Exploration of the Dimensions of Intuitive Eating in Individuals with Diagnosed Eating Disorders

Emie Therrien

School of Human Nutrition
McGill University, Montreal
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Abstract

Eating disorders (ED) are mental illnesses that include pathologic behaviours associated to eating such as food restriction, binging and purging. These disorders present sensation and perceptual disturbances that influence the ED symptomatology. As an effort to better manage ED, intuitive eating has recently been considered as a mean of prevention and intervention since it has been associated with lower food restriction and preoccupation, body dissatisfaction and binge eating and with better interoceptive awareness and self-esteem in the general population. However, very few studies have tried to confirm these associations in a sample population suffering from ED. The objective of this study was to explore the associations between intuitive eating and ED symptomatology among participants with diagnosed ED.

Method. Self-reported questionnaires have been filled-out by patients seeking treatment at the LoriCorps ED treatment program at the beginning (n = 124) of the program to assess intuitive eating, food preoccupation and restriction, body dissatisfaction, binge eating, interoceptive awareness and self-esteem. Body dissatisfaction has also been measured using virtual reality which also gave a measure of body distortion.

Results. Intuitive eating was found to be moderately (r = -0.3 to 0.7) correlated to food preoccupation and restriction, body dissatisfaction, binge eating, interoceptive awareness and self-esteem. Our ED samples showed differences in the direction of some correlations between some IE dimensions and some ED symptoms when compared to the available literature. Indeed, in the AN sub-sample, the correlations between both dietary restriction and body dissatisfaction and the eating for "physical rather than emotional reasons" dimension of intuitive eating are positive while these same correlations are negative in the BN and BED sub-samples.

Conclusion. In light of the obtained results, specific ED features (restriction and binge eating) seems to influence the associations between intuitive eating and ED symptomatology.

Résumé

Les troubles de comportement alimentaire (TCA) sont des troubles de santé mentale qui incluent des comportements pathologiques associés à l'alimentation tels que la restriction alimentaire, les compulsions alimentaires et la purge. Les TCA sont caractérisés par des troubles de la sensation et de la perception qui influencent la symptomatologie des TCA. Afin de mieux adresser les TCA, l'alimentation intuitive a récemment été considérée comme un moyen de prévention et d'intervention, puisque les études dans la population générale démontrent des associations négative entre l'alimentation intuitive et les restrictions et préoccupations alimentaires, l'insatisfaction corporelle et les compulsions alimentaires. L'alimentation intuitive serait aussi positivement associée à une meilleure conscience intéroceptive et une meilleure estime globale de soi. Cependant, très peu d'études ont tenté de confirmer ces associations dans un échantillon de population présentant un TCA. L'objectif de cette étude était d'explorer associations entre l'AI et la symptomatologie des TCA chez des individus ayant reçu un diagnostic de TCA.

Méthode. Des questionnaires auto-rapportés ont été remplis par des patients du programme d'intervention en TCA LoriCorps au début de programme (n = 124) pour évaluer l'alimentation intuitive, la restriction et la préoccupation alimentaire, l'insatisfaction corporelle, les compulsions alimentaires, la conscience intéroceptive et l'estime globale de soi. L'insatisfaction corporelle a également été mesurée à l'aide d'un outil réalité virtuelle qui a également donné une mesure de la distorsion corporelle.

Résultats. L'alimentation intuitive s'est avérée modérément (r = 0,3 à 0,7) corrélée à la préoccupation et à la restriction alimentaires, à l'insatisfaction corporelle, aux compulsions alimentaires, à la conscience intéroceptive et à l'estime de soi. Par rapport à la littérature

disponible, nos résultats ont démontré des différences dans la direction de certaines corrélations entre les dimensions de l'alimentation intuitive et certains symptômes des TCA. En effet, dans le sous-échantillon sur l'anorexie mentale, les corrélations entre la dimension de l'alimentation intuitive «manger pour des raisons physiques plutôt qu'émotionnelles» et les variables restriction alimentaire et insatisfaction corporelle sont positives alors que ces mêmes corrélations sont négatives dans les sous-échantillons de la boulimie et de l'hyperphagie boulimique.

Conclusion. À la lumière des résultats obtenus, des caractéristiques spécifiques des TCA (restriction et compulsion alimentaire) semblent influencer les associations entre l'alimentation intuitive et la symptomatologie des TCA.

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Contribution of Authors

Emie Therrien is the principal author of this thesis and participated in conceiving the study concept, designed and conducted the data analysis and interpreted the results of the research. Dr. Johana Monthuy-Blanc participated in conceiving the study concept, in the interpretation of data and in the editing of the thesis. Dr. Hugues Plourde participated in conceiving the study concept and provided technical oversight and input into all aspects of the study including data analysis and thesis preparation. Dr. Plourde and Dr. Monthuy-Blanc both revised the thesis and approved the final version. All authors declare no conflicts of interest related to this study. The database used in this thesis is the property of the Loricorps research group.

Abbreviations

AN	Anorexia nervosa
BED	Binge eating disorder
B-FCC	Body-food choice congruence
BN	Bulimia nervosa
DSM	Diagnostic and Statistical Manual of Mental Disorders
ED	Eating disorders
EDE-Q	Eating Disorders Examination Questionnaire
EDI	Eating Disorders Inventory
EDI-VSF	Eating Disorders Inventory-Very short form
EDNOS	Eating disorder not otherwise specified
EIE-BI	Ecological Immersive Environment-Body Image
EPR	Eating for physical rather than emotional reasons
IE	Intuitive eating
IES-2	Intuitive eating scale-2
OSFED	Other specified feeding or eating disorder
PSI-VF	Physical-self Inventory-Very short form
RHSC	Reliance on hunger and satiety cues
UPE	Unconditional permission to eat

CHAPTER I

INTRODUCTION

ED are mental illnesses that include pathologic behaviours associated to eating such as food restriction, binging and purging (American Psychiatric Association [APA], 2013). Most of the literature available on the incidence ED state a stable (Currin et al., 2005; Hoek et al., 1995; Lucas et al., 1988; Milos et al., 2004; Nielsen, 1990; Smink et al., 2012) or increasing (Eagles et al., 1995; Hoek et al., 1995; Micali et al., 2013) incidence of these diseases since as early as the 1930's. In addition to the persistence of ED through the decades, these diseases also display other preoccupying statistics. Indeed, anorexia nervosa (AN), a type of eating disorder, is among the psychiatric illness with the highest mortality rate (Arcelus et al., 2011) with an estimation of 10% of individual with AN dying within 10 years of the onset of the disorder (Quadflieg & Fichter, 2003) . Also, it is estimated that only around 50% of the individuals with an eating disorder will recover from their disease (Pike, 1998; Steinhausen, 2002). In this context, and because chronicity is associated with worse prognostic (Steinhausen, 2009), it seems right to join efforts in developing better prevention and treatment of ED.

The act of eating is an occupation that one shall do each day, everyday day of their life. Originally, it was serving a survival need (biological aspect of eating (Poulain, 2013). While this is still true, eating also allows fulfilment of social and psychological needs. However, for people with an eating disorder, eating has become a disturbed habit that brings psychological distress and avoidance of social activity related to food (Clark & Nayar, 2012; Morris, 2012). But how can this innate ability of feeding ourselves can go from the recomforting moment that we experience as breastfed newborn to complete distress related to eating? While there are some psychological and biological predisposition factors to ED, socio-environmental factors play a significant role in the deterioration of the relation that one might have with food and it is on those factors that we can socially have an impact. If the valorisation of thinness is the main cultural precipitating factor of

ED, the addition of other messages conveyed by society exacerbate the onset of ED. Habits instilled by parents, food trends and promotion of weight management regime can all influence the relationship that individuals have with their food, mind and body. Furthermore, since dietary restraint, defined as intentional restriction of caloric intake in the purpose of maintaining or losing weight (Herman & Mack, 1975; Wadden et al., 2002), is known to be associated with binge eating, emotional eating (de Witt Huberts et al., 2013) and ED (Linardon et al., 2018; Schaumberg et al., 2016), nutrition recommendations can be added to the precipitating factors of ED because of their mostly restrictive nature. In this sense, health care institutions recommendations nurture the food, the weight and shape preoccupations that individuals predisposed to ED already have (Le Barzic, 2001). In fact, since the perceptual disturbances that characterize ED (Bruch, 1962), those at risk-persons tend to distort nutritional information in a dichotomous way (Goodheart et al., 2000) so that they end up with rigid personal nutrition guidelines. These guidelines become rules and bring them anxiety and culpability and hence can precipitate an eating disorder. As an example, the general recommendation to limit fat intake could be perceived as if the consumption of food that is not low in fat is forbidden. This means that recommendations to limit some types of food can be associated to ED and this association goes both ways. Indeed, following restrictive recommendations can, as said before, precipitate an eating disorder but also, having restrained eating habits based on specific diet type could mask an eating disorder. For example, it has been shown that in anorexia nervosa, adopting a vegetarian diet could be a method to restrict calories intake in a way that was perceived more socially acceptable so that the individual wouldn’t have to justify his dietary restrictions (Barr, 1999; O'Connor et al., 1987; Robinson-O'brien et al., 2009). So whichever the case, it seems that advocating a more liberal eating style could be beneficial in the prevention and treatment of ED. In this line of thought, intuitive eating (IE) has recently been

considered as a possible mean of prevention and intervention for eating disorder (Tribole & Resch, 2020) and might be a good avenue to overcome this problematic.

Intuitive eating aims to create a healthy relationship with food, mind and body to facilitate normal eating (Tribole & Resch, 2012) and is an approach that has been developed in part in response to the association of restrained eating with dysfunctional relationship with food (Herbert et al., 2013). The intuitive eating approach includes: focussing on physical cues for hunger and satiety; permitting an unconditional permission to eat; making food choices for both health and eating satisfaction; not using food to cope with emotions; respecting the body regardless of weight and shape; and being physically active for the enjoyment and health rather than calorie-burning for weight loss (Bruce & Ricciardelli, 2016; Tribole & Resch, 2012). Intuitive eating has been extensively studied as an adaptive approach to healthy eating and weight management. Through these studies on general population, benefices of intuitive eating such as higher body satisfaction, self-esteem, positive affect, optimism, and life satisfaction (Van Dyke & Drinkwater, 2014) have led to further research about intuitive eating and disordered eating patterns. However, to date, there is very few studies that look at intuitive eating in a population of people that suffer from diagnosed ED.

CHAPTER II

LITERATURE REVIEW

1. WHAT ARE REALLY EATING DISORDERS: STATE OF KNOWLEDGE

ED (ED) are mental illnesses that include pathologic behaviours associated to eating such as food restriction, purging and binging. The main specified ED include anorexia nervosa, bulimia nervosa, binge ED and other specified eating and feeding disorders according to the DSM 5 classification. Considering that ED share the same distinctive psychopathology and that individuals move between the diagnostic states over time (Fairburn et al., 2003), a dimensional classification of ED is advocated by some authors (Fairburn et al., 2003; Jones, 2012; Solomon-Krakus et al., 2020).

ED diagnoses: The DSM 5 categorical approach

Anorexia nervosa is defined by a restriction of caloric intake leading to a significantly low body weight for the age and height. Individuals present an intense fear of gaining weight and/or a persistent behavior that interferes with weight gain. These two characteristics are influenced by body image distortion and by the influence of body weight and/or shape on self-evaluation. In addition, the persistent lack of recognition of the seriousness of the current low body weight adds to the illness severity (APA, 2013). Clinically, the eating pattern does not only correspond to a rigid restriction of the amount of food eaten but also include disorganisation in food preferences, tastes, eating habits, and manners (Bruch, 1962). In this sense, individuals presenting AN self-impose quantitative and qualitative rules associated to eating and display rigid control over these rules (Cooper & Fairburn, 1987). AN is further subtyped into the restricting type or the binge eating/purging type (APA, 2013).

