) in a large Internet survey of individuals reporting symptoms consistent with a TTM diagnosis also reported having sought help for a comorbid psychological problem, primarily mood and anxiety disorders (Woods, Flessner, Franklin, et al., 2006). In a study of HP phenomenology in a community sample, Duke et al. (2009) compared depression and anxiety symptoms in 54 self-reported hair-pullers with symptoms in 776 individuals who did not report HP, and found that the HP group had significantly greater symptoms. In a similar study of a college student sample, Duke and colleagues (Duke, Keeley, Ricketts, et al., 2010) found significantly greater symptoms of depression in self-reported hair-pullers than in non-hair-pullers. No between-group differences in anxiety were reported.

Skin-picking. Where SP is concerned, similar findings have been reported. Arnold et al. (1998) found that each of their 34 participants with pathological SP met DSM criteria for at least one current or lifetime comorbid psychiatric disorder, primarily mood and anxiety disorders. Major depression (24%) was the most common; a minority of participants reported SP in the context of OCD (6%) or body dysmorphic disorder (BDD) (9%). Calikuşu et al. (2003) found that a sample of clinical skin-pickers (N = 31) recruited from a dermatology clinic had significantly

higher rates of depression and OCD diagnoses than did controls with another dermatological condition. The elevated rate of depression (58%) in the SP group led the authors to conclude that depression is not only a common comorbid psychiatric condition with SP, but may be the primary clinical condition in individuals with SP. Wilhelm et al. (1999) reported that every participant in a sample of 31 individuals with self-injurious SP met criteria for a comorbid disorder; the most common comorbidities were OCD, alcohol abuse/dependence, and BDD.

Several authors have investigated the relationship between psychopathology and BFRBs by exploring correlations between SP severity and psychopathology severity. Hayes, Storch, and Berlanga (2009) found significant correlations between SP severity and depressive, impulsive, anxious, and obsessive-compulsive symptom severity in 222 skin-pickers in a non-clinical community sample. In a sample of students reporting SP, Bohne et al. (2002) reported a correlation between SP frequency and OCD symptom severity, but no correlation between SP and depression. Neziroglu et al. (2008) found no significant relationship between SP severity and anxiety or SP severity and depression. However, the Neziroglu et al. sample was composed of individuals who reported some degree of SP but were seeking treatment for other psychiatric disorders; as such, anxiety and depression may have been more closely related to participants' other diagnoses. Snorasson, Smári, and Olaffson (2010) also did not observe a relationship between SP symptoms and severity of depression or anxiety symptoms.

Nail-biting. It is commonly assumed that NB is related to anxiety or is a sign of emotional tension, but this assumption has been the subject of insufficient research (Wells, Haines, & Williams, 1998). Joubert (1993a) measured NB and other habits including HP, SP, nose-picking, and teeth-grinding in 139 men and women, and reported that individuals with NB tended to have elevated scores on measures of manifest anxiety and OC symptoms. Klatte and Deardorff (1981) measured anxiety in

10 individuals with NB and 10 controls, and found that individuals with NB reported greater anxiety. Joubert (1993b) reported no relationship between NB and level of happiness (i.e., NB was not associated with unhappiness), but Hansen et al. (1990) reported a relationship between NB and negative appraisals of health and appearance. The research on NB is confounded by the difficulty of distinguishing non-distressing NB from problematic and distressing NB. Much of the literature may focus on mild NB that does not cause distress, creating a limited understanding of the relationship between NB and psychological symptoms or psychopathology.

Multiple BFRBs. Several studies focused on the relationships between psychological symptoms and more than one different BFRB. Hajcak et al. (2006) investigated the prevalence of HP and SP in a large college sample, and the relationship between the frequency of pulling or picking and anxiety or other negative emotions. The authors found that skin-pickers and hair-pullers had significantly higher scores on measures of affective distress than did controls. More specifically, individuals with TTM reported elevated anxiety, stress reactivity, and OC symptoms, whereas individuals with SP reported more pathological worry. Lochner, Simeon, Nichaus, and Stein (2002) reported that 51.8% of a sample of 68 individuals with TTM had a current or lifetime comorbid diagnosis; the most common diagnoses were major depressive disorder, OCD, and GAD. The authors further reported that 47.6% of a sample of 21 patients with pathological SP had a comorbid diagnosis; the most common diagnoses were major depression and dysthymia. Finally, Teng and colleagues (2004) explored BFRBs in undergraduate students and found that students with problematic body-focused behaviours were more anxious and more depressed than were controls. Further, participants reported that their negative affective states were directly related to self-reported impairment from BFRB.

Although the relationship between psychological symptoms and psychopathology in BFRBs does not allow us to draw conclusions about BFRBs and

ER, the elevated rate of psychological symptomatology indicates that this population experiences greater than average negative affect and may experience poorly regulated affect. However, further support for the ER model can be drawn from studies that directly measure for capacity for ER in individuals with BFRBs.

1.7.2 Emotion regulation

Several studies have explored the ER model for BFRBs using questionnaire measures of ER. Shusterman et al. (2009) conducted a large (N = 1162) Internet survey of affective experiences associated with TTM; this study was the first to use measures of ER to explore differences between hair-pullers and controls. The results revealed that hair-pullers reported more difficulty "snapping out of" emotions than did controls on every emotion measured; the biggest differences between groups were observed for anxiety, tension, shame, and boredom. Individuals who reported difficulty regulating certain emotions often reported experiencing those same emotions before and during pulling episodes. Although the correlation between overall difficulty regulating emotions (as measured by the Affective Regulation Scale [ARS]; Shusterman et al., 2009) and HP severity was small to moderate, and ER made only a small independent contribution to HP severity, the authors concluded that hair-pullers may be less capable of regulating emotions than are controls, and that ER may therefore be a factor in TTM.

Snorrason et al. (2010) conducted a study designed to directly investigate the relationships between SP, ER, and emotion reactivity, i.e., the tendency to experience frequent, intense, and persistent emotions (Nock et al., 2008). The authors found that individuals in the SP group reported greater problems with ER and higher scores on measures of emotion reactivity than did controls. They further found that ER and emotion reactivity both predicted SP diagnosis, although the two variables were not related to SP severity.

The results of this non-exhaustive sample of studies on the relationship between BFRBs and psychological symptoms or disorders and BFRBs and ER are presented in Table 1.1. The studies discussed in this section demonstrate associations between global psychopathology and BFRBs; researchers in this area have pursued the question of emotion and ER in BFRBs by exploring the emotions that are present during an episode of BFRB, and change in emotion over the course of an episode.

1.7.3 Naturalistic studies

Naturalistic studies of ER and BFRBs have used questionnaires to measure the presence and intensity of participants' emotions before, during, and after BFRB episodes.

Hair-pulling. Neal-Barnett and Stadulis (2006) explored the emotional states of 43 African-American women with TTM prior to, during, and after an episode of HP. The participants reported significant decreases in boredom, happiness, and anxiety over the course of pulling episodes, and significant increases in guilt and relief. Diefenbach et al. (2002) measured affective states in 44 clinical participants with TTM over the course of an episode of HP; participants reported that boredom, anxiety, and tension decreased after pulling, and guilt, relief, sadness, and anger increased after pulling. Diefenbach et al. (2008) compared a clinical TTM group with a control group on affective states over the course of an HP episode; in comparison to the control group, the clinical group experienced greater decreases in boredom, sadness, anger, and tension over the course of pulling, and greater increases in calm, relief, and pleasure.

Duke and colleagues (Duke, Keeley, Ricketts, et al., 2010) explored affective states associated with HP in a college student sample. The most common states experienced prior to pulling were boredom, anxiety, tension, frustration, and indifference; with the exception of indifference, each of these states decreased over

the course of the pulling episode. Duke and colleagues (2009) measured affective states before, during, and after a pulling episode in a community sample of individuals reporting HP, and reported consistent results: boredom, anxiety, tension, and frustration were the most common pre-pulling emotions; frustration and anxiety increased during pulling, but every emotion decreased after the pulling episode.

Finally, Stanley and colleagues (Stanley, Borden, Mouton, & Breckenridge, 1995) and Mansueto, Thomas, and Brice (2007) also explored emotional experiences associated with non-clinical HP. Stanley et al. reported that boredom, anxiety, tension, and indifference were common pre-pulling emotions; common post-pulling emotions included indifference, calm, and relief. Further, significant decreases in boredom, sadness, anger, and tension over the course of the pulling cycle were reported. Mansueto and colleagues (2007) reported that the most common pre-pulling emotions were anxiety, tension, boredom, and indifference; the strongest post-pulling emotions reported were relief, indifference, and happiness. Relief increased after pulling, and boredom, anxiety, tension, and relief decreased to zero. Calm increased during the pulling episode, only to disappear following pulling. With some exceptions, these results suggest that calm replaces and provides relief from negative emotions.

Skin-picking. Wilhelm et al. (1999) measured various emotions and experiences (e.g., physical pain) from before to during SP and from during to after SP in a sample of 31 clinical participants. The authors observed significant increases in shame and guilt, and a significant decrease in tension from pre- to post-picking. A similar study compared individuals with clinical and non-clinical SP and found that the clinical group reported higher levels of tension before picking, greater satisfaction during picking, and more shame and pain after picking (Keuthen, Deckersbach, Wilhelm, et al., 2000).

Bohne et al. (2002) investigated the presence and intensity of various emotions before, during, and after SP in 122 students; 47.4% of participants reported increased tension or nervousness prior to picking and 60.2% reported pleasure or relief during or after picking. Among other emotions, significant increases in satisfaction from pre- to post-picking were reported. Bohne et al. further asked students why they pick skin; in addition to habit and to avoiding a displeasing appearance, participants attributed SP to negative emotional states such as discomfort (27.1%), tension (22.6%), nervousness, (16.5%), and boredom (13.5%); 13.5% of participants reported that they engaged in SP because it was pleasurable.

Snorrason et al. (2010) also explored retrospective reports of emotional experiences before, during, and after SP in a non-clinical sample. Participants reported decreases in a number of negative emotions over the course of SP. In particular, the intensity of boredom decreased from before to during SP and from during to after SP; anxiety and tension diminished from before to after picking. Gratification and relief increased from before to during picking and guilt and shame increased after picking.

Finally, Neziroglu et al. (2008) collected data from 40 individuals reporting a range of SP severity. Participants reported tension, loss of control, and general negative feelings (e.g., guilt, shame) prior to SP, as well as a feeling of being "mesmerized" (p. 310). A small but significant decrease in tension over the course of picking was reported, as well as increases in satisfaction, guilt, shame, and general negative feelings. The finding that tension decreases but that guilt and shame increase over the course of SP episodes is consistent with findings from Keuthen, Deckersbach, Wilhelm, et al. (2000), Snorasson et al. (2010), and Wilhelm et al. (1999).

Together, the findings of naturalistic studies on emotion and BFRBs suggest that negative emotions such as frustration, tension, and anxiety decrease over the

course of an episode of BFRB, but that BFRB may subsequently increase negative emotions such as guilt or shame; these results imply that specific emotions may be differentially implicated in ER and BFRBs. No studies of this type are available for NB. The results of naturalistic studies are summarized in Table 1.2.

The naturalistic studies discussed here evaluated retrospective reports of affect during BFRB, and demonstrated fluctuations in various emotions across the BFRB cycle. Confirming the role of emotion as a BFRB trigger or mediator requires experimental protocols that directly manipulate emotions designed to elicit body-focused behaviour.

1.7.4 Experimental studies

A smaller group of studies on BFRBs and ER used experimental manipulations to induce emotion and to elicit and measure problematic body-focused behaviour.

Hair-pulling. Drysdale, Johoda, and Campbell (2009) conducted a case study of a 16-year-old participant with TTM, using four experimental conditions: one neutral condition, two distraction conditions, and one general emotional arousal condition. The participant's reported urge to pull was greatest during the emotional arousal condition, which involved reading a script describing her discovery of a perceived infidelity on the part of her boyfriend. Although this result supports the ER model for BFRBs, the findings were not specific to particular emotions and the single-case design of the research limits the generalizability of the results.

Multiple BFRBs. Woods and Miltenberger (1996) measured five classes of body-focused movements or behaviours–hair manipulation, face manipulation, object manipulation, object mouthing, and repetitive limb movements–in a non-clinical sample of university students in three conditions: bored, anxious, and neutral. The

authors observed more face and hair manipulation in the anxiety condition than in the bored or neutral conditions.

Teng et al. (2004) recruited students with one of the following BFRBs: NB, SP, mouth-chewing, skin-biting, and skin-scratching. Video segments were used to induce boredom, depression, and anxiety, and a neutral control condition was used. The primary finding was that individuals with BFRBs demonstrated significantly more BFRB in the boredom condition than in the control condition. No differences were found in the comparison of the anxiety condition to the control condition or of the depression condition to the control condition. From these findings, the authors hypothesized that boredom may be more relevant in BFRBs than are other affective states (Teng et al., 2004).

Nail-biting. Williams, Rose, and Chisholm (2006) explored the function of BFRBs in 39 undergraduate students reporting NB. The participants were exposed to four experimental conditions: being left alone (boredom), solving math problems (frustration), being reprimanded for NB (contingent attention), and continuous conversation (non-contingent attention). Thirty-seven participants bit their nails during the experiment and NB was most frequent in the boredom and frustration conditions. The participants also completed a questionnaire indicating how often they bit their nails in identifiable situations or for specific purposes. The most frequently-reported situations and purposes for NB were "when you are bored," "to get something," "to get something you want (e.g., games, food, or drinks)," "because you are uncomfortable," and "when you are not feeling well;" no information was provided as to how NB allowed participants to get something they wanted. The authors concluded that NB occurs primarily in states of boredom or in the context of work on difficult problems (reflecting emotional states such as frustration).

Wells, Haines, Williams, and Brain (1999) devised an experiment to measure the psychophysiological response of individuals reporting severe NB, mild NB, and

no NB to exposure to an imagery script describing an episode of NB and to a neutral script. The authors hypothesized that NB serves a tension reduction function and that participants with more severe NB would demonstrate a greater arousal response, and a pattern of tension reduction in response to NB imagery. Levels of arousal as measured by muscle tension, heart rate, and skin conductance did not differ significantly between the severe and mild groups, although the NB groups demonstrated greater arousal than controls. However, the authors observed a difference between the severe and mild NB groups in their pattern of response across different stages of the NB sequence. The mild NB group demonstrated increased arousal/tension at the moment (in the script) of engaging in NB and a decrease following NB, whereas the severe NB group demonstrated an increase in arousal/tension prior to NB and a decrease during NB. The severe NB group's response mirrors the pattern observed in response to self-cutting (Brain, Haines, & Williams, 1997; Haines, Williams, Brain, & Wilson, 1995). A second experiment demonstrated that, in individuals reporting self-cutting, the psychophysiological response to imagery of an episode of NB is one of tension increase followed by reduction; the response of participants who reported severe NB was a pattern of tension management. Wells and colleagues concluded that severe NB is a self-mutilative behaviour similar to cutting, but that the chronic and habitual nature of NB is such that NB is less effective in neutralizing tension. Findings of experimental studies of ER and BFRBs are summarized in Table 1.3.

Results of experimental studies on BFRBs and ER demonstrate that certain emotions or affective states may be more likely than others to elicit body-focused behaviour. Studies of "high-risk" emotions have focused directly on the task of identifying the specific emotions involved in BFRBs.

1.7.5 Studies identifying high-risk emotions

The literature on emotions and ER in BFRBs has focused on a wide variety of affective states, including but not limited to depression, anxiety, anger, sadness, guilt, shame, tension, frustration, and boredom. However, as the research in this area grows, certain types of emotion have emerged as more relevant than others. In a review of the literature on TTM, Duke and colleagues reported that, across studies, the affective states reported as most intense before HP were frustration, anxiety, tension, boredom, and guilt (Duke, Keeley, Geffken, et al., 2010). Results from the few studies that experimentally manipulated emotion suggest that boredom, tension, anxiety, and frustration may be the most relevant emotions; that is, these emotions may be more likely than others to trigger an episode of BFRB, and may be the most likely to be modulated by BFRB (e.g., Teng et al., 2004; Williams, Rose, & Chisholm, 2006).

This hypothesis is supported by reports from individuals with BFRBs that they are at the highest risk of engaging in the behaviour during sedentary activities (e.g., reading, studying, sitting in class) or frustrating activities (Bohne et al., 2002; Diefenbach et al., 2002; du Toit et al., 2001; Duke, Keeley, Ricketts, et al., 2010; O'Connor et al., 2003). O'Connor and colleagues (O'Connor et al., 2001; O'Connor et al., 2003; O'Connor, Gareau, & Blowers, 1993) asked participants with various BFRBs to list the activities during which they were the most and least likely to engage in the behaviour. The highest-risk activities for BFRB episodes were passive attendance (e.g., watching TV), study activity (e.g., attending class), transit (e.g., coming home from work), and waiting (e.g., in line). The lowest-risk activities were physical exercise, socializing, eating, and manual work. Participants were further asked to appraise the activities or situations that tended to precipitate BFRB. Individuals with TTM appraised high-risk activities as boring; individuals with NB appraised high-risk activities as inactive; and individuals who reported teeth-grinding appraised high-risk activities as unsatisfying (O'Connor et al., 2003).

Individuals with tics and BFRBs have been demonstrated to have a perfectionist or overactive style of planning (Pélissier & O'Connor, 2004), and may self-impose unrealistic expectations or standards that are difficult to meet. Failure to meet standards elicits emotions such as boredom, frustration, impatience, and dissatisfaction. These emotions build, creating tension, and the tension and negative emotions are subsequently released or diminished through BFRB or tics (O'Connor, 2002; O'Connor, Aardema, & Pélissier, 2005).

Studies of high-risk emotions have demonstrated that certain emotions (e.g., boredom, frustration) frequently provoke BFRB. Research on subtypes investigates whether these emotions are present and relevant in all episodes of HP, SP, or NB, or whether some BFRB occurs outside of awareness and is unrelated to ER.

1.7.6 Studies of BFRB subtypes

Research examining the phenomenology of HP and SP suggests that individuals are not always aware when they engage in BFRBs, and that BFRB occurs on a spectrum from complete awareness to nearly complete unawareness (Flessner, Woods, Franklin et al., 2008). Christenson and colleagues (Christenson, Mackenzie, & Mitchell, 1991; Christenson, Risvedt, & Mackenzie, 1993) first reported that individuals with TTM engage in two types of HP, and subsequent studies (e.g., Walther et al., 2009) have evaluated subtypes of SP. Automatic pulling or picking refers to body-focused behaviour that occurs outside of awareness; it often occurs during sedentary activities such as reading or watching television, and individuals may not realize that they are pulling or picking until after the fact. In contrast, focused BFRB refers to a consciously-initiated behaviour with an almost compulsive quality. Focused pulling or picking may be preceded by conscious negative emotional states and triggered by mounting tension and a powerful urge to pull or pick (Arnold et al., 2001; du Toit et al., 2001; Flessner, Conelea, et al., 2008).

Hair-pulling. Automatic and focused dimensions have been supported in studies of TTM. Although many individuals with TTM engage in both types of pulling (Duke, Keeley, Geffken, et al., 2010), most can identify a dominant style (Flessner, Conelea, et al., 2008; Flessner, Woods, Franklin, Cashin, & Keuthen, 2008). Christenson and MacKenzie (1994) suggested that 25% of pulling episodes are primarily focused, with automatic as the dominant style for the remaining 75%. A measure of adult TTM subtypes, the Milwaukee Inventory for Subtypes of Trichotillomania-Adult Version (MIST-A; Flessner, Woods, et al., 2008), has been developed to explore the presence of the two dimensions of HP. Factor analysis provided support for two separable dimensions (i.e., distinct pulling styles) in TTM.

Skin-picking. Automatic and focused dimensions have also been supported in research on SP. Grant, Odlaug, & Kim (2007) reported that 66.7% of participants (N = 24) in an SP treatment study were aware of their SP at least half of the time, whereas 33.3% picked skin primarily automatically. Neziroglu and colleagues (2008) reported similar percentages (73.9% aware at least 50% of the time), but Arnold and colleagues (1998) reported that 76% of participants with SP (N = 34) reported a more automatic form of SP (i.e., they "found themselves" picking). The Milwaukee Inventory for the Dimensions of Adult Skin-Picking (MIDAS; Walther, Flessner, Conelea, & Woods, 2009) has been developed to assess automatic versus focused SP and has provided evidence for separable dimensions. These dimensions have not been explored in NB.

The distinction between automatic and focused BFRB has significant implications for the ER model. Some researchers (e.g., Twohig & Woods, 2004) have proposed that ER is a greater factor in focused BFRB than in automatic BFRB and that focused pulling, picking, or biting is designed to address negative emotional experience. If that proves to be the case, treatment for individuals with BFRBs can be tailored to address the predominant type of HP, SP, or NB. That is, individuals whose

BFRB is predominantly "automatic" may benefit from treatments designed to increase awareness of the behaviour and interrupt the HP, SP, or NB routine; in contrast, individuals whose BFRB is predominantly "focused" may be best treated via interventions that address negative emotions that trigger or exacerbate episodes of BFRB (Flessner, Conelea, et al., 2008; Flessner, Woods, et al., 2008; Walther et al., 2009). One way to explore this question is by evaluating the efficacy of treatments that include components designed to directly target ER.

1.7.7 Treatment trials

The majority of treatment trials for BFRBs have focused on behavioural or CB treatments as the treatment of choice. Behavioural and CB interventions for HP and SP usually involve habit reversal training (HRT; Azrin & Nunn, 1973), a technique that focuses on awareness and self-monitoring, stimulus control, and the development of a competing response (Bloch et al., 2007). Self-monitoring and increased awareness allow individuals to interrupt BFRB, whereas competing responses (e.g., putting hands in pockets or squeezing a rubber ball) physically prevent the problem behaviour. Stimulus control involves identification and modification of environments and activities that trigger BFRB, and HRT often also involves a relaxation training component. CB interventions (e.g., Schuck, Keijsers, & Rinck, 2011) also use strategies such as restructuring of distorted cognitions related to BFRBs.

Hair-pulling. Trials of CBT/HRT for TTM and SP often report significant symptom reduction (e.g., Diefenbach, Tolin, Hannan, Maltby, & Crocetto, 2006; Ninan, Rothbaum, Martseller, Knight, & Eccard, 2000; Teng, Woods, and Twohig, 2006; Twohig and Woods, 2001; van Minnen, Hoogduin, Keijsers, Hellenbrand, & Hendriks, 2003), but do not always result in maintenance of gains over time (Keuthen, Fraim, et al., 2001; Lerner, Franklin, Meadows, Hembree, & Foa, 1998; Twohig & Woods, 2001).

Behavioural or CB interventions for TTM have been demonstrated to be effective in comparison to control conditions (e.g., van Minnen et al., 2003) and in comparison to pharmacotherapy with clomipramine (Ninan et al., 2000). A systematic review demonstrated that HRT had the largest effect size ([ES] = - 1.14, [CI] = -1.89, -.38) for TTM when compared to various two types of antidepressants (selective serotonin reuptake inhibitors; tricylic antidepressants) (Bloch et al., 2007). A 2011 meta-analysis of 18 studies using HRT to treat BFRBs including HP and NB, tics, temporomandibular disorder, and other oral-digital behaviours found that HRT was an overall effective intervention for these disorders, with a large combined effect size (*ES* = -1.14, 95% CI -1.89 to 0.38) for pre-treatment to post-treatment change (Bate, Malouff, Thorsteinsson, & Bhullar, 2011).

In an uncontrolled study of CBT for TTM by Lerner and colleagues, 12 of 14 participants demonstrated significant improvement at post-treatment, but only 31% had maintained the gains at long-term follow-up (on average, 3.9 years later). Van Minnen and colleagues effectively treated 14 TTM patients with behaviour therapy/HRT, reporting an effect size of 3.80; however, gains were reduced by 49% at 3-month follow-up, and by 70% two years post-treatment (Keijsers et al., 2006).

Given the inconsistent maintenance of gains across treatment studies and across BFRBs, researchers who study TTM have endeavoured to identify variables that impact long-term outcome. For TTM, symptom duration, age at onset, and general neuroticism do not appear to be relevant, and the impact of pre-treatment TTM severity and change in depressive symptoms are not consistent (Woods, Snorrason, & Epsil, 2012).

Skin-picking. Two trials of CBT/HRT for SP produced significantly decreased symptoms, and gains were maintained over time. Teng, Woods, and Twohig (2006) conducted a pilot investigation comparing brief HRT to a wait-list control condition for individuals reporting chronic SP that resulted in either social impairment or

physical injury. HRT was significantly superior to the wait-list condition in decreasing self-reported picking and decreasing skin damage (as assessed by photograph ratings). Between-group differences in improvement were maintained at 3-month follow-up. Schuck, Keijsers, and Rinck (2011) conducted a randomized controlled trial comparing four sessions of CBT for pathological SP to a wait-list control condition. Unlike Teng et al. (2006), Schuck and colleagues included direct interventions for dysfunctional cognitions related to SP. The authors found that CBT was superior to the wait-list condition in reducing SP severity, SP impact, dysfunctional cognitions related to SP, and skin damage as assessed via photographs; gains were maintained at 3-month follow-up.

Nail-biting. The majority of treatment studies for NB were conducted in the 1970s, 1980s, and 1990s, and results are mixed. Silber and Haynes (1992) and Horne and Wilkinson (1980) found the competing response component of HRT to be effective in reducing NB, and Maletzky (1974) reported that self-monitoring alone was effective. However, Allen (1996) failed to replicate these findings.

Some authors view CBT/HRT as incomplete treatments that fail to address internal experiences such as emotion and ER (Bate et al., 2011). In an effort to improve upon long-term outcomes from CBT/HRT trials, two research groups have published trials of treatments that include components designed to supplement CBT and directly target ER.

Acceptance and commitment therapy. Acceptance and Commitment Therapy (ACT; Hayes, Strosahl, & Wilson, 1999) is a treatment approach that discourages emotional control strategies and promotes acceptance of private events, including thoughts, emotions, and urges. ACT teaches clients to observe thoughts and feelings as objective external events, in order to gain awareness of the process of thinking and develop the ability to disengage from thoughts (Twohig, Hayes, & Masuda, 2006). Where BFRBs are concerned, the ACT model suggests that maladaptive body-

focused behaviours may be used to avoid or alter unpleasant psychological experiences such as painful thoughts, emotions, or urges. The use of maladaptive behaviour to avoid difficult private events is a core ACT concept known as experiential avoidance (Hayes, Wilson, Gifford, Follette, & Strosahl, 1996). Previous research (e.g., Begotka, Woods, & Wetterneck, 2004; Norberg, Wetterneck, Woods, & Conelea, 2007) has provided evidence for the relationship between experiential avoidance and TTM and SP severity.

Four studies investigated the use of ACT or ACT-enhanced behaviour therapy (AEBT) for BFRBs. Twohig and Woods (2004) evaluated a 7-week combined HRT and ACT protocol with six adults with TTM. The ACT portion of the treatment (four sessions) included (a) abandonment of strategies designed to control urges to pull hair; (b) acceptance of urges to pull; (c) deconstruction of language (experiencing words as sound without meaning in order to help participants become less "fused" with their thoughts); and (d) review of personal values. In particular, sessions three and four focused on acceptance of difficult private emotional experiences. The HRT component (three sessions) included awareness training, competing response training, and social support. HP severity (as measured by the Massachusetts General Hospital Hair-Pulling Scale [MGH-HPS]; Keuthen et al., 1995) and experiential avoidance (as measured by the Acceptance and Action Questionnaire [AAQ]; Hayes et al., 2004) were evaluated pre- and post-treatment.

The results revealed a significant decrease in HP from pre- to post-treatment in four participants, with results maintained at follow-up for three of the four treatment responders. At post-treatment, the average decrease in HP severity was 63%; at follow-up, the decrease was 52%. Moderate improvements in the expected direction were observed for experiential avoidance scores, but the small sample size precluded statistically significant results.

Woods, Wetterneck, and Flessner (2006) conducted a randomized controlled trial comparing combined HRT and ACT for TTM to a wait-list control. The 10-session combined treatment was a slightly elaborated version of Twohig and Woods (2004); the objective of combining ACT and HRT was to test the possibility that decreasing experiential avoidance would produce decreases in HP severity. HP severity (MGH-HPS), experiential avoidance (AAQ), hair-pulling impact (National Institute of Mental Health Trichotillomania Impairment Scale [NIMH-TIS]; Swedo et al., 1989), and anxiety and depression (Personality Assessment Inventory [PAI]; Morey, 1991) were measured pre- and post-treatment. The results revealed a statistically significant reduction (45%) in overall MGH-HPS scores from pre- to post-treatment and an average 58% reduction in number of hairs pulled per day (as compared to a 28% increase in the wait-list group). A 13% reduction in experiential avoidance was observed, as were significant decreases in HP impact, anxiety, and depression. The decrease in MGH-HPS scores was not entirely maintained at 3-month follow-up, but the average number of hairs pulled per day remained stable from post-treatment to follow-up, indicating that some pulling reductions were maintained. Decreases in experiential avoidance, HP impact, anxiety, and depression were maintained. Once treated, the wait-list control group demonstrated similar decreases in experiential avoidance, HP, and NIMH-TIS ratings, although reductions in anxiety and depression were not observed. To evaluate the role of reduced experiential avoidance in reducing HP, the authors calculated change scores for both variables and conducted correlational analyses. The results revealed a moderate correlation between decreased experiential avoidance and decreases on the MGH-HPS scale, supporting the authors' hypothesis.

Flessner and colleagues (Flessner, Busch, Heideman, & Woods, 2008) explored the impact of ACT and HRT component sequencing in an AEBT protocol with five individuals with HP and SP using a 10-session intervention that incorporated the ACT and HR components described above. Component sequencing

involves testing the impact of the order of treatment components; in this case, three participants received HRT followed by ACT and two others received ACT followed by HRT. HP and SP were measured with the MGH-HPS; experiential avoidance was not measured. The results demonstrated that AEBT reduced HP and SP in all five participants. Mean symptom reduction from pre- to post-treatment was 49.5% for SP and 65.3% for HP. Participants' response patterns varied somewhat according to treatment component sequence, and the authors concluded that it may be valuable to predetermine participants' primary HP or SP style (automatic versus focused) and tailor treatment sequence accordingly.

Finally, Twohig, Hayes, and Masuda (2006) implemented a preliminary trial of ACT for SP with five participants. The eight-session treatment included (a) data collection, treatment contract, and evaluation of urges; (b) work on decreasing urges to pick and efforts to control urges; (c) cognitive defusion and contact with the present moment; and (d) identification of personal values, review, and relapse prevention. SP severity was evaluated pre- and post-treatment using objective skin-damage ratings and the Skin Picking Impact Scale (SPIS; Keuthen, Deckersbach, Wilhelm, Engelhard, Forker, O'Sullivan, et al., 2001). Experiential avoidance was measured using the AAQ.

The results revealed that four of the five participants decreased SP frequency over the course of treatment. Four participants reached near-zero levels of SP; one returned to near baseline level at follow-up, and two showed increases in SP from post-treatment to follow-up, without reaching baseline levels. Only one participant maintained gains entirely. Three of five participants demonstrated large reductions in experiential avoidance from pre- to post-treatment, with continued or maintained gains at three-month follow-up. No information was provided about correlations between decreases in SP and decreases in experiential avoidance. The authors of the

study concluded that ACT has the potential to effectively treat SP, but that additions or modifications to the protocol are required to enhance maintenance of gains.

Despite some limitations and some inconsistent results, data on the use of ACT to treat BFRBs indicate that experiential avoidance may be a variable of interest in the ER model for BFRBs; further tests of the ACT approach to treating BFRBs are warranted.

