Université de Montréal

Promoting Healthy Body Images in Populations:

Does body dissatisfaction influence reactions to Québec's Charter for a Healthy and Diverse Body Image?

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Ce mémoire intitulé:
Promoting Healthy Body Images in Populations:
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présenté par :
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a été évalué par un jury composé des personnes suivantes :

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Résumé

Problématique : Au cours des dernières années, la prévalence des problèmes de santé liés à des poids malsains a augmenté. Cependant, on ne sait que peu de choses sur la façon dont l'image corporelle et la taille du corps influencent la façon dont les populations comprennent, interprètent et réagissent aux initiatives conçues pour promouvoir des images corporelles saines.

Objectifs: À partir d'un échantillon populationnel, nous avons examiné l'association entre l'insatisfaction corporelle (IC) et le niveau d'appui pour la Charte québécoise pour une image corporelle saine et diversifiée (CHIC) et les effets modérateurs de l'indice de masse corporelle (IMC), de l'âge et du sexe dans cette association. **Méthodes:** L'échantillon comprenait de 1738 adultes résidant au Québec qui ont répondu à un sondage en ligne. Des modèles de régression logistique multivariés ont été créés pour estimer les rapport des cotes (RC) entre l'IC et le niveau d'appui pour la CHIC et pour tester les effets d'interaction potentiels entre la catégorie d'IMC, l'âge et le sexe avec l'IC. Les analyses ont été ajustées pour le revenu familial, l'éducation et le statut d'immigration. **Résultats:** Les résultats montrent que les personnes qui avaient une plus grande IC avaient une probabilité plus faible d'être défavorable à la CHIC que les personnes qui n'en avaient pas (RC = 0,38; IC 95% : 0,23-0,63). Les répondants qui étaient des hommes (RC = 3.70; IC 95% : 2.12-6.43), en surpoids (OR = 1.95, IC à 95% 1.00-3.80), obèses (RC = 2.91; IC 95% : 1.43-5.91), ou avaient tout au plus une éducation secondaire (RC = 1,93; IC 95% à 1,10-3,41) avaient une probabilité plus élevée d'être défavorable à la CHIC. Les répondants adultes plus jeunes avaient une probabilité plus faible d'être défavorable (RC = 0,15; IC 95%: 0,03-0,71) et les participants dont l'IMC était insuffisant étaient significativement plus susceptibles d'être défavorable à la CHIC (RC = 10,68; 95 % CI : 2,03-56,10). Aucun effet modérateur de l'IMC, de l'âge ou du sexe sur la relation entre IC et le niveau d'appui pour le CHIC n'a été détecté. **Conclusions:** Cette étude présente l'un des premiers efforts visant à examiner l'impact des facteurs de risque individuels sur l'adoption des initiatives de promotion de la santé. Les résultats indiquent que l'IC influence considérablement l'adoption d'une initiative axée sur la population pour promouvoir une image corporelle saine. Ces résultats méritent d'être reproduits et étendus.

Mots-clés : insatisfaction corporelle, image corporelle, perception individuelle, indice de masse corporelle, charte québécoise pour une image corporelle saine et diversifiée, promotion de la santé

Abstract

Background: There is considerable concern around the increasing prevalence of unhealthy eating behaviours and attitudes, disordered eating, and eating disorders. However, little is known regarding how individual body image and size influence the way in which populations understand, interpret, and react to initiatives designed to promote healthy body images. **Objectives:** Using a population-based sample, we examined the relationship between body dissatisfaction (BD) and perception of the Québec Charter for a Healthy and Diverse Body Image (CHIC) and the moderating effects of BMI, age, and sex in this association. **Methods:** Participants included 1738 Québec adult respondents to an online survey. Multivariate logistic regression models were created to estimate odds ratios (OR) between BD and level of favourability to the CHIC and to test potential interaction effects between one's BMI category, age, and sex with BD. Analyses were adjusted for household income, education, and immigration status. **Results:** Analyses suggested that those with greater BD were less likely to be unfavourable towards the CHIC compared to those who have no BD (OR= 0.38; 95% CI: 0.23-0.63). Respondents who were men (OR= 3.70; 95% CI: 2.12-6.43), overweight (OR=1.95; 95% CI: 1.00-3.80), obese (OR=2.91; 95% CI: 1.43-5.91), or had less than high school education (OR=1.93; 95% CI: 1.10-3.41) were more likely to be unfavourable towards the CHIC. Younger adult respondents were also less likely to be unfavourable (OR= 0.15, 95% CI 0.03-0.71) and those participants who had an underweight BMI were found to be significantly more likely to be unfavourable to the CHIC (OR= 10.68; 95% CI: 2.03-56.10). No moderating effects of BMI, age, or sex on the relationship between BD and level of favorability for the CHIC were detected. **Conclusions:** This study presents one of the first efforts to examine the impact of individual risk factors on the uptake of health promotion initiatives**.** Results indicate that current body image discrepancy substantially influences the uptake of a population-based initiative to promote healthy body image. This is a finding that requires replication and extension.

MeSH terms and keywords : body dissatisfaction, body image, individual perception, body mass index, Québec Charter for a Healthy and Diverse Body Image, health promotion

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List of Acronyms

BD: Body dissatisfaction

BMI: Body mass index

DE: Disordered eating

ED: Eating Disorder

FSM: Fat Silhouette Measure

MSM: Muscle Silhouette Measure

Québec CHIC: Québec Charter for a Healthy and Diverse Body Image

OR: Odds ratio

SDT: Self-Discrepancy Theory

SPSS: Statistical package for social sciences

List of Abbreviations

Etc.: Etcetera

لَا يُكَلِّفُ اللَّهُ نَفْسًا إِلَّا وُسْعَهَا

"Allah does not burden a soul beyond that it can bear…"

– (The Qur'an, 2:286).

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Preface

The current thesis is composed of five chapters. The purpose of the first chapter of this document is to provide an introductory overview on the topic of body images and the Québec Charter for a Healthy and Diverse Body Image (CHIC), a population-based health promotion initiative. In the second chapter, a comprehensive literature review of the current scientific knowledge surrounding the key factors that are pertinent to the discussion of body dissatisfaction (BD) and reactions towards health promotion initiatives are discussed. The current research gaps and the precise objectives and hypotheses of this thesis are also described. The third chapter of this thesis includes the results, which are presented in an article format and provide an extensive analysis of the findings of the study. The fourth chapter provides a review of the final results of this study within a broader context of the surrounding literature as well as discusses the fruitful research directions and practical implications of these findings in the population. Finally, we conclude the last chapter by providing some final insight and closing remarks on the topic of body image and reactions to large-scale health promotion actions in the population.