Bulimia nervosa is defined by recurrent episodes of binge eating and inappropriate compensatory behaviours. Binge eating is characterized by eating a large amount of food in a discrete period of time while experiencing a loss of control over eating during the episode. While

the definition of what constitute a large amount of food remains unclear in the literature and mostly based on clinical judgment (Li et al., 2019; Wolfe et al., 2009), the loss of control experienced during binge episode seems to be the main characteristic of binge eating (Wolfe et al., 2009). As of the recurrent inappropriate compensatory behaviors, they are methods used in order to prevent weight gain following binge eating, such as self-induced vomiting, misuse of laxatives, diuretics or other medications, fasting, or excessive exercise. Between binges, individuals with BN typically restrict their total caloric consumption and avoid foods that they perceive to be fattening or likely to trigger a binge (APA, 2013). As in AN, bulimic individuals self-evaluation is influenced by body shape and weight (APA, 2013).

Individuals presenting binge eating disorder experience recurrent episodes of binge eating as seen in bulimia. However, there is no inappropriate compensatory behaviors in BED. In this context, overweight and obesity are physical conditions that arise from recurrent binge eating episodes (APA, 2013). However, it is important to distinguish obesity from BED as most obese individuals do not have binge eating episodes. For example, it a study by Vamado et al. (1997) on the prevalence of binge eating disorder in obese adults seeking weight loss treatment, it was shown that only 1 to 7% of the participants met the diagnosis criteria for BED and that 11 to 21% reported binge eating, but did not endorse all BED diagnostic criteria (Vamado et al., 1997). Also, individuals with BED typically have greater functional impairment, lower quality of life, more subjective distress, and greater psychiatric comorbidity than obese individuals that do not experience binge eating (Wonderlich et al., 2009). In BED, the binge eating episodes are associated with at least three of the following: eating much more rapidly than normal, eating until feeling uncomfortably full, eating large amounts of food when not feeling physically hungry, eating alone because of feeling embarrassed by how much one is eating and feeling disgusted with

oneself, depressed, or very guilty afterward (APA, 2013). Binge eating triggers include negative affect, dietary restraint, negative feelings related to body image and food; and boredom (APA, 2013).

Other specified ED (OSFED) is a category that applies to presentations in which symptoms characteristic of ED that cause clinically significant distress or impairment in functioning is present but do not meet the full criteria for any of the other ED (APA, 2013). In the DSM-4, the previous version of the DSM, this category was called eating disorder not otherwise specified (EDNOS). In this version, BED was included in the EDNOS diagnostic category because it was only a diagnostic group for research purposes at that time (Mahan & Escott-Stump, 2008).

The transdiagnostic theory, a direction to the dimensional approach

The DSM 5 classification of ED is mostly a categorical approach and is known to facilitate (1) the empirical study of mental health diseases; (2) the dissemination of empirical results; (3) the issuing of clinical decisions; and (4) the selection of efficient interventions according to each of the ED (Goldberg, 2000). The ED diagnoses from the DSM-5 tend to point out the divergence between the different diagnoses whereas the lifetime rates show that 55% of cases of restrictive AN become AN with binge and purge, 34% of cases of AN become BN (Eddy et al., 2008) 19% of cases of BN become BED (Ackard et al., 2011). In regards to the outcomes of the epidemiological studies, Fairburn (2003) conceptualised the ED transdiagnostic theory which means that ED migrates across the diagnostic category because they share the same distinctive psychopathology. In other words, the transdiagnostic theory implies that there are many convergent features between all the ED diagnoses notably the body image disturbances, the low self-esteem and the obsessive thoughts about food and body image (APA, 2013; Bardone-Cone,

Thompson, et al., 2020; Herrin & Larkin, 2013; Lewer et al., 2017). The characteristics of the transdiagnostic theory has led to the ED dimensional approach (Fairburn et al., 2003; Jones, 2012) which emerged through a continuum of eating behaviors and attitudes. Indeed, two types of population profiles are at the ends of a bipolar continuum relating to eating behaviors: those who manage to eat or cook for pleasure (in mindfulness or in sharing) and those who eat in guilt (by restricting themselves or by using dysfunctional compensation behaviors) (Monthuy-Blanc et al., in preparation). Additionally, weight and food concerns, who influences the eating attitudes and behaviors, can trigger ED in predisposed populations or work as maintenance or worsening factors of ED in clinical populations (Rodgers et al., 2020). This involves taking into account all forms of ED, from subclinical to clinical severities by evaluating ED according to a dimensional approach to mental health (vs categorical). Indeed, in contrast to the ED psychiatric diagnosis from the DSM-5 (specifically, anorexia nervosa, bulimia nervosa and binge eating disorder), this approach militates for a continuum of severity of inappropriate eating attitudes and behaviors ranging from an asymptomatic state (absence of ED) to a clinical state (proven presence of ED) with a range of sub-clinical behaviors (food restriction, taking laxatives, use of psychotropic drugs to activate satiety and metabolism, etc.) in between. In this sense, a dimensional approach to eating disorder classification would allow to correct for certain limits of the categorical approach according to some authors. These limits include that the categorical approach fails to (1) identify all configurations of ED (Solomon-Krakus et al., 2020); (2) address the transdiagnostic symptoms of ED; (Jones, 2012) and (3) reflect the heterogeneity of mental health disorders and the individual differences reflecting various clinical realities (Dudley et al., 2011; Ouellet, 2019).

Prevalence and mortality of ED

In regards to ED DSM-categories, lifetime prevalence estimates of AN, BN, and BED are respectively of 0.9%, 1.5%, and 3.5% among women, and 0.3% 0.5%, and 2.0% among men according to a United-States study (Hudson, 2012). A more recent Australian study reports lifetime prevalence of BN and BED to be 2.59% and 1.85% among women and 1.21% and 0.74% among men (Bagaric et al., 2020). Beyond the prevalence, the mortality rates from these disorders, attributable to mainly anorexia nervosa, are among the highest of all psychiatric disorders (Arcelus et al., 2011). Standardized mortality ratios were reported to be of 5.35 for AN, 1.49 for BN and 1.50 for BED (Fichter & Quadflieg, 2016). In those three disorders combined, deaths are mainly due to circulatory collapse in 31% of cases, suicide in 20% of cases, organ failure in 8% of cases (e.g., rupture of the esophagus due to induced vomiting), cachexia in 8% of cases and pneumonia in 8% of cases. Of the deaths included in those statistics, 57% are from cases of AN (Fichter & Quadflieg, 2016). The next section will describe additional complications of ED.

Impacts of ED

A holistic approach is required to understand the impact of ED. Even if the three spheres of impact obey a systemic functioning, they will be presented one after the other to allow better understanding.

Psychological impacts. Psychological impacts of ED can go from general ill-being (e.g. feeling depressed (APA, 2013)) to psychiatric comorbidities. Indeed, ED are not without consequences for the psychological adaptation of the patients. Among the concomitant psychological disorders observed, we note mood disorders (Grilo et al., 2009; Miniati et al., 2018), personality disorders, anxiety disorders (Grilo et al., 2009; Jordan et al., 2008), substance abuse

disorders (Grilo et al., 2009; Jordan et al., 2008) and obsessive-compulsive disorders (Milos et al., 2002).

Socio-occupational impacts. Aside from the medical complications, ED can also impact the functioning of individuals in modifying their every day life. Since eating is an occupation in itself, the global occupational sphere of ED is important to consider in diseases like ED where a daily survival activity is the primary complicated feature. A narrative review by St-Pierre et al. (in preparation) describes which and how occupational spheres are affected by ED. Occupational imbalances and disturbances in occupational performances seems to characterized ED. Indeed, an overinvestment in the eating occupations can results in an underinvestment of the remaining occupational routine. The opposite is also seen. As for occupational performances, opposite observations are also reported since performance at school and at work can be either increased or decreased. Social avoidance behaviors related to eating occupations are also reported in this review by St-Pierre et al. Examples of these behaviors include taking lunch breaks alone and simulating illnesses to avoid going out with others to eat alone.

Physical complications. In the more severe cases, ED bring many health complications. Gastrointestinal symptoms are frequent in ED and can vary from benign symptoms to serious health complications. Abdominal pain, delayed gastric emptying, constipation, nausea and gastric dilation are examples of common ED gastrointestinal symptoms. Hormonal changes and alteration of gut microbiota associated to malnutrition as well as laxative misuse are factors that contribute to impaired gut motility. Purging ED can also experience some esophageal problems like Barrett's oesophagus from recurrent vomiting (Hetterich et al., 2019). Electrolytes imbalance caused by purging and malnutrition is linked to constipation and can lead to cardiac problems. Malnutrition is also related to cardiac complications, such as bradycardia and hypotension, rhythm

abnormalities, and changes in heart rate variability. Endocrine abnormalities can also be seen and include amenorrhea, pubertal delay, growth stunting, infertility or changes in mood. Vitamin and mineral deficiencies can also be included in the physical complications of ED. The most common deficiencies include vitamin D, calcium, and iron deficiencies. These disturbances may contribute to ED complications or symptoms, such as fatigue, decreased bone mass, depression, and reduced taste (Peebles & Sieke, 2019).

Etiology

Because of their multidimensional aspect, it is impossible to state exactly what are the causes of ED. However, the biopsychosocial model allows a systemic comprehension of the multiples factors that can play a role in the development of these illnesses (Munro et al., 2017; Smolak & Striegel-Moore, 1996). This model integrates biological, psychological and sociocultural factors. There is no one absolute factor that can predict alone the development of ED and some of the factors can be included in both the causes and the symptoms of the ED. In this way, Garner described the pathogenesis of AN using predisposing, precipitating and perpetuating factors (Garner, 1993) that can each includes biological, psychological and sociocultural factors. Biological factors include dieting, genetics, neuroendocrine factors and lack of interoceptive awareness. Cognitive pathology may also contribute to ED (Polivy & Herman, 2002). As for psychological factors, those include body dissatisfaction, sexual or physical abuse, teasing, negative affect, mood disorders, low self-esteem and perfectionism (Hilbert, 2005; Polivy & Herman, 2002). Interoceptive awareness, even if included in the biological factors, is also included in the psychological factors since it includes emotion awareness (van Dyck et al., 2016). The most important sociocultural factor is the cultural value of thinness. Other sociocultural factors include

idealization of body image through media, dysfunctional family and peer pressure to fit with the idealized image of slimness advocated by the society (Polivy & Herman, 2002).

It is important to state that most of the alleged causes of ED operate through body dissatisfaction (Fairburn & Harrison, 2003; Polivy & Herman, 2002). This makes body dissatisfaction central in ED development and maintenance as it is both a cause and a symptom of ED but also because the perceived body image of individuals with ED will influence their perception on various other aspect of their life, notably on physiological sensations and others physical self-perceptions.

2. SENSATION AND PERCEPTUAL DISTURBANCES IN ED

Disturbed physical self-perceptions and lower interoceptive awareness are among the main symptomatology aspects that describe ED (Bruch, 1962; Richard et al., 2019). The next section will explain how these elements are expressed in ED and how they can relate to both sensation and perceptual disturbance that characterize ED.

Physical self-perception: an integration of body image and self-esteem

Physical self-perceptions include, among others, global self-esteem and perceived physical appearance (Fox & Corbin, 1989). The latter is congruent to another physical self-perception dimension often distinctively studied but recently conceptually integrated (Ouellet, Pauzé et Monthuy-Blanc, in preparation): the body image. Body image can be determined in part by an individual's judgment and is divided in two main dimensions of body image disturbances: body dissatisfaction and a body distortion (Cash, 2012). Thus, physical self-perceptions play a central

role in ED and are often interrelated as body shape or weight are typically extremely important in determining self-esteem in these individuals (APA, 2013). In fact, self-esteem has been shown to moderate the relationship between body dissatisfaction and eating pathology (Rosewall et al., 2020).