Dialectical behaviour therapy. Dialectical Behaviour Therapy (DBT; Linehan, 1993) is a CB approach based on the dialectic between validation/acceptance of client experience and helping clients change. DBT combines mindfulness and acceptance of uncomfortable or negative internal experiences with concrete, step-by-step skills and strategies for tolerating distress and regulating emotions (Linehan, 1993). Originally developed to treat individuals with Borderline Personality Disorder, DBT has been effective with a variety of conditions characterized by impulsivity and ER problems.

Keuthen, Rothbaum, et al. (2010) conducted an open clinical trial of DBT with individuals with TTM. Ten female participants received an 11-week program of DBT-enhanced CBT/HRT. The protocol included (a) psychoeducation and self-monitoring; (b) competing response, stimulus control, and prevention training; (c) mindfulness training; (d) ER and distress tolerance training; and (e) relapse prevention. Three sessions focused directly on ER; six sessions focused on mindfulness skills and distress tolerance. Participants were assessed pre- and post-treatment with several clinician-administered measures of TTM and other psychopathology, including the NIMH-TIS. They also completed self-report measures of TTM and ER, including the MGH-HPS, the Difficulties in Emotion Regulation Scale (DERS; Gratz & Roemer, 2004), the Affective Regulation Rating (ARR)—a measure designed for the study—and the Generalized Expectancy for Negative Mood Regulation Scale (NMR; Catanzaro & Mearns, 1990).

Eight of 10 participants were full treatment responders (score of ≤ 2 on the Clinical Global Improvement Scale [CGI; Guy, 1976] and ≥ 35% decrease on the MGH-HPS) post-treatment. HP severity on the MGH-HPS decreased significantly from pre- to post-treatment. Group total scores on impairment from TTM improved significantly from pre- to post-treatment, as did total scale scores on ER measures. Impairment from TTM, as measured by the NIMH-TIS, decreased significantly from baseline to post-treatment and remained stable over the 3-month maintenance period. Importantly given the history of non-maintenance of gains in individuals with TTM treated with CBT/HRT, participants' improved functioning was maintained or improved from post-treatment to the end of the maintenance phase (three months, including four booster sessions) and the two treatment non-responders became partial responders (score of ≤ 2 on the CGI or decrease ≥ 35% on the MGH-HPS). CGI (not available at baseline) scores improved significantly from post-treatment to 3-month maintenance. At 3-month and 6-month follow-up (three and six months after the maintenance period, respectively), all participants remained either full or partial treatment responders, despite some loss of treatments gains in ER and TTM symptoms (Keuthen et al., 2011).

Secondary analyses were conducted to determine the relationship between ER and TTM severity. Baseline ER and TTM severity were not significantly correlated overall, but change in HP severity correlated significantly with change in total score on the ER scales, and correlations between changes in capacity for ER and changes in TTM severity remained significant at 3-month and 6-month follow-up (Keuthen et al., 2011). These results suggest that DBT-enhanced CBT/HRT produced significant change in both TTM symptoms and ER, and that these two variables may change together.

To more rigorously explore the use of DBT for TTM, Keuthen et al. (2012) subsequently conducted a randomized controlled trial comparing DBT-enhanced CB

for TTM with a minimal attention control (MAC) comparison group. Twenty participants received 11 sessions of DBT-enhanced treatment; 18 were assigned to the comparison group. All participants completed measures of ER (DERS, ARR, NMR), HP severity and impairment (NIMH-TIS, MGH-HPS, and National Institute of Mental Health Trichotillomania Severity Scale [NIMH-TSS]), and experiential avoidance (AAQ).

The results indicated that DBT-enhanced CB treatment effectively decreased TTM severity and impairment, decreased experiential avoidance, and improved ER. Although gains in TTM severity and impairment were not entirely maintained, participants remained significantly improved at 3-month maintenance, 3-month follow-up, and 6-month follow-up. Significant differences between groups were observed for change in HP severity and impairment, and in change in ER capacity on the ARR, with the active treatment group improving more than the MAC group. The treatment group did not demonstrate greater change than the control group in experiential avoidance or in ER on the DERS or the NMR. The authors suggested that the AAQ, DERS, and NMR may not be the best measures of experiential avoidance and ER, for individuals with TTM, and hypothesized that the ARR better assesses the full range of emotional triggers potentially related to TTM.

No significant correlations were observed between change in ER scores and change in measures of TTM from pre- to post-treatment in the entire sample. However, change in DERS total scores from pre-treatment to 3-month maintenance were significantly correlated with changes in MGH-HPS and NIMH-TSS total scores during the same period. Change in ARR scores from pre-treatment to 3-month follow-up were correlated with changes in MGH-HPS and NIMH-TSS total scores during the same period. From pre-treatment to 6-month follow-up, changes in ARR scores were significantly correlated with changes in total scores on the MGH-HPS and NIMH-TIS. Marginally significant correlations between change in ER and

change in TTM severity at various follow-up points were reported; the authors hypothesized that the increasing correlations between TTM severity and ER capacity over time may be attributable to increased emotional awareness as participants completed treatment.

Overall, the results of studies exploring the use of DBT-enhanced treatments for TTM indicate that this option is effective in producing improvement in both TTM symptoms and in capacity for ER. Limited correlations between changes in these two variables prevent us from concluding that addressing deficits in ER promotes improvement in TTM. However, the findings are overall congruent with the conceptualization of TTM and other BFRBs as a maladaptive ER mechanism, and indicate that further trials of DBT and other ER-based treatments for BFRBs are warranted. The results of treatment trials are summarized in Table 1.4.

1.8 Implications of research on the ER model

The present review and synthesis of the research on the ER model for BFRBs provides support for the key role of emotional variables in the initiation, reinforcement, and maintenance of BFRBs. The results of studies exploring psychiatric comorbidity and psychological symptoms in individuals with BFRBs indicate that this population suffers from greater comorbidity and more psychological symptoms than are observed in control populations. No causal direction can be confirmed, but such findings suggest that individuals with BFRB experience dysfunctional emotion regulation. The conclusions that can be drawn from the naturalistic studies described here are limited by the use of retrospective reports, but the results suggest that negative affective states precipitate or cue body-focused behaviour. Relief from negative affective states seems to reinforce BFRB, although engaging in an episode of BFRB may subsequently trigger or increase the intensity of emotions such as shame or guilt. The results of studies that measured BFRB in

experimental conditions collectively indicate that the behaviour is differentially related to diverse emotions and affective states. Studies devoted to identifying emotions and contexts that put individuals with BFRBs at "high risk" for episodes of BFRB indicate that boredom, tension, anxiety and frustration may be particularly relevant; such findings may allow clinicians to develop interventions that target high-risk emotions.

The presence of BFRB subtypes (i.e., focused vs. automatic) and fluctuations in degree of awareness during an episode of HP, SP, and NB may imply that BFRBs are related to ER in some individuals and not others, or that ER is relevant in some but not all episodes of BFRB in a given individual. These findings (e.g., Flessner, Woods, et al., 2008; Walther et al., 2009) have significant implications for treatment. If ER is the function of focused BFRB, effective treatment will require a component designed to teach new methods of coping with painful emotion. That is, CBT/HRT may be an effective intervention for individuals whose episodes of BFRB are primarily automatic; however, individuals who engage in primarily focused HP, SP, or NB may benefit from treatments that directly address effective management of negative emotions or other difficult private experiences (Franklin, Zaggrabbe, & Benavides, 2011). Finally, although treatment outcome data cannot conclusively answer questions about etiological models for BFRBs, the results of trials of ACT and DBT for BFRBs are promising and provide support for an ER component to BFRBs.

1.9 Recommendations for future research on BFRBs and ER

Although research on BFRBs has advanced significantly in the past two decades, the body of research presented here also has significant limits. One of the primary limits of studies of BFRBs is the lack of consensus regarding diagnostic criteria. This problem is particularly prevalent in research on SP and NB; the

inclusion of SP in the upcoming DSM-5 should facilitate consistency across studies and allow research in this area to proceed in an organized and uniform fashion. The new classification of SP as Excoriation Disorder (Skin-Picking Disorder) will also facilitate awareness of this problem in psychiatric and dermatological settings.

Treatment outcome and experimental research constitute promising avenues for exploration of the ER model for BFRBs. First, results from trials of ACT and DBT for individuals with HP and SP are promising, and indicate that ER-based treatments, particularly in combination with standard CBT/HRT strategies, can decrease BFRB and improve ER. Replication of Keuthen and colleagues' trials of DBT for TTM (Keuthen, Rothbaum, et al., 2010; Keuthen et al., 2012), and trials of interventions that evaluate primary BFRB style (i.e., automatic vs. focused) and structure treatment accordingly are warranted. Randomized controlled trials comparing treatments that focus on ER with standard CBT/HRT could provide gold-standard evidence for the role of ER in BFRBs.

Second, experimental studies would permit further investigation of specific emotions or states that may be particularly relevant to BFRBs. If frustration, impatience, dissatisfaction, and boredom are preferentially related to BFRBs, the frequency of the behaviour should peak in experimental conditions designed to induce those emotions. Recent research has provided support for BFRBs as a method of regulating frustration and boredom (e.g., Duke et al., 2010b; Teng et al., 2004; Williams et al., 2006), but this model warrants investigation in a clinical population.

Third, the dimensions of automatic and focused HP and SP (Flessner, Woods, Franklin, et al., 2008; Walther et al., 2009) have been supported, but a further exploration of BFRB subtypes is warranted. In combination with the identification of individual "high-risk" emotions, investigation of individual subtypes (focused vs. automatic) would permit the development of treatments designed specifically to address each individual's diverse and idiosyncratic presentation of BFRB.

A fourth direction for future research is further exploration of the role of emotional variables in BFRBs other than TTM. Although some correlational and experimental research supports the ER model for SP and NB, the majority of research on BFRBs focuses on TTM. The existence of concrete diagnostic criteria facilitates research, and the greater attention paid to TTM is probably a function of this disorder's inclusion in the DSM. Some authors (e.g., Teng et al., 2002; Snorrason, Belleau, & Woods, 2012) have argued that BFRBs are best conceptualized as a cohesive group of disorders, and some BFRBs (e.g., neck-cracking, teeth-grinding) have not been explored but could benefit from investigation. In particular, it would be interesting to explore whether or not the dimensions of focused and automatic behaviour are present in other BFRBs and whether or not these dimensions correspond respectively to efforts to regulate emotion and simple habits. Research on the etiology of BFRBs other than TTM, SP, and NB would allow this group of disorders to be appropriately defined and subsequently included in the future versions of DSM. Inclusion in the DSM would in turn facilitate differential diagnosis of BFRBs other than TTM and SP, and would allow future research on BFRBs to proceed in an organized, integrated, and efficient manner (Teng et al., 2002).

1.10 Limitations of psychological models

The CB and ER models provide an explanation for the presence and/or maintenance of BFRBs, but do not account for the initial development of the behaviours. That is, the ER and CB models both explain how BFRBs are maintained by relief from unpleasant thoughts and emotions but do not explain why, in the face of discomfort, distress, desire for distraction, or other triggers, individuals pull out hair, pick skin, or bite nails, rather than engaging in constructive behaviour (e.g., physical exercise) or in alternative harmful behaviour (e.g., binge eating, binge drinking). Penzel's SR model (2002) provides a biological rationale for the original development of BFRBs that accounts for automatic and focused subtypes; integration

of the SR model or of biological or neurological models with the ER or CB models could provide a more complete explanation for the development and maintenance of BFRBs.

A second limitation of the models presented here are that they do not address certain cognitive elements related to BFRBs, such as perfectionism (e.g., unrealistic standards and expectations), and beliefs about actions and about self-control (e.g., O'Connor, Laverdure, Roberts, Goulet, & St-Pierre-Delorme, 2010). Although the CB model incorporates thoughts as triggers or as cues for episodes of BFRB, core beliefs and personality factors are not addressed. The addition of cognitive factors to psychological models could result in a more comprehensive and complete account of BFRBs.

Finally, as discussed above, questions remain about the applicability of the ER model and other psychological models to BFRBs such as NB, knuckle-cracking, and neck- or jaw-cracking; research on BFRBs other than HP, SP, and NB is necessary.

1.11 Limitations of the review

Several limitations of the present article must be acknowledged. First, in order to thoroughly review a specific body of research, this review addresses only psychological models for BFRBs, and does not discuss ethological or neurobiological models. Comparison of various etiological models constitutes a valuable exercise in identifying the model that best corresponds with the current research evidence about BFRBs, and future research should develop this comparison. Second, the present article focuses on TTM, SP, and NB to the exclusion of other BFRBs such as teeth-grinding, joint-cracking, and skin-scratching, among others. The number of BFRBs addressed in the present article was limited and drew on the available research, but a wider exploration of BFRBs is indicated.

Despite these limitations, the present compilation and synthesis of the available scientific research about ER and BFRBs constitutes a significant contribution to the literature in this area. Research about emotional variables related to BFRBs is limited but growing; the increased attention to emotional variables on the part of researchers in this area may reflect recognition that CBT/HRT for BFRBs has not yielded consistent results. Further, the current popularity of acceptance-based treatments has prompted both clinicians and researchers to reconsider the roles of emotional expression and avoidance in maladaptive behaviours; the recent focus on emotions in research on BFRBs may reflect a general shift in the field of clinical psychology. Despite limitations in the current body of research about BFRBs, the results of research on ER and BFRBs to date allow us to safely conclude that emotional variables play a significant role in BFRBs.

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Table 1.1
Studies of BFRBs and psychopathology by BFRB, population, and method

Authors	BFRB	Sample*	Measure	Results
Comorbidity				
Hair-pulling				
Diefenbach et al., 2002	HP	Selected; Clinical ($N = 44$)	ADIS	55% were diagnosed with a comorbid anxiety or depressive disorder (30% GAD; 11% Social Phobia; 11% Specific Phobia)
Christenson, MacKenzie et al., 1991	HP	Selected; Clinical ($N = 60$)		82% met diagnostic criteria for a comorbid current or past DSM Axis-I diagnosis
Woods, Wetterneck, et al., 2006	HP	Selected; Clinical ($n = 12$); comparison group ($n = 13$)	PAI (anxiety and depression subscales)	57.1% of participants had at least one comorbid Axis I diagnosis (28.6% depression; 10.7% OCD)
Duke et al., 2009	HP	Unselected; Non-clinical ($n = 54$); comparison group ($n = 759$)	BDI; BAI	HP group had significantly greater anxiety and depression symptoms than comparison group
Duke, Keeley, Ricketts, et al., 2010	HP	Unselected; Non-clinical ($n = 527$); comparison group ($n = 476$)	BDI; STAI	Significantly greater depression in HP group than controls; no between-group differences in anxiety
Woods, Flessner, et al., 2006	HP	Unselected: Non-clinical ($N = 1697$)	DASS-21	34% had sought help for a comorbid problem, primarily mood and anxiety disorders

Comorbidity: Skin-picking				
Arnold et al., 1998	SP	Selected; Clinical ($N = 34$)	SCID, Y-BOCS	All 34 participants met criteria for comorbid disorder (mood = 68%; anxiety = 41%)
Calikuşu et al., 2003	SP	Selected; Clinical ($n = 31$) comparison group ($n = 31$)	SCID, BDI, Y-BOCS, HARS	SP group had significantly higher incidence of depression and OCD than controls
Wilhelm et al., 1999	SP	Selected; Non-clinical ($N = 31$)	SCID-I and II, BDI, BAI	All 31 participants met criteria for a comorbid disorder; most common were OCD, alcohol abuse or dependence, and BDD
Comorbidity: Nail-biting				
Klatte & Deardorff, 1981	NB	Unclear if selected or unselected; Non-clinical ($n = 10$) comparison group ($n = 10$)	Taylor Manifest Anxiety Scale	NB group reported significantly greater anxiety
Comorbidity: Several BRFBs				
Lochner et al., 2002	HP and SP	Selected; Clinical; HP ($n = 68$); SP ($n = 21$)		51.8% of TTM sample had current or lifetime comorbid diagnosis; 47.6% of SP sample; most common were major depressive disorder, OCD, and GAD

Hajcak et al., 2006	SP and HP	Unselected; Non-clinical (n = 72) comparison group (n = 221)	DASS-21, PSWQ, OCI-R, PSWQ	BFRB group had significantly greater anxiety, stress reactivity, and obsessive-compulsive symptoms; no between-group differences in depressive symptoms
Correlations:				
Neziroglu et al., 2008	SP	Selected; Non-clinical SP (N = 40)	BAI; BDI; clinician DSM diagnosis	No significant correlation between SP severity and anxious or depressive symptoms
Bohne et al., 2002	SP	Unselected; Non-clinical (N = 133; n = 122 who reported SP		Significant correlation between SP frequency and OCD symptom severity; no correlation between SP and depression
Hayes et al., 2009	SP	Unselected; Non-clinical (n = 354); comparison group (n = 132)	OCI-R, BIS-15, BDI-II; BAI; SPIS	Significant correlations between SP severity and depressive, impulsive, anxious, and obsessive-compulsive symptom severity
Snorrason et al., 2010	SP	Unselected; Non-clinical (n = 55); comparison group (n = 55)		No significant relationship between SP symptoms and severity of depression or anxiety

Joubert, 1993b	NB	Unselected; *Non-clinical* ($N = 310$)	Self-report happiness scale	No relationship between happiness and NB
Emotion Regulation				
Shusterman et al., 2009	HP	Selected; Non-clinical ($n = 1162$); comparison group ($n = 175$)	MGH-HPS, ARS/HTS, PSWQ, PSS	HP group demonstrated significantly greater difficulty regulating emotion
Snorrason et al., 2010	SP	Unselected; Non-clinical ($n = 55$); comparison group ($n = 55$)		SP group reported significantly greater problems with ER and greater emotion reactivity than did controls

ARS/HTS = Affective Regulation Scale/Hair-pulling Trigger Scale; BAI = Beck Anxiety Inventory; BDD = Body Dysmorphic Disorder; BDDQ = Body Dysmorphic Disorder Questionnaire; BDI = Beck Depression Inventory; BIS-15 = Barratt Impulsiveness Scale—Short Form; CSEI = Coopersmith Self-Esteem Inventory; DASS-21 = Depression Anxiety Stress Scales 21-item version; ED = Eating disorder; GAD = Generalized Anxiety Disorder; HARS = Hamilton Anxiety Rating Scale; MAS = Manifest Anxiety Scale; MD = mood disorder; MOCI = Maudsley Obsessive-Compulsive Inventory; OCI-R = Obsessive-Compulsive Inventory-Revised; PSS = Perceived Stress Scale; PSWQ = Penn State Worry Questionnaire; SCID = Structured Clinical Interview for DSM-IV; SPI = Skin-Picking Inventory; SPIS = Skin-picking Impact Scale; SPS = Skin-Picking Scale; STAI = State-Trait Anxiety Inventory; YBOCS = Yale-Brown Obsessive-Compulsive Scale

* Selected = direct recruitment of individuals with problem HP, SP, NB
Unselected = drawn from a large sample of individuals with and without HP, SP, or NB
Clinical = individuals receiving clinical treatment for HP, SP, or NB, or clinician-diagnosed (i.e., not self-report only)
Non-clinical = individuals not receiving clinical treatment for HP, SP, or NB and not clinician-diagnosed (i.e., self-report only)

Table 1.2
Naturalistic studies on ER and BFRBs

Authors	BF-RB	Sample*	Design	Emotions or states measured	Key results
Hair-pulling					
Diefenbach et al., 2002	HP	Selected; Clinical ($N = 44$)	Question-naire measure of affective states before, during, and after pulling	Boredom, happiness, sadness, anger, calm, anxiety, guilt, tension, relief, indifference	Decreased boredom, anxiety, and tension after pulling; increased guilt, relief, sadness, and anger after pulling
Diefenbach et al., 2008	HP	Selected; Clinical ($n = 34$); control ($n = 32$)	Comparison of clinical and control groups on questionnaire measure of affective states before, during, and after pulling	Boredom, happiness, sadness, anger, calm, anxiety, guilt, tension, relief, indifference	Larger decrease in boredom, sadness, anger, and tension across pulling; greater increase in calm, relief, and pleasure across pulling in clinical group than in controls
Neal-Barrett & Stadulis, 2006	HP	Selected; Clinical ($N = 43$)	Question-naire measure of affective states across pulling episode	Boredom, happiness, sadness, anger, calm, anxiety, guilt, tension, relief, indifference	Decreased boredom, happiness, and anxiety after hair-pulling; increased guilt after pulling; increased relief during pulling
Duke et al., 2009		Unselect ed; Non-clinical $N = 830$, $n = 54$ who endorsed	Question-naire measure of affective states before, during, and after picking	Tension, anxiety, depression, boredom, happiness, sadness, anger, calm,	Most common pre-pulling emotions: boredom, anxiety, tension, frustration, all of which decreased

		HP		relief, indifference, embarrass-ment, frustration, loneliness	after pulling, although frustration and anxiety increased during pulling
Duke, Keeley, Ricketts, et al., 2010	HP	Unselec-ted; Non-clinical $N = 527$ college students; $n = 51$ who endorsed HP	Comparison of automatic and focused hair-pullers using questionnaire measure of affective states across pulling episode	Tension, anxiety, depression, boredom, happiness, sadness, anger, calm, relief, indifference, embarrass-ment, frustration, loneliness	Decreased tension, anxiety, depression, boredom, sadness, anger, and frustration after pulling; increased embarrassment and relief after pulling; most emotions reported more frequently by focused than automatic pullers
Mansueto, et al., 2007	HP	Unselec-ted; Non-clinical ($N =$ 248; $n = 15$ who endorsed HP)	Question-naire measure of emotions present before and after pulling	Boredom, happiness, sadness, anger, calm, anxiety, guilt, tension, relief, indifference	Most common pre-pulling emotions: anxiety, tension, boredom, and indifference; most common post-pulling emotions: relief, indifference, happiness
Stanley et al., 1995	HP	Unselec-ted; Non-clinical ($N = 22$)	Questionnair e measure of affective states before, during, and after pulling	Boredom, happiness, sadness, anger, calm, anxiety, guilt, tension, relief, indifference	Decreased tension, boredom, anger, and sadness after pulling
Skin-picking					

Keuthen et al., 2000	SP	Selected; Clinical (n = 31) Unselected; Non-clinical (n = 82)	Comparison of clinical and control groups on questionnaire measure of affective states before, during, and after picking	Tension, satisfaction, shame	Greater tension before picking, satisfaction during picking, and shame after picking in clinical group than in controls
Neziroglu et al., 2008	SP	Selected; Non-Clinical SP (N = 40)	Question-naire measure of affective states before, during, and after picking	Guilt, shame, general negative feelings, tension, satisfaction	Increase in guilt, shame, and general negative feelings after picking; increase in satisfaction after picking; decrease in tension after picking
Wilhelm et al., 1999	SP	Selected; Non-Clinical (N = 31)	Question-naire measure of affective states before, during, and after picking	Satisfaction, feeling mesmerized, loss of control, tension, guilt, shame	Increased satisfaction during picking; decreased satisfaction after picking; increased shame and guilt and decreased tension after picking
Bohne et al., 2002	SP	Unselec-ted; Non-clinical (n = 122 SP; n = 10 no SP)	Question-naire measure of affective states before, during, and after picking	Satisfaction, guilt, tension,	Increased guilt and satisfaction after picking; decreased tension after picking; presence of pleasure or relief during or after picking
Snorrason et al., 2010	SP	Unselec-ted; Non-clinical	Question-naire measure of emotion	Tension, anxiety, sadness,	Decreased boredom, anxiety, and tension after

	(*n* =55); comp-arison group (*n* = 55)	regulation and affective states before, during, and after picking	boredom, relief, gratification, trance, shame, guilt	picking; increased gratification and relief during picking; increased guilt after picking; emotion regulation problems and high emotion reactivity predicted skin-picking; similar pattern in controls, but less intense emotion

* Selected = direct recruitment of individuals with problem HP, SP, NB
Unselected = drawn from a large sample of individuals with and without HP, SP, or NB
Clinical = individuals receiving clinical treatment for HP, SP, or NB, or clinician-diagnosed (i.e., not self-report only)
Non-clinical = individuals not receiving clinical treatment for HP, SP, or NB and not clinician-diagnosed (i.e., self-report only)

Table 1.3
Experimental Studies of ER and BFRBs

Authors	BFRB	Sample*	Design	Emotions or states	Key results
Diefen-bach, et al., 2008	HP	Selected; Clinical (n = 34); control (n = 32)	Comparison of clinical and control groups on HP task	Boredom, happiness, sadness, anger, calm, anxiety, guilt, tension, relief, indiffer-ence	Greater decrease in anxiety during pulling from non-typical site in clinical group than in control group
Drysdale et al., 2009	HP	Selected; Clinical (N = 1)	Case study; comparison of BFRB across conditions	Neutral, distraction and emotional arousal	Reported urge to pull greatest in arousal condition
Wells et al.,1999	NB	Selected; Non-clinical n = 15 severe; n = 15 mild; n = 15 control	Exposure to scripted imagery of an episode of NB and a neutral script	Respira-tion, muscle tension, heart rate, skin conduct-ance	NB groups greater arousal response than controls to NB scripts; few differences in arousal between mild and severe groups; mild NB group increased arousal during NB and decreased after; severe group increased arousal prior to NB and decreased during
Wells et al., 1999	NB	Selected; Non-	Exposure to scripted	Respira-tion,	Self-cutting reduces

		clinical* $n = 15$ severe; $n = 15$ mild; $n = 67$ self-cutting	imagery of an NB episode and a self-cutting episode	muscle tension, heart rate, skin conduc-tance	arousal/tension in individuals who cut more effectively than does NB in individuals with NB
Williams et al., 2006	NB	Selected; Non-clinical ($N = 40$)	Comparison of BFRB across conditions	Boredom, frustration, contingent attention, non-contingent attention	NB most frequent in boredom and frustration conditions
Teng et al., 2004	NB, SP, skin-biting, teeth-grinding, tongue-thrusting, mouth-chewing, body-scratching	Unselec-ted; Non-clinical ($n = 18$); controls ($n = 14$)	Comparison of BFRB across conditions	Boredom, anxiety, neutral	BFRB most frequent in boredom condition
Woods & Milten-berger, 1996	Hair, face, and object manipula-tion; object mouthing; repetitive limb move-ment	Selected; Non-clinical ($N = 44$)	Comparison of BFRB across conditions	Anxiety, boredom, neutral	Hair and face manipulation most frequent in anxiety condition; object manipulation most frequent in boredom condition

* Selected = direct recruitment of individuals with problem HP, SP, NB
Unselected = drawn from a large sample of individuals with and without HP, SP, or NB
Clinical = individuals receiving clinical treatment for HP, SP, or NB, or clinician-diagnosed (i.e., not self-report only)
Non-clinical = individuals not receiving clinical treatment for HP, SP, or NB and not clinician-diagnosed (i.e., self-report only

Table 1.4
Trials of ACT, ACT-enhanced HRT, and DBT-enhanced HRT for BFRBs

Authors	BFRB	Samples	Design	Treatment components	Key results
ACT					
Flessner, Busch, et al., 2008	HP and SP	Clinical ($N = 5$)	Comparison of component sequencing in 10-week protocol (HRT/ACT versus ACT/HRT)	Values, willingness, cognitive defusion, acceptance of urges, HRT components	All participants significantly reduced pulling/picking independently of treatment component sequence
Twohig et al., 2006	SP	Clinical ($N = 5$)	8-week ACT protocol	Values, mindfulness, acceptance of urges, cognitive defusion	4 of 5 participants significantly decreased skin-picking; only 1 maintained gains entirely; 3 of 5 participants reduced experiential avoidance, with maintained gains
Twohig & Woods, 2004	HP	Clinical ($N = 6$)	7-week ACT/HRT protocol	Values, acceptance of urges, cognitive defusion, HRT components	3 participants significantly decreased hair-pulling; results maintained for 3 of 4 responders; non-significant decrease in experiential avoidance
Woods, Wetter-neck, et al., 2006	HP	Clinical; treatment ($n = 12$); control	10-session ACT/HRT versus waitlist	Values, acceptance of private events,	Treatment group significantly reduced hair-pulling and

		(n = 13)	control	cognitive defusion, HRT components	experiential avoidance; not all gains maintained
DBT					
Keuthen, Roth-baum, et al., 2010 and Keuthen et al., 2011	HP	Clinical (N = 10)	11-week DBT-enhanced CBT protocol	Mindfulness, distress tolerance, ER, HRT components	8 of 10 participants significantly reduced HP and improved ER; majority of gains maintained or improved at 3- and 6-month follow-up
Keuthen et al., 2012	HP	Clinical (n = 20 DBT; n = 18 control)	11-week DBT enhanced CBT protocol versus minimal attention control (MAC) condition	Mindfulness, distress tolerance, ER, HRT components	DBT group significantly decreased HP severity and impairment, decreased experiential avoidance, and improved ER; majority of gains maintained over time; between-group differences reported in change in HP severity and impairment, and in some measures of ER

CHAPTER II

ARTICLE II –EMOTION REGULATION IN BODY-FOCUSED REPETITIVE BEHAVIOURS: EVIDENCE FROM A CLINICAL SAMPLE

Abstract

Body-focused repetitive behaviours (BFRBs) refer to repetitive and injurious habits such as hair-pulling, skin-picking, and nail-biting. Although BFRBs cause significant distress, they seem to be maintained by negative reinforcement. The emotion regulation (ER) model proposes that individuals with BFRBs are characterized by deficits in ER, and engage in damaging body-focused behaviours to avoid or alleviate negative emotions. The present study tested the ER model by comparing individuals with BFRBs (n = 24) and controls (n = 23) on questionnaire measures of ER. Between-group differences in ability to regulate specific emotions were also investigated, as was the relative power of specific emotions to trigger episodes of BFRB. The results indicated that individuals with BFRBs have significantly greater difficulty with global ER than do controls. More specifically, the BFRBs group had greater difficulty regulating anxiety, indifference, tension, guilt, boredom, and irritability. In the BFRBs group, anxiety, boredom, and tension were the affective states most likely to trigger BFRB. The results of the present study provide further evidence for the role of ER in explaining the persistence of injurious body-focused behaviours. They suggest that individuals with BFRBs could benefit from treatments focused on alternative strategies for tolerating or regulating unpleasant emotions.

Keywords: Body-focused repetitive behaviours, trichotillomania, skin-picking, nail-biting, emotion regulation; OCD spectrum

2.1 Body-focused repetitive behaviours

Body-focused repetitive behaviours (BFRBs) are repetitive, damaging, and seemingly non-functional habits such as hair-pulling, skin-picking, and nail-biting (O'Connor, Lavoie, Robert, Stip, & Borgeat, 2005; Snorrason et al., 2012). Although many individuals engage in harmless and occasional body-focused habits that do not cause distress, the term BFRBs refers to behaviours that fall on the maladaptive end of the continuum, causing significant distress or impairment in functioning (Teng, Woods, Marcks, & Twohig, 2004). In fact, chronic and dysfunctional hair-pulling and skin-picking are included in the Diagnostic and Statistical Manual of Mental Disorders (DSM-5; American Psychiatric Association [APA], 2013) as Trichotillomania (Hair-Pulling Disorder) and Excoriation Disorder (Skin-Picking Disorder), respectively.