Chapter 1: Introduction

Unrealistic norms regarding unattainable and unhealthy body image ideals have become an international concern and a pressing matter for public health experts, researchers, policy-makers, and governments. Recently, the pertinence of this issue has prompted significant multinational efforts to raise population awareness regarding the problem of unhealthy weights and eating practices To date, many countries around the world continue to implement efforts to overcome eating disorders and challenge sociocultural standards regarding thinness in favour of healthy body images that encourage positive perceptions and health promotion in the population. In 2009, the government of Québec (particularly, the Minister of Communication, Culture and the Status of Women of the Government of Québec) also joined these efforts and took action to address this issue.

1.1. The Québec Charter for a Healthy and Diverse Body Image

The Québec Charter for a Healthy and Diverse Body Image (CHIC) is a health promotion tool created by a task force assembled following a request launched by the Minister of Communication, Culture and the Status of Women of the Government of Québec in 2009. The precise objective of the creation, launching, and promotion of this tool is to promote a healthy diversity of body images and encourage positive health in the population. The CHIC was created through a series of meetings involving consensus building around a series of agreed-upon messages. Specifically, the CHIC "incites organizations and people to pledge to:"

1. Promote a diversity of body images, including different heights, proportions, and ages
2. Encourage healthy eating and weight control habits
3. Discourage excessive weight-control practices or appearance modification.
4. Refuse to subscribe to esthetic ideals based on extreme thinness
5. Remain vigilant and diligent so as to minimize the risks of anorexia nervosa, bulimia nervosa and unhealthy preoccupations with weight

6. Act as agents of change so as to promote healthy eating and weight-control practices and realistic body images
7. Promote the Québec Charter for a Healthy and Diverse Body Image among our partners, clients and colleagues, while actively respecting and adhering to its principles (www.ijoinonline.ca)

Essentially, the three key goals of the creation and promotion of the CHIC can be summarized as follows: promote a healthy and diverse body images in the population, use the media and other social realms as a means of encouraging positive health, and to increase the knowledge regarding the consequences of unhealthy eating, disordered eating, and weight-related disorders such as anorexia and bulimia.

Currently, the CHIC plays a unique role in Québec society as "a preventive program which targets a broad range of weight-related problematic conditions and behaviours" and fosters a community where healthy and positive body image is encouraged (Dion et al., 2014). To date, two studies have been conducted in which the reach and acceptability of the CHIC in the population were examined. Findings showed strong support in the population and the fact that certain individual characteristics might be associated with how one might react to the health promotion initiative.

In the current study, our objective is to follow-up on the previous findings and further investigate the existing datasets to extend our scientific knowledge surrounding this topic. In particular, the purpose of this thesis is to evaluate selected outcomes of the launching of the CHIC and ultimately, infer how different segments of the population understand and respond to large-scale health promotion actions.

Chapter 2: Literature review

The current literature review is comprised of seven sections. The objective is to provide a comprehensive summary of the current scientific knowledge surrounding the topic of BD and reactions towards health promotion initiatives. The first section begins by describing the search strategies that were used for conducting the current research. Following this, the underlying risk factors and important similarities in the discourse of eating disorders (ED) and disordered eating (DE) habits are discussed. In section three, we define, conceptualize, and discuss the phenomenon of body dissatisfaction (BD). These first sections are then entwined together in section four, which further elaborates on the importance of body mass index (BMI) in the discussion of BD, and section five, which addresses the notion of BD in the population. Finally, section six outlines the important literature gaps and re-emphasises the pertinence of this project while chapter seven clearly addresses the particular objectives and hypotheses of the thesis.

2.1. Literature search strategies

Given the complexity of body image research and the novel scientific interest to investigate this topic, several literature searches were conducted between the period of February 2017 and 2018 to thoroughly inventory the scientific knowledge. Research of this topic was executed using the Atrium and PubMed databases. Furthermore, Google Scholar, literature snowballing methods, and recommendations of expert scholars were also used for as a means for the retrieval of additional references. All search strategies were conducted using key words and/or MeSH descriptors, and were restricted to include peer reviewed articles in English, French, or Spanish that were published within a maximum of the previous two decades. Those articles that were directly relevant to the purposes of the current research (i.e., dealt specifically with BD and reactions to interventions as well as influences of the variables BMI, sex, and age) however, were retained for the study even if they were published prior to the date of inclusion.

2.1.1. Québec Charter for a Healthy and Diverse Body Image (CHIC)

Given the relatively recent launching of the CHIC initiative, a preliminary search was conducted using the following key words: (Québec Charter for a Healthy and Diverse Body Image) OR (Charte Québécoise pour une image corporelle saine et diversifiée). Although a total

of 117 articles were identified on Atrium, 114 were excluded after reviewing titles, abstracts, and duplicates. A total of three articles were retained for the purposes of the current research. Two additional articles were retrieved using Google scholar based on expert recommendation.

2.1.2. Body mass index and views regarding health promotion efforts

A second search was conducted to assess existing research on the relationship between BMI category and response to a program or intervention that promotes healthy weights and body images in the population. The following key words were used: ((Body mass index) OR (BMI AND category*)) AND (understanding* OR perception* OR reaction*) AND ("body image" OR ("health promotion" AND program)) and the following MeSH phrase was searched on PudMed: "Body Mass Index"[All Fields] OR "Body weight"[All Fields] AND "Health Promotion"[Mesh] AND "perception*"[All Fields]. A total of four relevant articles were located on Atrium and were retained for the purposes of the current thesis. Although none of the retrieved articles specifically addressed the question under investigation, the research underscores the importance of body-related satisfaction and its role in perceived interest to engage in healthier lifestyle habits.