Self-esteem. Global self-esteem is the individual's positive or negative attitude toward the self as a totality, in other words the appraisal of one's self-worth (Bardone-Cone, Miller, et al., 2020; Rosenberg et al., 1995). Low self-esteem has been extensively associated to both the development and maintenance of ED. In fact, lower self-esteem has been found to be predictive of later ED symptoms in some studies (Bardone-Cone, Thompson, et al., 2020). Additionally, there are evidences supporting that lower self-esteem mediates the relations between other ED symptoms. Indeed, self-esteem appears to lessen the effects of body dissatisfaction on eating disorder symptoms according to Dakanalis, Zanetti, Riva, and Clerici (2013). Furthermore, the relation between socializing difficulties and eating pathology was also seen as mediated by self-esteem (Raykos et al., 2017).

Body image. Individuals suffering from ED experience body image disturbances which are dysfunctions in perceptual, cognitive, affective or behavioral manifestations in the subjective experience of one's own body (Cash, 2012). Sensations related to body image are also affected by the way individuals feel inside their body since it is part of the body image concept (Gardner, 1996). This is also supported by Cash while he reports that individuals suffering from anorexia nervosa can feel unacceptably large even when objectively underweight (Cash, 2012). So, it is not only the way individuals see their bodies that is disturbed in ED but also the sensation related to their bodies. Additionally, the body sensations can influence body image. For example, the feeling of fulness related to eating can affect negatively body image in some individuals (Cash, 2012).

The body image disturbances can be further divided into body dissatisfaction and body distortion. Body dissatisfaction is related to the view of the body as being displeasing while body distortion is related to an inaccurate perception of body size (Cash, 2012). Body image disturbances are described for both anorexia nervosa and bulimia nervosa but not for binge ED in the Diagnostic and Statistical Manual of Mental Disorders: DSM-5 (APA,2013). However, individuals suffering from binge eating disorder still have body image issues. In fact, when compared to a control group constituted of participants presenting obesity, participants with binge ED have been found to exhibit higher body dissatisfaction and body weight and shape concerns. As for body distortion, this feature seems to be less present in BED than in AN and BN (Lewer et al., 2017).

Interoceptive awareness

Interoceptive awareness is the ability to detect internal bodily cues and this ability is known to be disturbed in individuals suffering from ED (Oswald et al., 2017). While lower interoceptive awareness was first describe in AN, studies have reported the significant correlations between binge eating and interoceptive deficits (Cella et al., 2019; Klabunde et al., 2013). Disturbances in detecting stimuli from the body such as hunger and satiety cues, are factors that affect development and maintenance of ED (Klabunde et al., 2013). These characteristics were pointed out as early as 1962 as Bruch described anorexic patients as having "a disturbance in the accuracy of perception or cognitive interpretation of stimuli arising in the body" (Bruch, 1962). According to this observation and to other authors, the interpretation of the bodily cues is also affected meaning that lower interoceptive awareness could lead to misinterpretation of hunger and satiety cues (Klabunde et al., 2013). Bruch also describe this problem as being the inability, denial or nonrecognition of hunger instead of being a loss of appetite.

In light of this, it is obvious that cognition also plays a role in the assessment of internal bodily cues. In fact, cognition is affected in a lot of different ways in ED (Herrin & Larkin, 2013). If these different aspects won't all be addressed in the present thesis, cognitive distortions are to be described to offer a better understanding of how they play a role on various symptoms of ED and to continue in line with the sensation and perceptual disturbances.

As individuals presenting eating disorder experience the sensation and perception disturbances previously described, they engage the dysfunctional eating behaviors that characterize ED: food restriction, binging and purging. In this context and as part of the global treatment, nutrition interventions that focus on body sensations is indicated.

3. WHAT IS INTUITIVE EATING: STATE OF KNOWLEDGE

Usual nutritional ED intervention

Nutrition intervention goals include correction of biologic and psychologic consequences of malnutrition, normalization of eating patterns and hunger and satiety cues and restoration of weight in underweight patients (Mahan & Escott-Stump, 2008). The latter is done using meal plan with calories and nutrients prescriptions with a gradual increase in the caloric intake prescribed in order to prevent resistance, refeeding syndrome and gastro-intestinal symptoms (Giannini & Slaby, 1993; Herrin & Larkin, 2013). The calorie prescription increases until the targeted weight is reached (Giannini & Slaby, 1993). Meal plans are also used in individuals independently of their weight in order to treat binge eating. Globally, meal plans have three objectives: to ensure that nutrient needs are met; to provide an organized approach to food consumption; and to expose progressively the individual to feared, binged, or purged foods (Herrin & Larkin, 2013). Meal plans typically include six food intakes (three meals and three snacks) in order to prevent binging

and purging and to help with appetite regulation. Meal plans are accompanied by food exchange list and education on well balanced eating patterns. For individuals with weight above normal, no weight loss interventions are recommended until binge eating and/or purging is eliminated (Giannini & Slaby, 1993). Indeed, in some programs, self-acceptance is encouraged instead of weight loss and work on body image is privileged (Mahan & Escott-Stump, 2008).

Nutrition education is a big part of the nutritional intervention. The next table highlights the subjects that are usually addressed in nutrition education for ED.

Table 1: Nutrition education topics in ED

- What constitute normal pattern of eating
- What is the role of food
- What are the body's need for food
- What are the causes of binge eating
- How to break the binge-purge cycle
- What are the medical consequences and clinical features of ED
- How to determine a biological appropriate weight
- What happens with weight gain
- Hunger and satiety cues
- The effects of starvation, malnutrition and restriction on metabolism
- Benefits of regular eating patterns
- The impact of purging and over exercising
- Amenorrhea and bone health
- Diets and diet myths

- Relapse prevention

(Giannini & Slaby, 1993; Herrin & Larkin, 2013; Mahan & Escott-Stump, 2008)

Other interventions included in nutrition treatment process can include eating meditation/mindfulness, identifying distress-tolerance/distraction activities, development of emotion regulation skills and cognitive restructuring. Motivational interviewing is used throughout all the nutrition interventions (Giannini & Slaby, 1993; Herrin & Larkin, 2013; Mahan & Escott-Stump, 2008).

Nutrition guidelines as a risk factors for ED

As previously presented, ED come with perceptual disturbances including cognitive distortions. Because of the presence of cognitive distortions in people at risk of or presenting ED, it is possible to think that some nutritional recommendations are misinterpreted or that they can lead to overconcerns about food and nutrition. If we take as an example the dichotomous thinking cognitive distortion that characterize ED, some could interpret the general recommendation of limiting fat intake as if fat shouldn't be eaten at all. With the same example but with overgeneralization, some could interpret that eating fat automatically results in weight gain. Another approach that is used to improve eating habits is the use of nutrition facts labels. If this method is associated with healthier eating habits, it is also associated with increased likelihood of engaging in unhealthy weight control methods (Christoph et al., 2018). Also, specific eating patterns associated to healthy eating habits can be associated to ED. For example, in individuals presenting ED it has been reported that vegetarianism is sometime used as a strategy to dietary restriction. Indeed, some individuals can use vegetarianism to hide their weight loss intent by explaining their diet choice with desire to eat healthier (Barr, 1999; Robinson-O'brien et al., 2009).

Intuitive eating: A nutritional approach that gains ground

Intuitive eating is a dynamic process integrating attunement of mind, body and food to facilitate normal eating (Tribole & Resch, 2012). This approach is known to be an adaptative approach that was developed in response to the negative impacts of restrained eating (Herbert et al., 2013). Since it is advocating to focus on physical cues for hunger and satiety and to allow an unconditional permission to eat, intuitive eating addresses many of the problems that arise with a prescriptive nutritional approach. There are ten principles that guide intuitive eating (Tribole & Resch, 2020):

1) Reject the diet mentality: to give up on any dieting behaviors, myths and mentality and on any media or tools (e.g. food plan, scale) that encourages dieting.
2) Honor your hunger: to learn to honor the biological hunger in order to keep the body fed with adequate energy and carbohydrates and to avoid excessive hunger.
3) Make peace with food: to allow unconditional permission to eat and to eliminate any forbidden food.
4) Challenge the food police: to eliminate eating rules and negative self-talk.
5) Feel your fulness: to listen for the body signals and to aim for a comfortable full feeling after eating.
6) Discover the satisfaction factor: to discover the pleasure in satisfaction that can be found in an eating experience.
7) Cope with your emotions with kindness: to recognize that food don't fix feelings and to fin ways to comfort, nurture, distract and resolve emotional issues without using food.
8) Respect your body: to accept and respect the body as it is genetically different from one person to another.

9) Movement-Feel the difference: to shift the focus on how the body feels when moving rather than on the calorie-burning effect of exercise.
10) Honor your health – Gentle nutrition: to make food choices according to health and food preferences with no aim of reaching perfection.

Following its appearance in 1995, several researchers have looked at the benefits that intuitive eating can bring. The following sections will summarize the main results of those studies and will allow the understanding of how intuitive eating has become an approach of great interest in eating disorder's prevention and treatment.

Intuitive eating and general health indicators

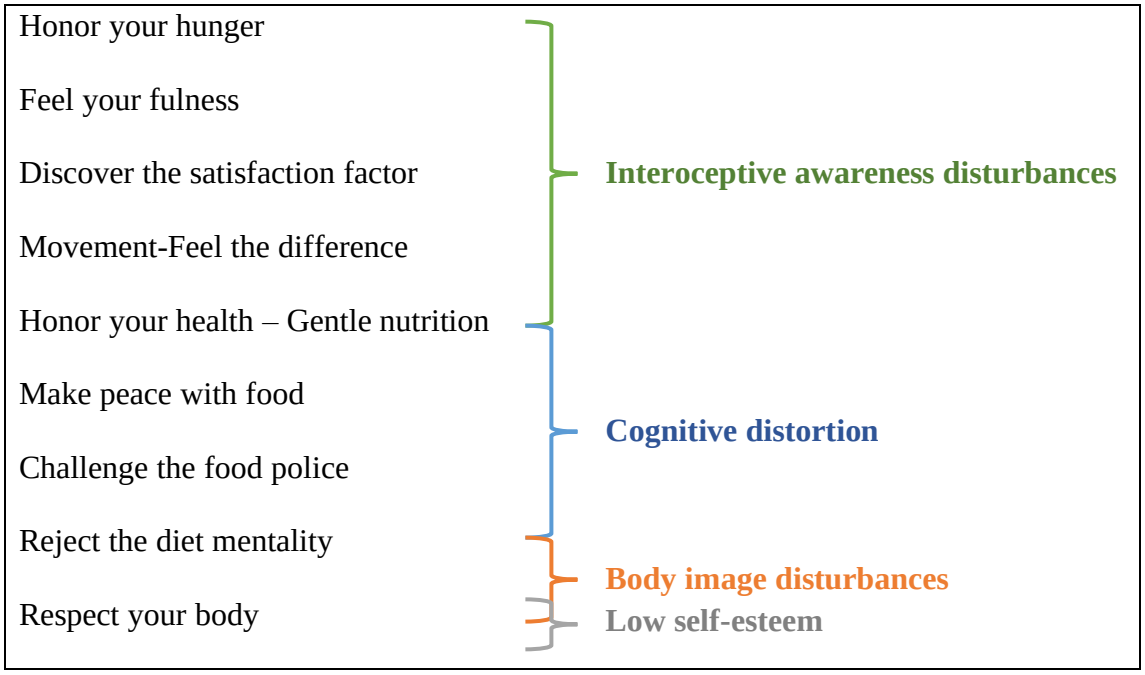
As intuitive eating became popular as an alternative to weight management diets, the first studies that have been done on intuitive eating were mostly trying to look at health indicators linked to chronic metabolic diseases. In 2014, a review of the literature on intuitive eating and health indicators was able to portray the benefits that intuitive eating can induce. In regards to physical health, intuitive eating is associated with a lower body mass index and weight maintenance (Van Dyke & Drinkwater, 2014). According to the clinical studies included in this review, the authors stated that intuitive eating could also result in possible improvement in blood pressure and cholesterol levels (Van Dyke & Drinkwater, 2014). If these outcomes can also be seen with prescriptive nutritional approaches, the ultimate benefit of intuitive eating lies in its association with psychological health indicators. Indeed, intuitive eating is positively associated with better body image, self-esteem, affect, optimism, and life satisfaction (Avalos & Tylka, 2006; Tylka, 2006). These last benefits of intuitive eating have led to further research about intuitive eating and disordered eating patterns. In fact, studies done on the general population (mostly in