2.1.1 Trichotillomania

In DSM-IV-TR (APA, 2000), trichotillomania (TTM) is characterized by chronic hair-pulling (HP) resulting in noticeable hair loss, tension immediately prior to pulling; pleasure, gratification, or relief when pulling out hair; significant distress or impairment caused by HP. Hair may be pulled out from any area of the body, including the scalp, eyebrows, arms, legs, and pubic area (APA, 2000). The prevalence of TTM as described by DSM-IV criteria is approximately 0.6% (Christenson, Pyle, & Mitchell, 1991; Duke, Bodzin, Tavares, Geffken, & Storch, 2009). However, a considerably greater proportion of the population reports recurrent HP that causes distress and impairment but does not meet all of the DSM-IV-TR criteria (Duke et al., 2009). Furthermore, the DSM-5 diagnostic criteria for TTM no longer include tension prior to pulling or relief or gratification after pulling; clinical prevalence rates as per DSM-5 criteria are not yet available. The research described here was conducted prior to the publication of DSM-5.

2.1.2 Skin-picking

Skin-Picking Disorder (SPD) refers to recurrent skin-picking (SP) resulting in lesions, with repeated attempts to decrease or stop SP. The symptoms cause clinically significant distress; impairment in social, occupational or other important areas of functioning; and are not better explained by the presence of another mental disorder (APA, 2013). SP may begin as a grooming routine in which small blemishes or skin irregularities are removed; in severe cases, however, individuals may spend hours per day (Flessner & Woods, 2006) using tweezers, pins, or other small instruments to dig into easily accessible areas such as the face, upper body, cuticles, and extremities (Arnold, Auchenbach, & McElroy, 2001; Calikuşu, Yücel, Polat, & Baykal, 2003; Keuthen et al., 2000). The reported prevalence of SP ranges from 1.4% to 5.4% in various populations (Hayes, Storch, & Berlanga, 2009; Keuthen, Koran, Aboujaoude, Large, & Serpe, 2010). However, prevalence rates must be interpreted with caution due to inconsistent diagnostic criteria across studies, all of which were conducted prior to the publication of DSM-5 (the first version of the manual to include SPD).

2.1.3 Nail-biting

Many individuals occasionally use the teeth to replace nail clippers in grooming, without distressing consequences. In contrast, pathological nail-biting (NB) involves biting past the nail bed and cuticles, drawing blood and resulting in chronic scarring, or in red, sore, and infected fingers (Penzel, 1995; Wells, Haines, & Williams, 1998). Despite limited and dated research on NB prevalence, Snyder and Friman (2012) reviewed the literature and tentatively concluded that NB peaks at puberty, with prevalence rates of 25%-60%, and subsequently decreases to 10%-25% in young adults and below 10% in adults over 35 years.

2.1.4 Impact of BFRBs

BFRBs are prevalent and their physical and psychological sequelae are considerable (Diefenbach, Mouton-Odum, & Stanley, 2002; Diefenbach, Tolin, Hannan, Crocetto, & Worhunsky, 2005; Woods, 2002), including hair loss; scarring and infections; damage to follicles, teeth, and gums (Woods, Friman, & Teng, 2001; Salmon-Ehr, Mohn, & Bernard, 1999; Krejci, 2000); shame and embarrassment about appearance (Bohne, Wilhelm, Keuthen, Baer, & Jenike, 2002); occupational impairment (Arnold et al., 2001); and avoidance of activities including sexual intimacy, swimming or other athletic activity, and exposure to windy weather or well-lit areas (Townsley-Stemberger, Thomas, Mansueto, & Carter, 2000).

2.2 Emotion regulation model

Although BFRBs and their consequences create considerable distress, they also seem to satisfy an urge and deliver some form of reward. This paradox has prompted researchers to explore etiological models to explain the development and maintenance of BFRBs. One model receiving recent research attention is the emotion regulation (ER) model.

ER refers to the ways in which individuals identify and respond to emotional experiences (Diefenbach, Tolin, Meunier, & Worhunsky, 2008); the ability to experience, differentiate between, and respond spontaneously to the full range of emotional experiences (Gratz & Roemer, 2004); and the processes through which individuals influence the experience and expression of emotions (Gross, 1998). The ER model for BFRBs proposes that individuals with BFRBs have difficulty regulating negative emotions and engage in body-focused behaviour to avoid or alleviate aversive affect. Negative emotional experiences trigger BFRB, and relief from negative emotion maintains and reinforces the behaviour. The ER model further suggests that individuals with BFRBs are characterized by a general deficit in ER

(Snorrason, Smári, & Ólafsson, 2010). Episodes of BFRB are hypothesized to result from a drive to stop experiencing a given affective state, and a lack of alternative methods for coping with it (Shusterman, Feld, Baer, & Keuthen, 2009).

2.3 Research on ER and BFRBs

Two studies explored the ER model for BFRBs by using measures of ER to explore differences between individuals with BFRBs and a comparison group. Shusterman and colleagues (2009) explored the relationship between HP (as per the Massachusetts General Hospital Hairpulling Scale [MGH-HPS]; Keuthen et al., 1995) and ER (ARS; Shusterman et al., 2009)in an online sample of 1162 individuals reporting uncontrollable HP or urge to engage in HP and a control group. Participants completed a measure of HP severity and a measure of ability to regulate affect. Hair-pullers reported more difficulty "snapping out" [*sic*] (Shusterman et al., 2009) of affective states than did the control group; the largest differences between groups were for anxiety, shame, tension, and boredom. Self-reported capacity for ER was correlated with HP severity, and difficulty regulating particular emotions predicted the degree to which those emotions triggered HP.

Snorrason and colleagues (2010) compared individuals with SP causing skin damage and distress or impairment with a control group on measures of ER and emotion reactivity (the tendency to experience emotions frequently, intensely, and persistently). The SP group reported greater difficulties with ER and greater emotion reactivity than did controls. ER and emotion reactivity each contributed to the prediction of SP after controlling for anxiety, worry, and depression.

Other questionnaire studies have explored the ER model for BFRBs by retrospectively evaluating the presence and intensity of diverse emotions before, during, and after episodes of BFRB. In clinical samples, individuals with HP and SP consistently report decreases in boredom, tension, and anxiety over the course of a

pulling or picking episode, and increases in guilt, shame, sadness, and relief following a BFRB episode (Diefenbach, Mouton-Odum, & Stanley, 2002; Neal-Barnett & Stadulis, 2006; Wilhelm et al., 1999). Studies using non-clinical samples have also found that boredom, anxiety, indifference, tension, and frustration are often present prior to BFRB; these states remain stable or increase during BFRB, and are subsequently replaced by guilt, relief, indifference, and satisfaction (Bohne et al., 2002; Duke et al., 2009; Mansueto, Thomas, & Brice, 2007). Some individuals also report pleasure or gratification during HP or SP (Bohne et al., 2002; Snorrason et al., 2010).

2.3.1 Research on specific emotions

Experimental research on ER and BFRBs has sought to identify the specific emotions that trigger BFRB. Teng and colleagues (2004) used video segments to induce boredom, anxiety, and depression in non-clinical participants with and without BFRBs. The BFRBs group demonstrated significantly more BFRB in the boredom condition than in the anxiety, depression, or control conditions. Similarly, Williams, Rose, and Chisholm (2006) experimentally induced boredom and frustration in undergraduates reporting NB, and compared behaviour in the boredom and frustration conditions with behaviour in a social interaction condition and a social disapproval condition. They observed that participants were more likely to engage in NB in the boredom and frustration conditions. Furthermore, Williams and colleagues reported that participants endorsed boredom and discomfort as conditions likely to trigger NB.

These experimental results are supported by reports from individuals with BFRBs that they engage in BFRB when they are bored, frustrated, or inactive (Bohne et al., 2002; Diefenbach et al., 2002; Duke, Keeley, Ricketts, Geffken, & Storch, 2010; O'Connor, Brisebois, Brault, Robillard, & Loiselle, 2003), or during activities requiring passive attendance or waiting (O'Connor et al., 2003). O'Connor and colleagues (2003) asked participants with various BFRBs (TTM, NB, skin-scratching,

bruxism) to list the activities during which they were at the greatest and the least risk of engaging in BFRB. Participants reported that the highest risk activities were passive attendance (e.g., watching TV), studying, transit (e.g., coming home from work), and waiting (e.g., in line). The lowest risk activities were physical exercise, socializing, eating, and manual work. Participants described high-risk activities as boring, inactive, and unsatisfying, and the majority of participants associated BFRB onset with a tense state.

The results of research to date on BFRBs and ER indicate that deficits in ER may differentiate individuals with BFRBs from controls. BFRB seems to decrease negative emotions such as boredom, tension, and anxiety, and trigger shame, guilt, and relief. Some evidence suggests that emotions such as boredom, tension, and frustration are particularly likely to trigger BFRB. Further direct comparisons of ER in individuals with BFRBs and controls are warranted, as are tests of the role of particular emotions.

2.4 Current study

The current study was designed to test the ER model by exploring differences between individuals with BFRBs and controls on measures of ER, and to identify emotions particularly likely to trigger BFRB. The study focuses on HP, SP, and NB, the BFRBs that have received the most research attention and are the most clearly defined. We collected data on ER and BFRB severity from a BFRBs group and a control group. We hypothesized that (a) the BFRBs group would report greater difficulty with global ER than would the control group and specifically, the BFRBs group would report greater difficulty regulating boredom and tension than would controls; (b) in the BFRBs group, boredom and tension would trigger BFRB; and (c) BFRB severity scores would correlate with ER.

2.4.1 Participants, recruitment, and informed consent

Participants were recruited via the website of the research centre of the Montreal University Institute in Mental Health; an online community bulletin board; recruitment posters in local universities, cafes, and healthcare institutions; and from lists of control participants from past or current studies at the research centre. All participants completed a 15- to 30-minute telephone screening interview regarding sociodemographic variables, BFRB severity and degree of impairment, and comorbid psychopathology. The research protocol was approved by the Montreal University Institute in Mental Health research ethics committee.

Inclusion criteria for the BFRBs group were the following: (a) age 18-65 years; (b) current BFRB with a subjective severity rating of at least 3/10, or significant distress or impairment from BFRB; (c) BFRB as primary presenting problem, even if another psychological problem or disorder was present; (d) if on psychotropic medication, medication had to be stabilized for three months. Inclusion criteria for the control group were the following: (a) age 18-65 years; (b) if on psychotropic medication, medication had to be stabilized for three months; and (c) if HP, SP, or NB were present, the behaviour had to be non-chronic and non-distressing. Given that some form of HP, SP, or NB is common in many populations (Hansen, Tishelman, Hawkins, & Doepke, 1990; Teng, Woods, Twohig, & Marcks, 2002), we did not attempt to recruit a control sample with zero BFRB. Exclusion criteria were the following: (a) DSM-IV Axis I or II disorder other than TTM or SPD as primary presenting problem; (b) alcohol or drug abuse; and (c) BFRB comorbid with chronic tics or Tourette Syndrome.

2.4.2 Assessment measures

Subsequent to the telephone screening interview, eligible participants were mailed a questionnaire package to complete at home, including the Symptom

Checklist-90-Revised (SCL-90-R; Derogatis, 2000) and the Massachusetts General Hospital Hairpulling Scale (MGH-HPS; Keuthen et al., 1995) and analogue SP, NB, and skin-scratching scales. The package included a standard consent form (see Appendix A) approved by the Montreal University Institute in Mental Health research ethics committee. Participants read the consent form at home prior to beginning the questionnaire battery and it was later reviewed and signed at the research centre. Participants completed the Difficulties in Emotion Regulation Scale (DERS; Gratz & Roemer, 2004), Affective Regulation Scale and Hairpulling Triggers Scale (ARS, HTS; Shusterman et al., 2009) at the research centre. For all but the SCL-90-R, French-speaking participants completed a French-Canadian version of the questionnaire, translated using a back-translation and consensus procedure (Vallerand, 1989). See Appendix B for all scales and questionnaires.

1) *Massachusetts General Hospital Hairpulling Scale*. The MGH-HPS (Keuthen et al., 1995) is a 7-item self-report measure of HP behaviours, using a 5-point scale. The scale assesses the frequency and intensity of HP during the past month, producing a total HP severity score. The MGH-HPS demonstrates good internal consistency ($\alpha = .89$) and test-retest reliability ($r = .97$). Participants also completed analogue SP, NB, and skin-scratching scales (i.e., the MGH-HPS with the word *hair-pulling* replaced by *skin-picking*, *nail-biting*, and *skin-scratching*). Although skin-scratching is a component of SP (Keuthen, Koran, et al., 2010; Tucker, Woods, Flessner, Franklin, & Franklin, 2011), it is not directly addressed in the SP scale; we therefore included a separate scale for skin-scratching. Although an SP scale has been validated (Keuthen et al., 2001), we used an analogue scale in order to obtain comparable severity scores across BFRBs.

2) *Affective Regulation Scale*. The ARS (Shusterman et al., 2009) consists of a list of nine emotions (bored, angry, guilty, indifferent, tense, irritable, sad, anxious, and ashamed); participants are instructed to "check the circle that indicates your

ability to control each of these emotions. How easily can you 'snap out of it?" Responses on a five-point scale range from "never able to control" (0) to "always able to control (5)." Shusterman et al. (2009) reported good internal consistency (α = .83 for hair-pullers and .87 for non-pullers).

3) *Hair-Pulling Triggers Scale* (HTS). The HTS (Shusterman et al., 2009) requires participants to "indicate how likely each mood is to cause hair-pulling." The HTS uses the same nine emotions as does the ARS, and possible answers are *always, sometimes,* and *never*. For the current study, "hair-pulling" was changed to "hair-pulling, skin-picking, or nail-biting." The authors reported good internal consistency in their sample of hair-pullers (α = 0.83).

4) *Difficulties in Emotion Regulation Scale*. The DERS (Gratz & Roemer, 2004) consists of 36 items that assess six dimensions of difficulties with ER: non-acceptance of emotional responses, difficulties engaging in goal-directed behaviour, impulse control difficulties, lack of emotional awareness, limited access to effective ER strategies, and lack of emotional clarity. Gratz and Roemer (2004) reported strong internal consistency on the DERS (α = .93), adequate internal consistency for all subscales (α > .80), and good test-retest reliability for the total scale over 4 to 8 weeks (r = .88).

5) *Symptom Checklist 90-Revised.* The SCL-90-R (Derogatis, 2000) is a 90-item psychiatric self-report inventory. Participants indicate the rate of symptom occurrence during the past week using a five-point Likert scale. The SCL-90-R yields three global distress indices. The scale has been demonstrated to have satisfactory internal consistency (α = .71-.85 for various subscales) and test-retest reliability (r = .68-.91) (Derogatis & Savitz, 2000). French-speaking participants completed the validated French-Canadian (Fortin & Coutu-Wakulczyk, 1985) version of this scale.

2.5 Results

In one year, 111 individuals responded to our recruitment advertisements. Forty-one dropped out of the study prior to or following the telephone screening interview and 22 were excluded following the interview; 48 participants (n = 24 BFRB; n = 24 controls) completed the study. Participants in the BFRBs group were classified as HP (n = 6), SP (n = 6), or NB (n = 12) based on initial report and based on scores on the MGH-HPS and analogue SP, NB, and skin-scratching scales. One control participant was excluded because she denied BFRBs during the telephone interview but endorsed significant BFRBs on all four MGH scales. The final sample (N = 47; n = 24 BFRB; n = 23 controls) was primarily female (n = 34), with an average age of 34.57 years (range 20-59 years). There were no significant differences between groups in age, gender, or language.

For all questionnaire measures, missing data was replaced on questionnaires that were at least 80% complete by the total sample's mean for that item. This method was chosen over other missing data approaches such as multiple imputation because of the very low ratio of missing values. All participants completed the four MGH scales. For control participants, MGH score was the mean of their scores on all four scales. For participants in the BFRBs group, MGH score was their score on the scale responding to their reported habit, with several exceptions. Two of the participants in the SP group (n = 6) scored highly on the skin-scratching scale and 0 on the SP scale; we used their scores on the scratching scale for analyses. Three other participants in the SP group had elevated scores on both the scratching and the SP scales; for analyses, we used their average from the two scales. One participant in the SP group limited SP to the skin around the nails and had elevated scores on the SP and NB scales; we used the participant's average from the two scales. Similarly, one participant in the NB group had equally high scores on the NB and skin-scratching scales; we used the participant's average on the two scales to calculate MGH score.

A significant difference between groups was observed on the MGH scale (t = 15.811, $p < .001$); mean score was 16.21 (SD = 4.59) in the BFRBs group and 0.87 (SD = 1.22) in the control group. No significant differences in MGH score were observed between individuals with HP, SP, and NB. Scores on SCL-90-R global distress dimensions (Global Severity Index, Positive Symptom Total, Positive Symptom Distress Index) were somewhat above average but fell within the norms for the measure; between-group differences were not significant. GSI data was abnormal, and was therefore transformed using a log transformation prior to comparison of means. See Table 2.1.

Hypothesis 1: Between-group differences in ER. Independent samples t-tests were conducted to identify between-group differences in ER on the DERS and ARS. Differences between the BFRBs group and the control group were observed for DERS total score and ARS total score; there were no significant differences between individuals with HP, SP, and NB. We therefore proceeded to explore between-group differences on DERS subscales and ARS specific emotions. Where variances were unequal between groups, the t statistic reported is that calculated without assuming equal variance.

On the DERS, the BFRBs group reported significantly greater difficulty with ER ($t(44)$ = 2.60, p = .013, d = .76) than did the control group. Significant differences between groups were observed on several subscales, including Lack of Emotional Clarity ($t(44)$ = 3.16, p = .003), Difficulties in Impulse Control ($t(44)$ = 2.44, p = .019), Limited Access to ER Strategies ($t(44)$ = 2.16, p = .036), and Difficulty Engaging in Goal-Directed Behaviour ($t(40)$= 2.27, p = .028). Effect sizes (Cohen's d) were moderate to large, ranging from .66 to .92. See Table 2.2.

On the ARS, the BFRBs group reported greater overall difficulty 'snapping out' of emotions ($t(44)$= -3.80, $p < .001$, d = 1.12) than did the control group, and rated themselves as less able to regulate each of the nine emotions measured. The

greatest between-group differences were demonstrated for ability to regulate anxiety ($t(44)= -4.82, p < .001$) and indifference ($t(37) = -2.61, p = .013$), followed by tension ($t(44)= -2.32, p = .025$), guilt ($t(44) = .2.29, p = .027$), boredom ($t(34) = -2.22, p = .033$) and irritability ($t(44)= -2.19, p = .034$) Between-group differences in anger, sadness, and shame were not significant. Effect sizes (Cohen's *d*) were medium to large, ranging from .64 to 1.43. See Table 2.3.

Hypothesis 2: Extent to which various emotions trigger BFRB. On the HTS, participants in the BFRBs group reported that the affective states most likely to trigger BFRB were anxiety, boredom, and tension. Seventy-eight percent reported that anxiety always triggered BFRB; 70% reported that tension always triggered BFRB, and 52% reported that boredom always triggered BFRB. For both anxiety and boredom, 96% of participants reported that these emotions always or sometimes triggered BFRB; 91% reported that tension always or sometimes triggered BFRB. The emotions rated as least likely to trigger BFRB were anger, indifference, and shame. See Table 2.4.

Hypothesis 3: Relationship between BFRB severity and ER. We conducted correlation analyses to investigate the relationship between BFRB severity and ER. For the complete sample (N = 47), MGH scores correlated significantly with both the DERS ($r = .46, p = .001$) and the ARS total scores ($r = -.59, p < .001$). When the analyses were re-conducted with only the BFRBs group data, the relationships were not significant. Analyses of DERS subscales revealed a significant correlation between MGH total score and the Difficulties in Impulse Control subscale ($r = .53, p = .008$). On the ARS, only ability to regulate irritability was significantly correlated with MGH total score ($r = -.52, p = .009$). See Tables 2.5 and 2.6.

2.6 Discussion

The objective of the present study was to compare ER in individuals reporting problematic BFRBs and a control group. We expected that individuals with BFRBs would have greater difficulties with ER than would controls, and in particular, greater difficulty regulating boredom and tension. We hypothesized that the BFRBs group would report that boredom and tension trigger BFRB, and that BFRB severity would correlate with difficulties with ER.

Consistent with the first hypothesis, significant between-group differences on total scores on the ARS and DERS indicated that individuals with BFRBs differ from controls in terms of ability to regulate emotion. The finding that individuals with BFRBs demonstrate deficits in ER is consistent with results from Shusterman and colleagues (2009) and Snorrason and colleagues (2010), and consistent with the ER model, which conceptualizes BFRB as a maladaptive method of regulating negative emotions.

On the ARS, individuals with BFRBs reported greater difficulty regulating every emotion measured, with significant between-group differences in six of the nine emotions. On the DERS, significant differences between groups were observed for several subscales, including Lack of Emotional Clarity, Difficulties with Impulse Control, Limited Access to ER Strategies, and Difficulties Engaging in Goal-Directed Behaviour. These results suggest that individuals with BFRBs differ from controls in ability to understand emotional responses and in ability to access and implement goal-directed ER strategies. They further suggest a relationship between BFRBs and impulse control, a finding that is consistent with the categorization of HP as an impulse control disorder in DSM-IV (APA, 2000). The findings suggest the following sequence: individuals with BFRBs experience unpleasant emotions triggered by an internal or external event; they are overwhelmed in the face of strong

emotion and possibly uncertain or unaware of how they feel; the impulse to engage in BFRB arises and is difficult to control; emotion is regulated by engaging in BFRB.

We expected that individuals with BFRBs would report greater difficulty regulating boredom and tension than would controls. This hypothesis was supported; however, the BFRBs group also had significantly greater difficulty regulating anxiety, indifference, guilt, and irritability, reducing the specificity of the finding. Overall, the BFRBs group had the greatest difficulties regulating anxiety and tension, whereas the control group reported the most difficulty regulating tension, irritability, and sadness.

The second hypothesis, that BFRB would be triggered by boredom and tension, was corroborated. On the HTS, two thirds of BFRBs group participants reported that tension always triggers BFRBs; over 50% of the BFRBs group reported that boredom always triggers BFRBs. These results add to the portrait of individuals with BFRBs drawn above: a combination of boredom, tension, and other emotions are triggered by an external or internal event; individuals with BFRBs have difficulty regulating the emotions and resort to BFRBs as a compensatory mechanism.

However, these results only partially support the hypothesis that boredom and tension specifically trigger BFRB. Although participants in the present study endorsed boredom and tension as triggers for HP, SP, and NB, anxiety was the emotion reported to be the most likely to trigger BFRBs, with three quarters of the BFRBs group endorsing anxiety as a regular trigger. This result may be attributable to variance between studies and between participants as to the definition of various emotions. Any study in which participant are asked to report on their emotional state presents the possibility of idiosyncratic definitions and experiences of emotions. For example, the affective state that one individual experiences as "anxiety" may be defined by another individual as "tension." A second explanation for this result is the possibility that anxiety is present during BFRB, but that it manifests in *response* to

BFRB, rather than as a trigger for the behaviour; that is, individuals may experience anxiety *subsequent* to BFRB onset.

As per the third hypothesis, we expected to find a relationship between BFRB severity (MGH scales) and difficulties with ER (DERS and ARS). In the sample as a whole, the expected significant relationship between BFRB severity and difficulties with ER was observed. However, when we reconducted the analyses using only the BFRBs group data, overall ARS and DERS scores did not correlate significantly with MGH scores. This finding may be attributable to lack of power in the analyses. Alternatively, the finding may suggest that the relationship between BFRB severity and problems in ER is robust enough to distinguish individuals with BFRBs from individuals without BFRBs, but not sensitive enough to distinguish between severe and non-severe BFRB in a BFRBs group. Finally, the finding may suggest that BFRB exists on a continuum (e.g., present, mild, moderate, and severe) rather than as a dimensional construct.

2.7 Clinical implications

The results demonstrate that individuals with HP, SP, and NB have difficulty with ER, providing support for the hypothesis that BFRB constitutes an effort to regulate affect. It follows that individuals with BFRBs could benefit from treatments designed to teach alternative strategies for tolerating or regulating difficult emotions. Traditional treatments for BFRBs have been primarily behavioural or cognitive-behavioural (CBT), and often involve habit reversal training (HRT; Azrin & Nunn, 1973). Trials of CBT or HRT for HP and SP often yield significant reductions in symptoms; however, gains are not always maintained over time (Keuthen, Fraim, et al., 2001; Lerner, Franklin, Meadows, Hembree, & Foa, 1998; Twohig & Woods, 2001). Some authors have suggested that CBT and HRT constitute incomplete treatments because they fail to address internal experiences such as emotion and ER (e.g., Bate et al., 2011).

Dialectical Behaviour Therapy (Linehan, 1993) combines mindfulness and acceptance of uncomfortable emotional experiences with step-by-step distress tolerance and ER skills and strategies. DBT-enhanced CBT has recently been applied to treat TTM and was demonstrated to be effective in both decreasing HP symptoms and improving ER (Keuthen et al., 2011; Keuthen et al., 2012; Keuthen, Rothbaum, et al., 2010). Acceptance and Commitment Therapy (ACT; Hayes, Strosahl, & Wilson, 1999) is a treatment approach that promotes acceptance of unpleasant thoughts, emotions, and urges, and discourages emotional avoidance or control strategies. ACT for HP and SP has yielded mixed results, but has been demonstrated to have some impact on ER and on symptoms of HP and SP (Flessner, Busch, Heideman, & Woods, 2008; Twohig, Hayes, & Masuda, 2006; Twohig & Woods, 2004; Woods, Wetterneck, & Flessner, 2006).

Although the results of treatment trials cannot answer questions about etiological models for BFRBs, the results of trials of ACT and, particularly, DBT for BFRBs are promising. That improvements in HP and SP symptoms seem to correlate with improvements in ER (Woods, Wetterneck, & Flessner, 2006; Keuthen, Rothbaum, et al., 2010; Keuthen et al., 2011) corroborates the ER model and strengthens the argument for attributing research and clinical resources to treatments for BFRBs that incorporate an ER component.

2.8 Future research

First, although our results corroborate prior research indicating that individuals with BFRBs experience greater difficulty with ER than do controls, it is possible that individuals with BFRBs simply experience more frequent or more intense emotions (i.e., greater emotion reactivity) than do controls, generating difficulties with regulation (Snorrason et al., 2010). Researchers in this area may wish to explore emotion reactivity in individuals with BFRBs by investigating whether or not they experience more frequent and more intense emotions than do controls.

Second, studies of HP and SP (Christenson, Mackenzie, & Mitchell, 1991; Christenson, Ristvedt, & Mackenzie, 1993; Flessner, Conelea, Woods, et al., 2008; Walther, Flessner, Conelea, & Woods, 2009) have identified two separate dimensions of BFRB. "Automatic" HP and SP occurs outside of awareness, often during sedentary activities; in contrast, "focused" BFRB is a consciously-initiated behaviour precipitated by a recognizable urge and preceded by conscious negative emotional states. Some researchers (e.g., Twohig & Woods, 2004) have suggested that ER plays a greater role in focused BFRB than in automatic BFRB, and that focused BFRB serves the specific purpose of responding to internal experiences such as negative thoughts and emotions. Future research that explicitly distinguishes focused from automatic BFRB would permit investigation of the relevance of ER in each type of behaviour.

2.9 Limitations

Several limitations of the present study must be acknowledged. First, although the size of the sample used in this study in was adequate, a larger sample is desirable and would reinforce the generalizability of the results. Further, several non-significant statistical effects (e.g., group differences on DERS subscales) may have lacked sufficient power, and may have reached significance in a larger sample. Second, to build upon prior research and to permit timely recruitment of participants, we limited the BFRBs in the present study to HP, SP, and NB to the exclusion of behaviours such as teeth-grinding, knuckle-cracking, neck- or jaw-cracking. Studies of ER in BFRBs other than HP, SP, and NB are warranted.

Third, the current study did not identify participants' BFRB as primarily focused or primarily automatic, a distinction that would have permitted exploration of the specific ER-related functions of the two dimensions of BFRBs. Finally, the results of the study presented here do not address the precise mechanism by which BFRB

regulates negative affective states. Diverse affective states clearly trigger or increase BFRB, but the exact mechanism by which BFRBs *regulate* affect is not established.

Despite these limitations, the present study is among the first to directly measure ER in individuals with BFRBs, and provides further evidence for the role of ER in explaining the persistence of injurious body-focused behaviours such as HP, SP, and NB. The results indicate that individuals with BFRBs demonstrate greater difficulties with ER than do controls, and suggest that deficits in emotion regulation may contribute to the development and maintenance of BFRBs.