2.1.3. Body image satisfaction and views regarding health promotion efforts

We conducted a third search to obtain a comprehensive understanding of the nature of this relationship. An example of the specific search strategy used on PubMed is as follows: ((("body image satisfaction" OR "body image dissatisfaction" OR "body image discrepancy")) AND (understanding* OR perception* OR reaction)) AND (health promotion OR public health OR initiative OR program). From this search, a total of five journal articles were retained. Furthermore, 12 additional articles were located and retained using Google Scholar as a method to locate studies using a snowballing strategy. In total, 26 articles examining the relationship between weight categories, body satisfaction, and health promotion related initiatives were identified using the aforementioned search strategies and were retained for the purposes of this project.

2.1.4. Associations between body dissatisfaction, unhealthy eating habits, and body mass index

A fourth research strategy was implemented to further explore the associations between body-related dissatisfaction, unhealthy eating habits, and body mass index. The final search was

executed using the following keywords: (("body image" OR body related) AND (satisfaction OR dissatisfaction OR discrepancy)) AND (eating disorders OR disordered eating) AND (body mass index* OR bmi) AND (Canada OR United States* OR West). From a filtered set of 92 articles, the title and abstract of 32 of these articles were retained for preliminary assessment, following which, 17 were judged as relevant for the objective of the current thesis and were included in the current literature review.

2.1.5. Additional notes for consideration

Complementary to the literature that was retrieved from the above search strategies, a total of 24 additional references were found using Google scholar, literature snowballing, and expert recommendation and were included in the current study. A detailed record of the complete literature search history used for the current project can be found in Appendix I.

2.2. Parallels between Eating Disorders and Disordered Eating

2.2.1. Body Mass Index

Recent population estimates show that over half of Canadian adults today are at an unhealthy weight level (i.e., are underweight, overweight, or obese) and that there has been a considerable rise in the prevalence of health problems that are associated with unhealthy weights and eating behaviours, and disordered eating (Kopelman, 2007; Olmstead and McFarlane, 2004; Statistics Canada, 2013). That is, unhealthy weight and health risk levels can be characterized with the "body mass index" (BMI) of an individual, which is the most common method of describing body weight standardized for height (Olmstead and McFarlane, 2004). Health Canada (2011) classifies weight levels into four BMI categories, which can be calculated by dividing body weight in kg by the squared value of height in meters. These generally agreed upon categories for adults are as follows: underweight (< 18.5 kg/m^2), normal weight (18.5 to 24.9 kg/m^2), overweight (25.0 to 29.9 kg/m^2), and obese ≥ 30.0 kg/m^2). Extensive research has shown that in combination with individual lifestyle habits and fitness levels, a U-shaped association between BMI level and increased health risk for morbidity and mortality can be observed in the population (McVey et al., 2008; Veronese, 2016). That is, individuals who are at normal weight are at the lowest risks for developing health-related problems. However, those who have a BMI in the underweight or overweight categories face increased health risks, while

those individuals who are categorized as obese are at the greatest risks for developing various complications. For instance, it is recognized that young individuals with extremely low weight can face major health challenges such as eating disorders, psychological distress, and nutritional deficiencies while those who are overweight and obese are susceptible to diseases which may include type 2 diabetes, hypertension, coronary artery disease and stroke, respiratory effects, cancers, and liver and gall bladder disease (Kopelman, 2007)

2.2.2. Similarities and differences

Modern research has shown that contrary to how notions of Eating Disorders (ED) and Disordered Eating (DE) were understood in previous years, there is a noteworthy overlap in the risk factors for these disorders that must be discussed relative to the dangerous consequences of being overweight, obese, or extremely underweight (Austin, 2011; Haines and Neumark-Sztainer, 2006; Villarejo et al., 2014). Traditionally, it has been scientifically assumed that obesity is a "medical illness with metabolic and genetic origins" where an individual shows an "excessive accumulation of body fat." The concept of an ED however, was understood as a completely different issue. Health problems associated with an underweight BMI have often been recognized largely as a mental health disorder originating from a cultural obsession with thinness that results in an altered eating pattern and a persistent overvaluation of the importance of one's figure (Day, Ternouth, & Collier, 2009; Hill, 2007; Olmstead and McFarlane, 2004; Perpiñá and Ronceroc, 2016). However, we know today that even though ED can be associated with various types mental health issues, ED may involve a variety of BMI categories. Particularly, experts today clearly suggest that eating disorders associated with low, normal, or increased weights are all manifested by the same underlying principle of disordered eating (Day, Ternouth, & Collier, 2009).

The literature suggests that those who may encompass either type of these health-related problems share behavioural, genetic, and psychosocial risk-factors which can include binge and purge symptomatology, unhealthy dieting habits, maladaptive attitudes towards eating, issues relating to their body image, and difficulties with self-regulation habits (Day, Ternouth, & Collier, 2009; Villarejo et al., 2014). Specifically, an emphasis has been placed on binge eating, which can be understood as a "loss of control over food consumption" (Day, Ternouth, & Collier, 2009; Stundard, 20011) as the missing link that may be responsible for the connection

between the two disorders. In an article by Day, Ternouth, and Collier (2009), the authors report that: "20-50% of people with obesity meet the criteria for binge eating disorder, whereas it is one of the diagnostic criteria for BN; most women with AN also engage in binge-eating behaviour" emphasising that this behaviour may be a key factors to consider in the heritable risks for both ED and DE.

In light of these findings, it has become a prioritized research interest to update previous prevention interventions and treatment methods that integrate the revised scientific evidence. Particularly, it is crucial that these concerns are addressed with an approach that a) emphasises the underlying similarities and integrated risks in the discussion of ED and DE, and b) focuses less directly towards promoting specific weights in individuals, but rather on increasing health literacy, and achieving long-term behavioural change in the population (Nutbeam, 2000; Neumark-Sztainer, 2009; Sánchez-Carracedo, Neumark-Sztainer, & López-Guimera, 2012).

2.3. Body-related dissatisfaction

2.3.1. Definition

Body-related dissatisfaction (BD) occurs when an individual's actual body figure is different in size and shape from the body silhouette that they desire to embody, and as a result of this discrepancy, the individual experiences negative thoughts and feelings about their body (Coelho, Fonseca, Pinto, & Mourão-Carvalhal, 2016; Furnham, Badmin, & Snaede, 2002; Kimber, Georgiades, Couturier, Jack & Wahoush, 2015; Tiggerman & Pennington, 1990). Given the rise in this issue over the recent years, academic research related to the topic of body image has developed substantially in the twenty-first century (Grogan, 2016). Although the research interest in discussing body image has traditionally focused on adolescents and college students – particularly emphasizing girls and young women - it is well documented that the socio-cultural pressures that encourage our society to conform to unrealistic body images has a significant impact on majority of the population. It has been recently estimated that one million Canadians today would meet the diagnostic criteria for an Eating Disorder (National Initiative for Eating Disorders [NIED], 2018) and that men, women, adolescents, older adults, and individuals of all economic classes and races can all subject to be affected by the serious consequences of ED and DE (National Association of Anorexia Nervosa and Associated Disorders [ANAD], 2016).