college and university students or young adults) showed that intuitive eating is negatively correlated with eating disorder symptomatology (Bruce & Ricciardelli, 2016; Denny et al., 2013; Van Dyke & Drinkwater, 2014) and positively correlated with psychological well-being (Schaefer & Magnuson, 2014; Tylka et al., 2015; Tylka & Wilcox, 2006). Furthermore, in a systematic review of the psychological correlates of intuitive eating (Bruce & Ricciardelli, 2016), intuitive eating correlated positively with body appreciation in eight studies and two other studies demonstrated that eating more intuitively was associated with greater body satisfaction. Other factors shown to correlate with higher levels of intuitive eating included, among others, self-esteem, self-compassion, unconditional self-regard, responsiveness to internal bodily sensations, greater life satisfaction and optimism. In addition, studies demonstrated that intuitive eating correlated negatively with internalisation of the thin ideal, pressure for thinness from others and poor interoceptive awareness. Based on these promising results, it was extrapolated that intuitive eating could be beneficial individuals suffering from ED. More studies on intuitive eating then appeared on this subject.

4. INTEGRATION OF EATING DISORDERS AND INTUITIVE EATING

When taking into account the description of each principle of intuitive eating, it is possible to link each of them with the characteristic features of ED previously described either because the principle improves or addresses the ED symptom (figure 1). In this context, an exploration of the literature around these two subjects is presented.

Figure 1: Integration of intuitive eating and characteristic features of ED



If there are still only a few published studies in which intuitive eating is studied in an eating disorder group, the results available all seem to point in the same direction. First, in the two studies that compared individuals presenting ED (including AN, BN, BED) to controls, individuals with ED have been reported to have lower intuitive eating scores than individuals with no ED or with fully recovered ED (Koller et al., 2020; van Dyck et al., 2016). In the van Dyck et al. study, researchers were able to point out differences among eating disorder diagnosis in terms of intuitive eating profile. Using the subscales (table 2) of the intuitive eating scale 2, a validated tool measuring the degree of adherence to intuitive eating principles, they reported that women with BED had higher scores on the unconditional permission to eat (UPE) subscale compared to participants with AN or BN. They also reported that those diagnosed with AN had higher scores on the eating for physical rather than emotional reasons (EPR) subscale than individuals with BN or BED (van Dyck et al., 2016). However, a major limitation of this study was that the eating

disorder diagnosis was self-reported. Still, these results indicate that intuitive eating could be of potential use in the prevention and treatment of ED. Indeed, since intuitive eating is related to positive outcomes and that intuitive eating components are deficits in ED, authors have studied the effect of intuitive eating interventions in the treatment of those populations. The next paragraph is resenting those studies.

The study of Richards and al. (2017) evaluated whether it was possible to teach intuitive eating principles to inpatients with AN, BN and eating disorder not otherwise specified (now known as OSFED). The analysis of intuitive eating scores showed that the patients' scores were significantly increased between the time they were admitted to the inpatient treatment program and the time they were discharged from treatment. The patients in each diagnostic group showed large and clinically significant increases in their ability to eat intuitively. These are promising results suggesting that intuitive eating can be taught to eating disorder patients. This study also provided evidence that improvements in patients' ability to eat intuitively is associated with other important indicators of healing and recovery, including reductions in eating disorder symptoms (as measured by the Eating Attitude Test), depression, anxiety, and social conflict and improvements in body image (Richards et al., 2017). As for BED, intuitive eating also seems to be beneficial for this disease. Indeed, Smitham (2008) reported significant reduction in binge eating after an eight-week intervention on intuitive eating in individuals suffering from BED. There were also significant improvements in the Eating Disorder Inventory (Garner et al., 1983)(validated questionnaire that measures eating attitudes and behaviors and personality characteristics associated with ED) scores after this intervention (Smitham, 2008).

Table 2: Intuitive Eating Scale 2 subscale scores

- Unconditional Permission to Eat (UPE)
- Eating for Physical rather than emotional Reasons (EPR)
- Reliance on Internal Hunger and Satiety Cues (RHSC)
- Body-Food Choice Congruence (B-FCC)

To conclude, the associations between intuitive eating and disordered eating patterns are well documented in the general population. However, no studies have looked at those same associations but in a sample of individuals with diagnosed ED. Indeed, the studies of Richards et al. (2017) and Smitham (2008) looked at the evolution of either the ability to eat intuitively or the evolution of ED symptoms after an intuitive eating intervention through an ED program but not at the associations between intuitive dimensions and ED symptomatology.

CHAPTER III

OBJECTIVES

Research Question

The statements and findings from the previous sections have brought the following question: Is intuitive eating associated to disordered eating pattern in individuals with diagnosed ED?

Objectives

The intuitive eating approach is now clinically used in the treatment of ED even though very few studies have looked at the intuitive eating profile of the individuals presenting these disorders. In this context, the objective of this thesis is to explore the associations between intuitive eating and ED symptomatology among participants with diagnosed ED.

General Methodology

In order to be able to meet the objective of this thesis, the following variables were investigated in a cross-sectional study: intuitive eating, dietary restriction, dietary preoccupation, body dissatisfaction, body distortion, binge eating, interoceptive awareness and global self-esteem. This study looked at the correlations between intuitive eating and the other study variables cited before and will be presented as a manuscript.

The LoriCorps program. The transdisciplinary eating disorder treatment program-LoriCorps program is affiliated to the Loricorps research group of the University of Quebec in Trois-Rivières. The LoriCorps program consists of four processes with each being divided into three stages listed in brackets: Process 1 - Evaluation (clinical evaluation, ecological assessment, exploration); Process 2 – Comprehension (conceptualization, understanding beliefs, understanding emotions); Process 3 - Experimentation (restructuring of beliefs, experimentation of emotions,

integration) and Process 4 - Consolidation (reassessment, appropriation, transition). The participants are evaluated at the beginning and at the end of the program in order to identify changes and evolution of the biological, psychological and social spheres. The LoriCorps program lasts 4 to 8 months, depending on the needs of the individual. The program includes weekly individual meetings as well as various group meetings. Meetings last 50 minutes on average and are held by a transdisciplinary team made up of psychosocial (psychologist, psychoeducator, social worker, occupational therapist) and health professionals (doctor, nurse, nutritionist, chiropractor) according to a transdisciplinary pre-established protocol. Since the LoriCorps program is an integrated research program, researchers are also involved in the program to optimize the evidence based-practice. The inclusion criteria for this study were (1) to suffer from a diagnosed ED; (2) to agree to participate in the research project; (3) to sign the consents (clinical and scientific); and (4) to be able to read and understand French (Ouellet, 2019).

Study variable measurements. The study included in this thesis is done with the data provided by the Loricorps database. In this context, the choice of the psychometric questionnaires that were used was limited by the dataset restrictions. Still, the next section will discuss why these questionnaires were chosen in the first place and what is usually seen in the literature for each study variable measurement.

Intuitive eating. The validated French version of the intuitive eating scale 2 (IES-2) by Tylka and Kroon Van Diest (Carbonneau et al., 2016; 2013) is the questionnaire that was used in both study as a measurement of intuitive eating behaviors. In the literature review presented earlier, all the authors used either the first intuitive eating scale (IES) developed by Tylka (2006) or its improved version the IES-2 developed in 2013 according to the year in which the studies were done. There is only one study that is an exception and that used the intuitive eating scale from

Hawks and al. (Hawks et al., 2004; Richards et al., 2017). Since the IES-2 is the most used questionnaire, this measurement tool was chosen as the measure of intuitive eating.

Dietary restriction and dietary preoccupation. Dietary restriction and dietary preoccupation are measured using the restraint and food concern subscales of the Eating Disorder Examination Questionnaire (EDE-Q). The EDE-Q is a psychometric tool recognized for assessing symptoms associated with anorexia nervosa and bulimia nervosa and it is in this general context that this questionnaire was originally chosen by the Loricorps research group. Regarding dietary restriction, many other questionnaires can give a measure of this variable. However, the literature is very heterogenous in term of the questionnaire used and it does not seem to be a consensus on the best method to measure dietary restriction. The choice of the measurement tool can also vary according to the other variables that the researchers want to look at and that are included in a same questionnaire. The Dutch Eating Behaviour Questionnaire is one of the other measurement methods of dietary restriction that exists and measures in addition to restrained eating, emotional eating and external eating (van Strien et al., 1986). Other psychometric tools that measures dietary restriction includes the Eating Attitudes-Test 26 with its dieting subscale (Garner et al., 1982), the Restraint Scale (Herman & Mack, 1975) and Revised Restraint Scale (Herman & Polivy, 1980), the Eating Inventory (previously named Three Factor Eating Questionnaire) with its dietary restraint scale (Stunkard & Messick, 1985), the Current Dieting Questionnaire (Lowe, 1993) and the Multidimensional Assessment of Eating Disorder Symptoms with its restrictive eating subscale (Anderson et al., 1999). In 2006, Williamson and al. tested the validity of four of these questionnaires: the Dutch Eating Behavior Questionnaire, the Eating Inventory, Revised Restraint Scale and the Current Dieting Questionnaire. Their findings suggest that, of the four questionnaires tested, the dietary restraint scale of the Eating Inventory was the most valid measure of the intent

to diet and actual caloric restriction (Williamson et al., 2007). Regarding dietary preoccupation, Tapper and Pothos created the Food Preoccupation Questionnaire designed to assess frequency of thoughts about food and whether these thoughts are associated with positive, negative or neutral affect (2010). Vreugdenburg and al. also developed a questionnaire specifically designed to assess food preoccupation but the factor analysis of this questionnaire subscales were conducted in an unpublished pilot study (Vreugdenburg et al., 2003). The Eating Attitudes-Test 26 also includes a bulimia/food preoccupation scale (Garner et al., 1982). However, since this subscale also includes a measure of bulimia, it could be less specific to dietary preoccupation.

Body dissatisfaction and body distortion. The body dissatisfaction and body distortion are measured using the Ecological Immersive Environment-Body Image (EIE-BI) which is an innovative virtual reality method. This tool simulates body sensations as experienced in the ecological context of the patient and simultaneously measure body perceptions. This tool is one of the added values of the Loricorps research group. Also, as the body dissatisfaction subscale of the Eating Disorder Inventory (EDI) was available in the anonymized database, this score is also included in the analysis. The very short form of the EDI is the questionnaire that was filled by the participants. This shortened version assesses eight dimensions relating to eating attitudes and behaviours (body dissatisfaction, drive for thinness, perfectionism, fear of maturity, interoceptive awareness, interpersonal trust, ineffectiveness and bulimia) (Maiano et al., 2016). The studies that were done on intuitive eating and body dissatisfaction either used, as in this thesis, the body dissatisfaction subscale of the EDI or the original or revised version of the Body Appreciation Scale (BAS or BAS-2) (Avalos et al., 2005; Tylka & Wood-Barcalow, 2015). These latest has been created by the same author that created the intuitive eating scale (Tylka, 2006; Tylka & Kroon Van Diest, 2013). As for body distortion, most measurement tools include a silhouette scale (either

from drawing, pictures, computer or virtual reality) where the discrepancy between the actual body and the perceived body is measured (Gardner, 2012). The EIE-BI uses such a scale but the two perspectives (allocentric and egocentric) that are possible with this tool allow to have an additional data linked to the body sensation and not only to the body perception.