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Table 2.1
Participant data

	BFRBs group (n = 24)		**Control group (n = 23)**		t	df	***sig.* (2-tailed)**
BFRB							
Hair-pulling	6						
Skin-picking	6						
Nail-biting	12						
Age							
M (*SD*) years	34.29	(11.18)	34.87	(12.20)			
Range (years)	20-54		20-59				
Gender							
Male (n, %)	7	(29.16)	6	(26.08)			
Female (n, %)	17	(70.83)	17	(73.91)			
Language							
French (n, %)	23	(95.83)	18	(78.26)			
English (n, %)	1	(4.16)	5	(21.74)			
MGH-HPS or analogue *M (SD)*	16.21	(4.59)	0.87	(1.22)	15.81	26	< .001
HP	15.50	(5.21)					
SP	16.83	(4.79)					
NB	16.25	(4.56)					
SCL-90-R							
PSDI *M (SD)*	1.55	(0.48)	1.38	(0.36)			*ns*
PST *M (SD)*	29.67	(19.28)	23.64	(15.56)			*ns*
GSI *M (SD)*	0.57	(0.51)	0.41	(0.34)			*ns*

Table 2.2
Between-group differences on the DERS

	Group	**Mean (SD)**	***t***	***df***	***sig.* (2-tailed)**	***d***
DERS Total Score	BFRBs	78.13 (21.84)				
	Controls	64.13 (14.08)	2.60	44	.013	.76
Subscales						
Lack of Emotional Clarity	BFRBs	10.58 (3.79)				
	Controls	7.65 (2.46)	3.16	40	.003	.92
Non-Acceptance	BFRBs	11.88 (4.68)				
	Controls	10.48 (3.94)	1.10	44	*ns*	
Difficulties with Impulse Control	BFRBs	11.88 (4.73)				
	Controls	8.96 (3.32)	2.44	44	.019	.71
Limited Access to ER Strategies	BFRBs	15.33 (4.93)				
	Controls	12.61 (3.58)	2.16	44	.036	.63
Lack of Emotional Awareness	BFRBs	14.54 (5.33)				
	Controls	12.87 (3.73)	1.24	44	*ns*	
Difficulties Engaging in Goal-Directed Behaviour	BFRBs	13.92 (4.21)				
	Controls	11.57 (2.76)	2.27	40	.028	.66

Table 2.3
Between-group differences on the ARS (ability to 'snap out' of emotions)

	Group	Mean (*SD*)	*t*	*df*	*sig.* (2-tailed)	*d*
ARS* Total Score	BFRBs	21.00 (4.75)				
	Controls	26.18 (4.48)	-3.80	44	<.001	1.12
Boredom	BFRBs	2.67 (0.92)				
	Controls	3.14 (0.47)	-2.22	34	.033	.64
Anger	BFRBs	2.67 (0.87)				
	Controls	2.91 (0.87)	-0.95	44	*ns*	
Guilt	BRFBs	2.29 (0.91)				
	Controls	2.91 (0.92)	-2.29	44	.027	.67
Indifference	BFRBs	2.54 (1.25)				
	Controls	3.32 (0.72)	-2.61	37	.013	.76
Tension	BFRBs	1.96 (0.81)				
	Controls	2.55 (0.91)	-2.32	44	.025	.68
Irritability	BFRBs	2.21 (0.78)				
	Controls	2.73 (0.83)	-2.19	44	.034	.64
Sadness	BFRBs	2.25 (0.74)				
	Controls	2.73 (0.88)	-2.00	44	*ns*	
Anxiety	BFRBs	1.83 (0.76)				
	Controls	2.77 (0.53)	-4.82	44	<.001	1.43
Shame	BFRBs	2.58 (1.10)				
	Controls	3.14 (0.83)	-1.91	44	*ns*	

* Only 22 control participants completed this scale

Table 2.4

BFRBs group responses to "Please indicate how likely each mood is to cause hair-pulling, skin picking, or nail-biting."

n = 23	Always *n* (%)	Sometimes *n* (%)	Never *n* (%)
Boredom	12 (52)	10 (43)	1 (4)
Anger	2 (9)	10 (43)	11 (48)
Guilt	6 (26)	11 (48)	6 (26)
Indifference	2 (9)	10 (43)	11 (48)
Tension	16 (70)	5 (22)	2 (9)
Irritability	8 (35)	9 (39)	6 (26)
Sadness	7 (30)	11 (48)	5 (22)
Anxiety	18 (78)	4 (17)	1 (4)
Shame	3 (13)	11 (48)	9 (39)

Table 2.5
Correlations between BFRB severity and DERS total score and subscales

	MGH-HPS or analogue Total Sample	**MGH-HPS or analogue BFRBs group only**
Pearson Correlations		
DERS Total	.46	.30
DERS Lack of Emotional Clarity	.48 **	.21
DERS Non-Acceptance	.22	.10
DERS Difficulties with Impulse Control	.50 **	.53 *
DERS Limited Access to ER Strategies	.39 *	.26
DERS Difficulties Engaging in Goal-Directed Behaviour	.35 *	.12
DERS Lack of Emotional Awareness	.24	.20

** Significant at $p < .001$ (2-tailed)
* Significant at $p < .05$ (2-tailed)

Table 2.6
Correlations between BFRB severity and ARS total score and ARS specific emotions

	MGH-HPS or analogue Total Sample	**MGH-HPS or analogue BFRBs group only**
ARS Total	-.59 **	-.38
Boredom	-.33	-.10
Anger	-.27	-.35
Guilt	-.43*	-.32
Indifference	-.32	.05
Tension	-.41 **	-.36
Irritability	-.46**	-.52
Sadness	-.32*	-.20
Anxiety	-.60 **	-.19
Shame	-.33 *	-.16

** Significant at $p < .001$ (2-tailed)
* Significant at $p < .05$ (2-tailed)

CHAPTER III

ARTICLE III – THE IMPACT OF EMOTIONS ON BODY-FOCUSED REPETITIVE BEHAVIOURS

Abstract

Body-focused repetitive behaviours (BFRBs) are repetitive, injurious, and non-functional habits that cause significant distress or impairment. BFRBs include hair-pulling, skin-picking, and nail-biting. The emotion regulation model suggests that BFRBs are triggered by negative emotions and reinforced by alleviation of unpleasant affect. More specifically, the frustrated action model suggests that BFRBs are triggered by and alleviate impatience, boredom, frustration, and dissatisfaction. Individuals with BFRBs are hypothesized to be particularly susceptible to these emotions because they demonstrate maladaptive planning styles characterized by high standards and unwillingness to relax. To test the frustrated action model, this study compared urge to engage in BFRB in a BFRBs group (n = 24) and a control group (n = 23) in experimental conditions designed to elicit boredom/frustration, stress, and relaxation, respectively. We hypothesized that individuals with BFRBs would report greatest urge to engage in BFRBs in the boredom/frustration condition. The results revealed that participants in both groups reported a stronger urge to engage in BFRB in the boredom/frustration condition than in the relaxation condition. Impatience and boredom were correlated with urge in the boredom/frustration and relaxation conditions, and individuals with BFRBs experienced greater impatience and dissatisfaction than controls across all experimental conditions. Finally, the BFRBs group presented significantly higher scores on maladaptive planning style, and maladaptive planning style was significantly correlated with difficulties with ER. The results highlight the role of boredom, frustration, and impatience in triggering BFRB,

and support the frustrated action model. Implications and recommendations for future research are discussed.

Keywords: Body-focused repetitive behaviours, trichotillomania, hair-pulling, skin-picking, nail-biting, emotion regulation

3.1 Body-focused repetitive behaviours

Body-focused repetitive behaviours (BFRBs) are repetitive, damaging, and seemingly non-functional habits such as hair-pulling, skin-picking, and nail-biting (O'Connor, Lavoie, Robert, Stip, & Borgeat, 2005; Snorrason et al., 2012). Although many individuals engage in harmless "nervous habits" that do not cause them distress, the term BFRBs refers to behaviours that fall on the maladaptive end of the continuum, causing significant distress or impairment in functioning (Teng, Woods, Marcks, & Twohig, 2004). In fact, chronic and dysfunctional hair-pulling and skin-picking are included in the Diagnostic and Statistical Manual of Mental Disorders (DSM-5; American Psychiatric Association [APA], 2013) as Trichotillomania and Excoriation Disorder (Skin-Picking Disorder), respectively. Although the sample described here included individuals who did not meet DSM criteria for TTM or SPD, all references to BFRBs in the current paper refer to chronic HP, SP, or NB that causes significant distress or impairment in functioning.

BFRBs are conceptualized as obsessive-compulsive spectrum disorders in DSM-5 (APA, 2013) due to the similarities between the repetitive motor symptoms observed in BFRB and the repetitive compulsive rituals observed in obsessive-compulsive disorder. BFRBs have also been conceptualized as impulse control disorders because individuals with BFRBs report a strong urge prior to engaging in pulling, picking, or biting, and diminished control over the behaviour (APA, 2000; Schreiber, Odlaug, & Grant, 2011).

The current study focuses on hair-pulling, skin-picking, and nail-biting, the BFRBs that have received the most research attention and are the most clearly defined.

3.1.1 Trichotillomania

Chronic hair-pulling is part of a DSM disorder called trichotillomania (TTM). In DSM-IV-TR (APA, 2000), the diagnostic criteria for TTM are as follows: chronic hair-pulling (HP) resulting in noticeable hair loss; tension immediately prior to pulling; pleasure, gratification, or relief when pulling out hair; and significant distress or dysfunction related to HP. Hair may be pulled out from any area of the body, including the scalp, eyebrows, arms, legs, and pubic area (APA, 2000). The prevalence of TTM as described by DSM-IV-TR criteria is approximately 0.6% (Christenson, Pyle, & Mitchell, 1991; Duke, Bodzin, Tavares, Geffken, & Storch, 2009). However, a considerably greater proportion of the population reports recurrent HP that causes distress and impairment but does not meet all of the DSM-IV-TR criteria (Duke et al., 2009; Stanley, Borden, Bell, & Wagner, 1994). Furthermore, the recently published DSM-5 (APA, 2013) removed the criteria of tension prior to pulling and gratification or relief after pulling, a change that is likely to result in an increase in the clinical prevalence rate of TTM. However, all of the studies cited in this article were conducted prior to the publication of DSM-5.

3.1.2 Skin-picking

Skin-picking is part of a DSM-5 (APA, 2013) disorder called Excoriation Disorder (Skin-Picking Disorder). Skin-Picking Disorder (SPD) refers to refers to recurrent skin-picking (SP) resulting in skin lesions, with repeated attempts to decrease or stop SP. The symptoms must cause clinically significant distress; impairment in social, occupational or other important areas of functioning; and must not be better explained by the presence of another mental disorder (APA, 2013). SP

may begin as a grooming routine in which small blemishes or skin irregularities are removed; in severe cases, however, individuals may spend hours per day (Flessner & Woods, 2006) using tweezers, pins, or other small instruments to dig into their skin, creating visible damage (Keuthen et al., 2000; Penzel, 1995; Wilhelm et al., 1999). Common sites for picking include easily accessible areas such as the face, upper body, cuticles, and extremities (Arnold, Auchenbach, & McElroy, 2001; Calikuşu, Yücel, Polat, & Baykal, 2003; Wilhelm et al., 1999). The reported prevalence of SP ranges from 1.4% to 5.4% in various populations (Hayes, Storch, & Berlanga, 2009; Keuthen et al., 2000; Keuthen, Koran, Aboujaoude, Large, & Serpe, 2010). However, these rates must be interpreted with caution due to inconsistent diagnostic criteria across studies, all of which were conducted prior to the publication of DSM-5 (the first version of the manual to include SPD).

3.1.3 Nail-biting

Nail-biting (NB) refers to an insertion of the fingers into the mouth, with contact between the nails and teeth. Many individuals occasionally use the teeth to replace nail clippers in grooming, without negative or distressing consequences; in contrast, NB as a BFRB involves biting past the nail bed and cuticles, drawing blood and resulting in chronic scarring, or in red, sore, and infected fingers (Penzel, 1995; Wells, Haines, & Williams, 1998). Reports of NB prevalence are limited by dated research and inconsistent operational definitions across studies. Snyder and Friman (2012) reviewed the literature and tentatively concluded that NB peaks at puberty, with prevalence rates of 25%-60%, and subsequently declines to 10%-25% in young adults and below 10% in adults over 35 years.

3.1.4 Impact of BFRBs

The physical and psychological sequelae of BFRBs are considerable (Diefenbach, Mouton-Odum, & Stanley, 2002; Diefenbach, Tolin, Hannan, Crocetto,

& Worhunsky, 2005; Woods, 2002; Woods, Friman, & Teng, 2001). Consequences of HP, SP, and NB include hair loss; scarring and infections; damage to follicles, teeth, and gums (Woods, Friman, & Teng, 2001; Salmon-Ehr, Mohn, & Bernard, 1999; Krejci, 2000; Johansson, Fareed, & Omar, 1991); guilt, shame, and embarrassment about appearance (Bohne, Wilhelm, Keuthen, Baer, & Jenike, 2002); avoidance of activities and situations including sexual intimacy, visiting the hairdresser, swimming or other athletic activity, and exposure to windy weather or well-lit areas (Townsley-Stemberger, Thomas, Mansueto, & Carter, 2000); and social and occupational impairment (Arnold et al., 2001; Swedo & Rappoport, 1991).

3.2 Emotion regulation model

Recognition of the psychological and psychosocial impact of BFRBs has prompted exploration of etiological models to explain the development and maintenance of these behaviours. Although BFRBs and their consequences create considerable distress, HP, SP, and NB also seem to satisfy an urge and deliver some form of reward. One model that has received empirical support proposes that BFRBs serve an emotion regulation (ER) function (Roberts, O'Connor, & Bélanger, 2013). The ER model suggests that individuals with BFRBs have difficulty managing unpleasant emotions, and engage in body-focused habits to avoid, modulate, or alleviate aversive affect. HP, SP, and NB persist despite negative consequences because they are reinforced by distraction or escape from undesired experiences (Teng, Woods, Marcks, & Twohig, 2004; Roberts, O'Connor, & Bélanger, 2013). The ER model further suggests that individuals with BFRBs are characterized by global deficits in ER (Shusterman, Feld, Baer, & Keuthen, 2009; Snorrason, Smári, & Ólafsson, 2010). Deficits in ER may be attributable to problems with impulse control, or to difficulty identifying, understanding, or accepting emotions (Gratz & Roemer, 2004).

The ER model has been supported by studies that demonstrate change in affective states over the course of BFRB episodes. In clinical and non-clinical samples, individuals with HP and SP consistently report that emotions such as boredom, anxiety, tension, and frustration are present prior to BFRB and decrease during or after pulling or picking episodes (Roberts, O'Connor, & Bélanger, 2013). Guilt, shame, sadness, and anger may develop during or after BFRB episodes, as do feelings of satisfaction, indifference, and relief (Diefenbach, Mouton-Odum, & Stanley, 2002; Neal-Barnett & Stadulis, 2006; Wilhelm et al., 1999; Bohne et al., 2002; Duke et al., 2009; Mansueto, Thomas, & Brice, 2007). For a review of this literature, see Roberts et al. (2013).

Two studies compared ER in individuals with BFRBs and a non-BFRB sample. Shusterman and colleagues (2009) found that individuals reporting uncontrollable HP or urge to engage in HP reported more difficulty "snapping out" of affective states such as boredom, tension, anxiety, and guilt than did a comparison group of individuals with no history of HP. The authors further reported that capacity for ER was correlated with HP severity, and that difficulty regulating particular emotions predicted the degree to which those emotions triggered HP. Snorrason and colleagues (2010) reported that individuals with SP causing skin damage and distress or impairment had greater difficulties with ER and reported higher scores on a measure of emotion reactivity (the tendency to experience emotions frequently, intensely, and persistently) than did a control group of individuals with no SP or minimal SP that did not cause distress or impairment. These results corroborate the conceptualization of BFRBs as a maladaptive method of regulating emotion, and support the ER model.

3.3 Frustrated action model

O'Connor and colleagues (O'Connor et al., 2001; O'Connor, Gareau, & Borgeat, 1997; Pélissier & O'Connor, 2004) reported that some individuals with

BFRBs and tics demonstrate a form of perfectionism characterized by unwillingness to relax and difficulty with appropriate pacing of tasks. Individuals with this maladaptive style of planning aim to be productive at all times, often setting unrealistic standards and trying to do too much at once. They are consequently susceptible to frustration, impatience, and dissatisfaction when standards are not met, and to boredom when productivity is impossible. Frustration, impatience, dissatisfaction, and boredom each imply a state of thwarted action, and result in a state of increased tension. According to the frustrated action model, BFRBs function to release the tension generated by these emotions (O'Connor, 2002). BFRB is subsequently negatively reinforced by a decrease in negative affect and positively reinforced by the feeling of 'taking action' (i.e., engaging in BFRB) after the initial desired action was thwarted.

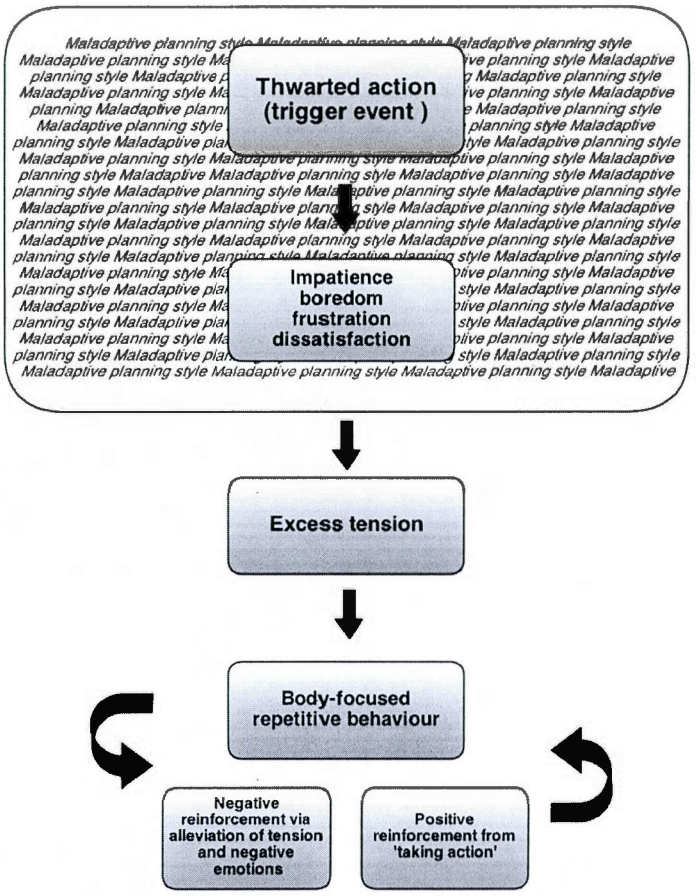

Figure 3.1 The frustrated action model

This model has received indirect research support. Studies that used questionnaire measures to evaluate emotional state during BFRB have found that individuals with BFRBs engage in HP, SP, and NB when they are bored, frustrated, or inactive (Bohne et al., 2002; Diefenbach et al., 2002; Duke, Keeley, Ricketts, Geffken, & Storch, 2010). O'Connor and colleagues (O'Connor, Brisebois, Brault, Robillard, & Loiselle, 2003) asked participants with various BFRBs (TTM, NB, skin-scratching, bruxism) to list the activities during which they were at the greatest and the least risk of engaging in BFRB. Participants reported that BFRB occurred during sedentary activity; the highest risk activities were passive attendance (e.g., watching

TV), study activity (e.g., attending class), transit (e.g., coming home from work), and waiting (e.g., in line). The lowest risk activities were physical exercise, socializing, eating, and manual work. Participants were further asked to appraise the activities or situations that tended to precipitate BFRB along several dimensions, including active-inactive and calm-tense. Individuals with TTM and skin-scratching appraised high-risk activities as boring; individuals with NB appraised high-risk activities as inactive, and individuals with bruxism appraised high-risk activities as unsatisfying. The majority of participants associated BFRB onset with a tense state.

Furthermore, results from the few studies that experimentally manipulated emotion in BFRB samples suggest that boredom, tension, anxiety, and frustration may be more likely than are other emotions to trigger an episode of BFRB, and may be the most likely to be modulated by BFRB (Teng et al., 2004; Williams, Rose, & Chisholm, 2006). For example, Teng and colleagues (2004) recruited students who reported SP, NB, mouth-chewing, skin-biting, and skin-scratching. Video segments were used to induce boredom, depression, and anxiety, and a neutral control condition was used. The primary finding was that individuals with BFRBs demonstrated significantly more BFRB in the boredom condition than in the control condition. No differences were observed in the comparison of the anxiety and depression conditions to the control condition. From these findings, the authors hypothesized that boredom may be more relevant in triggering BFRBs than are other affective states (Teng et al., 2004).

Williams, Rose, and Chisholm (2006) explored the function of NB in 39 undergraduate students. Participants were exposed to four experimental conditions: boredom (being left alone), frustration (work on difficult math problems), contingent attention (being reprimanded for NB), and non-contingent attention (continuous conversation). NB was most frequent in the boredom and frustration conditions. Participants also completed a questionnaire indicating how often they bit their nails in

identifiable situations or for specific purposes. The most frequently-reported situations and purposes for NB were "when you are bored," "to get something," "to get something you want (e.g., games, food, or drinks)," "because you are uncomfortable," and "when you are not feeling well." The authors concluded that NB occurs primarily in states of boredom or in the context of work on difficult problems (reflecting emotional states such as frustration).

The frustrated action model is consistent with the global ER model for BFRBs. The global ER model suggests that individuals with BFRBs have deficits in ER. When a trigger event or situation provokes negative emotions, individuals engage in BFRB in an effort to decrease to alleviate or modulate unpleasant affect. When negative affect is effectively decreased, BFRB is negatively reinforced. The frustrated action model also implies that a trigger event or situation generates negative emotions and subsequent BFRB. However, this model situates the cycle of trigger event, negative emotion, and BFRB in the context of maladaptive planning styles. Furthermore, the frustrated action model specifies that the negative event or situation involves frustrated action; that it triggers boredom, frustration, impatience, and dissatisfaction; and that BFRB serves to modulate the tension generated by those particular emotions. The global ER model and the frustrated action model are consistent but the latter model refines the global ER model and clarifies the processes that may be at play during an episode of BFRB.

Although the frustrated action model has received indirect research support, the hypothesis that BFRB is triggered by boredom, frustration, impatience, and dissatisfaction—rather than by stress or nervousness—has not been tested experimentally. To test the frustrated action model, we chose to directly measure the capacity of emotions that represent frustrated action to provoke BFRB or the urge to engage in BFRB.

3.4 Current study

The objective of the present study was to test the frustrated action model for BFRBs. Specifically, the study is designed to measure BFRB in experimental conditions designed to elicit diverse emotions, and to test the hypothesis that BFRB is triggered by boredom, frustration, dissatisfaction, and impatience. Our primary hypotheses were as follows: a) The BFRBs group would demonstrate more BFRB and report a greater urge to engage in BFRB in conditions of boredom and frustration than in stress or relaxation conditions; and b) frustration, boredom, impatience, and dissatisfaction in experimental conditions would predict BFRB/urge to engage in BFRB. We also hypothesized that the BFRBs group would report more intense emotions across conditions than would the control group; that the BFRBs group would demonstrate greater perfectionism and maladaptive planning styles; and that perfectionism and maladaptive planning style would correlate with difficulties with ER.

3.4.1 Participants, recruitment, and informed consent

Participants were recruited via the website of the hospital research centre where the study was conducted; an online community bulletin board; posters in local universities, cafes, and healthcare institutions; and from lists of participants in past or current studies at our . To facilitate recruitment, we limited our sample to individuals reporting HP, SP, and NB. The research protocol was approved by the Montreal University Institute in Mental Health research ethics committee.

Individuals who responded to our recruitment efforts were referred to a clinical evaluator for a 15- to 30-minute telephone screening interview concerning sociodemographic variables, BFRB severity and degree of impairment, and comorbid psychopathology. Inclusion criteria for participants in the BFRBs group were the following: (a) age 18-65 years; (b) BFRB of at least mild severity (subjective rating

of at least 3/10) or significant distress or impairment as the result of the BFRB; (c) BFRB as primary presenting problem, even if another psychological problem or disorder was present; and (d) if on psychotropic medication, medication had to be stable for three months. Inclusion criteria for the control group were the following: (a) age 18-65 years; (b) if on psychotropic medication, medication had to be stable for three months (c) if any HP, SP, or NB was present, must be non-chronic and non-distressing. Exclusion criteria for the present study were the following: (a) DSM Axis I or Axis II disorder other than TTM or SPD as primary presenting problem; (b) alcohol or drug abuse; and (c) BFRB comorbid with chronic tics or Tourette Syndrome.

Over the course of one year, 111 individuals responded to our recruitment advertisements. Forty-one dropped out of the study prior to or following the telephone screening interview, and 22 were excluded following the telephone interview; 48 participants (n = 24 HD; n = 24 controls) completed the study. All participants completed the MGH-HPS, and the analogue SP, NB, and skin-scratching scales. For participants in the BFRBs group, MGH score was their score on the scale responding to their reported habit, with several exceptions (e.g., for two participants who reported SP and had elevated scores on both the SP and skin-scratching scales, we used the average score from the two scales). Control participants' MGH score was the mean of their scores across all four scales. One control participant's data was excluded from the analysis because she denied BFRBs during the telephone interview but endorsed significant BFRBs on all four BFRB scales. The final sample (N = 47; n = 24 BFRB; n = 23 controls) was primarily female (n = 34), with an average age of 34.57 years (range 20-59 years).

3.4.2 Assessment measures

Subsequent to the screening interview, eligible participants were mailed a questionnaire package to complete at home, including the Style of Planning questionnaire (STOP; O'Connor, 2005), Frost Multidimensional Perfectionism Scale (Frost, Marten, Lahart, & Rosenblate, 1990), Symptom Checklist-90-Revised (SCL-90-R; Derogatis, 2000), and Massachusetts General Hospital Hair-Pulling Scale (MGH-HPS; Keuthen et al., 1995) and analogue SP, NB, and skin-scratching scales. A separate scale for skin-scratching was included because, although skin-scratching is a component of SP (Keuthen, Koran, et al., 2010; Tucker, Woods, Flessner, Franklin, & Franklin, 2011), it is not directly addressed in the SP scale and we wanted to ensure that our measures of BFRB adequately captured the complete range of SP behaviour. These measures were included in the standard questionnaire package completed by all participants in studies at our centre for the study of OCD-Spectrum disorders. The package included a standard consent form (See Appendix A) approved by the institution research ethics committee for participants to read prior to beginning the questionnaire battery. The Difficulties in Emotion Regulation Scale (DERS; Gratz & Roemer, 2004) and Affective Regulation Scale (ARS; Shusterman et al., 2009) were completed on site prior to the experiment (See Appendix B for all scales and questionnaires).

1) *Affective Regulation Scale*. The ARS (Shusterman et al., 2009) consists of a list of nine emotions (bored, angry, guilty, indifferent, tense, irritable, sad, anxious, and ashamed); participants are instructed to "check the circle that indicates your ability to control each of these emotions. How easily can you 'snap out of it?" Responses on a five-point scale range from "never able to control" (0) to "always able to control." Shusterman et al. (2009) reported acceptable internal consistency (α = .83 for hair-pullers and α = .87 for non-pullers). For French-speaking participants, a French-Canadian version of the questionnaire was used, translated using a back-translation and consensus procedure (Vallerand, 1989).

2) *Difficulties in Emotion Regulation Scale*. The DERS (Gratz & Roemer, 2004) consists of 36 items that assess six dimensions of difficulties with ER: non-acceptance of emotional responses, difficulties engaging in goal-directed behaviour, impulse control difficulties, lack of emotional awareness, limited access to effective ER strategies, and lack of emotional clarity. Gratz and Roemer (2004) reported strong internal consistency on the DERS (α = .93), adequate internal consistency for all subscales (α > .80), and adequate test-retest reliability for the total scale over 4 to 8 weeks (r = .88). For French-speaking participants, a French-Canadian version of the questionnaire was used, translated using a back-translation and consensus procedure (Vallerand, 1989).

3) *Massachusetts General Hospital Hairpulling Scale*. The MGH-HPS (Keuthen et al., 1995) is a 7-item self-report measure of HP behaviours, using a 5-point scale. The scale assesses the frequency and intensity of HP during the past month, as well as the degree of control over urges to pull, producing a total HP severity score. The MGH-HPS demonstrates good internal consistency (α = .89) and test-retest reliability (r = .97). Participants also completed analogue SP, NB, and skin-scratching scales (i.e., the MGH-HPS with the word *hair-pulling* replaced by *skin-picking*, *nail-biting*, and *skin-scratching*, respectively). Although an SP scale has been validated (The skin picking scale; Keuthen et al., 2001), we chose to use an analogue scale in order to obtain comparable severity scores across BFRBs. For French-speaking participants, a French-Canadian version of the questionnaire was used, translated using a back-translation and consensus procedure (Vallerand, 1989).

4) *Style of Planning Questionnaire*. The STOP (O'Connor, 2005) is a 34-item scale designed to assess maladaptive planning style in individuals with obsessive-compulsive (OC) spectrum disorders. The questionnaire measures over-activity (i.e., unwillingness to relax, failure to pace self appropriately), over-investment (i.e., need to be over-prepared; high standards of personal organization), and overcomplication

(i.e., complicating straightforward tasks, imagining unforeseen difficulties). Good test-retest reliability (r = .91-.94) and internal consistency (α = .79-.85) have been demonstrated (O'Connor, 2005). For French-speaking participants, a French-Canadian version of the questionnaire was used, translated using a back-translation and consensus procedure (Vallerand, 1989).

5) *Frost Multidimensional Perfectionism Scale*. The FMPS (Frost, Marten, Lahart, & Rosenblate, 1990) is a 35-item questionnaire that measures perfectionism across six dimensions: Concern over Mistakes (CM), Personal Standards (PS), Parental Expectations (PE), Parental Criticism (PC), Doubts about Actions (DA), and Organization (OR). Internal consistency (α = .73-.91) and test-retest reliability (α = .75-.88) are satisfactory. For French-speaking participants, we used the validated French-Canadian (Labrecque, Stephenson, Boivin, & Marchand, 1999) version of the FMPS.

6) *Symptom Checklist 90-Revised*. The SCL-90-R (Derogatis, 2000) is a 90-item psychiatric self-report inventory. Participants respond to questionnaire items using a five-point Likert scale, indicating the rate of symptom occurrence during the past week. The SCL-90-R yields three global distress indices. The scale has been demonstrated to have satisfactory internal consistency (α = .71-.85 for various subscales) and test-retest reliability (r = .68-.91) (Derogatis & Savitz, 2000). The validated French-Canadian (Fortin & Coutu-Wakulczyk, 1985) version of this scale was used for French-speaking participants in the present study.

7) *Modified Stress Arousal Checklist* (MSACL). The MSACL was developed for the current study; it is based on the Stress Arousal Checklist (SACL; MacKay, Cox, Burrows, & Lazerrini, 1978) and was modified to include emotions relevant for this study. The scale contains 32 emotions; participants are asked to "Please indicate to what extent you are currently experiencing the following emotions/moods" and

may respond *not at all* (0), *a little* (1), or *a lot* (2). French- and English-language versions were developed.

8) *Measure of urge to engage in BFRB.* Individuals with BFRBs often report a mounting urge to pull hair, pick skin, or bite nails prior to engaging in the behaviour (APA, 2013, 2000; Arnold et al., 2001; Flessner, Conelea, et al., 2008). To capture the sensation of urge and to account for the possibility that participants would resist pulling, picking, or biting during the study, we developed a brief measure of urge to engage in BFRB. Participants answered the question *"During the past 10 minutes, how strong was your urge to pull out your hair/pick your skin/bite your nails?"* by drawing a line on a scale from 1 to 10 (1 = very weak; 3 = weak; 5-6 = moderate; 7-8 = Strong; 10 = very strong). This measure was developed in French- and English-language versions.

3.4.3 Procedure

Upon arrival at the research centre, participants submitted to the experimenter the MGH-HPS, SCL-90-R, FROST, and STOP they had completed at home. They subsequently reviewed and signed the consent form with the experimenter, and completed the ARS and DERS. Next, participants completed the MSACL and the measure of urge to establish baseline affective state and urge to engage in BFRB.

Each participant was exposed to five experimental conditions: stress, three instances of the relaxation condition, and either the boredom or the frustration condition. Experimental conditions are described in Table 3.1 (see also Appendix D). A random numbers table (Fisher & Yates, 1963) was used to randomly assign consecutive participants to either the boredom or the frustration condition and to randomize the order of the stress and boredom or frustration conditions to control for order effects. The relaxation condition at baseline was used to evaluate participants' BFRB activity/urge to engage in BFRB in a relaxed state. It was presented again

between the stress condition and the boredom or frustration conditions to allow participants to return to a neutral baseline between conditions. To measure fluctuations in affect and in urge to engage in BFRB, participants completed the MSACL and measure of urge after each condition, for a total of six times.

The experiment took place in an approximately 10x10 ft room containing two desks, a chair, a computer, and a video camera mounted on the wall. Participants were filmed during the experiment, as per their informed consent. Following the experiment, participant were debriefed about the objectives of the study and given the opportunity to ask questions.

Two trained research assistants who were blind to experimental condition and experimental group scored all of the DVD recordings by counting seconds of BFRB in each condition using the operational definitions in Table 3.2.

3.5 Results

There were no significant differences between groups in age, gender, or language. Scores on SCL-90-R global distress dimensions (Global Severity Index, Positive Symptom Total, Positive Symptom Distress Index) were above average but fell within the norms for the measure; between-group differences were not significant, a finding that validates our screening procedures. Expected significant differences between groups were observed on the MGH-HPS, STOP, DERS, and ARS In comparison to controls, individuals with BFRBs demonstrated maladaptive planning styles on the STOP and deficits in ER on the DERS and ARS (See Table 3.3).

Manipulation Check. Participants completed the MSACL prior to the first experimental condition and after each condition (six times in total) and these data were used to determine whether or not the experimental manipulations effectively

elicited the target emotions. To facilitate analyses and to capture the complete spectrum of emotions relevant to the frustrated action model, the boredom and frustration conditions were collapsed into one. Participants' experiences of frustration, boredom, impatience, dissatisfaction, and relaxation were defined by self-report. As per SACL factor loadings, stress was defined by averaging participants' endorsements of tension, worry, apprehension, uneasiness, distress, fear, uptightness, jitteriness, and nervousness (Mackay, 1980).

We used repeated-measures analysis of variance (ANOVA) and pairwise post-hoc comparisons to conduct a manipulation check. Mauchly's test was used to ensure that data met the assumption of sphericity; unless indicated, this assumption was met.