2.3.2. Theoretical conceptualization

The current thesis is couched within the broader psychological framework of Tory Higgins' (1987) Self-Discrepancy Theory (SDT). In his theory, Higgin's differentiates the domains of the self into three categories. These include the "actual self" which he describes as the "representation of the attributes that someone (yourself or another) believes you actually possess," the "ideal self" as the "representation of the attributes that someone (yourself or another) would like you, ideally, to possess," and the "ought self" as the "representation of the attributes that someone (yourself or another) believes you should or ought to possess." Essentially, one basic tenet of SDT lies in the idea that a discrepancy between the "actual self" relative to the "ideal self" creates a negative emotional vulnerability such as feelings of disappointment, dissatisfaction, and sadness whereas an inconsistency with the "ought self" leads to "agitation-related emotions" (Higgins, 1987).

In the discussion of BD and unhealthy lifestyle habits, one can understand the basis of this concept as the sentiments that are created when one's actual body figure (i.e. the shape and size of their current body) is not in accordance to their ideal body figure. As a response to this discrepancy, the individual feels psychologically at unease and is motivated to reconcile the gap in their selves (Cash & Szymanski, 1995; Vartanian, 2012). They therefore respond to their negative emotions by engaging in various health-related activities which may include dieting, exercise, or certain forms of surgery (Vartanian, 2012). The emotional pain caused by the mismatch between their self-concepts, however, has also been shown to evolve as a vital risk factor in the trajectory of developing physical and psychological problems including depression, suicidal ideation, low self-esteem, unhealthy weight control behaviours, and eating pathologies such as eating disorders ED and DE (National Eating Disorders Association [NEDA] 2018; Neumark-Sztainer et al., 2006). Particularly, it has been shown that in those who had greater BD, greater levels of dieting, smoking, and lower levels of physical activity were prevalent. Antithetical with achieving the body image ideals that are desired, scholars suggest that these types of unhealthy actions may actually place individuals at risk for "weight gain and poorer overall health" (Neumark-Sztainer et al., 2006).

2.3.3. Measures

Higgins work regarding SDT plays a fundamental role in the discourse and methodological assessment of body image discrepancies today (Vartanian, 2012). Originally, the concept of self-discrepancies was measured through Higgins "Selves Questionnaire," in which an idiographic approach is used to evaluate the difference between ones concepts of the self (Davis, 2017). Using this method, respondents use a "free response method" to generate self-attributes regarding their "actual", "ought", and "ideal" selves (Cash & Szymanski, 1995; Davis, 2017). Although the original questionnaire was essentially developed to identify discrepancies in an individual's physical attributes, it is a measure that has been modified and adapted throughout the decades for use in body image research (Davis, 2017; Vartanian, 2012)

Although there currently exists a number of research instruments to estimate BD using "figural stimuli", the Figure Rating Scale developed by Stunkard, Sorensen, and Schulsinger in 1983 has been established as a widely accepted measure to assess body dissatisfaction (Kronenfeld, Reba-Harreleson, Von Holle, Reyes, & Bulik, 2010; Tiggemann & Pennington, 1990). Specifically, the Figure Rating Scale consists of a range of schematic body silhouettes. Respondents are instructed to two select of those figures which they believe to be the best representation of their current body shape as well as the silhouette that embodies their ideal body. The degree of difference between the two silhouettes (or in other words, the discrepancy between the real and ideal (or ought) self) is taken to be the measure of the individual's level of body dissatisfaction (Cardinal, Kaciroti, & Lumeng 2006; Davis, 2017).

To date, the Figure Rating Scale is one of the most widely used measures of BD and has been shown to be a valid and reliable measure of body satisfaction across various groups of the population and particularly practical for large epidemiological investigations (Cardinal et al., 2006; Lynch et al., 2009; Kronenfeld, Reba-Harreleson, Von Holle, Reyes, & Bulik, 2010). Particularly, studies have compared figure ratings from various individual perspectives (i.e., both in-person and through videotape) and inter-rater evaluations (such as children and their parents, unbiased observers from the community, etc). Findings have consistently shown a high correlation between inter-rater scores which further validates the methodological strengths of the Figure Rating Scale (Cardinal et al., 2006; Sørensen, Stunkard, Teasdale, & Higgins, 1983).

A criticism of the Figure Rating Scale however, is that the silhouettes portrayed do not accurately capture ethnic differences in body shapes, sizes, and representations. Although this has traditionally been a concern which limits the utility of this measure, various alternate versions of the Figure Rating Scale have been developed and tested in recent years to be used amongst an ethnically diverse population as well as to adapt to the increase in body size across Western culture (Kronenfeld et al., 2010). Furthermore, the nature of the measure to indicate BD through a "two-dimensional [perspective] of […] images" has also been critiqued (Silva, Nahas, De Sousa, Del Duca & Peres, 2011). It has been suggested that by largely simplifying the complex phenomenon of body image, the various anthropometric facets that are relevant for capturing the individual as a whole are disregarded. Nevertheless, given the complexity in achieving a precise and accurate measure of BD, economical and practicable advantages of this scale make it an advantageous measure of BD (Silva et al., 2011).