Binge eating. Binge eating is measured using the bulimia subscale of the very short form of the EDI previously presented. The Binge Eating Scale (BES) (Gormally et al., 1982) was also available in the anonymized database, but very few participants had completed this questionnaire so that it is not included in this thesis. However, most studies that looked at the associations between intuitive eating and binge eating used the BES. Other measures of binge eating includes The Eating Attitudes-Test 26 bulimia/food preoccupation scale (Garner et al., 1982) and quantitative measures of binge frequencies.

Interoceptive awareness. The interoceptive awareness subscale of the very short form of the EDI (Maiano et al., 2016), in its original version, is the measure that is used in this project. This is also the most commonly used measured method that is seen in the literature about intuitive eating and interoceptive awareness. The Interoceptive Awareness Questionnaire-expanded (IAQ-E) is the other questionnaire that is included in the literature. The IAQ-E is an expended version of the interoceptive awareness subscale of the EDI (van Dyck et al., 2016). The Multidimensional Assessment of Interoceptive Awareness (Mehling et al., 2018) also exist but was not used in the literature on intuitive eating. Aside from self-report method, heart beat detection and counting is sometimes seen as a measure of interoceptive awareness in the general literature. However, the validity of this method to assess the clinical importance in regards to variations of interoceptive skills has been questioned (Mehling et al., 2018; Ring & Brener, 2018).

Global self-esteem. The physical self-perception is a topic of interest for the Loricorps research group. In this context, the very short form of the Physical Self-Inventory (PSI-VSF) (Maiano et al., 2008) is filled out by all participants of the treatment program. The PSI-VSF is a French and shortened version of the Physical-Self Inventory (Fox & Corbin, 1989) that assesses six dimensions of physical self-perception (global self-esteem, physical self-worth, sport competence, physical condition, physical attractiveness and physical strength). The global self-esteem subscale is the measure used to assess global self-esteem in this thesis. When looking at the literature about intuitive eating and self-esteem, the Rosenberg self-esteem scale (Rosenberg, 1965) is often the measure used. However, this scale measures global self-esteem as a unidimensional component while the global self-esteem of the Physical-Self Inventory offers a multidimensional measure of global self-esteem (Ouellet, 2019).

CHAPTER IV

MANUSCRIPT

Associations Between Intuitive Eating and ED Symptomatology in Individuals with Diagnosed ED

Emie Therrien[1 2], Hugues Plourde[1], Johana Monthuy-Blanc[2 3]

[1]School of Human Nutrition, McGill University, Ste Anne de Bellevue, Quebec, Canada

[2]GR2TCA-Loricorps (Groupe de recherche transdisciplinaire des troubles du comportement alimentaire-Loricorps) : Université du Québec à Trois-Rivières, Canada

[3] Department of Educational sciences, Université du Québec à Trois-Rivières, Canada

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Abstract

Eating disorders (ED) are mental illnesses that include pathologic behaviours associated to eating such as food restriction, binging and purging. As an effort to better manage ED, intuitive eating (IE) has recently been considered as a mean of prevention and intervention since it has been associated with lower food restriction and preoccupation, body dissatisfaction and binge eating and with better interoceptive awareness and self-esteem in the general population. However, very few studies have tried to confirm these associations in a sample population suffering from ED. The objective of this study was to explore the associations between IE and ED symptomatology among participants with diagnosed ED. **Method.** Self-reported questionnaires have been filled-out by patients seeking treatment at the LoriCorps ED treatment program at the beginning (n = 124) of the program to assess intuitive eating, food preoccupation and restriction, body dissatisfaction, binge eating, interoceptive awareness and self-esteem. Body dissatisfaction has also been measured using virtual reality which also gave a measure of body distortion. **Results.** Intuitive eating was found to be moderately (r = -0.3 to 0.7) correlated to food preoccupation and restriction, body dissatisfaction, binge eating, interoceptive awareness and self-esteem. Our ED samples showed differences in the direction of some correlations between some IE dimensions and some ED symptoms when compared to the available literature. Indeed, in the AN sub-sample, the correlations between both dietary restriction and body dissatisfaction and the "eating for physical rather than emotional reasons" subscale are positive while these same correlations are negative in the BN and BED sub-samples. **Conclusion.** In light of the obtained results, specific ED features (restriction and binge eating) seem to influence the associations between IE and ED symptomatology. **Key words:** ANOREXIA, BULIMIA, BINGE, RESTRICTION, DIMENSIONAL

Introduction

ED are characterized by excessive preoccupation about food, weight and body shape (American Psychiatric Association [APA], 2013); conceptualized to perceptual disorders (Bruch, 1969). Main features of ED include body dissatisfaction, low interoceptive awareness, cognitive distortions associated to eating and to body image and obsessive-compulsive features (Bruch, 1962; Goodheart et al., 2000; Polivy & Herman, 2002). These disturbances are expressed through pathologic behaviours associated to eating such as food restriction, purging and binging (American Psychiatric Association [APA], 2013).

Dieting and dietary restraint are risk factors for the development of ED (Hilbert et al., 2014; Jacobi et al., 2004). On the other hand, intuitive eating is an adaptative nutritional approach that was developed in response to the negative impacts of restrained eating (Herbert et al., 2013). In this context, intuitive eating now gains ground as a nutritional approach to include in the prevention and treatment of ED (Richards et al., 2017; Smitham, 2008; Tribole & Resch, 2020) Intuitive eating is an approach that encourages the regulation of dietary intake based on hunger and satiety cues (Tribole & Resch, 2020) and this could be an answer to the interoceptive awareness disturbances that characterize ED. Indeed, interoceptive awareness is the ability to detect internal bodily cues and this ability is known to be dysfunctional in individuals presenting ED (Oswald et al., 2017). In addition to targeting these physiological factors of ED, intuitive eating offers a holistic approach that fits well with the multidimensional ED symptomatology. While the most important sociocultural factor is the cultural value of thinness (Polivy & Herman, 2002), intuitive eating advocates the opposite by encouraging to accept and respect the body independently of its weight and shape (Tribole & Resch, 2020). With this principle, intuitive eating also addresses a central maintenance factor of ED; body dissatisfaction (Grave, 2011). In contrast of the ED restrictive behavior, intuitive eating applies the unconditional permission to eat in order to refrain

from excessive preoccupation about forbidden food (Tribole & Resch, 2020). Eliminating eating rules based on external factors could also tackle cognitive distortion which brings individuals to erroneously perceive information based on underlying inaccurate beliefs. Indeed, it was shown that the unconditional permission to eat overlapped substantially with low levels of eating disorder symptomatology (Tylka & Wilcox, 2006).

In the last decades, intuitive eating has been reported many times to be positively associated with body satisfaction, interoceptive awareness, self-esteem, positive affect and proactive coping. On the opposite, intuitive eating was found to be negatively associated with binge eating, drive for thinness, restraint/dieting, emotional eating, food preoccupation and inadequate weight control behaviors (Bruce & Ricciardelli, 2016; Hazzard et al., 2020; Linardon & Mitchell, 2017; Tylka, 2006; Tylka & Wilcox, 2006; van Dyck et al., 2016).

While the literature showed repetitively similar correlations between intuitive eating and disordered eating, the data used for these studies came mostly from college and university women not diagnosed with ED. To our knowledge only one study has looked at these associations in a population sample of individuals with diagnosed ED. Those individuals were all women between 13 and 55 years old and were presenting either anorexia nervosa (AN, 39%), bulimia nervosa (BN, 30%) or ED not otherwise specified (EDNOS, 31%). This study reported that intuitive eating scores measured at discharge of an ED inpatient program were significantly associated with fewer ED symptoms, body shape concerns and psychological symptoms (Richards et al., 2017). In this context, the aim of study is to document the associations between the intuitive eating dimensions and eating disorder symptoms in individuals with diagnosed ED.

Methods

Design and participants

This cross-sectional design was done using data from the Loricorps database which is supplied by the transdisciplinary eating disorder treatment program-LoriCorps program. The LoriCorps program is a front-line outpatient program. The data collected for this study come patients that have been evaluated between 2017 and 2019. The present study and data analysis received approval by UQTR research ethic committee. Before entering treatment, participant have been informed that the data collected during their participation to the program would be used by the Loricorps research group. The patients had to sign the clinical consent form in order to participate to the program but had the choice to have their data used for research or not by signing or not signing the research consent form.

The database included data from 221 individuals. From these 221, 31 were excluded because they were missing three or more questionnaires associated with main outcomes, three more were excluded because they were missing the intuitive eating scale questionnaire and one was excluded because of incomplete questionnaires. From the 186 individuals remaining, only 124 had a confirmed AN, BN, BED or OSFED diagnosis so only those individuals were kept for final data analysis.

In the total sample of 124 individuals, 111 are women, 6 are men and 7 individuals were missing the data about gender. The sample mean age was 37 years old (±14.6). The diagnoses distribution among the total sample is of 18 (15%) individuals with AN, 24 (19%) individuals with BN, 52 (42%) individuals with BED and 30 (24%) individuals with OSFED. Most diagnoses were of mild to moderate severity according to the DSM-5 classification (APA, 2013). The participants evaluated in the LoriCorps program have either been referred to the program by their health care

professional or they have called the program themselves to receive help. For the present study, only the data of the participants having a confirmed eating disorder diagnosis of anorexia nervosa (AN), bulimia nervosa (BN), binge eating disorder (BED) and other specified feeding and ED (OSFED) have been included. The diagnoses have been made by the program medical team based on the DSM-5 criteria (American Psychiatric Association [APA], 2013). Based on a Pearson correlation analysis for the intuitive eating scale variable, it was estimated that eighty-five subjects (n=85) would be required to obtain a power at 0.80 level and a significance level of 0.05.

Measures

Intuitive Eating: The degree of adherence to intuitive eating principles has been assessed with a validated French-Canadian version (Carbonneau et al., 2016) of the Intuitive Eating Scale-2 (IES-2) (Tylka & Kroon Van Diest, 2013). This 23-item questionnaire provides a total score as well as four subscales (α = 0.66 to 0.81): Unconditional Permission to Eat (UPE), Eating for Physical rather than emotional Reasons (EPR), Reliance on internal Hunger and Satiety Cues (RHSC), and Body-Food Choice Congruence (B-FCC). Unconditional Permission to Eat represent the acceptance of eating when hungry and with no forbidden food. EPR is related to eating when physically hungry rather than when trying to cope for emotions. RHSC reflects trust in hunger and satiety cues to guide intake and B-FCC represent the ability to match food choices with body needs (Tylka & Kroon Van Diest, 2013).

Binge eating and interoceptive awareness: The bulimia and interoceptive awareness subscales of the Very Short Form of the Eating Disorder Inventory (EDI-VSF) (Maiano et al., 2016) are the measures that were used to assess binge eating and interoceptive awareness. The EDI-VSF is a shorter version of the Eating Disorder Inventory that was developed to assess eating attitudes and behaviors as well as personality characteristics associated with ED. According to

Maiano et al. this questionnaire has satisfactory internal validity demonstrated by Cronbach's alpha coefficients varying from 0.53 to 0.88 depending on the scales.