We evaluated the degree of relaxation participants reported across the three relaxation conditions (R1, R2, and R3). Although the differences were not significant, participants became slightly less relaxed from R1 to R2 to R3. This was a predictable finding, as R1 was designed to induce relaxation at baseline and R2 and R3 were designed to alleviate stress, frustration, and boredom and facilitate a return to a neutral baseline between conditions. R1 was therefore retained as the relaxation condition for the remainder of the analyses. A repeated-measures ANOVA revealed that participants felt significantly more relaxed in the relaxation condition than in the stress and boredom/frustration conditions $F(2,44) = 32.86, p < 0.001$.

Participants reported significantly greater stress in the stress condition than in the boredom/frustration condition or in the relaxation condition. The assumption of sphericity was not met and we therefore reported the conservative Lower-bound statistic, $F(1,45) = 33.337, p < 0.001$. Participants also reported significantly greater frustration in the boredom/frustration conditions than in the stress condition or relaxation condition, $F(2,45) = 9.576, p < 0.001$. Post-hoc pairwise comparisons revealed that degree of frustration did not differ significantly between the relaxation and stress conditions.

Participants reported significant differences in degree of boredom across conditions $F(2,45) = 3.88$, $p = .024$. Post-hoc pairwise comparisons revealed that the difference between boredom in the boredom/frustration condition and boredom in the relaxation condition was not significant.

To ensure that the boredom/frustration condition generated the emotions of interest in the frustrated action model, the degree of impatience and dissatisfaction present across conditions was explored. The boredom/frustration condition generated greater impatience, $F(2,45) = 5.25$, $p = .007$ than the stress or relaxation condition. The boredom/frustration condition also generated more dissatisfaction than the stress or relaxation conditions; the assumption of sphericity was not met and the conservative Lower-bound statistic is therefore reported, $F(1,45) = 12.27$, $p < 0.001$. Since boredom, frustration, impatience, and dissatisfaction are equally important in the frustrated action model, we concluded that the conditions successfully provoked the emotion variables of interest.

Inter-rater Agreement. Two independent raters scored all of the DVD recordings. The correlation coefficients for inter-rater agreement ranged from $r = 0.75$ to $r = 1.00$, with an average of $r = 0.95$.

Frequency of BFRB. We used repeated-measures analysis of variance (ANOVA) and pairwise post-hoc comparisons to explore frequency of BFRB and urge to engage in BFRB across conditions. Mauchly's test of sphericity was used to ensure that data met the norms of sphericity; unless indicated, this assumption was met.

Of the sample of 46 participants (one participant's DVD data was damaged and therefore excluded), only nine individuals (6 [26%] in the BFRBs group; 3 [13%] in the control group) engaged in observable BFRB across the four experimental conditions, a result that is probably attributable to participants' awareness of being in

a research protocol. Nonetheless, we conducted a 2 (groups) by 3 (conditions) repeated-measures ANOVA to explore between-group differences and between-condition differences in seconds of BFRB. Mean seconds of BFRB across conditions was 14.70 (*SD* = 36.34*)* for the BFRBs group and 1.43 (*SD* =4.01) for the control group. Mean seconds of BFRB across conditions was 0.39 (*SD* = 2.25) for the relaxation condition, 3.65 (*SD* = 21.19) for the stress condition, and 4.02 (*SD* = 12.86) for the boredom/frustration condition. No main or interaction effects were observed. See Table 3.4.

We further conducted a 2x3 repeated-measures ANOVA with the data from the nine participants who engaged in observable BFRBs; no significant main effects or interaction effects were observed. This result is probably a function of the small sample size and the very large standard errors observed for mean seconds of BFRB. Although no significant effect of group or condition was observed in this smaller sample of participants, group means revealed that six participants (including two controls) engaged in BFRB exclusively in the boredom/frustration conditions, one participant engaged in BFRB in both the boredom/frustration and the stress condition, one participant engaged in BFRB in both the stress and relaxation conditions, and one engaged in BFRB across all three conditions. Across both groups, the boredom/frustration conditions most frequently triggered BFRB. See tables 3.5 and 3.6.

One individual (see Table 3.6) in the BFRBs group engaged in 143 seconds of BFRB in the stress condition, a figure that more than doubles the next highest result. This individual's data was explored to identify possible relationships; the investigation revealed average scores on measures of ER, perfectionism, and style of planning and a BFRB severity score that was nearly two standard deviations greater than the mean for the BFRBs group (participant score = 24; BFRBs group $M = 16.21$, $SD = 4.59$).

Urge to Engage in BFRB. Given the limited BFRB demonstrated by participants, we investigated the impact of the various affective states on reported urge to engage in BFRBs, using a 2x3 repeated-measures ANOVA. Mauchly's test confirmed that the data met the norms of sphericity. Tests of between-subject effects revealed a main effect of group in urge to engage in BFRBs, $F(1,45) = 31.28$, $p < 0.001$. That is, across conditions, the BFRBs group reported a significantly greater urge to engage in BFRBs than did the control group.

Multivariate tests revealed a small but significant main effect of condition on urge to engage in BFRBs, $F(2,44) = 3.46$, $p = .040$. Urge to engage in BFRB fluctuated across experimental affective conditions, with the strongest urge in the boredom/frustration condition. Specifically, pairwise comparisons revealed significant differences in urge between the boredom/frustration conditions and the relaxation condition, 95% CI [0.129; 1.052]. The difference between the relaxation condition and the stress condition and the difference between the stress condition and the boredom/frustration conditions were not significant.

No interaction effect was observed; that is, the two groups were similarly affected by the affective conditions, although the BFRBs group reported significantly greater urge overall across conditions (See Table 3.7).

Affective Predictors of Urge to Engage in BFRB. We conducted correlation and partial correlation analyses to determine whether or not subjective frustration, boredom, impatience, dissatisfaction, or stress predicted urge to engage in BFRB. We began by testing predictors in the entire sample ($N = 47$). In the boredom/frustration condition, *urge* to engage in BFRB was correlated with boredom ($r = .416$, $p = .004$), impatience ($r = .567$, $p < .001$), and stress ($r = .409$, $p = .004$). Subsequent partial correlations demonstrated that impatience remained significantly correlated with urge ($r = .329$, $p = .027$) after controlling for boredom and stress. In the relaxation condition, urge to engage in BFRB was correlated with impatience ($r = .434$, $p =$

.002), and stress (r = .320, p = .028). Subsequent partial correlations demonstrated that impatience remained significant after controlling for stress (r = .324, p = .028). None of the five potential predictors contributed significantly to urge to engage in BFRB in the stress condition.

Given the findings above, we were specifically interested in exploring the relationship between urge to engage in BFRB and boredom and impatience in the BFRBs group and the control group separately. In the BFRBs group, the results continued to reveal significant relationships between urge and boredom (r = .480, p = .018) and between urge and impatience (r = .457, p = .025) in the boredom/frustration condition. Significant relationships between urge to engage in BFRB and boredom (r = .417, p = .043) and urge to engage in BFRB and impatience (r = .510, p = .011) were also observed in the relaxation condition. Subsequent partial correlations revealed that the relationship between urge and boredom decreased to a trend when impatience was controlled and that the relationship between urge and impatience decreased to a trend when boredom was controlled, indicating shared variance between boredom and impatience in the prediction of urge. In the BFRBs group, boredom and impatience were not significantly related to urge in the stress condition. In the control group, boredom and impatience were not significantly related to urge in any condition.

Intensity of Emotions. As illustrated in Table 3.8, the BFRBs group experienced stronger emotions than did the control group in many but not all of the experimental conditions. The BFRBs group reported greater boredom across all conditions, greater frustration in the boredom/frustration condition, greater stress across the boredom/frustration and relaxation conditions, greater impatience in the boredom/frustration and relaxation conditions, and greater dissatisfaction across all conditions. Significant between-group differences were observed for impatience

across all conditions ($F(1,45) = 4.38$, $p = .042$) and for dissatisfaction across all conditions ($F(1,45) = 5.80$, $p = .020$).

ER, planning style, and perfectionism. Independent samples *t*-tests revealed between-group differences in style of planning, with the BFRBs group demonstrating a more maladaptive planning style. Mean STOP total score was 178.60 ($SD = 37.25$) for the BFRBs group and 199.06 ($SD = 30.16$) for the control group ($t(45) = -2.60$, $p = .045$). No significant between-group differences in perfectionism were observed for total score on the FMPS. On the DERS, the BFRBs group reported significantly greater difficulty with ER ($t(44) = 2.60$, $p = .013$) than did the control group. On the ARS, the BFRBs group reported greater overall difficulty 'snapping out' of (i.e., regulating) emotions ($t(44) = -3.80$, $p < .001$) than did the control group, and rated themselves as less able to regulate each of the nine emotions measured.

We calculated Pearson's r for the relationships between perfectionism (FMPS), style of planning (STOP), and ER (ARS and DERS). For the total sample, we found significant correlations between FMPS total score and DERS total score ($r = .34$, $p = .020$) and between FMPS and ARS total scores ($r = -.43$, $p = .003$). Further, significant correlations were observed between STOP total score and DERS total score ($r = -.61$, $p < 0.001$) and between STOP total score and ARS total score ($r = .66$, $p < 0.001$). That is, participants with an overactive style of planning scored lower on ER and participants who scored higher on perfectionism also scored lower on ER. When we re-conducted the analyses with the data from the BFRBs group only, the same relationships were observed between ER and style of planning (DERS and STOP $r = -.54$, $p = .007$; ARS and STOP $r = .61$, $p = .002$) and ER and perfectionism (DERS and FMPS $r = .43$, $p = .038$; ARS and FMPS $r = -.43$, $p = .037$).

3.6 Discussion

The present study was developed to explore the functional impact of diverse affective variables on HP, SP, and NB. Specifically, the study was designed to test the frustrated action model for BFRBs and to test the hypothesis that BFRB is triggered by boredom, frustration, dissatisfaction, and impatience. We hypothesized that the BFRBs group would demonstrate more BFRB and report a greater urge to engage in BFRB in conditions of boredom and frustration than in stress or relaxation conditions. We also hypothesized that the presence of frustration, boredom, impatience, and dissatisfaction in experimental conditions would predict BFRB and urge to engage in BFRB. Finally, we expected that the BFRBs group would report more intense emotions than the control group across conditions; that the BFRBs group would demonstrate greater perfectionism and maladaptive planning styles; and that perfectionism and maladaptive planning style would correlate with difficulties with ER.

To determine which emotions generate BFRB or the urge to engage in BFRB, individuals with BFRBs and controls were video-recorded in experimental conditions designed to elicit the target emotions. The observed incidence of BFRB was too low to create statistically significant findings, and the interpretation of the results was further complicated by the large variance in seconds of BFRB in each experimental condition. However, the results support the global ER model by indicating that individuals are less likely to engage in BFRB when they are relaxed than when they are feeling unpleasant emotions. They partially support the frustrated action model in that participants were more likely to engage in BFRB when they felt bored, frustrated, impatient, and dissatisfied than when they felt relaxed. A larger sample or longer experimental conditions may be necessary to diminish the inhibitory effect of participating in an experimental protocol and permit participants to engage in HP, SP, or NB.

The BFRBs group reported a greater urge to engage in BFRB in the boredom and frustration conditions than in the relaxation condition. The finding that urge was greater under conditions of negative emotion supports the general ER model (i.e., that BFRB regulates emotion). However, the hypothesis that individuals with BFRBs would report a stronger urge to engage in BFRB when bored/frustrated than when stressed was not supported. One possibility is that the degree of boredom and frustration and degree of stress generated by the respective conditions was not sufficient to generate statistically significant fluctuations in urge. There is also the possibility of confounding in individual definitions of various emotional states. That is, the emotional experience that one individual experiences as "stress" may be experienced by others as "boredom," or "frustration." Alternatively, BFRBs and the urge to engage in BFRB may be more idiosyncratic than hypothesized and although many individuals report that HP, SP, and NB are triggered by emotions implicated in the frustrated action model, others may engage in BFRB or feel the urge to do so under conditions of stress.

The descriptive statistics for the nine participants who engaged in BFRB provide further support for the frustrated action model. Six participants (3 BFRBs; 3 controls) engaged in BFRB exclusively in the boredom/frustration condition. Six participants demonstrated no BFRB in the stress condition and seven demonstrated no BFRB in the relaxation condition. In the three control participants, HP, SP, and NB occurred exclusively in the boredom/frustration condition; one explanation for this results is that BFRB plays an ER function for individuals with problem HP, SP, and NB but that for controls, BFRB functions as a self-stimulatory behaviour in environments with restricted stimulation. This hypothesis is supported by the observation that the individuals in the control group who engaged in BFRB did not demonstrate DERS scores that were appreciably different from the control group average.

We expected that, in the BFRBs group, subjective frustration, boredom, impatience, and dissatisfaction would predict the urge to engage in BFRB more than would subjective stress. This hypothesis was general supported, with boredom and impatience emerging as key predictors. The finding that boredom and impatience were significantly associated with urge in the boredom/frustration and relaxation conditions supports the frustrated action model. Boredom and impatience imply restlessness or irritation in the face of opposition, delay, or inactivity; that urge fluctuated with the intensity of these emotions is consistent with prior research indicating that individuals with BFRBs tend to value productivity and to have difficulty waiting or relaxing. The finding that boredom and impatience predicted urge to engage in BFRBs in the relaxation condition indicates that relaxation may be a paradoxical condition for individuals with BFRBs; at a moment they are meant to be released from tension, the inactivity inherent to relaxation generates boredom and impatience, and may generate subsequent tension.

That impatience and boredom rather than frustration and dissatisfaction emerged as key predictors serves to refine the frustrated action model. The concepts of boredom and impatience appear to subsume the variety of emotions proposed to be involved in the model; boredom and impatience may be the emotions that most effectively capture the feeling of thwarted action that defines the frustrated action model.

As predicted, individuals with BFRBs reported greater maladaptive planning styles than did the control group, a finding that supports the frustrated action model. However, no between-group differences were observed on the FMPS, a more classic measure of perfectionism. It is perhaps not surprising that the STOP distinguishes between groups and the FMPS does not since the STOP was developed to differentiate individuals with tics and BFRBs from controls, whereas the FMPS measures a more global type of perfectionism. Past research (e.g., O'Connor et al.,

2001) similarly found that total scores on the FMPS were not higher than average in tic and BFRB groups. However, a significant correlation between FMPS total score and STOP total score was observed, and it is possible that the relationship between BFRBs and general perfectionism is not direct but rather is mediated by planning and organizational style.

We found that individuals with maladaptive planning styles on the STOP and elevated perfectionism scores on the FMPS had greater difficulties regulating emotion. There are several possible explanations for these results. Lacking ER strategies, individuals with deficits in ER may try to self-regulate by imposing rigid and unrealistic standards for their actions and behaviour, and by overplanning and overinvesting in activities. Alternatively, individuals with maladaptive planning styles may experience more frequent or more intense negative emotion subsequent to failure to meet self-imposed unrealistic standards. They may possess adequate ER skills overall, but still experience ER difficulties as the result of excess negative emotion.

The tendency to experience frequent, persistent, and intense emotions is referred to as emotion reactivity (Nock, Wedig, Holmberg, & Hooley, 2008), whereas The final sample (N = 47) was primarily female (n = 34), with an average age of 34.57 years (range 20-59 years). ER refers to the ability to accept, understand, and manage emotion. Although these two concepts are distinct, we hypothesized that the BFRBs group would report more intense emotions across conditions than would the control group. That is, we expected that the BFRBs group would be more affected by the experimental manipulations. This hypothesis was partially supported. Interestingly, the two emotions that emerged as significantly different between groups were impatience and dissatisfaction, with the BFRBs group reporting significantly stronger impatience and dissatisfaction across all conditions. Furthermore, subjective dissatisfaction and impatience in the BFRBs group in the boredom/frustration

condition were the strongest emotions reported by either group in any condition throughout the experiment. Finally, the BFRBs group reported significant boredom during the relaxation condition, a finding that is congruent with the hypothesis that individuals with BFRBs find it difficult to relax or to be unproductive.

3.7 Clinical implications

The present study has several important implications. First, the fluctuation in urge to engage in BFRBs across experimental affective conditions demonstrates that BFRBs are not simply "nervous" habits. The global ER model for BFRBs has been supported by prior literature (Roberts et al., 2013; Shusterman et al., 2009; Snorrason, Smári, & Ólafsson, 2010) and the results of this study add to the data, implying that individuals suffering from BFRBs could benefit from interventions designed to directly target emotion variables. For example, Dialectical Behaviour Therapy (Keuthen, Rothbaum, et al., 2010; Keuthen et al., 2012) has been applied to treat BFRBs, with promising results.

Second, this study was designed to test a specific ER model for BFRBs. The frustrated action model holds that the most relevant emotions in triggering BFRBs are frustration, boredom, dissatisfaction, and impatience, a hypothesis that was partially supported by the results of this study. Our findings add to the growing literature that suggests that emotions such as boredom, frustration, and impatience trigger BFRB (Teng et al., 2004; Williams et al., 2008). If simple boredom triggers BFRB, interventions designed to increase activity and decrease boredom may be useful in reducing BFRB activity (Teng et al., 2004). However, if as our results suggest, these emotions trigger BFRB because of tension-producing planning styles in individuals with BFRBs, cognitive therapies designed to modify maladaptive planning styles and address perfectionist cognitions about busy-ness and productivity could effectively decrease BFRB. Modification of perfectionist standards and reductions in overactive planning could allow individuals with BFRBs to avoid an accumulation of impatience

and frustration and the subsequent need for tension release via BFRBs. This treatment model was supported by a case study of an individual with TTM (Pélissier & O'Connor, 2004) who was able to reduce HP subsequent to restructuring of maladaptive beliefs relating to planning style. O'Connor and colleagues (O'Connor et al., 2001) also successfully treated individuals with BFRBs using a CBT protocol based on habit reversal and modification of tension-producing planning styles; 98% of participants changed their style of planning, two thirds of whom found cognitive restructuring of planning style to be very helpful in diminishing tic or BFRB activity.

3.8 Limitations

Several limitations of the present study must be acknowledged. First, a larger sample size is preferable. Non-significant statistical effects (e.g., differences across conditions in seconds of BFRBs; differences in urge to engage in BFRB between the boredom/frustration and stress conditions) may have lacked sufficient power, and may have reached significance in a larger sample. Furthermore, a larger sample would increase the generalizability of the results. Second, although our experimental conditions were overall effective in eliciting the desired emotions, future research in this area may wish to employ experimental manipulations that more clearly distinguish between different affective states. For example impatience is time-related; an impatience condition therefore could have involved a situation that unfolded extremely slowly, perhaps with a time limit or a pressing engagement afterwards. Furthermore, future studies could use validated mood-induction measures (e.g., music, stress induction via public speaking and other validated stress-induction tasks) to increase the likelihood that participants would experience the intended emotions, and could employ psychophysiological measures of stress and arousal to remove the impact of demand characteristics.

Although this study used a selected sample of individuals reporting problematic BFRBs, the distress or impairment criterion used was 3/10; future studies may wish to use a more stringent criterion for selecting individuals with BFRBs.

Several of the questionnaires used in the present study were not validated or the French-language translation was not validated. The lack of psychometric data for these measures limits the interpretation of the results.

Finally, although the present study provides support for the global ER model for BFRBs and for the frustrated action model, it does not directly establish the precise manner by which BFRB modulates or relieves tension, boredom, or other negative affective states. Further research may wish to combine studies of fluctuation in emotion over the course of BFRB episodes with experimental protocols that elicit the desired emotions and measure the incidence of BFRB.

Despite these limitations, the present study is one of few studies to directly measure BFRB in experimental affective conditions, and provides further evidence for the role of ER in explaining the persistence of damaging body-focused behaviours such as HP, SP, and NB. The results confirm the complex nature of BFRBs, with maladaptive planning styles, deficits in ER, and certain key emotions combining to generate tension and trigger BFRBs. The findings presented here imply that individuals seeking help for BFRBs could benefit from treatments designed to target ER and to decrease boredom and frustration either by adjusting level of activity or by modifying maladaptive perfectionist beliefs.

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Table 3.1
Description of experimental conditions

Emotion	Experimental Condition
Stress (video segment)	8-minute clip from the 1993 feature film *Alive* (Kennedy, Watts, & Marshall, 1993), featuring a vivid plane crash from the perspective of the airplane passengers. Clip begins with light turbulence and concludes with the airplane resting in several pieces in the crevices of the Andes.
Relaxation (video segment)	6-minute video of waves on a tropical beach, with instructions to "Settle in the chair so that you're comfortable. Focus on the images on the screen and let go of other thoughts. Stay awake during the video and don't touch the computer or anything else." Two similar beach videos were used with differences in time of day and colour of sand only.
Frustration	Participants were given five minutes to identify 4-6 differences between four pairs of nearly identical photos presented on a computer monitor. Participants were falsely informed that "the task is fairly easy" and that "most people are able to find all the differences in five minutes." To ensure that hands were free to engage in BFRBs during the task, participants were asked to state each difference out loud rather than recording them on paper.
Boredom	Participants were left alone for six minutes in the experiment room. The experimenter pretended to have forgotten something and said, "I just need to grab a document from my office. Please wait here a minute." Participants did not have access to cell phones or reading material.

Table 3.2
Operational definitions of BFRBs provided to DVD raters

Behaviour	Definition
Hair-pulling	Using fingers to remove hair from the head or other body part; twirling, feeling, and touching hair for the sole purpose of touching hair. Adjusting hair, such as tucking strands behind the ears or moving hair out of face, is not considered HP.
Skin-picking	Using the fingers or nails to remove skin or scabs from the body; focused, intensive, or interactive scratching or rubbing skin on any part of the body. Scratching or rubbing skin over clothes is not considered SP.
Nail-biting	Insertion of fingers or part of finger into the mouth or full contact between tips of fingers and mouth, lips, or teeth; visually examining nails, and using the fingers on the same hand or the opposite hand to touch, rub, or pick at the nails or the skin around the nails. Resting the face in the hand with only the palm or knuckles touching the mouth is not considered NB.

Table 3.3
Participant data

	BFRBs group ($n = 24$)		Control group ($n = 23$)		*t*	*df*	*sig.* (2-tailed)
BFRB							
Hair-pulling	6						
Skin-picking	6						
Nail-biting	12						
Age							
M (*SD*) years	34.29	(11.18)	34.87	(12.20)			
Range (years)	20-54		20-59				
Gender							
Male (*n*, %)	7	(29.16)	6	(26.08)			
Female (*n*, %)	17	(70.83)	17	(73.91)			
Language							
French (*n*, %)	23	(95.83)	18	(78.26)			
English (*n*, %)	1	(4.16)	5	(21.74)			
MGH-HPS or analogue *M (SD)*	16.21	(4.59)	.87	(1.22)	15.81	26	< .001
DERS Total *M (SD)*	78.13	(21.84)	64.13	(14.80)	2.60	44	.013
ARS Total *M (SD)*	21.00	(4.75)	26.18	(4.48)	- 3.80	44	< .001
FMPS Total *M (SD)*	97.29	(20.82)	93.09	(16.10)			*ns*
STOP Total *M (SD)*	178.60	(37.25)	199.07	(30.16)	-2.06	45	.045
SCL-90-R*							
PSDI *M (SD)*	1.55	(.48)	1.38	(.36)			*ns*
PST *M (SD)*	29.67	(19.28)	23.64	(15.56)			*ns*
GSI *M (SD)*	.57	(.51)	.41	(.34)			*ns*

ARS = Affective Regulation Scale; DERS = Difficulties in Emotion Regulation Scale; FMPS = Frost Multidimensional Perfectionism Scale; GSI = Global Severity Index; MGH-HPS = Massachusetts General Hospital Hair-Pulling Scale; PSDI = Positive Symptom Distress Index; PST = Positive Symptom Total; SCL-90-R = Symptom Checklist-90-Revised; STOP = Style of Planning Questionnaire

Table 3.4
Mean seconds of BFRB by group and condition

Group	**Seconds of BFRB** *M (SD)*		
	Boredom/Frustration	Stress	Relaxation
BFRBs (n =23)*	6.61 (17.56)	7.30 (29.84)	0.78 (3.16)
Controls (n = 23)	1.43 (4.01)	0.00 (0.00)	0.00 (0.00)
Total (N = 46)	4.02 (12.86)	3.65 (21.19)	0.39 (2.25)

* One participant's DVD data was unavailable

Table 3.5
Mean seconds of BFRB by group and condition for nine participants who engaged in BFRB

Group	**Seconds of BFRB** *M (SD)*		
	Boredom/ Frustration	Stress	Relaxation
BFRBs ($n = 6$)	25.33 (28.07)	28.00 (56.78)	3.00 (6.00)
Controls ($n = 3$)	11.00 (4.36)	0.00 (0.00)	0.00 (.00)
Total ($n = 9$)	20.56 (23.42)	18.67 (47.02)	2.00 (4.98)

Table 3.6
Seconds of BFRB by group and condition for nine participants who engaged in BFRB

Participant	**Group**	**Seconds of BFRB per Condition**		
		Boredom/ Frustration	Stress	Relaxation
1	BFRB	14	18	0
2	BFRB	17	7	3
3	BFRB	2	0	0
4	BFRB	49	0	0
5	BFRB	0	143	15
6	BFRB	70	0	0
7	Control	13	0	0
8	Control	14	0	0
9	Control	6	0	0

Table 3.7
Mean urge to engage in BFRB by group and condition

Condition	**Urge to engage in BFRBs** *M (SD)*	
	BFRBs	Controls
Boredom/Frustration	4.22 (2.13)	1.48 (1.34)
Stress	3.58 (1.98)	1.44 (1.24)
Relaxation	3.40 (2.57)	1.13 (0.27)

Table 3.8
Intensity of emotions (MSACL scores) by group and condition

Condition	Group	Emotions * *M (SD)*				
		Frustrated	Bored	Stressed	Impatient	Dissatisfied
Boredom/ Frustration	BFRB	.63 (.65)	.46 (.66)	.42 (.37)	.79 (.72)	.75 (.79)
	Controls	.30 (.56)	.43 (.73)	.29 (.37)	.43 (.59)	.43 (.59)
Stress	BFRB	.17 (.48)	.21 (.51)	.60 (.43)	.25 (.53)	.29 (.62)
	Controls	.17 (.58)	.17 (.49)	.65 (.51)	.35 (.65)	.13 (.46)
Relaxation	BFRB	.04 (.20)	.67 (.64)	.16 (.23)	.50 (.59)	.13 (.45)
	Controls	.04 (.21)	.35 (.49)	.04 (.12)	.09 (.29)	.00 (.00)

* Participants were asked to "Please indicate to what extent you are currently experiencing the following emotions/moods." 0 = *not at all*, 1= *a little*, 2 = *a lot*

CONCLUSION

Body-focused repetitive behaviours (BFRBs) are problematic, injurious, and apparently non-functional behaviours directed toward the body, including hair-pulling (HP), skin-picking (SP), and nail-biting (NB) (O'Connor et al., 2005; Snorrason, Belleau, & Woods, 2012; Teng et al., 2004). Although BFRBs and their consequences create considerable distress and impairment in functioning (Bohne et al., 2002; Diefenbach et al., 2005; Woods, 2002; Woods, Friman, & Teng, 2001), they also seem to satisfy an urge and deliver some form of pleasure or reward. Recognition of this paradox has prompted exploration of etiological models for BFRBs. The global emotion regulation (ER) model proposes that BFRBs function as a maladaptive mechanism for regulating unpleasant emotions. That is, individuals engage in BFRBs in an effort to alleviate or modulate aversive affect (Roberts, O'Connor, & Bélanger, 2013). The ER model further suggests that individuals with BFRBs are characterized by global deficits in ER (Shusterman et al., 2009; Snorrason et al., 2010).

Whereas the global ER model incorporates a wide variety of emotions including anxiety, sadness, frustration, anger, stress, and boredom, the frustrated action model for BFRBs focuses on the role of a specific subgroup of emotions. The latter model hypothesizes that individuals with BFRBs are characterized by a maladaptive planning style (e.g., doing multiple tasks at once, inability to relax, overplanning tasks or activities) that, in certain situations, generates boredom, frustration, impatience, and dissatisfaction. These negative emotions produce tension, and the tension and negative emotions are subsequently released via BFRB (O'Connor, 2002; O'Connor, 2005).

The frustrated action model is consistent with the global ER model. Both models suggest that a trigger event or situation provokes unpleasant emotions, and

both models propose that individuals resort to BFRB to alleviate unpleasant affect. However, the frustrated action model situates the cycle of trigger event, negative emotion, and BFRB in the context of tension-producing maladaptive planning styles, and specifies that BFRB functions to modulate impatience, frustration, dissatisfaction, boredom, and tension. The frustrated action model thus refines the global ER model and clarifies the processes that may be at play during an episode of BFRB.

To test the global ER model and the frustrated action model, we developed an original research project with three distinct objectives: (a) to review the literature on BFRBs and ER, (b) to test the global ER model by comparing a BFRBs group and a control group on questionnaire measures of ER, and (c) to test the frustrated action model by measuring BFRB and urge to engage in BFRB in a BFRBs group and a control group in experimental conditions designed to elicit diverse emotions.

The first objective of this research project was to provide an up-to-date synthesis of the research on ER and BFRBs in adults. We thoroughly reviewed the research in this area, and the resulting paper was published in *Clinical Psychology Review* (Roberts, O'Connor, & Bélanger, 2013). The comprehensive review of the literature on ER and BFRBs provides support for the key role of emotional variables in the initiation and maintenance of BFRBs.

The results of studies exploring psychopathology and psychiatric comorbidity in individuals with BFRBs indicate that this population suffers from greater comorbidity and more psychological symptoms than are observed in the general population. Although a causal direction cannot be confirmed, the findings suggest that individuals with BFRBs experience dysfunctional ER. The results of the naturalistic studies included in the literature review (e.g., Diefenbach et al., 2002; Duke, Keeley, Ricketts, et al., 2010; Neal-Barnett & Stadulis, 2006) suggest that negative affective states precipitate or cue BFRB. Relief from negative affective

states seems to reinforce BFRB, although BFRB may also trigger further negative emotions such as shame or guilt. The results of studies that measured BFRB in experimental conditions (e.g., Drysdale, Johoda, & Campbell, 2009; Teng et al., 2004; Williams et al., 2006) collectively indicate that certain affective states, such as boredom, tension, anxiety and frustration, may be particularly likely triggers for BFRB. Similarly, the results of studies designed to identify high-risk emotions (e.g., O'Connor et al., 2001; O'Connor et al., 2003) indicate that boredom, frustration, and tension frequently provoke BFRB. The results of studies designed to explore focused and automatic subtypes of BFRB (e.g., Flessner, Woods, et al., 2008; Walther et al., 2009) indicate that individuals with BFRBs experience fluctuations in degree of awareness during episodes of HP, SP, and NB, and imply that ER may be more implicated in episodes of focused BFRB. The results of trials of ER-focused treatments for BFRBs such as ACT (e.g., Flessner, Busch, Heideman, & Woods, 2008; Woods, Wetterneck, & Flessner, 2006) and DBT (e.g., Keuthen, Rothbaum, et al., 2010; Keuthen et al., 2012) indicate that this population may benefit from treatments that include components that directly address ER.

The overall implication of the literature review is that we can confidently conclude that emotional variables play a significant role in BFRBs. Future research in this area would provide further insight into the precise role of emotions and ER in the development, maintenance, and reinforcement of BFRBs, and would inform treatment options for this population.

The second objective of this research project was to test the global ER model. This model proposes that individuals with BFRBs are characterized by deficits in ER and engage in damaging body-focused behaviours to modulate or alleviate negative emotions.