2.4. Associations of body mass index and body-related dissatisfaction

It has been well established in the literature that Body Mass Index (BMI) is a key predictor of BD and one of the most extensively studied risk factors for developing eating disorders (Ålgars et al., 2009; Berner, Arigo, Mayer, Sarwer & Lowe, 2015; Kilpela, Becker, Wesley & Stewart, 2015; Presnell, Bearman, & Stice, 2004; Runfola et al., 2013). However, the precise nature of this multifaceted association is not as widely understood in the literature. According to the work of some scholars, evolutionary, psychological, and sociocultural foundations must be stressed to gain a clearer knowledge regarding how personal characteristics impact BD (Ålgars et al., 2009; Grogan, 2016). Simultaneously, the moderating effects of an individual's age, sex, culture, and ethnicity must also be examined as key factors that impact the relationship between BMI and level of BD

2.4.1. Age

Traditionally, body image research has focused predominantly on adolescents and young adults, and more particularly – college aged women (Tiggemann et al., 2004). Although the importance of broadening the scope of the literature has been increasingly recognised our knowledge is limited in that current research addressing the longitudinal influences of BMI and

BD across the lifespan must be further investigated (Halliwell, 2015; Kilpela et al., 2015; Tiggemann, 2013). In a review which sought to bring together the empirical findings revolving body image and age research, Tiggemann et al. (2004), suggested that generally, level of BD in women has been shown to remain "remarkably stable" across ones lifespan (Grogan, 2006) but that the "importance attached to physical appearance, specifically body size and weight, does decrease with age" (Tiggemann et al., 2004). More recently however, Ålgars and colleagues (2009) conducted a study to address some of the research gap surrounding this phenomenon further. In their population-based survey, 11,468 Finnish men and women between the ages of 18-49 years of age were asked to respond to a questionnaire assessing multiple aspects of body image. Their results showed that "for women, age was associated with lower levels of body dissatisfaction." These findings support the idea that BMI plays a complex yet important role in understanding BD throughout different ages, and that body image may fluctuate throughout ones adult years because certain aspects of the body may be characterized as more important than others. However, before we can reach a valid consensus, it is necessary to further investigate these effects in both men and women from a longitudinal perspective (Ålgars et al., 2009; Kilpela, Becker, Wesley & Stewart, 2015; Murray & Lewis, 2014).

2.4.2. Sex

The research emphasizing body image in men is equally of a recent interest (Grogan, 2006). Although there is consistent evidence in the literature that females generally tend to have higher levels of BD (despite having lower BMI levels) compared to males, it has been well established that BD affects both sexes (Ålgars, et al, 2009; Grilo & Masheb, 2005; Tremblay & Lariviere, 2009). The direction of this relationship however, is sex specific in that it functions as a result of the socio-cultural pressures placed on women to be unrealistically thin, and men to be more muscular (Grogan, 2006). In a study by Runfola et al. (2013), over 75% of women responded that the weight and shape of their body played a primary role in whether they had BD or not. More particularly, females have been shown to experience BD regardless of their actual weight, but a linear association between an increased BMI and BD has nonetheless been documented (Bearman, Presnell, Martinez, & Stice, 2006; Coelho et al., 2016).

Scholars have found that there are two prominent characteristics that define body image in men: body fat and muscularity. In a paper by Frederick et al. (2007a), four separate studies

were conducted to assess BD in men. Combining the cross-study results, the authors found that while 51–71% of men in the U.S. to be dissatisfied with their body, being underweight or overweight compared to "average" has been linked to greater levels of BD (Bearman, Presnell, Martinez, & Stice, 2006; Coelho et al., 2016; Grogan, 2016). This U-shape association implies that those men who are comparable in weight to their average counterparts experience the lowest levels of BD. In their studies, Frederick et al., (2007a) also evaluated male BD by asking a total of n=162 undergraduate (study 1 and 2) and n=56 graduate participants (study 3) to complete the Fat Silhouette Measure (FSM) and Muscle Silhouette Measure (MSM). In their comparison of these three studies, Frederick et al., (2007a) found that nearly all male undergraduate (over 90%) and graduate (96%) students across the US wanted to be more muscular, indicating that increased muscle tone is central to male beauty standards (Frederick et al., 2006; Grogan, 2016).

2.4.3. Culture and Ethnicity

In our modern society, the influence of globalized media has shifted previous notions of body image ideals as a "western problematic" to become an international matter (Shembre, Nigg, & Albright, 2011). Experts suggest that today, BD is a common phenomenon that has generally been found across all cultures and ethnicities (Fernandes, Crow, Thuras, & Peterson, 2010; Fitzgibbon et al., 2000; Frederick et al., 2007; Gupta, Chaturvedi, Chandarana & Johnson, 2000; Kronenfeld, 2010; Mellor et al., 2014). However, as we seek to understand this phenomenon better, we must consider with respect to the interwoven impact of sex, age group, and BMI.

In women, the key factor that differentiates their experience of this phenomenon is the BMI level at which BD is experienced by women in different ethnic groups. In a study by Shembre et al. (2011), researchers performed a secondary data analysis of an online questionnaire on current and desired weight status, physical activity habits, and eating habits that was completed by 281 university students in Hawai'i during 2010. The results that they obtained were consistent to previous findings in the literature (Fitzgibbon et al., 2000; Kronenfeld, 2010). Particularly, it was found that women who were white reported BD while categorized at a normal BMI level (BMI=24.6) whereas those participants who were black or Hispanic experienced BD after they were categorised at overweight (BMI=29.2 and 28.5 kg/m^2 respectively). In another study by Niskar, Baron-Epel, Garty, Sandalon, and Keinan-Boker

(2009) the researchers wanted to explore the cultural differences in BMI and BD amongst Israeli Jewish and Arab women. In their study, 1,393 Jewish and Arab randomly selected women from the general population who were over the age of 21 years were asked to complete the Israeli National Health Interview Survey in 2003-2004. Their results showed that while older Jewish women reporter higher BD (39.1%) compared to older overweight-obese Arab women (29.1%), these cultural differences disappeared in the younger women who are of normal weight. These findings suggest that while the associations of BMI and BD in women exist cross-culturally, this is a phenomenon that must be considered with respect to individual characteristics.

In men, some ethnic differences leading to BD have also been observed. In another study by Frederick, Forbes, Grigorian, and Jarcho (2007b) the researchers sought to examine the components of ethnic differences and BD in 2,206 American undergraduate students using a body image survey. According to their results, Asian and Hispanic men tended to have higher levels of BD when compared to their while male counterparts, although (consistent to previous research) these differences were not large. What this suggests is that the discussion of culture and BD in men is much more complex and less consistent in the literature (Frederick et al., 2007b; Grogan, 2006; Mellor et al., 2014).

In order to better understand and develop this scientific matter further, an integrative approach combining multidisciplinary theories regarding the social constructs of sex, culture, and stereotypes may be an important strategy to consider (Sukhanova & Thomashoff, 2015).