Dietary restriction and dietary preoccupation: The restraint and eating concerns subscales of the Eating Disorder Examination Questionnaire (EDE-Q) have been used to assess dietary restriction and dietary preoccupation. The EDE-Q is a 28-item questionnaire derived from the Eating Disorder Examination (EDE), a semi-structured interview developed to assess the specific symptoms of ED according to the DSM-IV (Santoncini et al., 2018). In a meta-analysis where the convergence between EDE and EDE-Q scores was examined in 16 articles, the conclusion was that both instruments are capable of measuring cognitive and behavioral symptoms where participants with an eating disorder diagnosis scored significantly higher on the questionnaire than control participants (Berg et al., 2011). The EDE-Q has good psychometric qualities as demonstrated by satisfactory sensitivity (0.83) and specificity (0.96) indices.

Self-esteem: The self-esteem has been measured using the global self-concept subscale of the very short form of the Physical Self-Inventory (PSI-VS) which is a tool used to measure physical self-perception (Maiano et al., 2008). The PSI-VS is a 12-item questionnaire that provides a total score as well as six subscales: global self-concept, physical self-worth, physical condition, sport competence, physical attractiveness and physical strength. Internal consistency of this questionnaire is satisfactory demonstrated by Cronbach's alpha coefficients that vary from 0.76 to 0.90 depending on the scales.

Body insatisfaction and body distortion: These two variables have been assessed using an innovative virtual reality method, the Ecological Immersive Environment – Body Image (EIE-BI). This tool has been developed by the Loricorps and validation studies are ongoing. Body

satisfaction and body distortion are evaluated in two different perspectives: the allocentric and the egocentric perspectives. In both perspectives, individuals have to identify the body that looks the most like them (perceived body) and the body that they would like to have (desired body). The difference between the perceived body and the desired body matches the body dissatisfaction while the body distortion is evaluated by measuring the difference between the perceived body's BMI and the actual participant's BMI (Monthuy-Blanc, 2018). The BMI has been calculated using the height and weight of participants as measured by the nurse or medical doctor from the intervention program. Body insatisfaction was also measured using the body dissatisfaction subscale of the Very Short Form of the Eating Disorder Inventory (EDI-VSF).

Data Analysis

Statistical analysis of the data was performed using Statistical Package for the Social Sciences (SPSS; version 24). Pearson or Spearman correlation coefficient was used according to sample size and data distribution. Correlations were considered clinically significant when the correlation coefficient was at 0.3 or above with a p-value of less than 0,05.

Results

Correlations between IES-2 and the other study variables in the total sample are presented in Table 1. Higher IES-2 scores represent better application of the intuitive eating principles. Overall, IES-2 scores (one or more component) were moderately inversely correlated to dietary restriction and preoccupation, binge eating and body insatisfaction. Self-esteem was moderately positively correlated to B-FCC and total IES-2 scales.

Table 1 : Correlations between IE and ED symptoms (total sample)

	IES 2				
	EPR	RHSC	UPE	B-FCC	Total
N = 122					
EDEQ Restraint	0.24**	-0.09	-0.58**	-0.21*	-0.08
EDEQ Eating Concern	-0.15	-0.19*	0.02	-0.36**	-0.26**
N = 120					
PSI Global Self-Esteem	0.04	0.24**	-0.01	0.41**	0.38**
N = 98					
Body Insatisfaction (1st person)	-0.06	-0.31**	0.12	-0.18	-0.30**
Body Distorsion (1st person)	0.01	0.00	-0.18	-0.03	0.01
Body Insatisfaction (3rd person)	-0.15	-0.29**	0.12	-0.16	-0.33**
Body Distorsion (3rd person)	-0.06	-0.02	-0.11	0.00	-0.02
N = 122					
EDI Body Dissatisfaction	-0.04	-0.26**	-0.08	-0.21*	-0.23*
EDI Bulimia	-0.46**	-0.24**	0.14	-0.05	-0.17

*p < 0.05, **p < 0.01, IE= intuitive eating, ED= eating disorders, IES-2= Intuitive eating scale 2, EPR= eating for physical rather than emotional reasons, RHSC= reliance on hunger and satiety cues, UPE= unconditional permission to eat, B-FCC= body-food choice congruence, EDEQ= Eating Disorder Examination Questionnaire, PSI = Physical Self-Inventory, EDI = Eating Disorder Inventory

Since the correlations in the total sample did not lead to particular findings, analysis were also done for each separate diagnosis. Table 2 presents the results for the AN sub-sample. In this sample, moderate to strong correlations are seen between dietary restriction and the EPR (r = 0.55, p = 0.02), RHSC (r = -0.70, p < 0.01) and UPE (r = -0.65, p < 0.01) subscales of the IES-2 with the correlation being positive for EPR while negative for RHSC and UPE. Other significant correlations in this sample are between body distortion and UPE (r = -0.53, p = 0,049) and between self-esteem and the B-FCC subscale (r = 0.51, p = 0,03). Table 3 presents the results for the BN sub-sample. All ED study variables show clinically significant correlations of moderate strength

with at least one dimension of the IES-2 except for body distortion and interoceptive awareness. Among the IES-2 subscales, only UPE did not correlate clinically significantly with an eating disorder study variable. Table 4 presents the results for the BED sub-sample. As in the BN sample, all ED study variables show clinically significant correlations of moderate strength with at least one measure of the IES-2 except for body distortion and interoceptive awareness. BED is the diagnosis for which the most clinically significant correlations are observed. Finally, table 5 presents the results for the OSFED sample. In this sample, clinically significant correlations where seen between at least one dimension of the IES-2 and the following ED variables: dietary restriction, body distortion, self-esteem, binge eating and interoceptive awareness.

Discussion

The aim of this study was to explore the associations between the intuitive eating dimensions and eating disorder symptoms in individuals with diagnosed ED. Our results tend to demonstrate that specific ED features seem to influence the associations between IE and ED symptomatology.

First, it is important to state that our sample is different from most samples that was used in the literature about intuitive eating and ED symptomatology. Indeed, studies have been done either in general population (that could include a proportion of individuals with some ED symptoms or subclinical diagnostic) (Bruce & Ricciardelli, 2016; Hazzard et al., 2020; Linardon & Mitchell, 2017; Tylka, 2006; Tylka & Wilcox, 2006; Van Dyke & Drinkwater, 2014) or in samples with severe cases of ED (Richards et al., 2017). In this context, in terms of symptoms' severity, our sample would be halfway between the two available categories of sample present in the literature. In our study associations between intuitive eating and interoceptive awareness were only seen in the OSFED sub-sample while studies in the general population mostly reported

moderate correlations between those two variables (Tylka, 2006; Tylka et al., 2015; Tylka & Kroon Van Diest, 2013). As the OSFED diagnostic represent individuals with symptoms associated with either AN, BN or BED but do not meet the full diagnostic criteria, the individuals an OSFED diagnostic can be seen as having a less severe ED diagnosis. In this sense, the association between intuitive eating and interoceptive awareness could be a feature of low severity of inappropriate eating attitude and behaviors and not a feature of mild to moderate severity ED (our sample). As data on this association in a sample of individuals presenting severe ED are not available, it could be interesting to look at this association in a further study.

Intuitive eating is reported to be negatively associated to ED symptomatology. However, our study points out positive associations between some dimensions of intuitive eating and some ED symptomatology variables. Indeed, for dietary restriction and preoccupation as well as for body insatisfaction, the correlations for AN are positive with EPR while they are negative in the BN and BED sub-samples. This shows that these ED features do not influence eating behaviors in the same way for AN than for BN and BED. The psychopathology of AN may explain this particularity of the results. Unlike BN and BED, AN is a disease based on control and is mainly characterized by food restriction. Since body insatisfaction lead their self-evaluation (American Psychiatric Association [APA], 2013), individuals presenting AN use this food restriction to increase their body satisfaction and consequently their self-esteem (Rich, 2006). In this way, individuals presenting AN control their eating in an inflexible way and won't let their emotions interfere in their eating.

While taking into account that that the following correlations are not significant, the direction of the associations between UPE and global self-esteem for BN and BED is also the opposite of what is seen in the literature on the general population (Bruce & Ricciardelli, 2016).

In fact, our results show negative associations for those variables in our total sample as well as for the BN and BED sub-samples, while in non-clinical population this association is usually positive. Considering that the associations for the OSFED sub-sample resemble the most to the ones of the AN sub-sample, it is hypothesized that the OSFED sub-sample mostly includes individuals with a restrictive type of eating disorder. Using this assumption, it seems that in the sub-samples were binge eating is a dominant feature, UPE is rated differently than in sub-sample of non-binging individuals. The results that have been discussed so far tend to demonstrate that ED dimensions and not ED diagnosis are what influence the differences in the associations between intuitive eating and ED symptomatology. The severity of the symptoms could also influence these associations. In this sense, the intuitive eating profile of individuals would not be determined by the ED diagnosis but rather according to the ED prominent features that the individual is presenting.

Since the B-FCC subscale on the IES-2 was added to this second version of the IES in 2013 there is not a lot of literature on the association between ED symptomatology and the B-FCC subscale of the IES-2. From our knowledges, the correlations between ED symptomatology and B-FCC are mostly weak (Carbonneau et al., 2016; Tylka & Kroon Van Diest, 2013). However, our results show that in this clinical ED samples, these correlations are mostly of moderate strength. Global self-esteem is our study variable with the strongest association to B-FCC. Indeed, in ED, the self-appreciating feeling of success relative to the ability to restrict dietary intake and to control weight can have the function of increasing their overall self-esteem (Rich, 2006). In this sense, low global self-esteem influence food choices that are not congruent to body needs. Indeed, individuals presenting ED eat according to their weight, emotions and self-appraisal and they ignore their body cues and their food preferences.

To our knowledge, there is no other study that have looked at the associations between intuitive eating and ED symptomatology in individuals with diagnosed ED. In this context, the novelty of our results is the biggest strength of our studies. Having the ED diagnoses done by a transdisciplinary team is also a good asset of our studies compared to diagnoses that are self-reported or assessed by questionnaires. The sample size of our study was good, however, the sub-samples sizes were small. The mean age of our samples more closely matches the mean age of the population than what is seen in other studies on intuitive eating. However, when comparing the correlations, this makes the comparison less accurate. For the measurement of some ED symptoms, the use of different questionnaires than was is mostly seen in comparable literature can also be a limit as is the fact that those measurements are self-reported. Finally, the use of virtual reality is strength to our first study since it gives an added value to the measure of body insatisfaction but also because it has allowed us to look at the associations between intuitive eating and body distortion. To our knowledge, this association had never been looked at.

Conclusion

Globally, intuitive eating is moderately associated with ED symptomatology in individuals presenting ED. The associations presented in this study pointed out that more severe ED symptoms are not always associated lower intuitive eating scores and this is important to consider when assessing the IES-2 scores of individuals presenting an ED. Overall, our results bring to light the multidimensional features of both intuitive eating and ED. Indeed, looking only at the global score of intuitive eating would not have allowed us to point out the differences seen in some associations between the different dimensions of intuitive eating and ED symptoms. Also, our results tend to demonstrate that looking at the different dimensions of ED instead of looking at the different

diagnostic could allow a better representation of the intuitive eating profile of individuals presenting ED.