To meet this objective, we compared individuals with BFRBs and a control group on the Difficulties in Emotion Regulation Scale, Affective Regulation Scale,

and Hairpulling Triggers Scale. These questionnaires respectively measure global ER; ability to regulate specific emotions such as tension, anxiety, and boredom; and the relative power of specific emotions to trigger episodes of BFRB. Of the emotions measured, the BFRBs group had the greatest difficulty regulating anxiety and tension. Between-group comparisons of capacity to regulate specific emotions revealed that the BFRBs group was less skilled than were controls in regulating boredom, tension, anxiety, indifference, guilt, and irritability. Furthermore, three quarters of participants in the BFRBs group reported that anxiety always triggers HP, SP, or NB; two thirds reported that tension always triggers BFRBs; and over one half reported that boredom always triggers BFRBs.

The primary finding of this study was that individuals with BFRBs are distinguishable from controls in terms of overall capacity for ER. More specifically, the BFRBs group was significantly less skilled than was the control group at regulating anxiety, indifference, tension, guilt, boredom, and irritability. In the BFRBs group, anxiety, boredom, and tension were the affective states most likely to trigger BFRB. The results provide further evidence for the role of ER in explaining the persistence of damaging body-focused behaviours. They imply that individuals with BFRBs could benefit from learning alternative strategies for tolerating or modulating unpleasant emotions, and that interventions focused on anxiety, boredom, and tension may be particularly effective.

The third objective of this research project was to test the frustrated action model for BFRBs. The model suggests that individuals with BFRBs have maladaptive planning styles that predispose them to impatience, boredom, frustration, and dissatisfaction, emotions that generate tension and trigger BFRB. The frustrated action model proposes that BFRB is not triggered by anxiety or stress, but rather by emotions that are generated by thwarted action, such as impatience and boredom,.

To meet this objective, we compared BFRB activity and urge to engage in BFRB in a BFRBs group and a control group in three experimental conditions respectively designed to elicit boredom/frustration, stress, and relaxation. Participants in both groups reported a stronger urge to engage in BFRB in the boredom/frustration condition than in the relaxation condition. We also found that, in the BFRBs group, subjective boredom and impatience were significantly correlated with urge to engage in BFRBs in the boredom/frustration condition and in the relaxation condition. This finding is consistent with the frustrated action model. Individuals with BFRBs are hypothesized to be particularly prone to boredom, frustration, impatience, and dissatisfaction because they hold perfectionist beliefs about planning, activity, and organization. They tend to hold themselves to unrealistically high standards of productivity and organization, inviting impatience, frustration, and dissatisfaction when the drive to plan and accomplish is thwarted. That impatience and boredom, rather than frustration and dissatisfaction, emerged as key predictors implies that boredom and impatience most effectively capture the experience of thwarted action that defines the frustrated action model.

The frustrated action model was further supported by results on the Style of Planning questionnaire. The BFRBs group had significantly higher scores than did the control group on maladaptive planning style. Further, maladaptive planning style was significantly correlated with difficulties with ER, a finding with several possible interpretations. Individuals with deficits in ER may try to self-regulate by imposing rigid standards and overinvesting in activities. Alternatively, individuals with maladaptive planning styles may experience problems with ER as a result of frequent or intense negative emotion generated by failure to meet self-imposed unrealistic standards.

The overall implication of the findings of the second empirical study is that BFRBs are not simply "nervous habits," but rather are complex and dynamic

behaviours that respond to specific emotions. Urge to engage in BFRB seems to respond consistently to emotions that represent frustrated action. In conjunction with the finding that individuals with BFRBs have maladaptive planning styles, the finding that urge fluctuates with subjective boredom and impatience has implications for treatment for this population. Individuals with BFRBs may benefit from interventions designed to address maladaptive cognitions about the need for constant activity and productivity, and to improve ability to tolerate or regulate boredom and impatience.

The first article (Chapter I), a review of the literature, represents the first published comprehensive review of the available research on ER and BFRBs. As such, it constitutes a significant contribution to the literature in this area. The first of the two empirical articles (Chapter II) is among few studies to directly measure ER in individuals with BFRBs; it provides evidence for the role of deficits in ER in explaining the persistence of damaging body-focused behaviours, and identifies specific emotions that trigger BFRB episodes. Finally, the second empirical article (Chapter III) is among the first experimental protocols to directly measure BFRB in experimental affective conditions. The protocol tested the impact of specific affective states on the occurrence of BFRB and on strength of urge to engage in HP, SP, and NB in individuals with BFRBs and a comparable control group.

The results of the literature review and the first empirical article support the global ER model and permit the conclusion that ER is implicated in BFRBs. Individuals with HP, SP, and NB have observable deficits in ER; they report change in affect intensity over the course of BFRB episodes; and diverse affective states differentially provoke BFRBs and the urge to engage in BFRBs. Each of these findings demonstrates that emotion plays a significant role in the initiation of an episode of BFRB and the maintenance of the behaviour over time.

The results of the second empirical article demonstrate that individuals with BFRBs have maladaptive planning styles, and that frustration, and particularly,

boredom and impatience may be the key emotions implicated in HP, SP, and NB. The results refine the global ER model and provide support for a revised frustrated action model. The original global ER model suggests that individuals with BFRBs have deficits in ER and that BFRB functions to alleviate or modulate unpleasant affect (see Figure 1.1). The original frustrated action model also implies a trigger event, subsequent negative emotion, and relief from negative emotion via BFRB, but adds the context of maladaptive planning styles to the model. However, the original frustrated action model (see Figure 3.1) does not include deficits in ER.

The results presented here generated a revised frustrated action model that incorporates thwarted action, deficits in ER, and maladaptive planning style. In the revised model, a trigger event or situation representing thwarted action generates negative emotions such as frustration, impatience, and boredom. These emotions arise in the context of elevated personal standards, inability to relax, and perfectionist beliefs about productivity. Deficits in ER prevent individuals with BFRBs from coping adaptively with the difficult emotions, and tension arises and subsequently triggers BFRB. BFRB is negatively reinforced by alleviation of tension and positively reinforced by the feeling of "taking action" (engaging in BFRB) when the original desired action was thwarted (see Figure C.1).

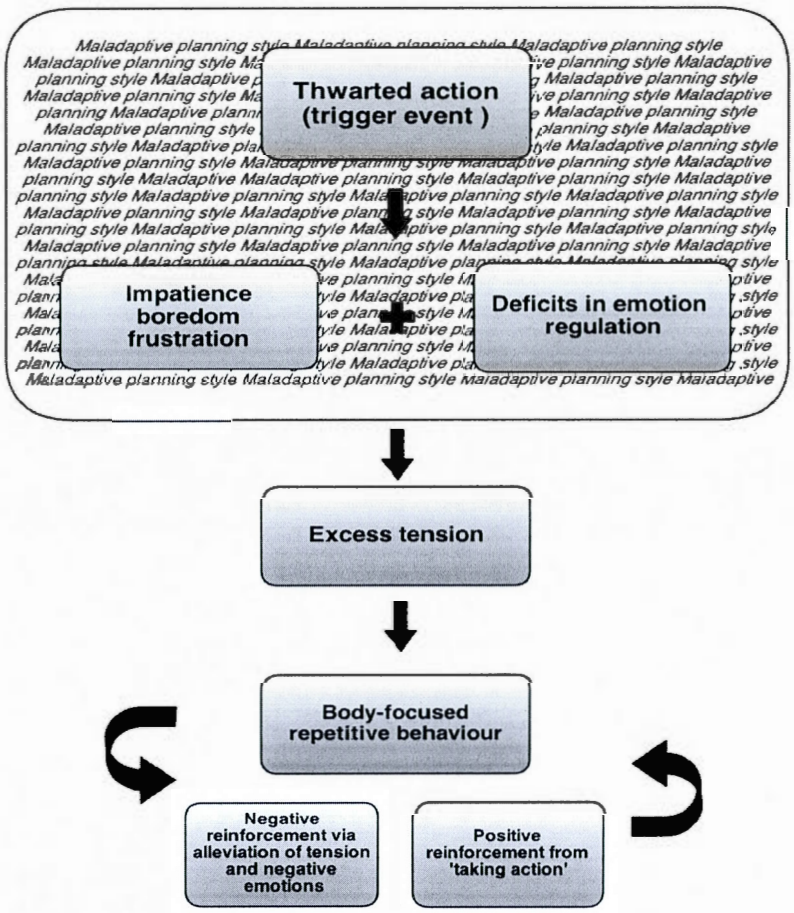


Figure C.1 The revised frustrated action model

First, demonstrated deficits in ER in this population suggest that individuals with BFRBs could benefit from interventions designed to target global ER. For example, Dialectical Behaviour Therapy is a cognitive-behavioural approach that combines acceptance of uncomfortable or negative internal experiences with concrete skills and strategies for tolerating distress and regulating emotions (Linehan, 1993). Acceptance and Commitment Therapy is a cognitive-behavioural approach that encourages awareness and acceptance (rather than avoidance or escape) of unpleasant

psychological experiences such as negative thoughts and emotions (Hayes, Strosahl, & Wilson, 1999). DBT has already been applied to treat BFRBs, with promising results (e.g., Keuthen, Rothbaum, et al., 2010; Keuthen et al., 2012) whereas ACT has yielded mixed results (e.g., Flessner, Busch, Heideman, & Woods, 2008; Twohig, Hayes, & Masuda, 2006; Twohig & Woods, 2004; Woods, Wetterneck, & Flessner, 2006). Other interventions that focus on emotions and ER may also be effective in treating BFRBs; for example, Emotion-Focused Therapy (EFT; Greenberg, 2004) is designed to help individuals become more aware and accepting of their emotions, and could be of interest for treating individuals with BFRBs.

Second, the finding that BFRBs is preferentially triggered by emotions such as boredom and impatience also has implications for treatment. Interventions designed to decrease boredom (by increasing activity) and increase tolerance for waiting or delay may be useful in reducing BFRB (Teng et al., 2004). However, if boredom and impatience trigger BFRB because of underlying tension-producing planning styles, individuals with BFRBs may benefit from interventions that address planning style and modify unrealistic beliefs and standards. Adjustment of perfectionist standards and modification of overactive planning could help prevent accumulation of impatience, boredom, frustration, and tension and the subsequent need for release via BFRBs.

Several limitations of the present research project must be acknowledged, including limitations related to sample, definition and measurement of emotion, and identification of BFRB subtypes.

Although the size of the sample used in the two empirical studies in this project was adequate, a larger sample is desirable for several reasons. First, several non-significant statistical effects (e.g., group differences on DERS subscales; differences across conditions in seconds of BFRBs; differences in urge to engage in BFRB between the boredom/frustration and stress conditions) may have lacked

sufficient power, and may have reached significance in a larger sample. Second, 50% of the sample was individuals with NB; a larger sample may have permitted a greater proportion of individuals with HP or SP.

In addition, although this study used a selected sample of individuals reporting problematic BFRBs, the distress or impairment criterion was 3/10, a cut-off chosen to facilitate recruitment of a difficult-to-recruit population. The low criterion for distress or impairment may have failed to distinguish some individuals with non-severe, non-distressing habits from individuals with BFRBs, unwittingly admitting some of the former population into the BFRBs group. A more stringent inclusion criterion would have prevented this possibility.

Any study in which participants are asked to report on their emotional state presents the possibility of diverse individual definitions of emotions. For example, the affective state that one individual experiences as "stress" may be defined by another individual as "boredom," or "frustration." In the two empirical studies, providing participants with clear definitions of experiences (e.g. "Boredom represents a negative state of restlessness or tedium associated with having nothing to do or with being unable to do what one wants") could have eliminated inconsistencies between participants and helped establish precisely which emotional experiences accompany BFRB. Alternatively, participants could have been asked to describe and appraise their experience in each condition (e.g., O'Connor et al., 2003), generating qualitative data for subsequent interpretation. Finally, the use of psychophysiological measures of stress would have eliminated the need for subjective evaluation on the part of participants.

Research on HP and SP distinguishes automatic BFRB from focused BFRB. Whereas automatic HP or SP refers to pulling or picking that occurs outside of awareness, often during sedentary activities, focused HP or SP refers to a consciously-initiated behaviour often preceded by negative emotional states and a

powerful urge to pull or pick (Flessner, Woods, et al., 2008; Walther et al., 2009). Some researchers (e.g., Twohig & Woods, 2004) have suggested that focused BFRB in particular is designed to address and alleviate negative emotions, serving an ER function. The two empirical studies included in this project could have explored this possibility by identifying participants' primary style of BFRB prior to measuring ER (first empirical study) and urge to engage in BFRBs (second empirical study). Separating the BFRBs group into focused and automatic subtypes would have permitted us to test hypotheses regarding the respective functions of the two types of BFRB.

The results of the research project presented here introduce new avenues for exploration of the role of ER in BFRBs, including exploration of alternative etiological models; exploration of BFRBs other than HP, SP, and NB; investigation of the role of emotion reactivity; establishing causality between emotions and BFRB; and establishing the precise mechanism by which BFRB regulates emotion.

In order to thoroughly evaluate a specific body of research, this project investigated the ER model for BFRBs to the exclusion of other models. Although the literature review that comprises Chapter I of the present document describes alternate psychological models for BFRBs, a discussion of ethological or neurobiological models is absent. Comparison of various types of etiological models for a given psychopathology constitutes a valuable exercise in identifying the model that best corresponds with the available evidence; a review and comparison of psychological, ethological, and neurobiological models for BFRBs would inform the conceptualization and treatment of this group of disorders.

To build upon prior research and to permit timely recruitment of participants, we limited recruitment for the BFRBs group to individuals with HP, SP, and NB, and limited the literature review to studies of these populations. Exploration of body-focused habits such as teeth-grinding, knuckle-cracking, joint-cracking, and cheek-

biting would clarify whether or not such behaviours also serve an ER function and should be included in a diagnostic category with HP, SP, and NB.

Whereas ER refers to the ability to accept, understand, and manage emotion, emotion reactivity refers to the tendency to experience frequent, persistent, and intense emotions (Nock, Wedig, Holmberg, & Hooley, 2008). Few studies have explored emotion reactivity in individuals with BFRBs, and it is plausible that the difficulty regulating emotion observed in this population is attributable to an overall excess of emotion. An exploration of emotion reactivity in individuals with BFRBs would inform this possibility.

Research on ER and BFRBs, including the studies described in the present document, has established that BFRB can be triggered by affective cues and fluctuates according to the emotions present. However, causality between certain emotions and the acts of HP, SP, and NB remains to be established. Longitudinal studies examining the development of emotion over time or A-B-A designs that provoke and subsequently extinguish a given emotion (e.g., frustration, boredom, impatience) or manipulate the intensity of the emotion would permit determination of causality.

Finally, although the research presented here provides support for the global ER model for BFRBs and for the frustrated action model, it does not directly establish the precise mechanism through which BFRB alleviates or attenuates boredom, impatience, tension, or other negative affective states. Diverse affective states clearly trigger or increase BFRB, but the exact mechanism by which BFRBs *regulate* affect is not clear. One possibility is that brief episodes of BFRB alleviate the frustration and impatience borne of thwarted action toward a larger goal by directing attention toward an alternate short-term goal, i.e., removing an interesting or bothersome piece of hair, skin, or nail. More prolonged BFRB episodes create a trance-like or "mesmerized" state (e.g., Neziroglu et al., 2008; Penzel, 1995), and

may allow individuals to become dissociated from unpleasant emotions. To more directly address the question of ER mechanism, future research could address the roles of distraction and dissociation in regulating emotion in individuals with BFRB.

The research project presented here constitutes a novel contribution to the understanding of ER in individuals with BFRBs. The review of the literature is the first of its kind and presents a comprehensive portrait of ER in individuals with BFRBs. The first empirical study contributes to the literature that suggests that individuals with BFRBs are characterized by deficits in ER, and adds to that body of work by identifying emotions that are particularly difficult for this population to regulate. The second empirical study contributes to the experimental research on HP, SP, and NB, and constitutes an initial test of the frustrated action model for BFRBs. The results of the second and third article generated a revised frustrated action model that incorporates thwarted action, deficits in ER, and maladaptive planning style. In the revised model, a trigger event or situation representing thwarted action generates negative emotions such as frustration, impatience, and boredom. Deficits in ER prevent individuals with BFRBs from coping adaptively with the difficult emotions and tension subsequently arises. BFRB is initiated in an effort to decrease tension and negative emotion, and is subsequently negatively and positively reinforced.

Further research is needed to establish the precise mechanisms by which BFRB regulates emotion and to explore causality between trigger emotions and BFRB. Such research will inform the conceptualization of this group of disorders, and contribute to the development and delivery of effective treatment options.

APPENDIX A

CONSENT FORMS

Centre de recherche
Fernand-Seguin
de l'Hôpital
Louis-H. Lafontaine

Animés par l'espoir

Hôpital
Louis-H. Lafontaine

Animés par l'espoir

INFORMATION AND CONSENT FORM

Evaluation of an Emotion Regulation Model for Habit Disorders

Primary investigators: Kieron O'Connor, PhD, psychologist and researcher, CRFS

Claude Bélanger, PhD, professor, UQAM
Sarah Roberts, PhD candidate, UQAM, CRFS

Funding Body: Fonds de la Recherche en Santé du Québec (FRSQ)

It is important that you read and fully understand the content of this consent and information form. Take as much time as you need to read and understand all of the information about participating in this research project. Please do not hesitate to ask any questions to the primary investigator or to the other members of the research team.

Research Project Description

The study described here focuses on habit disorders (HD). For the purposes of the present study, habit disorders include hair-pulling (trichotillomania; TTM), nail-biting (onychophagia), and skin-picking (scabiomania). The first objective of the study is to test an emotion regulation model in individuals with habit disorders and individuals with tics or Tourette's Syndrome, using questionnaire measures of emotion regulation. The second objective of the study is to evaluate the impact of certain specific emotions on habit disorder behaviour and tics in individuals with these problems. Experimentation will take approximately 1.5 hours and will place at the *de recherche Fernand-Seguin.*

Nature of your participation

Your participation in the present study involves a single experimentation session. The experimentation involves exposure to five situations or tasks (maximum 10 minutes each) designed to provoke certain emotional states. If you are receiving treatment at the , the experimentation will take place on a day in which you have an appointment scheduled with your psychotherapist, where possible. You will be videotaped during the experimentation.

Your participation also requires the completion of several questionnaires. You will complete two questionnaires after you agree to participate and provide informed consent. In addition, you will be asked to complete two brief questionnaires before and after each experimental task or situation.

Potential disadvantages of participation

There are no physical risks involved in participation in the present study. The research project involves the induction of emotions through experimental tasks or situations. The emotions that you experience during the experimentation may create distress or discomfort. The experimentation may also produce a temporary increase in habit behaviour or tics. These temporary reactions are part of the experimental process; in the unlikely event of prolonged adverse reactions, they will be addressed by your psychologist.

Potential benefits

The data that you provide will allow us to improve our understanding of the mechanisms involved in habit disorders and inform treatment options for these problems.

Financial compensation

Participants will receive a financial compensation to defray transportation costs or other costs related to their participation.

Right to participate and to withdraw participation

Your participation in this research project is entirely voluntary. You have the right to terminate or withdraw your participation at any step of the process. You will not be obliged to discuss your reasons; simply advise a member of the research team of your decision orally or in writing. Your decision not to participate in the study will have no bearing or consequences on any subsequent treatment or care that you receive or on your relationship with your therapist or other health care professionals.

Certain situations could necessitate the premature termination of your participation in this study. For example, in the event that your mental health is compromised by your participation, we will be obliged to discontinue your involvement in the study. In this event, your treating therapist will be help you deal with any reactions that you may have to your discontinued participation.

In the event that your participation is withdrawn or terminated, your data will be stored for a period of seven (7) years following the completion of the study.

Confidentiality

All of the information collected in the context of the research project described here (including experimenter observations, questionnaire results, and videotape) will be coded numerically and treated confidentially. The paper documents will be secured in a locked file and the electronic data will be integrated into a locked database with a secure password. The data will be stored in a locked room reserved for this purpose, and access will be limited to members of the research team. The results of the present study may be presented in scientific communications, including articles for publication. In accordance with confidentiality regulations, no publication or scientific communication will reveal information that could allow you to be identified. The data collected during this research project will be stored for a period of seven (7) years following the completion of the study, after which time they will be destroyed.

Contacts

For any questions about this study, or for any problem related to your participation, contact the head researcher (Kieron O'Connor) at (514) 251-4015, extension 2343 or the research project coordinator at extension 3585.

For all questions concerning your rights as a research participant or for any ethical concerns about your participation in this project, contact:

Complaints and Quality of Services Commissioner
Hôpital Louis- H. Lafontaine, 7401, rue Hochelaga
Montréal, QC H1N 3M5
(514) 251-4000, extension 2920

Research Ethics Committee
comité.ethique@crfs.rtss.qc.ca
(514) 251-4015, extension 3591

Participant signature

I hereby declare that I have read the information and consent form and am aware of the risks and requirements of my participation in this project. I acknowledge that the project was clearly explained to me, that all of my questions were answered, and that I was granted the time necessary to make a decision.

I freely and voluntarily consent to participate in this project. I have received a signed copy of this information and consent form. This form will be added to my medical file.

_____

Participant name (please print) *Signature*

_____

Date

Researcher Signature

I hereby certify that I clearly explained the terminology in the present information and consent form to the participant and that I responded to all of the participant's questions. I clearly indicated to the participant that he or she is free to withdraw or terminate participation at any time, orally or by writing, without prejudice. I agree to respect the terms set in this information and consent form.

_____

Researcher name (please print) *Signature*

_____

Date

Permission to record

I acknowledge that the procedures involved in the present study were explained to me. I am aware that my participation will be video recorded for the purpose of subsequent analysis by one or more researchers or research professionals. The rationale for the recordings was clearly explained to me. All of my questions were answered to my satisfaction. I was advised that the recordings are confidential and will be destroyed seven (7) years after the research project is completed. I consent to be recorded, but reserve the right to request the destruction of the recordings at any time.

_____

Participant name (please print) *Date*

_____

Signature

FORMULAIRE DE RENSEIGNEMENT ET DE CONSENTEMENT

Évaluation d'un modèle de la régulation des émotions pour les désordres d'habitudes

Chercheurs responsables: Kieron O'Connor, PhD, chercheur et psychologue, CRFS
Claude Bélanger, PhD, professeur, UQAM
Sarah Roberts, candidate au PhD, UQAM, CRFS

Organisme subventionnaire: Fonds de la Recherche en Santé du Québec (FRSQ)

Il est important de bien lire et comprendre le présent formulaire d'information et de consentement pour la recherche à laquelle nous vous demandons de participer. Prenez le temps nécessaire pour lire et comprendre tous les renseignements liés à cette recherche. Nous vous invitons à poser toutes les questions que vous jugerez utile au chercheur responsable ou aux membres de son équipe.

Description du projet de recherche

L'étude porte sur les désordres d'habitudes (DH). Pour les fins du projet actuel, les DH comprennent, arracher ses cheveux (la trichotillomanie), ronger ses ongles (onychophagie), et le « skin-picking ». Le projet vise à tester le modèle de régulation des émotions avec des individus ayant des désordres d'habitudes, des tics chroniques (TC) ou le Syndrome Gilles de la Tourette (SGT) à l'aide de questionnaires mesurant la régulation des émotions. L'étude vise également à évaluer l'impact de l'expérience de certaines émotions sur les comportements de personne ayant un DH ou des tics. L'expérimentation sera d'une durée d'environ une heure et demi et se passera au de recherche Fernand-Seguin.

Nature de la participation

Votre participation à cette étude implique une séance d'expérimentation d'environ une heure et demi. L'expérimentation implique l'exposition à cinq situations ou tâches d'un maximum de 10 minutes chacune visant à provoquer certains états émotifs. L'expérimentation sera enregistrée sur bande vidéo. Si vous recevez actuellement un traitement au , la séance d'expérimentation devra se faire une journée où vous avez un rendez-vous de prévu avec votre psychologue.

Votre participation implique également la complétion de quelques questionnaires. Ceux-ci vous seront remis au moment de votre acceptation pour participer à l'étude. Par la suite, vous aurez à compléter deux autres questionnaires de moins de cinq minutes avant et après chaque tâche ou situation.

Inconvénients pouvant découler de votre participation à ce projet

Il n'y a aucun risque physique relié à votre participation. Le projet de recherche implique la stimulation d'états affectifs par des tâches ou situations expérimentales. Les émotions provoquées durant l'expérimentation pourront vous occasionner de la détresse ou de l'inconfort. L'expérimentation pourra également provoquer une augmentation temporaire des comportements de DH ou de SGT/TC. Ces réactions font partie du processus expérimental; dans le cas improbable d'une réaction averse intense, un soutien psychologique sera offert.

Avantages pouvant découler de votre participation au projet de recherche

Les données recueillies permettront de faire avancer la compréhension des mécanismes et des alternatives de traitement pour les désordres d'habitudes.

Indemnité compensatoire

Les participants recevront une compensation de 20 dollars, afin de défrayer les coûts de déplacement ou autres coûts reliés à leur participation.

Liberté de participation et de retrait

Votre participation à ce projet de recherche est tout à fait volontaire. Vous êtes donc libre de refuser d'y participer. Vous pouvez également vous retirer de ce projet à n'importe quel moment, sans avoir à donner de raisons, en faisant connaître votre décision au chercheur ou à l'un des membres de l'équipe, oralement ou par écrit. Si vous recevez actuellement un traitement au , votre décision de ne pas participer à l'étude ou de vous en retirer n'aura aucune conséquence sur les soins qui vous seront

fournis par la suite ou sur vos relations avec votre thérapeute et les autres intervenants.

Certaines circonstances peuvent mener à un retrait prématuré, par exemple, si votre santé psychologique est compromise, nous devrons mettre fin à votre participation. Dans ce cas, votre retrait de l'étude et n'importe quelles réactions que vous pourriez avoir en réaction de votre retrait de l'étude seront abordées.

Dans le cas d'un retrait prématuré, vos données seront conservées pour une période de 7 ans suivant la fin de l'étude, après quoi elles seront détruites.

Confidentialité

Les observations effectuées au cours de l'expérimentation, la bande vidéo de l'expérimentation et les résultats aux questionnaires et aux entrevues recueillis dans le cadre du projet de recherche décrit ci-dessus seront traités de manière tout à fait confidentielle et codifiée par numéro. Les documents papiers seront centralisés dans une filière sous clé et les données informatisées seront intégrées à une base de données avec un mot de passe sécurisé. Seulement les membres de l'équipe de recherche auront accès aux résultats. Ceux-ci seront gardés sous clé dans un local réservé à cette fin. Il est entendu que les résultats de la présente étude pourront servir à des fins de publication scientifique tout en respectant les règles de confidentialité. Aucune publication ou communication scientifique ne renfermera quoi que ce soit qui puisse permettre de vous identifier. Les données du projet de recherche seront conservées pour une période de 7 ans suivant la fin de l'étude, après quoi elles seront détruites.

Contacts

Si vous avez des questions concernant le projet de recherche ou si vous croyez que vous éprouvez un problème relié à votre participation au projet de recherche, vous pouvez communiquez avec le chercheur responsable du projet de recherche (Kieron O'Connor) au numéro suivant 514-251-4015, poste 2343 ou avec la coordonnatrice des projets de recherche (Karine Bergeron) au poste 3585.

Pour toutes questions sur vos droits à titre de participant à une recherche ou pour tout problème éthique concernant les conditions dans lesquelles se déroule votre participation à ce projet, vous pouvez contacter:

La Commissaire local aux plaintes
Hôpital Louis-H. Lafontaine, 7401, rue Hochelaga
Montréal, QC H1N 3M5
Téléphone: 514-251-4000, poste 2920.

Comité d'éthique de la recherche
comité.ethique@crfs.rtss.qc.ca
(514) 251-4015, extension 3591

Signature du participant

Je déclare avoir lu le présent formulaire d'information et de consentement, particulièrement quant à la nature de ma participation au projet de recherche et l'étendue des risques qui en découlent. Je reconnais qu'on m'a expliqué le projet, qu'on a répondu à toutes mes questions et qu'on m'a laissé le temps voulu pour prendre une décision.

Je consens librement et volontairement à participer à ce projet. On me remettra une copie signée du présent formulaire d'information et de consentement. Le présent formulaire sera consigné à mon dossier médical.

_____

Nom du participant (lettres moulée) *Signature du participant*

_____

Date

Signature de l'expérimentateur

Je certifie que j'ai expliqué au participant de recherche les termes du présent formulaire d'information et de consentement, que j'ai répondu aux questions que le participant avait à cet égard et que j'ai clairement indiqué qu'il demeure libre de mettre un terme à sa participation, et ce, oralement ou par écrit, sans préjudice et je m'engage à respecter ce qui a été convenu au formulaire d'information et de consentement.

_____

Nom de l'expérimentateur (lettres moulée) *Signature de l'expérimentateur*

_____

Date

Demande d'autorisation d'enregistrement

On m'a expliqué le déroulement du projet de recherche. J'ai pris connaissance que des enregistrements vidéo seront effectuées pour permettre une analyse subséquente par un ou plusieurs chercheurs ou professionnels de recherche. On m'a expliqué les raisons de ces enregistrements. J'ai eu l'occasion de poser des questions auxquelles on a répondu. On a garanti, à ma satisfaction, la confidentialité de ces enregistrements et on m'a informé qu'ils seront conservés pour une période de 7 ans suivant la fin de l'étude, après quoi ils seront détruits. Après réflexion, j'accepte que ces enregistrements soient effectués mais je conserve le droit de demander en tout temps que ces enregistrements soient détruits.

_____

Nom du participant (lettres moulée) *Signature du participant*

_____

Date

APPENDIX B

SELECTION OF SCALES AND QUESTIONNAIRES

Affective Regulation Scale

Participant: _____ Date: _____

Below you will see a list of moods. Please check the circle that indicates you ability to control each of these moods. How easily can you "snap out of it?"

	Never able to control	Rarely able to control	Can control about half the time	Can control most of the time	Always able to control
Bored	O	O	O	O	O
Angry	O	O	O	O	O
Guilty	O	O	O	O	O
Indifferent	O	O	O	O	O
Tense	O	O	O	O	O
Irritable	O	O	O	O	O
Sad	O	O	O	O	O
Anxious	O	O	O	O	O
Ashamed	O	O	O	O	O

Please indicate how likely each mood is to cause hair-pulling, skin picking, or nail-biting.

	Never	Sometimes	Often
Bored	O	O	O
Angry	O	O	O
Guilty	O	O	O
Indifferent	O	O	O
Tense	O	O	O
Irritable	O	O	O
Sad	O	O	O
Anxious	O	O	O
Ashamed	O	O	O

Affective Regulation Scale (French)

Participant: _____ Date: _____

Vous verrez ci-dessous une liste d'humeurs. SVP cochez le cercle qui indique votre habileté à contrôler chacune de ces humeurs. Comment facilement pouvez-vous vous en sortir?

	Jamais capable de contrôler	Rarement capable de contrôler	Capable de contrôler environ la moitié du temps	Capable de contrôler la plupart du temps	Toujours capable de contrôler
Ennuyé	O	O	O	O	O
Fâché	O	O	O	O	O
Coupable	O	O	O	O	O
Indifférent	O	O	O	O	O
Tendu	O	O	O	O	O
Irritable	O	O	O	O	O
Triste	O	O	O	O	O
Anxieux	O	O	O	O	O
Honteux	O	O	O	O	O

SVP indiquez quelle est la probabilité que chacune de ces humeurs vous provoque à vous arracher les cheveux/poils, ronger les ongles ou de vous gratter ou arracher de la peau.