2.5. Addressing body-related dissatisfaction in the population

Body image satisfaction has been well documented as an important component in addressing one's health behaviour and cognitive processes (Godfield, 2010; Runfola et al., 2013; Van den Berg & Neumark-Sztainer, 2007; Warren, 2012). It plays an extensive role in the well-being of the population and may be a serious risk factor for the development of weight-related disorders (Haines & Neumark-Sztainer, 2006a). Therefore, as BD has grown to become a cultural norm, it has simultaneously become an international priority to address and reduce unhealthy body image ideals (Gladstone, 2016; Krawitz, 2014).

2.5.1. Associations of body-related dissatisfaction and health behaviours

Since most individuals wish for a body weight that is less than their current weight, the research on body-related dissatisfaction has expanded tremendously in the recent years (Schembre, Nigg, & Albright, 2011). Researchers suggest that in both males and females, lower levels of body satisfaction are associated with increased negative health behaviours including higher levels of dieting, unhealthy weight control habits, binge eating, and lower levels of physical activity (Austin, Haines & Veugelers, 2009; Neumark-Sztainer et al., 2006). Our scientific knowledge on the direct associations of those who have body-related satisfaction is far scarcer. This is likely due to a combined effect of the small minority of individuals who actually fall within this category as well as the complexity in successfully embracing body image research. Particularly, Runfola et al., (2013) explains that by using methods in which we often assess only one-aspect of BD (i.e., the difference between the physical silhouette that the individual encompasses, versus that which they desire to encompass), we limit our scientific capacity to fully capture the details of this multidimensional phenomenon. Complementary to the results of the described literature however, some researchers have shown that those women with greater body satisfaction tend to have fewer dieting and unhealthy weight control habits (Runfola et al., 2013). These findings are notable because they have had a significant impact on how we address body image research in the scientific community today and have had large implications in the extensive efforts that aim to reduce BD in our population.

2.5.2. Reducing the norm of body-related dissatisfaction

Experts in the field have proposed some essential recommendations to consider in order to positively enhance body-related satisfaction in the population, and ultimately, foster a healthier society (Haines & Neumark-Sztainer, 2006a). Specifically, it has been suggested that the development of prevention interventions and treatment strategies for maladaptive weight-related practices should be addressed with a focus that is less directed towards promoting specific weights in individuals but rather through increasing health literacy (Nutbeam, 2000; Neumark-Sztainer, 2009). In other words, the aim is to implement "preventive program[s] which target[s] a broad range of weight-related problematic conditions and behaviours" and encourage a community where healthy and positive body image is encouraged (Dion et al., 2014). Essentially, we can summarize the key strengths for successful health promotion as: prevention,

health education, and the encouragement of positive lifestyle habits such as healthy eating and regular physical activity (Haines et Neumark-Sztainer, 2006b; Nutbeam, 2000).

Correspondingly, there has been an ongoing active and international interest to raise awareness and implement programs for the promotion of healthier body image norms and habits in the recent years. To date, a number of countries including Israel, Brazil, the U.K., Spain, France, Argentina, and Australia, and provinces in Canada have adopted governmental, and non-governmental measures aiming to address this issue (Gauvin & Steiger, 2012; Gladstone, 2016; Krawitz, 2014). Although the desired outcome of these programs and initiatives are similar, there are differences in the means by which they are implemented. For instance, the "Photoshop Law" was originally implemented by the government in Israel and later influenced the creation of similar legal actions in France, Spain, and Italy. This law obligates all models in Israel over the age of 18 years to have a BMI of 18.5 kg/m^2 or higher (i.e. to be in a healthy, normal weight category) (Krawitz, 2014). This is a type of government-based action which strictly targets the fashion industry and forbids models under a healthy BMI from appearing in advertisements and having public influence. In comparison, the "Council of Fashion Designers of America [CFDA] Health Initiative" (2007) recognizes the holistic measures that are required to successfully address unhealthy eating patterns in the population. It therefore provides an "approach about awareness and education, […as opposed to direct] policing". Additionally, some private industries have also integrated in their key missions to promote healthy and realistic body images. A recent and compelling example of this is the "Dove's Campaign for Real Beauty", which was launched in 2004 to "celebrate the natural physical variation embodied by all women and inspire them to have the confidence to be comfortable with themselves" (Dove, 2017). In particular, this Dove campaign seeks to re-define the concept of "real beauty" as is it understood in our modern society. To date, this remains one of the largest and most successful marketing campaigns to address this issue from a large-scale perspective.

2.6. Research Gaps

2.6.1. Impact of health promotion efforts in the population

Health promotion advocates are optimistic that the adaptation of these public health initiatives could potentially have significant public health benefits comparable to the outcomes

of the efforts to reduce smoking in the population (Krawitz, 2014). For instance, government initiated smoking campaigns have been successful in reducing unhealthy habits in the population and has shown that people worldwide are in fact interested in the outcome of the government's decision to intervene in public health matters (Krawitz, 2014). However, there currently exists very limited scientific research which has explored the details regarding the effectiveness and impact of these programs and initiatives in our population. This understanding is a crucial to consider because in order to create a healthy society, it is necessary that we understand how individuals – particularly those who are most vulnerable to the consequences of BD understand, interpret, and react to these efforts.

2.6.2. Importance of individual perspective

Preliminary research findings suggest that although this relationship is important to consider, it is quite complex. In a collaborative pilot study, McVey et al. (2010) addressed the issue of body satisfaction and perceived favourability of a health promotion program in a group of university students. In the study, thirty-seven undergraduate students from three Canadian universities participated in two- three-hour long sessions composing an intervention aimed to promote positive body image among university students. During the sessions, activities and videos pertaining to the themes of "media literacy, self-esteem enhancement strategies, stress, management skills and ways to recognize healthy versus unhealthy relationships" were organized to spur "interactive discussions" The precise duration between the two sessions of the study are not explicitly defined in the article. As a component of their study, McVey et al. (2010) measured perceived favourability of the program by the level of satisfaction displayed in an open-ended feedback from the participants. The results show that the program received a favourable response from the participants, and that participation in the program was associated with increased body satisfaction, decreased levels of internalization of the thinness ideal, and implications for helping to reduce disordered eating behaviours. A limitation of this study, however, is that the findings cannot describe whether level of satisfaction for the program might have been a result of the individual characteristics of those who had higher levels of participation.