Table 2 : Correlations between IE and ED symptoms (AN sub-sample)

	IES 2				
	EPR	RHSC	UPE	B-FCC	Total
N = 17					
EDEQ Restraint	0.55*	-0.70**	-0.65**	-0.33	-0.43
EDEQ Eating Concern	0.46	-0.01	-0.15	-0.42	-0.28
N = 17					
PSI Global Self-Esteem	-0.43	0.08	0.24	0.51*	0.40
N = 13					
Body Insatisfaction (1st person)	0.42	-0.42	-0.51	-0.17	-0.31
Body Distorsion (1st person)	0.11	-0.31	-0.39	-0.44	-0.32
Body Insatisfaction (3rd person)	0.54*	-0.43	-0.51	-0.10	-0.30
Body Distorsion (3rd person)	0.41	-0.44	-0.53*	-0.42	-0.45
N = 17					
EDI Body Dissatisfaction	0.16	-0.12	-0.31	0.07	-0.06
EDI Bulimia	-0.20	-0.19	-0.10	0.13	0.05

*p < 0.05, **p < 0.01, IE= intuitive eating, ED= eating disorders, IES-2= Intuitive eating scale 2, EPR= eating for physical rather than emotional reasons, RHSC= reliance on hunger and satiety cues, UPE= unconditional permission to eat, B-FCC= body-food choice congruence, EDEQ= Eating Disorder Examination Questionnaire, PSI = Physical Self-Inventory, EDI = Eating Disorder Inventory

Table 3 : Correlations between IE and ED symptoms (BN sub-sample)

	IES 2				
	EPR	RHSC	UPE	B-FCC	Total
N = 23					
EDEQ Restraint	-0.42*	-0.22	-0.28	-0.41	-0.25
EDEQ Eating Concern	-0.04	-0.22	0.17	-0.39	-0.46*
N = 23					
PSI Global Self-Esteem	0.44*	0.41*	-0.19	0.61**	0.58**
N = 20					
Body Insatisfaction (1st person)	-0.16	-0.38	0.05	-0.54*	-0.27
Body Distorsion (1st person)	0.02	-0.04	-0.39	0.00	0.15
Body Insatisfaction (3rd person)	-0.35	-0.46*	0.14	-0.51*	-0.50*
Body Distorsion (3rd person)	-0.09	-0.08	-0.40	-0.08	-0.03
N = 23					
EDI Body Dissatisfaction	-0.19	-0.35	0.22	-0.58**	-0.27
EDI Bulimia	-0.32	-0.33	0.26	-0.41*	-0.45*

*p < 0.05, **p < 0.01, IE= intuitive eating, ED= eating disorders, IES-2= Intuitive eating scale 2, EPR= eating for physical rather than emotional reasons, RHSC= reliance on hunger and satiety cues, UPE= unconditional permission to eat, B-FCC= body-food choice congruence, EDEQ= Eating Disorder Examination Questionnaire, PSI = Physical Self-Inventory, EDI = Eating Disorder Inventory

Table 4 : Correlations between IE and ED symptoms (BED sub-sample)

	IES 2				
	EPR	RHSC	UPE	B-FCC	Total
N = 52					
EDEQ Restraint	-0.01	0.05	-0.39**	-0.22	0.01
EDEQ Eating Concern	-0.21	-0.26	0.10	-0.37*	-0.30*
N = 51					
PSI Global Self-Esteem	0.23	0.18	-0.23	0.19	0.32*
N = 42					
Body Insatisfaction (1st person)	0.00	-0.24	0.22	-0.33*	-0.39*
Body Distorsion (1st person)	-0.16	-0.06	-0.01	-0.04	-0.11
Body Insatisfaction (3rd person)	-0.32*	-0.41**	0.10	-0.40**	-0.58**
Body Distorsion (3rd person)	-0.23	-0.08	0.03	0.00	-0.11
N = 52					
EDI Body Dissatisfaction	0.01	-0.28	-0.21	-0.33*	-0.22
EDI Bulimia	-0.11	-0.27	-0.07	-0.15	-0.24

*p < 0.05, **p < 0.01, IE= intuitive eating, ED= eating disorders, IES-2= Intuitive eating scale 2, EPR= eating for physical rather than emotional reasons, RHSC= reliance on hunger and satiety cues, UPE= unconditional permission to eat, B-FCC= body-food choice congruence, EDEQ= Eating Disorder Examination Questionnaire, PSI = Physical Self-Inventory, EDI = Eating Disorder Inventory

Table 5: Correlations between IE and ED symptoms (OSFED sub-sample)

	IES 2				
	EPR	RHSC	UPE	B-FCC	Total
N = 30					
EDEQ Restraint	0.05	0.21	-0.69**	-0.16	0.26
EDEQ Eating Concern	-0.23	-0.13	-0.22	-0.33	-0.06
N = 29					
PSI Global Self-Esteem	-0.02	0.44*	0.26	0.51**	0.53**
N = 23					
Body Insatisfaction (1st person)	0.09	-0.26	-0.17	0.15	-0.12
Body Distorsion (1st person)	0.20	-0.01	-0.54**	-0.13	0.08
Body Insatisfaction (3rd person)	-0.07	-0.05	-0.07	0.23	-0.01
Body Distorsion (3rd person)	-0.04	0.12	-0.37	0.25	0.34
N = 30					
EDI Body Dissatisfaction	-0.04	-0.35	0.21	0.11	-0.34
EDI Bulimia	-0.66**	-0.07	0.25	0.09	0.07

*p < 0.05, **p < 0.01, IE= intuitive eating, ED= eating disorders, IES-2= Intuitive eating scale 2, EPR= eating for physical rather than emotional reasons, RHSC= reliance on hunger and satiety cues, UPE= unconditional permission to eat, B-FCC= body-food choice congruence, EDEQ= Eating Disorder Examination Questionnaire, PSI = Physical Self-Inventory, EDI = Eating Disorder Inventory

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CHAPTER V

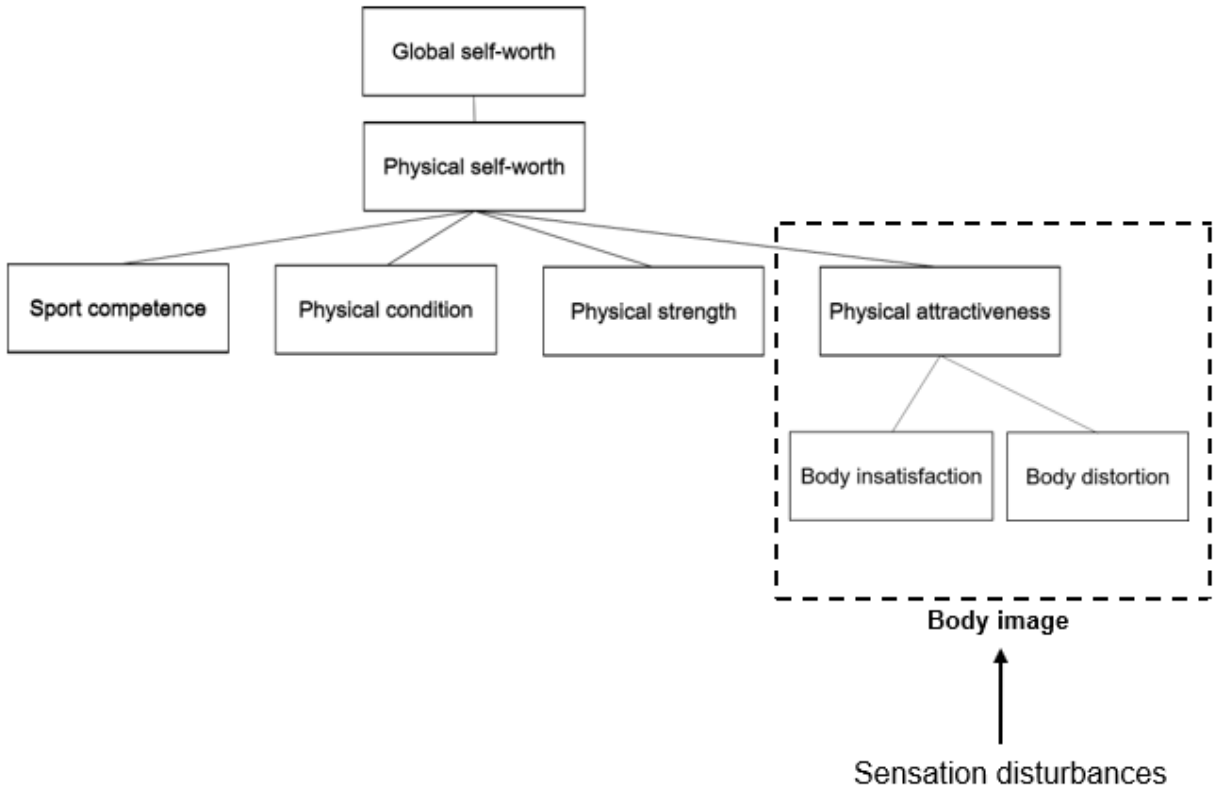
General discussion and clinical implications

The objective of this thesis was to explore the associations between the different dimensions of intuitive eating and ED symptoms in patients with diagnosed ED. Higher adherence to intuitive eating is what is targeted in order to reach attunement of mind and body and have a healthy relationship with food. However, from the results described in the chapter four, there seems to have distinctions to make in the case of ED. In addition, these distinctions appear to be related to specific features of ED and not only to one specific diagnosis. This brings us to two main findings. First, in individuals presenting pathologic food restriction (here our AN and OSFED sub-sample), the associations between the ability to eat for physical rather than emotional reasons and the ED symptoms of food restriction, food preoccupation and body insatisfaction are the opposite of the same associations in other populations. While this is an interesting research finding, it is even more interesting for clinical practice. Indeed, in a context of clinical evaluation of an individual with pathologic food restriction where the IES-2 is used, a high score or an improvement (increase in the score) in the score of the "eating for physical rather than emotional reasons" subscale could mean a deterioration of the ED symptoms instead of an improvement. This same logic could be applicable to the association between the unconditional permission to eat and self-esteem in individuals presenting binge eating since this association has also been shown to be the opposite than in other sample of population according to our results. The hypothesis that higher score on "eating for physical rather than emotional reasons" and "unconditional permission to eat" for restrictive ED and binging ED respectively could be associated to specific pathologic symptoms is supported by the results of van Dyck et al. (2016). Indeed, they reported that women with BED had higher scores on the "unconditional permission to eat" subscale compared to participants with AN or BN, and those diagnosed with AN had higher scores on the "eating for

physical rather than emotional reasons" subscale than individuals with BN or BED. Since our study is the first to look at the associations between intuitive eating and ED symptomatology in individuals with diagnosed ED, other studies would be necessary to confirm those results.

The second interesting finding with those results is the appearance of results according to distinct profile of eating behaviors (restriction or binge). In this context, the dimensional approach to ED could make light on those results and confirm our assumption that restriction and binge profiles are the explanation to the differences between our sub-samples. Indeed, as dietary restriction and binge eating can be seen in more than one eating disorder, the dimensional approach could address these transdiagnostic features as suggested by Jones (2012). The use of the dimensional approach to ED classification could also work in improving the ED prognosis. Individuals presenting ED tend to migrate from a diagnosis to another instead of recovering from ED. Indeed Milos et al. reported that over the follow up period of their study 20% of the participant showed remission of their ED while migration between the ED diagnoses occurred in over half the cases (Milos et al., 2005). In this way, tackling the specific ED features exhibited by an individual could allow a better understanding of the individual specific expression of the ED psychopathology instead of labeling the individual to the psychopathology of the diagnosis that was attributed.

Figure 2: Integrated conceptualization of physical-self perception from Ouellet, 2019 (according to the models of Fox and Corbin, 1989 and Cash and Pruzinski, 1990) with integration of the influence of sensation disturbances in ED.