	Ne me provoque jamais	Me provoque parfois	Me provoque souvent
Ennuyé	O	O	O
Fâché	O	O	O
Coupable	O	O	O
Indifférent	O	O	O
Tendu	O	O	O
Irritable	O	O	O
Triste	O	O	O
Anxieux	O	O	O

Honteux O O O

DERS

Please indicate how often the following statements apply to you by writing the appropriate number from the scale below on the line beside each item:

1----------2----------3----------4----------5

Almost never	sometimes	about half the time	most of the time	almost always
(0-10%)	(11-35%)	(36-65%)	(66-90%)	(91-100%)

_____ 1) I am clear about my feelings.

_____ 2) I pay attention to how I feel.

_____ 3) I experience my emotions as overwhelming and out of control.

_____ 4) I have no idea how I am feeling.

_____ 5) I have difficulty making sense out of my feelings.

_____ 6) I am attentive to my feelings.

_____ 7) I know exactly how I am feeling.

_____ 8) I care about what I am feeling.

_____ 9) I am confused about how I feel.

_____ 10) When I'm upset, I acknowledge my emotions.

_____ 11) When I'm upset, I become angry with myself for feeling that way.

_____ 12) When I'm upset, I become embarrassed for feeling that way.

_____ 13) When I'm upset, I have difficulty getting work done.

_____ 14) When I'm upset, I become out of control.

_____ 15) When I'm upset, I believe that I will remain that way for a long time.

1----------2----------3----------4----------5
Almost never (0-10%) sometimes (11-35%) about half the time (36-65%) most of the time (66-90%) almost always (91-100%)

_____ 16) When I'm upset, I believe that I'll end up feeling very depressed.

_____ 17) When I'm upset, I believe that my feelings are valid and important.

_____ 18) When I'm upset, I have difficulty focusing on other things.

_____ 19) When I'm upset, I feel out of control.

_____ 20) When I'm upset, I can still get things done.

_____ 21) When I'm upset, I feel ashamed with myself for feeling that way.

_____ 22) When I'm upset, I know that I can find a way to eventually feel better.

_____ 23) When I'm upset, I feel like I am weak.

_____ 24) When I'm upset, I feel like I can remain in control of my behaviors.

_____ 25) When I'm upset, I feel guilty for feeling that way.

_____ 26) When I'm upset, I have difficulty concentrating.

_____ 27) When I'm upset, I have difficulty controlling my behaviors.

_____ 28) When I'm upset, I believe that there is nothing I can do to make myself feel better.

_____ 29) When I'm upset, I become irritated with myself for feeling that way.

_____ 30) When I'm upset, I start to feel very bad about myself.

_____ 31) When I'm upset, I believe that wallowing in it is all I can do.

_____ 32) When I'm upset, I lose control over my behaviors.

_____ 33) When I'm upset, I have difficulty thinking about anything else.

1	2	3	4	5
Almost never (0-10%)	sometimes (11-35%)	about half the time (36-65%)	most of the time (66-90%)	almost always (91-100%)

_____ 34) When I'm upset, I take time to figure out what I'm really feeling.

_____ 35) When I'm upset, it takes me a long time to feel better.

_____ 36) When I'm upset, my emotions feel overwhelming.

DERS (French)

Participant: _____

Date: _____

SVP indiquez à quelle fréquence les énoncés suivants s'appliquent à vous en écrivant le chiffre approprié de l'échelle ci-dessous sur la ligne à côté de chaque item:

1----------2----------3----------4----------5

Presque jamais	parfois	environ la moitié du temps	la plupart du temps	presque toujours
(0-10%)	(11-35%)	(36-65%)	(66-90%)	(91-100%)

_____ 1) Je suis claire à propos de mes émotions

_____ 2) Je prête attention à comment je me sens.

_____ 3) Je vis mes émotions comme étant envahissantes et hors contrôle.

_____ 4) Je n'ai aucune idée de comment je me sens.

_____ 5) J'ai de la difficulté à faire du sens de mes émotions.

_____ 6) Je suis attentif(ve) à mes émotions.

_____ 7) Je sais exactement comment je me sens.

_____ 8) La manière dont je me sens m'importe.

_____ 9) Je suis confus(e) à propos de la façon dont je me sens.

_____ 10) Quand je suis troublé(e), je reconnais mes émotions.

_____ 11) Quand je suis troublé(e), je deviens en colère contre moi-même pour m'être senti(e) de cette manière.

_____ 12) Quand je suis troublé(e), je deviens embarrassé(e) de m'être senti(e) de cette manière.

1----------2----------3----------4----------5
Presque jamais parfois environ la moitié du temps la plupart du temps presque toujours
(0-10%) (11-35%) (36-65%) (66-90%) (91-100%)

_____ 13) Quand je suis troublé(e), j'ai de la difficulté à faire du travail.

_____ 14) Quand je suis troublé(e), je perds le contrôle.

_____ 15) Quand je suis troublé(e), je crois que je resterai de cette manière pendant longtemps.

_____ 16) Quand je suis troublé(e), je crois que je finirai par me sentir très dépressif.

_____ 17) Quand je suis troublé(e), je crois que mes sentiments sont valides et importants.

_____ 18) Quand je suis troublé(e), j'ai de la difficulté à focusser sur d'autres choses.

_____ 19) Quand je suis troublé(e), je me sens hors de contrôle.

_____ 20) Quand je suis troublé(e), je peux encore accomplir des choses.

_____ 21) Quand je suis troublé(e), j'ai honte de me sentir de cette manière.

_____ 22) Quand je suis troublé(e), je sais que je peux trouver un moyen de me sentir mieux éventuellement.

_____ 23) Quand je suis troublé(e), je sens que je suis faible.

_____ 24) Quand je suis troublé(e), je me sens capable de rester en contrôle de mes comportements.

_____ 25) Quand je suis troublé(e), je me sens coupable de me sentir de cette manière.

_____ 26) Quand je suis troublé(e), j'ai de la difficulté à me conr.

_____ 27) Quand je suis troublé(e), j'ai de la difficulté à contrôler mes comportements.

1----------2----------3----------4----------5
Presque jamais parfois environ la moitié du temps la plupart du temps presque toujours
(0-10%) (11-35%) (36-65%) (66-90%) (91-100%)

_____ 28) Quand je suis troublé(e), je crois qu'il n'y a rien que je puisse faire pour me faire sentir mieux.

_____ 29) Quand je suis troublé(e), je deviens irrité(e) avec moi-même pour m'être senti(e) de cette manière.

_____ 30) Lorsque je suis troublé(e), je commence à me sentir très mal par rapport à moi-même.

_____ 31) Quand je suis troublé(e), je crois que m'apitoyer sur mon sort est la seule chose que je peux faire.

_____ 32) Quand je suis troublé(e), je perds le contrôle sur mes comportements

_____ 33) Quand je suis troublé(e), j'ai de la difficulté à penser à autre chose.

_____ 34) Quand je suis troublé(e), je prends le temps de comprendre comment je me sens vraiment.

_____ 35) Quand je suis troublé(e), ça me prend longtemps à me sentir mieux.

_____ 36) Quand je suis troublé(e), mes émotions me semblent envahissantes.

Style of planning (STOP)

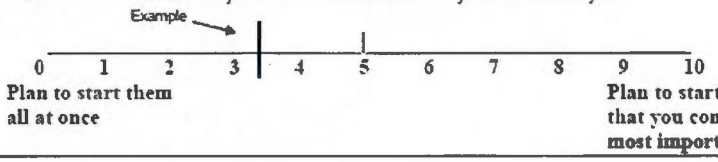
Below are listed examples of activities you are likely to encounter during the day. We ask you to indicate how you would anticipate dealing with these situations by marking a vertical line at right angles to the horizontal line in between the two extremes approaches to the problem.

If your approach most clearly ressembles the right option place a vertical line as far as possible to the right; if it clearly ressembles the left place your line to the far left. If your preference is towards one option but lies somewhere in between the two alternatives place your line at the appropriate point along the right or left section of the horizontal line.

If you would be equally likely to use both approaches with no preference then place the line midway.

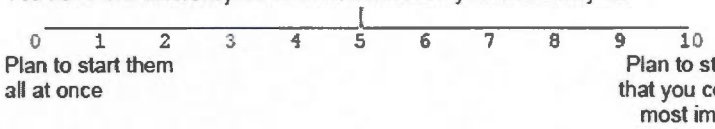
Here an EXAMPLE:

1. You have five different jobs to do at home. Are you most likely to:

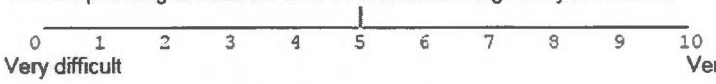


Style of planning (STOP)

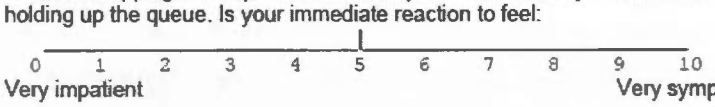
1. You have five different jobs to do at home. Are you most likely to:



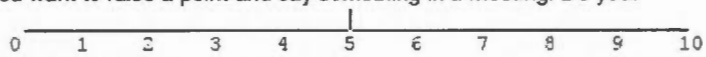
2. You are planning to relax for an hour and do nothing? Do you find this:



3. You are shopping in a supermarket and a person in front of you is slow and holding up the queue. Is your immediate reaction to feel:



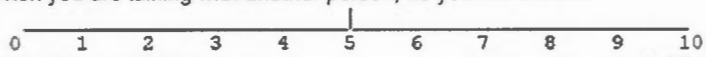
4. You want to raise a point and say something in a meeting. Do you:



Plan all you want to say beforehand

Just start talking and let your thoughts follow on

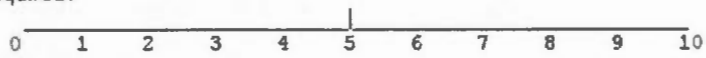
5. When you are talking with another person, do you more often:



Adopt the mannerisms of the other person

Are not at all influenced in your posture or tone of voice by the other person

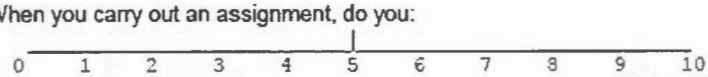
6. Do you find you overprepare for a task and put in more effort than is really required?



All the time

Never

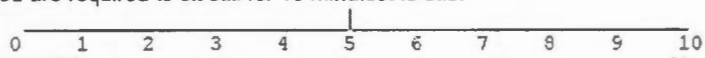
7. When you carry out an assignment, do you:



Prepare well advance

Wait until the last minute to prepare

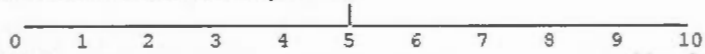
8. You are required to sit still for 15 minutes. Is this:



Impossible

No problem

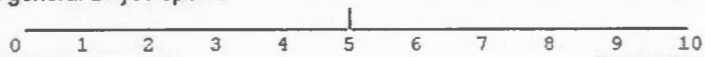
9. When you are on your own, do you find yourself repeating words or phrases you have heard over and over to yourself?



Never

Very frequently

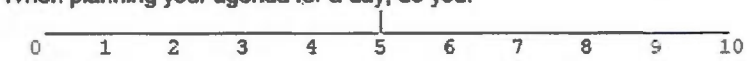
10. In general do you speak:



Faster than normal

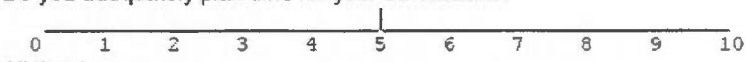
Slower than normal

11. When planning your agenda for a day, do you:



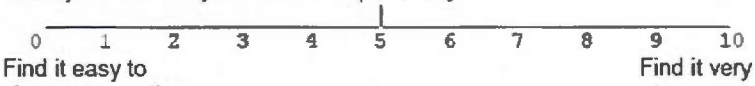
Have a realistic idea of how much you can achieve — Cram as much activity in as you can

12. Do you adequately plan time for your own leisure?



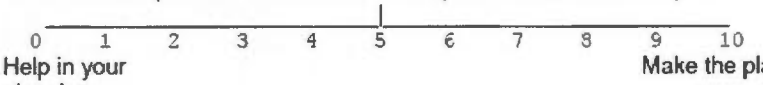
All the time — Never

13. Once you have set your mind on a plan, do you:



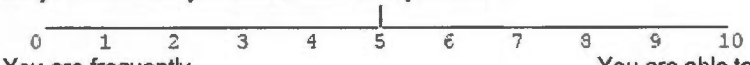
Find it easy to change to another — Find it very difficult to accept change

14. You are under pressure from others to complete a task. Does this pressure:



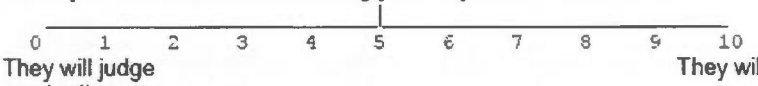
Help in your planning — Make the planning more difficult

15. Do you find when you concentrate on a job that:



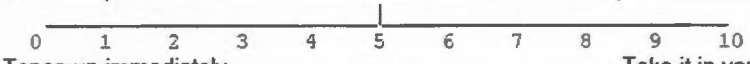
You are frequently distracted and your mind wanders — You are able to screen out distraction and keep your mind firmly on the job

16. When you know others are watching you, do you more often assume that:



They will judge you badly — They will judge you well

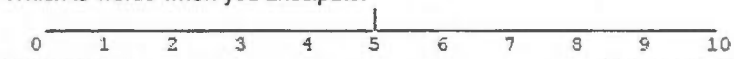
17. You anticipate that some unfamiliar or unknown event is likely to occur. Do you:



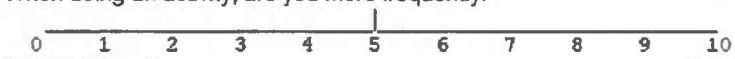
Tense up immediately — Take it in your stride

18. Do you prefer:

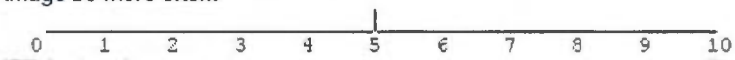
19. Which is worse when you anticipate:



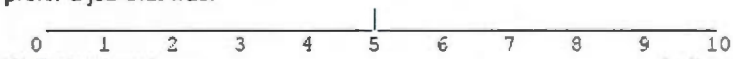
20. When doing an activity, are you more frequently:



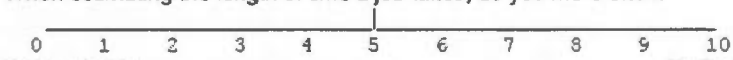
21. If you could choose to project an image of yourself to friends, would you prefer this image be more often:



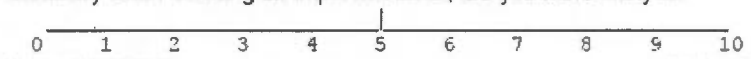
22. Given that the same amount of work was expected in both cases, would you prefer a job that was:



23. When estimating the length of time a job takes, do you more often:

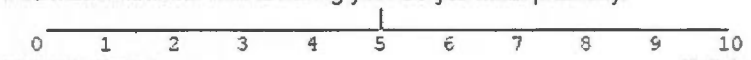


24. Generally when deciding an important issue, are you more likely to:



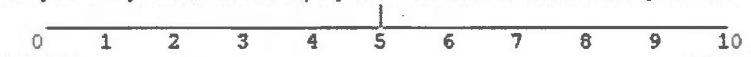
Take a long time weighing up the pros and cons — Make a decision fairly quickly

25. You meet someone who is boring you. Do you most probably:



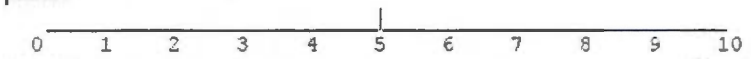
Listen to them anyway but feel impatient — Tell them right away you can't stop to talk

26. Do you feel you are forced to play a role and are not able to be yourself?



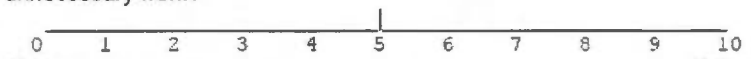
Always — Never

27. Do you have a tendency to overcomplicate what to others seem straight forward plans?



Always — Never

28. Do you find you get side tracked in the middle of doing a job and end up doing unnecessary work?

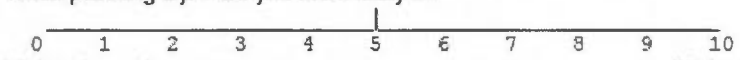


Always — Never

29. When planning a job do you imagine all sorts of unforeseen eventualities that might happen and makes the job seem more difficult?

Always — Never

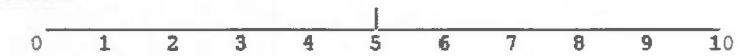
30. When planning a job are you more likely to:



Elaborate each stage in detail beforehand

Stick with a general idea of what is required

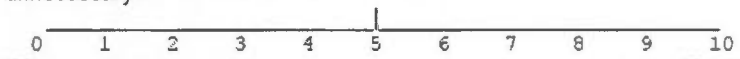
31. Do you tend to invest more physical effort than needed when you carry out an action?



More physical effort

Just sufficient physical effort

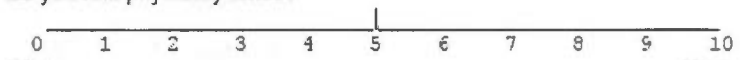
32. Do you notice you sometimes create tension in your muscles when it is unnecessary?



Often

Never

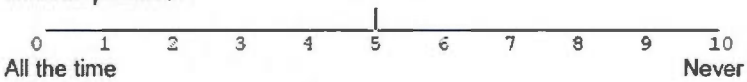
33. Do you feel physically tense?



Often

Never

34. Do you need to physically feel you have done a job well by putting in as much effort as possible?



All the time

Never

Style de planification (STOP)

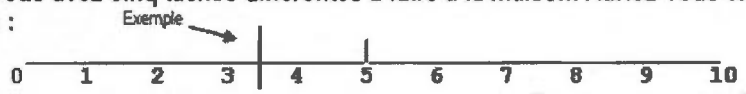
Ce questionnaire contient des exemples d'activités que vous êtes susceptibles d'effectuer au cours d'une journée. Nous vous demandons d'indiquer comment vous prévoyez composer avec ces activités en traçant sur la ligne horizontale un trait vertical décrivant le mieux votre style de planification.

Si votre approche correspond au choix situé à droite, tracez un trait à l'extrême droite; si votre approche correspond davantage à celui de gauche, tracez un trait à l'extrême gauche. Si votre approche ne correspond à ni l'un ni l'autre des choix proposés, mais se situe plutôt entre les deux pôles, tracez un trait à la position appropriée sur la ligne horizontale.

Si vous vous retrouvez indifféremment dans les deux choix proposés, faites un trait au milieu de la ligne horizontale.

Voici un EXEMPLE :

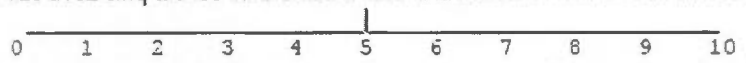
1. **Vous avez cinq tâches différentes à faire à la maison. Auriez-vous tendance à :**



Les commencer toutes en même temps — **Commencer par celles que vous jugez prioritaire**

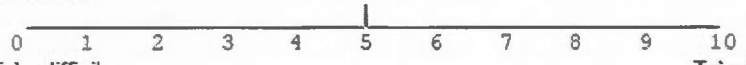
Style de planification (STOP)

1. Vous avez cinq tâches différentes à faire à la maison. Auriez-vous tendance à :



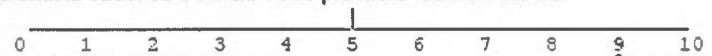
Les commencer toutes en même temps — Commencer par celles que vous jugez prioritaire

2. Vous décidez de vous détendre pendant une heure et de ne rien faire. Trouvez-vous cela :



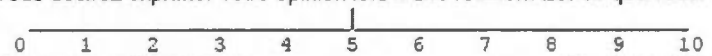
Très difficile — Très facile

3. Vous faites des achats dans un supermarché et la personne située en tête de file ralentit la cadence d'achat. Votre première réaction est de:



Devenir très impatient — Être compréhensif

4. Vous désirez exprimer votre opinion lors d'une réunion. Est-ce que vous:

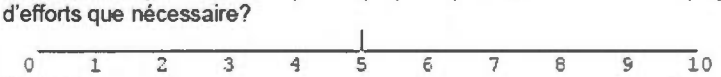


Planifiez au préalable tout ce que vous voulez exprimer — Exprimez vos pensées au fur et à mesure

5. Lorsque vous parlez avec une autre personne, avez-vous tendance à:

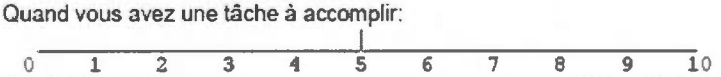
Adopter sa posture et son ton de voix — Ce que votre posture et votre ton de voix ne soient pas influencés par l'autre personne

6. Avez-vous l'impression de trop vous préparer pour une tâche et de déployer plus d'efforts que nécessaire?



Toujours — Jamais

7. Quand vous avez une tâche à accomplir:

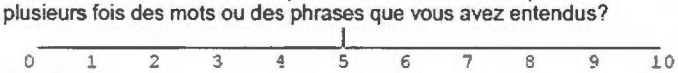


Vous vous préparez longtemps à l'avance — Vous attendez jusqu'à la dernière minute

8. On vous demande de ne pas bouger pendant 15 minutes. Est-ce pour vous:

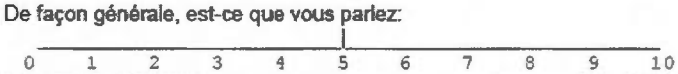
Impossible — Facilement réalisable

9. Quand vous êtes seul, est-ce qu'il vous arrive de vous répétez à vous-même plusieurs fois des mots ou des phrases que vous avez entendus?



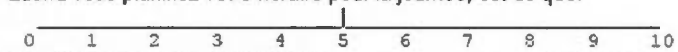
Jamais — Très souvent

10. De façon générale, est-ce que vous parlez:



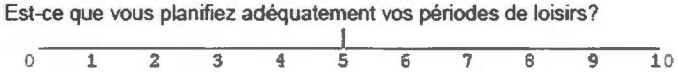
Plus rapidement que la plupart des gens — Plus lentement que la plupart des gens

11. Quand vous planifiez votre horaire pour la journée, est-ce que:



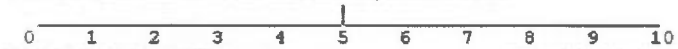
Vous avez une conception réaliste de ce que vous pouvez accomplir — Vous vous surchargez du plus de tâches possibles

12. Est-ce que vous planifiez adéquatement vos périodes de loisirs?



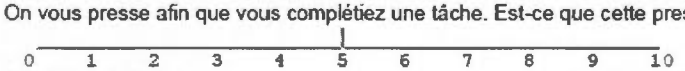
Toujours — Jamais

13. Une fois votre idée fixée sur une activité, trouvez-vous:



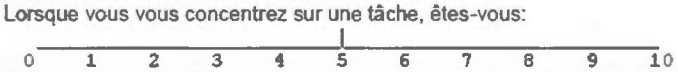
Très facile de la modifier — Très difficile de la modifier

14. On vous presse afin que vous complétiez une tâche. Est-ce que cette pression:



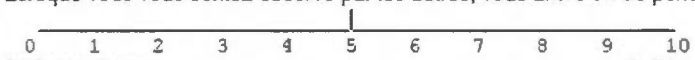
Rend plus facile la planification de tâches — Rend plus difficile la planification de tâches

15. Lorsque vous vous concentrez sur une tâche, êtes-vous:



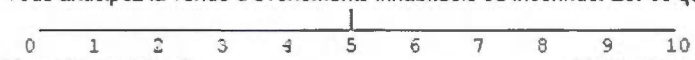
Fréquemment distrait de votre tâche — Facilement capable de maintenir votre attention en faisant abstraction de l'environnement

16. Lorsque vous vous sentez observé par les autres, vous arrive-t-il de penser:



Qu'ils vont vous juger négativement — Qu'ils vont vous juger positivement

17. Vous anticipez la venue d'événements inhabituels ou inconnus. Est-ce que:

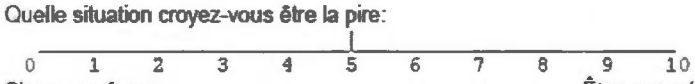


Vous devenez tendu immédiatement — Vous vous y adaptez aisément

18. Est-ce que vous préférez:

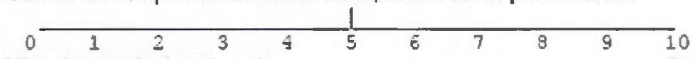
Un emploi routinier — Un emploi impliquant de nouveaux problèmes

19. Quelle situation croyez-vous être la pire:



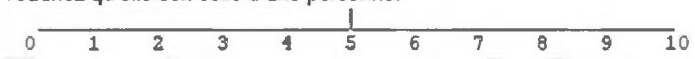
S'ennuyer ferme — Être poussé au-delà de vos capacités

20. Lors de l'accomplissement d'une tâche, avez-vous le plus souvent:



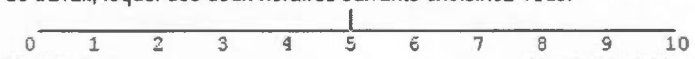
Hâte de prendre les devants et de la compléter — Du plaisir à l'accomplir

21. Si vous pouviez projeter l'image de votre choix à vos amis, est-ce que vous voudriez qu'elle soit celle d'une personne:



Efficace et compétente — Bienveillante et compatissante

22. Si vous deviez choisir entre deux emplois aboutissant au même nombre d'heures de travail, lequel des deux horaires suivants choisiriez-vous:

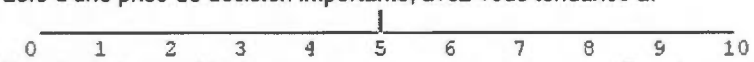


Horaire fixe — Horaire variable que vous pouvez structurer vous-même

23. Lorsque vous évaluer le temps que peut prendre une tâche, avez-vous tendance à:

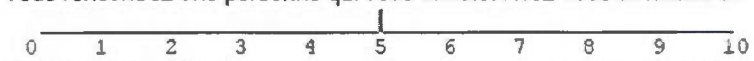
Surestimer ce que vous pouvez faire — Sous-estimer ce que vous pouvez faire

24. Lors d'une prise de décision importante, avez-vous tendance à:



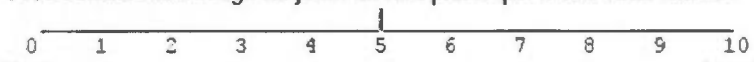
Prendre le temps d'évaluer le pour et le contre — Prendre une décision plutôt rapidement

25. Vous rencontrez une personne qui vous ennuie. Avez-vous tendance à:



L'écouter même si vous vous sentez impatient — Lui dire sans gêne que vous n'avez pas le temps de l'écouter

26. Vous sentez-vous obligé de jouer un rôle plutôt que d'être vous-même?

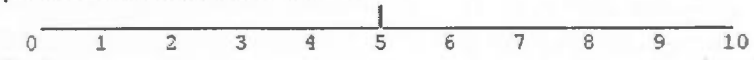


Toujours — Jamais

27. Avez-vous tendance à compliquer des situations qui semblent pourtant simples pour les autres?

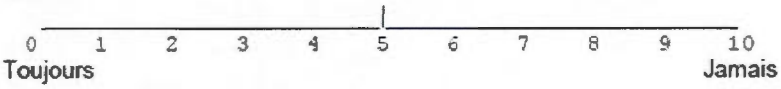
Toujours — Jamais

28. Sentez-vous que vous vous égarez en plein milieu d'un travail, ce qui vous pousse à faire des efforts inutiles?

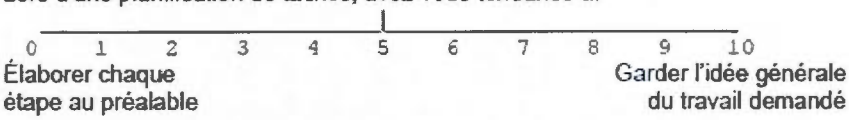


Toujours — Jamais

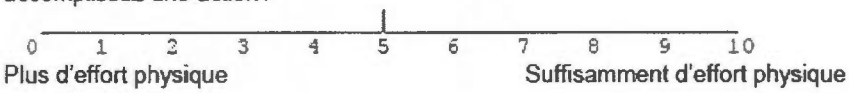
29. Lors d'une planification de tâches, vous arrive-t-il d'anticiper des événements imprévus rendant d'autant plus difficiles l'accomplissement de ces mêmes tâches?



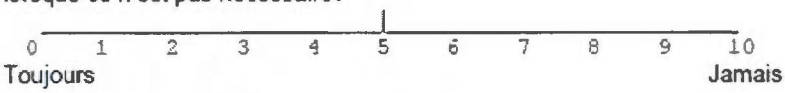
30. Lors d'une planification de tâches, avez-vous tendance à:



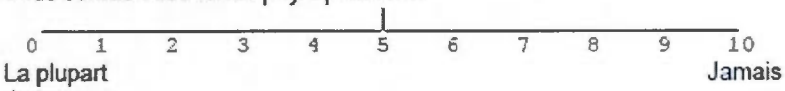
31. Avez-vous tendance à mettre plus d'effort physique que nécessaire quand vous accomplissez une action?



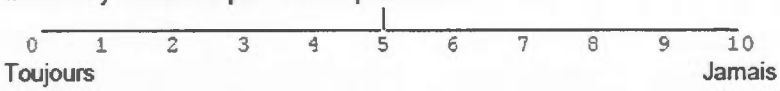
32. Avez-vous remarqué que vous créez parfois de la tension dans vos muscles lorsque ce n'est pas nécessaire?



33. Vous sentez-vous tendu physiquement?



34. Avez-vous besoin de ressentir physiquement que vous avez bien accompli une tâche en y mettant le plus d'effort possible?



EMJP (FROST)

Date :

Please circle the number indicating how much you agree or disagree with the following statements.

Please use the following scale:

Strongly disagree 1 2 3 4 5 Strongly agree

	Strongly Disagree				Strongly Agree
1. My parents set very high standards for me.	1	2	3	4	5
2. Organization is very important to me.	1	2	3	4	5
3. As a child, I was punished for doing things less than perfect.	1	2	3	4	5
4. If I do not set the highest standards for myself, I am likely to end up a second-rate person.	1	2	3	4	5
5. My parents never tried to understand my mistakes.	1	2	3	4	5
6. It is important to me that I be thoroughly competent in everything I do.	1	2	3	4	5
7. I am a neat person.	1	2	3	4	5
8. I try to be an organized person.	1	2	3	4	5
9. If I fail at work/school, I am a failure as a person.	1	2	3	4	5
10. I should be upset if I make a mistake.	1	2	3	4	5
11. My parents wanted me to be the best at everything.	1	2	3	4	5
12. I set higher goals than most people.	1	2	3	4	5
13. If someone does a task at work/school better than I, then I feel like I failed the whole task.	1	2	3	4	5
14. If I fail partly, it is as bad as being a complete failure.	1	2	3	4	5
15. Only outstanding performance is good enough in my family.	1	2	3	4	5
16. I am very good at focusing my efforts on attaining a goal.	1	2	3	4	5

Strongly disagree	1	2	3	4	5	Strongly agree

17. Even when I do something very carefully, I often feel that it is not quite right.	1	2	3	4	5
18. I hate being less than the best at things.	1	2	3	4	5
19. I have extremely high goals.	1	2	3	4	5
20. My parents have expected excellence from me.	1	2	3	4	5
21. People will probably think less of me if I make a mistake.	1	2	3	4	5
22. I never felt like I could meet my parents' expectations.	1	2	3	4	5
23. If I do not do as well as other people, it means I am an inferior human being.	1	2	3	4	5
24. Other people seem to accept lower standards from themselves than I do.	1	2	3	4	5
25. If I do not do well all the time, people will not respect me.	1	2	3	4	5
26. My parents have always had higher expectations for my future than I have.	1	2	3	4	5
27. I try to be a neat person.	1	2	3	4	5
28. I usually have doubts about the simple everyday things I do.	1	2	3	4	5
29. Neatness is very important to me.	1	2	3	4	5
30. I expect higher performance in my daily tasks than most people.	1	2	3	4	5
31. I am an organized person.	1	2	3	4	5
32. I tend to get behind in my work because I repeat things over and over.	1	2	3	4	5
33. It takes me a long time to do something "right".	1	2	3	4	5
34. The fewer mistakes I make, the more people will like me.	1	2	3	4	5
35. I never felt like I could meet my parents' standards.	1	2	3	4	5

* Multidimensional Perfectionism Scale by Frost

Échelle multidimensionnelle du perfectionnisme

Code du participant : _____

S'il vous plait, encerclez le chiffre qui représente le mieux votre degré d'accord ou de désaccord avec les affirmations ci-dessous.