Furthermore, a qualitative study was conducted by Chan, Lok, Sea, and Woo (2009) to better understand the views of clients attending a community-based lifestyle modification

program in Hong Kong. In their investigation, the scholars found that one of the key factors presented after interviewing 25 overweight or obese participants (according to the World Health Organizations BMI criteria for Asians) was the importance of the client's perception of the program to be both valuable and achievable. The implications of their research address the gap in the literature with regards to this matter, and suggest the need to recognize the individual's views when addressing this sort of problem in the society (Chan & Woo, 2010).

2.6.3. Individual reactions to the Québec CHIC

In discussing the research relevant to the CHIC, a study by Gauvin and Steiger (2012) presented one of the first efforts to date to examine the potential outcomes of a large-scale health promotion initiative by assessing the population reach, acceptability, and perceived potential among Québec adults. In this large-scale population-based telephone survey of 1003 Québec residents, level of favourability to the Charter was assessed by the personal acceptance of the individual to the ideas conveyed by the Charter and perceived potential of the actions proposed in the initiative to change social norms. This was examined in the questionnaire by asking the respondent to rate the "extent of their willingness to personally adhere to the Charter on the basis of it or the description that was provided" from a range of responses that varied from "very favourable" to "not at all favourable" as well as to rate their level of agreement using "if-then" type statements regarding the proposition to reduce sociocultural pressures towards thinness and accepting diverse body images from a set of responses ranging from "completely agree" to "completely disagree." Findings of the study suggest that only six months after the launching of the Charter, about one-third of the respondents recognized the Charter, were very favourable towards personally adhering to it, and perceived it as having high potential to sensitize people to negative consequences of disordered eating (Gauvin & Steiger, 2012).

Following these findings, the *Population-based study on the impact of the promotion of the Québec Charter for a Healthy and Diversified Body Image (CHIC) on the attitudes and eating behaviours of Québecois adults and adolescents* was developed to further explore population perceptions regarding the CHIC five years after its launching (Minister of Employment and Social Solidarity and the Minister responsible for the Status of Women of the Government of Québec, 2014). Although the survey was nearly identical to the latter project, the sample size of this study was larger, including a total of 2180 individuals, and respondents were

categorized according to their status as either adolescents, adults, parents, or parents of an adolescent aged between 14-17 years old. The findings of this study suggested that the recognition and adherence to the CHIC in the Québec population remained relatively stable throughout the years and was generally unrelated to weight category. However, a further analysis of individual characteristics suggested that while there is no difference seen in adolescences in their recognition or adherence to the CHIC, those individuals who were categorized as both, parents and in the obese weight category were less likely to be convinced regarding the perceived potential of the CHIC.

2.7. Current objectives and hypotheses

The purpose of the current research study is to address the gaps in the literature pertaining to the lack of scientific evidence surrounding the importance of individual characteristics (i.e. including the perceptions, reactions, and responses) and how different segments of our population might understand health promotion initiatives that are encouraged in our society. Furthermore, it also seeks to recognize the consequences of the aforementioned limitation, which results in an insufficient scientific understanding of the impact of these types of actions in our population. My thesis is integrated into the broader the *Population-based study on the impact of the promotion of the Québec Charter for a Healthy and Diversified Body Image (CHIC) on the attitudes and eating behaviours of Québécois adults and adolescents* (Minister of Employment and Social Solidarity and the Minister responsible for the Status of Women of the Government of Québec, 2014) but provides a unique contribution to this project in that it seeks to expand scientific insight regarding how individual BD may be associated with one's perception - specifically, their level of favourability to programs and initiatives that are designed to promote healthy body images in the population. The primary objective of my thesis is to examine the associations between BD and level of favourability towards the CHIC. The secondary aim is to explore whether or not level of favourability for the CHIC differs as a function of individual characteristics including BMI category, age, and sex (see Figure 1).Specifically, we hypothesized that a higher level of BD would be associated with a lower likelihood of being unfavourable to the CHIC. The potential moderating role of BMI, age, and sex in this association were also be explored. Although the current scientific knowledge does

not allow us to yet stipulate a directional hypothesis for these moderating effects, the literature suggests reasonable evidence to explore their potential effects as moderators.

Chapter 3: Article

The current master's thesis is presented in a "mémoire par article" format. An abbreviated discussion of the methodology and primary results of the proposed research is therefore presented in the manuscript titled "Promoting Healthy Body Images in Populations: Does body-image related dissatisfaction influence reactions to Québec's Charter for a Healthy and Diversified Body Image?" This article is currently in preparation to be submitted to the *International Journal of Eating Disorders*. The details pertaining to the co-author contributions can be found in Appendix II.

Title: Understanding how body dissatisfaction influences reactions to the Québec Charter for a Healthy and Diverse Body Image: A population-based study

Authors: Farah Islam, MSc student; Howard Steiger, PhD**;** Lise Gauvin, PhD

Abstract

Background. There is considerable concern around the increasing prevalence of unhealthy eating behaviours and attitudes, disordered eating, and eating disorders. However, little is known regarding how body dissatisfaction influences the way in which individuals understand, interpret, and react to large-scale initiatives designed to promote healthy body images.

Objectives. Using a population-based sample, we examined the relationship between body dissatisfaction (BD) and reactions to the Québec Charter for a Healthy and Diverse Body Image (CHIC). We also examined the moderating effects of BMI, age, and sex in this association.

Methods. Participants included 1738 Québec adult residents of Québec to an online survey. Logistic regression analyses were performed to estimate associations between BD and favourability to the CHIC and to test potential interaction effects between BMI, age, and sex with BD. Analyses were adjusted for household income, education, and immigration status.

Results. Results showed that those who reported a desire to be thinner were less likely to be unfavourable towards the CHIC (OR=0.38; 95% CI: 0.23-0.63). No moderating effects of BMI, age, or sex on the relationship between BD and favourability towards the CHIC were observed.

Discussion. These findings indicate that BD substantially influences the uptake of a large-scale initiative to promote healthy body image. This finding requires replication and extension.