Our results also make light on the expression of ED sensation and perceptual disturbances in intuitive eating. Considering that intuitive eating is mostly describe through its principle of eating according to physiological (hunger and satiety) cues, intuitive eating could be automatically linked to the interoceptive awareness deficit that characterize ED. Indeed, in Figure 1, interoceptive awareness is the ED feature that is linked with the most intuitive eating principles. However, our results did not point out to important associations between intuitive eating and

interoceptive awareness in our ED samples. Instead, self-esteem and body satisfaction came out as themes of importance when looking at intuitive eating associations in individuals presenting ED. The explanation to this observation could lie in the interaction between the sensation disturbances and the perceptual disturbances. This interaction is pictured in Figure 2. Based on this physical-self perceptions model and from the premise that the relationships between the different dimensions of the physical-self perceptions are bidirectional (Feist et al., 1995; Fox & Corbin, 1989; Marsh & Yeung, 1998), body image influences global self-esteem (global self-worth in the figure) and vice versa. When integrating the sensation disturbances that can affect the perceived body image (Monthuy-Blanc et al., 2008), the influence of the sensation disturbances can go up through the model to influence global self-esteem. Through this bidirectional passage all the other physical self-perception dimensions can also be affected. In this way, the sensation disturbance of ED express itself through the perceptual disturbance. The overgeneralization effect that causes this cascade of disturbances recalls cognitive distortions, an important feature of ED that has not been addressed so far in this thesis.

Cognitive distortions are the erroneous perception of information in a systematic way which reflect underlying inaccurate beliefs (Beck et al., 1979). They often participate in the maintenance of dysfunctional behaviors (Shafran et al., 1999). In ED cognitive distortions surrounding the themes of food, eating, body shape and weight are frequent. In a study of Dritschel and colleagues (1991), personalization, overgeneralization, catastrophization, and selective abstraction (Dritschel et al., 1991) were the different types of general cognitive distortions reported to be present in ED. On their side, Goodheart et al. (2000) describe dichotomous reasoning, overgeneralization and catastrophization as the main ED cognitive distortions. That is to say, for individuals presenting ED, assessment of information about food, eating, body shape and weight

received from internal (e.g. bodily cues) and external (e.g. weight on a scale) sources are prone to be affected by these cognitive distortions. Moreover, there is a specific cognitive distortion associated to ED called the though-shape fusion which happens when "merely thinking about eating a forbidden food increases the person's estimate of their shape or weight, elicits a perception of moral wrongdoing and makes the person feel fat" (Shafran et al., 1999). This is a good demonstration of how cognitive distortion can have an impact on physical self-perception and how cognitive distortion itself are part of the perceptual disturbances of ED.

Finally, our results tend to support the transdisciplinarity that is practiced in the LoriCorps program. The transdisciplinarity often appears to be the best option to encourage the collaboration between health care professionals in order to provide more effective interventions. This approach ensures greater cohesion between health professionals by focusing on joint practices while respecting the reserved activities to each of the disciplines. Transdisciplinarity requires a high level of synergy and relationship between stakeholders who share a common vision in order to better understand and address clinical complexity (Monthuy-Blanc et al., 2016). Indeed, this thesis highlights the complex relationship between the different dimensions of ED and intuitive eating. These findings, indicating an overlap between the visions of the social and the health sciences, require a decompartmentalization of professional disciplines while crossing different disciplinary perspectives on eating attitudes and behaviors. In this context, it seems beneficial to favor the transdisciplinarity approach when addressing intuitive eating in ED.

For further studies, it would be interesting to look at the associations between the ED symptomatology and intuitive eating while using the dimensional classification of ED as this could

complement our results. Similar studies including severe ED cases would also be pertinent since this population was not included in our study.

Strengths and limits

To our knowledge, there is no other studies that have looked at the associations between intuitive eating and ED symptomatology in individuals with diagnosed ED. In this context, the novelty of our results is the biggest strength of our studies. The conceptual limit of this thesis lies in the choice of studying the categorical diagnosis subsamples instead of having created subsamples according to dimensional ED features. This could have allowed the representation of a better intuitive eating profile of individual presenting ED. The methodological limit on its side, lies in the available sample. Since most participants has mild to moderate ED diagnosis, this prevented us from having data from both ends of the of inappropriate eating attitudes and behaviors continuum. Indeed, our participants are probably in the middle of the continuum of severity.

General conclusion

In conclusion, we demonstrated that the associations between some dimensions of intuitive eating and ED symptomology differ from what has been measured in the general population. These results can be of clinical importance when evaluating individuals presenting ED symptoms. It was also pointed out that specific dimensional features of ED (restriction and binge eating) could explain those differences. This finding supports the use of the dimensional approach to ED classification for further study of the associations between intuitive eating and ED

symptomatology. The complexity of the relationship between the eating behaviors and ED disturbances was also highlighted and tend to favor the transdisciplinarity approach when addressing ED.

Appendix A: Eating disorders diagnostic criteria (DSM 5)

ANOREXIA NERVOSA DIAGNOSTIC CRITERIA

A. Restriction of energy intake relative to requirements, leading to a significantly low body weight in the context of age, sex, developmental trajectory, and physical health. *Significantly low weight* is defined as a weight that is less than minimally normal or, for children and adolescents, less than that minimally expected.
B. Intense fear of gaining weight or of becoming fat, or persistent behavior that interferes with weight gain, even though at a significantly low weight.
C. Disturbance in the way in which one's body weight or shape is experienced, undue influence of body weight or shape on self-evaluation, or persistent lack of recognition of the seriousness of the current low body weight.

- Mild: BMI $\geq$ 17 kg/m^2
- Moderate: BMI 16–16.99 kg/m^2
- Severe: BMI 15–15.99 kg/m^2
- Extreme: BMI < 15 kg/m^2

BULIMIA NERVOSA DIAGNOSTIC CRITERIA

A. Recurrent episodes of binge eating. An episode of binge eating is characterized by both of the following:
    1. Eating, in a discrete period of time (e.g., within any 2-hour period), an amount of food that is definitely larger than what most individuals would eat in a similar period of time under similar circumstances.
    2. A sense of lack of control over eating during the episode (e.g., a feeling that one cannot stop eating or control what or how much one is eating).
B. Recurrent inappropriate compensatory behaviors in order to prevent weight gain, such as self-induced vomiting; misuse of laxatives, diuretics, or other medications; fasting; or excessive exercise.
C. The binge eating and inappropriate compensatory behaviors both occur, on average, at least once a week for 3 months.
D. Self-evaluation is unduly influenced by body shape and weight.
E. The disturbance does not occur exclusively during episodes of anorexia nervosa.

- Mild: An average of 1–3 episodes of inappropriate compensatory behaviors per week.
- Moderate: An average of 4–7 episodes of inappropriate compensatory behaviors per week.
- Severe: An average of 8–13 episodes of inappropriate compensatory behaviors per week.
- Extreme: An average of 14 or more episodes of inappropriate compensatory behaviors per week.

BINGE EATING DISORDER DIAGNOSTIC CRITERIA

A. Recurrent episodes of binge eating. An episode of binge eating is characterized by both of the following:
    1. Eating, in a discrete period of time (e.g., within any 2-hour period), an amount of food that is definitely larger than what most people would eat in a similar period of time under similar circumstances.
    2. A sense of lack of control over eating during the episode (e.g., a feeling that one cannot stop eating or control what or how much one is eating).
B. The binge-eating episodes are associated with three (or more) of the following:

    1. Eating much more rapidly than normal.
    2. Eating until feeling uncomfortably full.
    3. Eating large amounts of food when not feeling physically hungry.
    4. Eating alone because of feeling embarrassed by how much one is eating.
    5. Feeling disgusted with oneself, depressed, or very guilty afterward.
C. Marked distress regarding binge eating is present.
D. The binge eating occurs, on average, at least once a week for 3 months.
E. The binge eating is not associated with the recurrent use of inappropriate compensatory behavior as in bulimia nervosa and does not occur exclusively during the course of bulimia nervosa or anorexia nervosa.

- Mild: 1–3 binge-eating episodes per week.
- Moderate: 4–7 binge-eating episodes per week.
- Severe: 8–13 binge-eating episodes per week.

- Extreme: 14 or more binge-eating episodes per week.

OSFED DIAGNOSTIC CRITERIA

This category applies to presentations in which symptoms characteristic of a feeding and eating disorder that cause clinically significant distress or impairment in social, occupational, or other important areas of functioning predominate but do not meet the full criteria for any of the disorders in the feeding and eating disorders diagnostic class. The other specified feeding or eating disorder category is used in situations in which the clinician chooses to communicate the specific reason that the presentation does not meet the criteria for any specific feeding and eating disorder. This is done by recording “other specified feeding or eating disorder” followed by the specific reason (e.g., “bulimia nervosa of low frequency”).

Appendix B: REB approval

RE: Dossier éthique(CER-20-264-07.11)

Lynda McNeil [lynda.mcneil@mcgill.ca]
Envoyé : lundi 9 mars 2020 16:51
À : Therrien, Emie; Émie Therrien [emie.therrien@mail.mcgill.ca]
Cc : Hugues Plourde Ph.D., RD [hugues.plourde@mcgill.ca]; Monthuy-Blanc, Johana; Comité d'éthique de la recherche avec des êtres humains (CEREH)

Emie Therrien,

The UQTR ethics approval reference #CER-20-064-07.11 - Expérimentation du Programme Loricorps : évaluation de la « sensation » relative à l'alimentation intuitive - is accepted under the terms of the Entente pour la reconnaissance des certificats d'éthique des projets de recherche à risque minimal. You are responsible for adhering to the requirements as stipulated by the UQTR ethics board.

Regards,

Lynda McNeil
Associate Director, Research Ethics
Directrice associée, Éthique de la recherche

Mandatory human research ethics training - All Principal Investigator applicants, whether McGill students (graduate, postdoctoral), faculty or staff, **must complete** the Tri-Council Policy Statement2 (TCPS2) online tutorial **before** submitting an application for review. Supervisors of student applicants are also be required to complete the tutorial before submission for review. To complete the online tutorial go to the TCPS2 Course on Research Ethics (CORE) website (http://pre.ethics.gc.ca/eng/education/tutorial-didacticiel.html) and create an account selecting McGill as your institution. Completion can then be verified by the REB office. The tutorial is available in English and French.

DROP IN SESSIONS- Do you have questions? Need advice? Have a draft application you would like reviewed? You can drop by for a consultation without an appointment **on any Wednesday, from 2-4 p.m** at the REB Office (REB-1,2,3,4) located in the James Administration Bldg. rm 325.

McGill University/Université de McGill | Office of the Vice-Principal(Research&Innovation), Research Ethics &Compliance/Bureau de la Vice-Principale (recherche et innovation), Éthique et conformité de la recherche | James Administration Building, Room 325/Pavillon de l'administration James, bureau 325 | 845 Sherbrooke Street West/845, rue Sherbrooke Ouest | Montréal (Québec) H3A 0G4 | **T: 514-398-6831** | lynda.mcneil@mcgill.ca | www.mcgill.ca/research/research/compliance/human/

3281

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CERTIFICAT D'ÉTHIQUE DE LA RECHERCHE AVEC DES ÊTRES HUMAINS

En vertu du mandat qui lui a été confié par l'Université, le Comité d'éthique de la recherche avec des êtres humains a analysé et approuvé pour certification éthique le protocole de recherche suivant :

Titre : **Expérimentation du Programme Loricorps : évaluation de la « sensation » relative à l'alimentation intuitive**

Chercheur(s) : Johana Monthuy-Blanc
Département des sciences de l'éducation

Organisme(s) : RBC et Fondation de l'UQTR

N° DU CERTIFICAT : CER-20-264-07.11

PÉRIODE DE VALIDITÉ : Du 28 janvier 2020 au 28 janvier 2021

En acceptant le certificat éthique, le chercheur s'engage à :

- Aviser le CER par écrit des changements apportés à son protocole de recherche avant leur entrée en vigueur;
- Procéder au renouvellement annuel du certificat tant et aussi longtemps que la recherche ne sera pas terminée;
- Aviser par écrit le CER de l'abandon ou de l'interruption prématurée de la recherche;
- Faire parvenir par écrit au CER un rapport final dans le mois suivant la fin de la recherche.

Bruce Maxwell
Président du comité

Fanny Longpré
Secrétaire du comité

Décanat de la recherche et de la création **Date d'émission :** 28 janvier 2020

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