Utilisez l'échelle suivante

Fortement en désaccord 1 2 3 4 5 Fortement en accord

1.	Mes parents étaient très exigeants à l'égard de mes performances	1	2	3	4	5
2.	L'organisation des choses est très importante pour moi	1	2	3	4	5
3.	Quand j'étais enfant, j'étais puni(e) si je ne faisais pas les choses parfaitement	1	2	3	4	5
4.	Si je n'exige pas le maximum de moi-même, je finis par me sentir comme une personne inférieure	1	2	3	4	5
5.	Mes parents n'ont jamais essayés de comprendre mes erreurs	1	2	3	4	5
6.	Il est important pour moi d'être très compétent dans tout ce que je fais	1	2	3	4	5
7.	Je suis une personne ordonnée et soignée	1	2	3	4	5
8.	J'essaie d'être une personne organisée	1	2	3	4	5
9.	Si j'échoue au travail ou aux études je me considère comme un(e) bon(ne) à rien	1	2	3	4	5
10.	Si je faisais une erreur je devrais être bouleversé(e)	1	2	3	4	5
11.	Mes parents voulaient que je sois le (la) meilleur(e) dans toutes les choses	1	2	3	4	5
12.	Les buts que je me fixe sont plus grands que la plupart des gens	1	2	3	4	5
13.	Si quelqu'un réussit une tâche mieux que moi au travail ou aux études, j'ai l'impression d'avoir échoué complètement cette tâche	1	2	3	4	5
14.	Si j'échoue même en partie, c'est comme si j'avais complètement échoué	1	2	3	4	5
15.	Seule une performance extraordinaire comptait dans ma famille	1	2	3	4	5
16.	Je suis très habile à concentrer mes efforts pour atteindre un but	1	2	3	4	5

Labrecque, J., Stephenson, R., Boivin, L., & Marchand, A. (1999). Validation de l'Échelle multidimensionnelle du perfectionnisme auprès de la population francophone du Québec. Validation of the Multidimensional Perfectionism Scale in the French-speaking population of Quebec. Revue Francophone de Clinique Comportementale Cognitive, 3, 1-14.

Utilisez l'échelle suivante

Fortement en désaccord 1 2 3 4 5 Fortement en accord

17.	Même si je m'applique à faire très bien les choses, j'ai souvent l'impression que ce n'est pas tout à fait correct	1	2	3	4	5
18.	Je déteste ne pas être le/la meilleur(e)	1	2	3	4	5
19.	J'ai de très grandes ambitions	1	2	3	4	5
20.	Mes parents attendaient de moi l'excellence	1	2	3	4	5
21.	Si je fais une erreur, je serai probablement dévalorisé(e) aux yeux des autres	1	2	3	4	5
22.	Je n'ai jamais eu le sentiment de pouvoir répondre aux attentes de mes parents	1	2	3	4	5
23.	Si je ne fais pas aussi bien que les autres, cela veut dire que je suis un être humain inférieur	1	2	3	4	5
24.	Les autres semblent accepter des exigences moins élevées que les miennes	1	2	3	4	5
25.	Si je ne fais pas toujours bien les choses les gens ne me respecteront pas	1	2	3	4	5
26.	Mes parents ont toujours eu des ambitions plus grandes que moi-même	1	2	3	4	5
27.	J'essaie d'être une personne ordonnée et soignée	1	2	3	4	5
28.	Je doute habituellement des choses courantes que je fais durant la journée	1	2	3	4	5
29.	Le soin apporté aux choses m'est très important	1	2	3	4	5
30.	Je vise une plus grande performance dans mes tâches quotidiennes que la plupart des gens	1	2	3	4	5
31.	Je suis une personne organisée	1	2	3	4	5
32.	Je prends du retard dans mon travail parce que je dois refaire souvent les mêmes choses	1	2	3	4	5
33.	Cela me prend beaucoup de temps pour faire les choses « comme il faut »	1	2	3	4	5
34.	Moins je ferai d'erreurs, plus je serai aimé(e) des gens	1	2	3	4	5
35.	Je n'ai jamais eu le sentiment de pouvoir répondre aux exigences de mes parents	1	2	3	4	5

Labrecque, J., Stephenson, R., Boivin, L., & Marchand, A. (1999). Validation de l'Échelle multidimensionnelle du perfectionnisme auprès de la population francophone du Québec. Validation of the Multidimensional Perfectionism Scale in the French-speaking population of Quebec. Revue Francophone de Clinique Comportementale Cognitive, 3, 1-14.

*Participant ID:*_____

SCL-90-R

Below is a list of problems people sometimes have. Please read each one carefully, and select the number that best describes how much that problem has distressed or bothered you during the past 7 days including today. Select only one number for each problem and do not skip any items.

	Not at all	A little bit	Moderately	Quite a bit	Extremely	HOW MUCH WERE YOU DISTRESSED BY:
1	0	1	2	3	4	Headaches
2	0	1	2	3	4	Nervousness or shakiness inside
3	0	1	2	3	4	Repeated unpleasant thoughts that won't leave your mind
4	0	1	2	3	4	Faintness or dizziness
5	0	1	2	3	4	Loss of sexual interest or pleasure
6	0	1	2	3	4	Feeling critical of others
7	0	1	2	3	4	The idea that someone else can control your thoughts
8	0	1	2	3	4	Feeling others are to blame for most of your troubles
9	0	1	2	3	4	Trouble remembering things
10	0	1	2	3	4	Worried about sloppiness or carelessness
11	0	1	2	3	4	Feeling easily annoyed or irritated
12	0	1	2	3	4	Pains in heart or chest
13	0	1	2	3	4	Feeling afraid in open spaces or on the streets
14	0	1	2	3	4	Feeling low in energy or slowed down
15	0	1	2	3	4	Thoughts of ending your life
16	0	1	2	3	4	Hearing voices that other people do not hear
17	0	1	2	3	4	Trembling
18	0	1	2	3	4	Feeling that most people cannot be trusted
19	0	1	2	3	4	Poor appetite
20	0	1	2	3	4	Crying easily
21	0	1	2	3	4	Feeling shy or uneasy with the opposite sex
22	0	1	2	3	4	Feelings of being trapped or caught
23	0	1	2	3	4	Suddenly scared for no reason
24	0	1	2	3	4	Temper outbursts that you could not control
25	0	1	2	3	4	Feeling afraid to get out of your house alone
26	0	1	2	3	4	Blaming yourself for things
27	0	1	2	3	4	Pains in lower back
28	0	1	2	3	4	Feeling blocked in getting things done
29	0	1	2	3	4	Feeling lonely
30	0	1	2	3	4	Feeling blue

Participant ID: _____

31	0	1	2	3	4	Worrying too much about things
32	0	1	2	3	4	Feeling no interest in things
33	0	1	2	3	4	Feeling fearful
34	0	1	2	3	4	Your feelings being easily hurt
35	0	1	2	3	4	Other people being aware of your private thoughts
36	0	1	2	3	4	Feeling others do not understand you or are unsympathetic
37	0	1	2	3	4	Feeling that people are unfriendly or dislike you
38	0	1	2	3	4	Having to do things very slowly to ensure correctness
39	0	1	2	3	4	Heart pounding or racing
40	0	1	2	3	4	Nausea or upset stomach
41	0	1	2	3	4	Feeling inferior to others
42	0	1	2	3	4	Soreness of muscles
43	0	1	2	3	4	Feeling you are watched or talked about by others
44	0	1	2	3	4	Trouble falling asleep
45	0	1	2	3	4	Having to check and double-check what you do
46	0	1	2	3	4	Difficulty making decisions
47	0	1	2	3	4	Feeling afraid to travel on buses, subways or trains
48	0	1	2	3	4	Trouble getting your breath
49	0	1	2	3	4	Hot or cold spells
50	0	1	2	3	4	Having to avoid certain things, places or activities because they frighten you
51	0	1	2	3	4	Your mind going blank
52	0	1	2	3	4	Numbness or tingling in part of the body
53	0	1	2	3	4	Lump in your throat
54	0	1	2	3	4	Feeling hopeless about the future
55	0	1	2	3	4	Trouble concentrating
56	0	1	2	3	4	Feeling weak in parts of your body
57	0	1	2	3	4	Feeling tense or keyed up
58	0	1	2	3	4	Heavy feeling in your arms or legs
59	0	1	2	3	4	Thoughts of death or dying
60	0	1	2	3	4	Overeating
61	0	1	2	3	4	Feeling uneasy when people are watching or talking about you
62	0	1	2	3	4	Having thoughts that are not your own
63	0	1	2	3	4	Having urges to beat, injure or harm someone
64	0	1	2	3	4	Awakening in the early morning
65	0	1	2	3	4	Having to repeat the same actions, such as touching, counting, washing
66	0	1	2	3	4	Sleep that is restless or disturbed
67	0	1	2	3	4	Having urges to break or smash things
68	0	1	2	3	4	Having ideas or beliefs that others do not share

Participant ID: _____

69	0	1	2	3	4	Feeling very self-conscious with others
70	0	1	2	3	4	Feeling uneasy in crowds, such as shopping or at a movie
71	0	1	2	3	4	Feeling everything is an effort
72	0	1	2	3	4	Spells of terror or panic
73	0	1	2	3	4	Feeling uncomfortable about eating or drinking in public
74	0	1	2	3	4	Getting into frequent arguments
75	0	1	2	3	4	Feeling nervous when you are left alone
76	0	1	2	3	4	Others not giving you proper credit for your achievements
77	0	1	2	3	4	Feeling lonely when you are with people
78	0	1	2	3	4	Feeling so restless you couldn't sit still
79	0	1	2	3	4	Feelings of worthlessness
80	0	1	2	3	4	The feeling that something bad is going to happen to you
81	0	1	2	3	4	Shouting or throwing things
82	0	1	2	3	4	Feeling afraid you will faint in public
83	0	1	2	3	4	Feeling that people will take advantage of you if you let them
84	0	1	2	3	4	Having thoughts about sex that bother you a lot
85	0	1	2	3	4	The idea that you should be punished for your sins
86	0	1	2	3	4	Thoughts or images of a frightening nature
87	0	1	2	3	4	The idea that something serious is wrong with your body
88	0	1	2	3	4	Never feeling close to another person
89	0	1	2	3	4	Feelings of guilt
90	0	1	2	3	4	The idea that something is wrong with your mind

Modified Stress Arousal Checklist (MSACL)

Participant: _____

Date: _____

Please indicate the extent to which you experienced the following emotions/moods in the last 5-10 minutes by circling the appropriate response.

Emotion/mood	Not at all	A little	A lot	Emotion/mood	Not at all	A little	A lot
Tense	0	+	++	Vigourous	0	+	++
Apprehensive	0	+	++	Active	0	+	++
Disturbed	0	+	++	Energetic	0	+	++
Worried	0	+	++	Idle	0	+	++
Uneasy	0	+	++	Alert	0	+	++
Discouraged	0	+	++	Lively	0	+	++
Bored	0	+	++	Stimulated	0	+	++
Distressed	0	+	++	Aroused	0	+	++
Fearful	0	+	++	Drowsy	0	+	++
Uptight	0	+	++	Tired	0	+	++
Jittery	0	+	++	Frustrated	0	+	++
Relaxed	0	+	++	Sluggish	0	+	++
Peaceful	0	+	++	Impatient	0	+	++
Cheerful	0	+	++	Nervous	0	+	++
Content	0	+	++	Dissatisfied	0	+	++
Comfortable	0	+	++				
Calm	0	+	++				

Modified Stress Arousal Checklist (French)

Participant: _____

Date: _____

Veuillez indiquer à quel point vous avez ressenti les émotions, états ou humeurs suivants au cours des derniers cinq à dix minutes. Encerclez la réponse qui correspond le mieux à ce que vous avez ressenti.

Émotion/ humeur/état	**Pas du tout**	**Un peu**	**Beau-coup**	**Émotion/ humeur/ état**	**Pas du tout**	**Un peu**	**Beau-coup**
Contracté	0	+	++	Vigoureux	0	+	++
Craintif	0	+	++	Actif	0	+	++
Dérangé	0	+	++	Énergétique	0	+	++
Inquiet	0	+	++	Désœuvré	0	+	++
Mal à l'aise	0	+	++	Alerte	0	+	++
Découragé	0	+	++	Gai	0	+	++
Ennuyé	0	+	++	Stimulé	0	+	++
Bouleversé	0	+	++	Excité	0	+	++
Apeuré	0	+	++	Somnolent	0	+	++
Tendu	0	+	++	Fatigué	0	+	++
Agité	0	+	++	Frustré	0	+	++
Détendu	0	+	++	Léthargique	0	+	++
En paix	0	+	++	Impatient	0	+	++
Joyeux	0	+	++	Nerveux	0	+	++
Satisfait	0	+	++	Insatisfait	0	+	++
À l'aise	0	+	++				
Calme	0	+	++				

Measure of urge

Participant: _____

Date: _____

How strong was your urge to pull out your hair/pick your skin/bite your nails/tic in the past five to ten minutes?

1--------- 2 --------- 3 --------- 4 --------- 5 ------- 6 --------- 7 ------- 8 ------- 9 ------10

Very Weak	Weak	Moderate	Strong	Very Strong

Mesure de l'envie

Participant(e): _____

Date: _____

Pendant les dernières 10 minutes, comment décririez-vous votre envie de vous arracher un cheveu/poils, de vous gratter ou arracher de la peau et/ou de vous ronger les ongles?

1--------- 2 ------- 3 --------4 ------- 5 ------- 6 ------- 7 -------- 8 ------- 9 -------10

Très Faible	Faible	Modéré	Fort	Très Fort

APPENDIX C

PROTOCOLS AND DEBRIEFING

English Research Protocol and Debriefing

Note: Participants are not permitted to bring handbags or cell phones into the experiment room.

"Before we start, the experimentation takes about an hour and a half, and it's preferable that you don't leave the room until it's complete. So if you'd like to use the rest room or get a drink of water, it would be best if you did so now."

1) Consent form introduction and signature

"Please read this information and consent form carefully. Feel free to ask me any questions about the study. When you're finished, if you consent to participate and consent to be filmed, please sign both copies in both spots. I'll sign too and you'll get a second copy to take with you."

2) ARS and DERS introduction and completion

"I now have some questionnaires I'd like you to complete. These first two are general measures of how you usually feel and react. Take as much time as you need and feel free to ask me any questions you might have."

3) MSACL/measure of urge introduction and completion (Time 1)

(While participant is completing questionnaires, begin the DVD recording.)

"These second two should be completed according to how you feel right now, in this moment. For the second one, you can just mark a line on the graph to show how you feel, like this... (Provide example)."

After: *"You'll be asked to complete the second two questionnaires six times over the course of the experimentation, including this time, so that we can keep track of how you feel at different points."*

Relaxation video (6 minutes)

"The next task is to watch an approximately 6-minute video. Arrange yourself in your chair so that you are comfortable and place your arms and legs in a comfortable position. Try to focus on the images on the screen and let go of your other thoughts. Please stay awake during the video and don't touch the computer or anything else. You don't need to do anything but watch the video until I come back into the room."

4) MSACL/measure of urge (Time 2)

"Please complete these two brief questionnaires again. Please respond according to how you felt during the video you just watched."

5) Stress video (8 minutes)

"The next task is to watch another video. This movie clip is about eight minutes long. Sit comfortably in your chair and focus on the video. Please stay awake during the video and don't touch the computer or anything else. You don't need to do anything but watch the video until I come back into the room."

6) MSACL/measure of urge (Time 3)

"Please complete these two brief questionnaires again. Please respond according to how you felt during the last video."

7) Relaxation video (6 minutes)

"The next task involves watching another approximately 6-minute video. Again, arrange yourself in your chair so that you are comfortable and place your arms and legs in a comfortable position. Try to focus on the images on the screen and let go of your other thoughts. Please stay awake and don't touch the computer or anything else. You don't need to do anything but watch the video until I come back into the room."

8) MSACL/urge (Time 4)

"Please complete these two brief questionnaires again. Please respond according to how you felt during the last video."

9) a) *Frustration (5 minutes)*:

(Turn computer on)

"The next experimental task involves four pairs of photos. For each pair, your job is to find the differences between the two. The number of differences between the photos is written at the top of the page for each pair of photos.. The first puzzle is the least difficult. The level of difficulty increases from the first to the fourth puzzle, but overall, the task is fairly easy. Rather than writing them down, as you spot each difference, just say it out loud; when I

watch the DVD later, I'll be able to hear your answers and score them So for example, here you can see that the two roofs are different. So you would just say aloud, "there's a difference between the roofs in the two photos."

"As you complete each set, just switch windows to move on to the next. It's preferable that you don't move to the next puzzle until you find all of the differences, so unless you're really stuck, finish one before moving on to the next. Use the mouse to click to the next puzzle, but aside from that, don't hold the mouse during the task. You have 5 minutes to complete the task. ***Most people are able to spot all of the differences in that time.*** *I'll come back into the room after 5 minutes."*

"Don't forget to say the differences out loud and to not hold the mouse."

b) ***Boredom (6 minutes):*** *"I just need to grab a document from my office. I'll be right back. Please wait here for a minute."*

6 minutes later: *"Sorry about that. Thanks for waiting."*

10) MSACL/measure of urge (Time 5)

"Please complete these two brief questionnaires again. Please respond according to how you felt during the 'spot the differences' task ***or*** *while you were waiting for me to return."*

11) Relaxation (6 minutes)

"This is the last experimental task. It involves another 6-minute video. Again, arrange yourself in your chair so that you are comfortable and place your arms and legs in a comfortable position. Try to focus on the images on the screen and let go of your other thoughts. Please stay awake and don't touch the computer or anything else. You don't need to do anything but watch the video until I come back into the room."

12) MSACL/measure of urge (Time 6)

"Please complete these two brief questionnaires for the last time. Please respond according to how you felt during the last video."

13) Debriefing

"That was the end of the experiment. I'm now going to do a quick summary of the project and the experiment and then you'll have the chance to ask any questions you might have.

The objective of the study was to improve our understanding about the role of emotion regulation in habit disorders such as hair-pulling, nail-biting, and skin-picking. The emotion regulation model suggests that people with habit disorders have problems regulating certain negative emotions and that feeling certain emotions make people with habit disorders more likely to engage in their habit than other emotions.

To test the reactions of people with habit disorders to different emotions, we decided to create experimental tasks or situations that would elicit certain negative emotions.

The three situations were designed to make you feel three different emotions. Relaxation or boredom – that was the three videos of the waves on the ocean; 2) stress – the video of the plane crash; and 3) frustration: the frustration task was the one with the different pictures where you had to find the differences between them. To make you feel frustrated, we purposely chose difficult puzzles and tried to give you not enough time to complete them. So if you didn't finish them all or didn't find all of the differences, don't worry, because the puzzles were really hard and a lot of people don't find all of the differences. ***Or****, and 3) boredom: the boredom task was when I left you alone in the room for five minutes.*

Using the DVD recordings, our goal is to be able to see how often participants engaged in their problem habit in each condition. We usually find that participants are very individualistic in the situations that prompt them to start doing their habit behavior. The questionnaire completed after each task or situation was to allow us to know whether or not the experiment really worked and you really felt frustrated, bored, stressed, and relaxed in the respective situations.

The main goal of the study was to find out whether or not emotion is related to habit disorders. If we find that people with habits react more or less to certain emotions, we can add work on emotion regulation to treatment for habit disorders. The results of the study will probably be published within two years, at which point you'll have access to the article if you wish.
So, thanks so much for participating in the study. Any questions?

Protocole et débriefing

Note: Les participants ne peuvent rentrer dans la salle expérimentale avec leurs sacs à main ou téléphone cellulaire

« L'expérimentation durera environ une heure de demi. Nous préférons que celle-ci se complète sans interruptions. Donc si vous avez à prendre de l'eau ou à allez à la salle de bain, ca serait préférable que vous le fassiez tout de suite. »

1) Signature du formulaire de consentement

« Veillez lire le formulaire d'information et consentement. Prenez le temps nécessaire pour bien comprendre. Vous pouvez me poser tous vos questions. Une fois la lecture terminé, si vous consentez à participer et à être filmé durant la participation, veillez signer aux deux places. Je vais signer moi aussi et je vous remettrai une copie du formulaire. »

2) Introduction et complétion de l'ARS et du DERS

Veillez remplir ces questionnaires. Les deux premières mesures sont des mesures général de comment vous vous sentez et vous vous réagissez normalement. Prenez tout le temps nécessaire et n'hésitez pas à me poser toutes questions s'il y'a quelque chose que vous ne comprenez pas.

(While participant is completing questionnaires, begin the DVD recording.)

3) MSACL/mesure d'envie introduction et remplissage (Temps 1)

« Les deux qui suivent se sont des mesures de comment vous vous sentez actuellement, en ce moment. Pour la deuxième, vous avez juste à tracer une ligne sur l'échelle comme ceci (par ex...). »

Après : *« Vous auriez à compléter les deux derniers questionnaires à six reprises au cours de l'expérimentation afin qu'on puisse surveiller vos émotions toute au long. »*

4) Vidéo de relaxation (6 minutes)

« La première tache expérimentale s'agit de visionner une vidéo de 6 minutes. Veillez vous installez dans votre chaise afin d'être à l'aise. Arranger vos jambes et bras dans une position confortable. Essayez de vous conr sur les images sur l'écran et de laisser tomber vos autres pensées. Veillez demeurer

alerte et visionner le vidéo jusqu'à la fin. Ne pas toucher à l'ordi ou à autre chose. Vous avez seulement à l'écouter jusqu'à ce que je revienne. »

5) MSACL/mesure d'envie (Temps 2)

« Veillez remplir ces deux brefs questionnaires encore. Veillez répondre en fonction de comment vous vous avez senti durant le vidéo que vous venez de visionner. »

6) Vidéo de stress (8 minutes)

« La prochaine tache s'agit de visionner une autre vidéo d'environ 8 minutes. Veillez vous installez afin d'être confortable dans votre chaise. Veillez visionner la vidéo au complet. Ne pas toucher à l'ordi ou à autre chose. Vous avez seulement à l'écouter jusqu'à ce que je revienne. »

7) MSACL/mesure d'envie (Temps 3)

« Veillez remplir ces deux brefs questionnaires encore. Veillez répondre en fonction de comment vous vous avez senti durant le vidéo que vous venez de visionner. »

8) Vidéo de relaxation (6 minutes)

« La prochaine tache expérimentale s'agit de visionner une autre vidéo de 6 minutes. Encore, veillez vous installez dans votre chaise afin d'être à l'aise. Arranger vos jambes et bras dans une position confortable. Essayez de vous conr sur les images sur l'écran et de laisser tomber vos autres pensées. Veillez demeurer alerte et visionner le vidéo jusqu'à la fin. Ne pas toucher à l'ordi ou à autre chose. Vous avez seulement à l'écouter jusqu'à ce que je revienne. »

9) MSACL/mesure d'envie (Temps 4)

« Veillez remplir ces deux brefs questionnaires encore. Veillez répondre en fonction de comment vous vous avez senti durant le vidéo que vous venez de visionner. »

10) Frustration ou Ennui

***a) Frustration (5 minutes)*: « *La prochaine tache expérimentale comprend quatre paires de photos. Pour chaque paire, votre tache est de trouvez les différences entre les deux photos. Le nombre de différences entre les deux*

photos est inscrit à la tête du document. C'est une tâche assez simple. La première paire de photos est le plus facile. Il y a une gradation dans le niveau de difficulté. Au lieu de l'écrire sur papier, aux moments que vous identifier une différence, dis le à haute voix; quand je visionne le DVD plus tard, je serais capable d'entendre vos réponses et des les coter. Par exemple... on peut voir ici que le toit est différent d'une photo à l'autre, donc je dirai à haute voix « il y à une différence entre les toits. »

Quand vous compléter une pair, veillez changer la fenêtre et commencer la prochaine pair. À moins que vous soyez vraiment incapable de trouver certaines différences, on demande que vous ne passiez pas au suivant avant d'avoir trouvé toutes les différences. Utilisez la souris uniquement pour passer à la prochaine fenêtre; à part de cela, ne pas tenir la souris de l'ordinateur durant la tache. Vous avez 5 minutes à compléter la tache. ***La plupart des gens sont capables de trouver tous les différences dans ce période.*** *Je reviendrai dans la salle après 5 minutes. »*

« N'oubliez pas de dire les différences à haute voix et de ne pas tenir la souris. »

b) Ennui (6 minutes): *« Je dois chercher un document dans mon bureau. Je serais de retour tout de suite. Veillez m'attendre ici. »*

6 minutes plus tard *: « Désolé pour le délai, merci de m'avoir attendu. »*

11) MSACL/mesure d'envie (Temps 5)

« Veillez remplir ces deux brefs questionnaires encore. Veillez répondre en fonction de comment vous vous avez senti durant la tache 'trouvez les différences' ***ou*** *en m'attendant. »*

12) Relaxation (6 minutes)

« On arrive à la dernière tache expérimentale. Il s'agit d'une autre vidéo de 6 minutes. Encore, veillez vous installez dans votre chaise afin d'être à l'aise. Arranger vos jambes et bras dans une position confortable. Essayez de vous conr sur les images sur l'écran et de laisser tomber vos autres pensées. Veillez demeurer alerte et visionner le vidéo jusqu'à la fin. Ne pas toucher à l'ordi ou à autre chose. Vous avez seulement à l'écouter jusqu'à ce que je revienne. »

13) MSACL/urge (Time 6)

« Veillez remplir ces deux questionnaires une dernière fois. Veillez répondre en fonction de comment vous vous avez senti durant le vidéo que vous venez de visionner. »

14) Débriefing

« L'expérimentation est terminée. Je ferais maintenant un bref résumé du projet et de l'expérimentation. Vous auriez par la suite l'opportunité à me poser tous vos questions, si vous en avez.

L'objective de l'étude était d'avancer notre compréhension du rôle de la régulation des émotions dans les désordres d'habitudes et les tics. La modèle suggère que les personnes avec des DH ont de la difficulté à réguler certaines émotions négatives. Le modèle suggère que l'expérience de certaines émotions provoquera davantage des comportements DH que d'autres émotions.

Pour tester les réactions des gens avec des désordres d'habitudes à certaines émotions, nous avons décidés de créé des taches ou situations expérimentales pour engendrer certains émotions négatives.

Trois situations à été développés pour élicités trois émotions différents. 1) La relaxation ou l'ennui – les vidéos des vagues sur l'océan, 2) le stress – le vidéo de l'écrasement d'avion, et 3) ***la frustration*** *: la tache de frustration était celle avec les paires de photos ou on vous exigeait à trouver les différences entre les deux. Afin de générer de la frustration, on a choisi des exemplaires difficiles et on vous a laissé insuffisamment du temps pour identifier les différences. Donc, ne vous inquiétez pas si vous n'avez pas compléter les taches; ils étaient difficiles et beaucoup de monde ne réussissent pas à trouver tous les différences. Ou, et 3)* ***l'ennui*** *: La tâche d'ennui était quand je vous ai laissé seul dans la salle pendant 5 minutes.*

En visionnant les enregistrements DVD, notre objective et d'être capable d'identifier à quel point et à quel fréquence les participants se sont engager dans leur habitude durant chaque tache ou condition. On attend à ce que les participants réagissent chacun d'une manière individuelle. Les questionnaires qu'on vous a demandé de compléter après chaque situation va nous permettre à confirmer si vous avez vraiment ressenti l'émotion qu'on ciblait – si vous avez vraiment senti frustré, ennuyé, stresse, ou détendu dans les situations respectives.

Les résultats seront publiés d'ici deux ans et vous auriez un accès à l'article si vous désirez.

Je vous remercie encore pour votre participation – c'est très apprécié.

Avez-vous des questions?

APPENDIX D

VIDEOS AND PUZZLES

D.1 Still image from the one of the relaxation condition videos

Image D.1 Still image one of the relaxation condition videos

Image D.2 Still image from the stress condition video

Image D.3 Frustration condition image 1

Image D.4 Frustration condition image 2

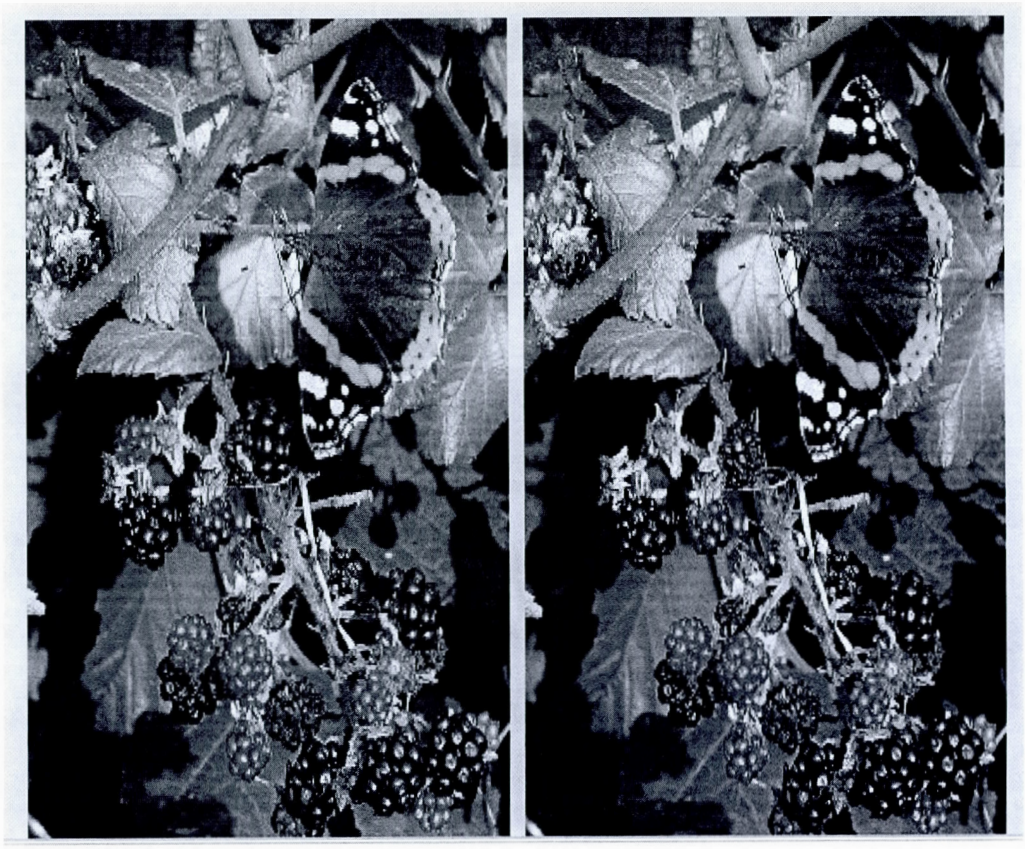


Image D.5 Frustration condition image 3

Image D.6 Frustration condition image 4

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