Keywords: Body dissatisfaction, individual perception, body mass index, Québec Charter for a Healthy and Diverse Body Image, health promotion

Introduction

Recent population estimates show that there has been a considerable rise in the prevalence of health problems associated with disordered eating and maladaptive eating attitudes with over half of adults in industrialized nations being at an unhealthy weight and reporting excessive eating episodes, dieting, and effort to reach unreasonable body sizes (Kopelman, 2007; Olmstead and McFarlane, 2004; Statistics Canada, 2013). Aspiring to attain unusually thin body images has been identified as a particularly important risk factor (Haines et Neumark-Sztainer, 2006a). Although there have been efforts to promote healthy body images in the community (Chan & Woo, 2010; Gauvin & Steigner, 2012), very little is currently known regarding how different segments of the population understand or support these types of programs and initiatives (Gauvin & Steiger, 2012). This is unfortunate because in order to effectively have a population level impact, it is essential to reach large segments of the population including individuals who are at the greatest risks for developing weight-related problems due to unhealthy body images.

Gauvin and Steiger (2012) conducted one of the first studies examining the potential outcomes of a population-based initiative to promote healthy body images. That is, they assessed the population reach, acceptability, and perceived potential of the 2009 launching of the *Québec Charter for Healthy and Diverse Body Images* (CHIC). The CHIC is a health promotion tool created through a government catalyzed task force and that includes a series of statements aimed at promoting healthy body images. Citizens are provided with an open opportunity to take a

stance on the issue of unhealthy weights by pledging support for the CHIC online and promoting positive messages regarding healthy and diverse body images in the community. The CHIC continues to be an important component of ongoing efforts to overcome unhealthy weights and body image-related problems in the population (Baril, Paquette, & Gendreau, 2011)

In their population-based telephone survey, Gauvin and Steiger (2012) assessed level of favourability to the Charter by tapping into respondents' prior knowledge of the CHIC (i.e., reach), willingness to personally adhere to the CHIC (i.e., acceptability), and by examining the perceived potential of the actions proposed in the Charter. Findings showed that six months after the launching of the CHIC, about one-third of respondents had prior knowledge of the CHIC, were very favourable towards personally adhering to the CHIC, and perceived the CHIC as having high potential to sensitize people to the negative consequences of disordered eating (Gauvin & Steiger, 2012).

More recently, Gauvin and Steiger (2014) examined population perceptions regarding the CHIC five years after its launching. Although the survey was similar to that of the previous project, it included a larger sample size and was conducted online rather than over the phone. The results showed that overall, the reach of the overall CHIC remained at about the same level as immediately following the launch (about 35% of respondents indicating being very favourable to the CHIC) as was acceptability and perceived potential. Furthermore, parents and obese individuals were less likely to be convinced of the potential impact of the CHIC suggesting that certain individual characteristics may play a role in one's perceptions of large scale initiatives (Gauvin & Steiger, 2014). This is important to consider because health promotion programs must be perceived as valuable and achievable for individuals to actively engage (Chan, Lok, Sea & Woo, 2009).

Interestingly, considerable literature suggests that body dissatisfaction (BD) is a key component in addressing one's preoccupation with health-related concerns and engagement in healthier lifestyle habits (Breines, 2013; Goldfield, 2010; Van den Berg & Neumark-Sztainer, 2007; Warren, 2012). Research shows that in both men and women, greater dissatisfaction with one's body image (BD) is associated with higher levels of dieting, unhealthy weight control behaviours, binge eating, and lower levels of physical activity (Austin, Haines & Veugelers, 2009; Neumark-Sztainer et al., 2006). Individual weight status as estimated through body mass

index (weight in kg divided by the square value of height in meters) is also an important risk factor in that those with excess weight often show greater BD. However, the nature and consequences of this risk is not straightforward as moderate levels of BD might actually be beneficial in motivating overweight individuals to engage in healthy weight loss behaviours and in attaining healthy weights in the long term (Austin, Haines & Veugelers, 2009; Van den Berg & Neumark-Sztainer, 2007).

To date, the manner in which BD might influence one's response to health promotion actions remains poorly understood. To our knowledge, only one study has broached the issue. A collaborative pilot study by McVey et al. (2010) addressed the issue of BD and satisfaction with a health promotion program in a group of university students. That is, 37 undergraduate students from three Canadian universities participated in an intervention aimed at promoting positive body image. As a component of the study, McVey et al. (2010) measured perceived favourability to the program through a measure of level of satisfaction. Results showed that the program was received favourably by respondents and that their participation in the program was associated with increased body satisfaction and decreased levels of internalization of the thinness ideal indicating that the program had the potential to reduce disordered eating behaviours. Unfortunately, the study did not examine whether or not individuals with different levels of BD expressed different levels of satisfaction and different outcomes from the program. Nonetheless, given the centrality of BD in the etiology of disordered eating and attitudes, it seems crucial to better understand its role in moderating the effects of health promotion initiatives.

Therefore, the purpose of this study was to examine associations between BD and level of favourability for the CHIC. We hypothesized that greater BD would be associated with lower likelihood of being unfavourable to the CHIC. Given the known association between BD and weight status, age, and sex, we also explored whether or not the association between BD and level of favourability for the CHIC was moderated by individual characteristics including BMI, age, and sex.

Methods

Study design

Data from a cross-sectional online survey, the "Population-based study on the impact of the CHIC on the attitudes and eating behaviours of Québec adults and adolescents" (Gauvin & Steiger, 2014) were analyzed.

Participants

A sample of n=2180 Québec adult residents from Québec who were members of a polling firm's online panel responded to an online survey. Although non-response bias is often a problem with web-based and telephone surveys, the cooperation rate for the survey drawn from the panel was 41.3%, which is comparable to typical cooperation-rate observed in similar study designs (Gauvin & Steiger, 2014). The inclusion criteria for the current study were being aged between 18 and 65 years and having a BMI above 18.5 (kg/m^2). Those respondents with any missing, aberrant, or extreme values for the variables height, weight, BMI, desired BMI, current silhouette rating, desired silhouette rating, level of discrepancy between current and desired silhouette rating, level of favourability for the charter, age, sex, or immigration status were excluded from the study. A detailed flow diagram describing participant exclusions can be found in Figure 2. However, in order to minimize the number of participants excluded, those with missing values for the variables household income (n=413) or education (n=193) were retained in the study. For these two variables, a category labeled "missing" was added to other categories. Coefficient estimates for these categories were not interpreted but the procedure allowed us to retain a greater number of participants in the survey.

Variables

Body dissatisfaction (BD). We asked participants to self-rate their current and desired silhouette using the Figure Rating Scale developed by Stunkard, Sorensen, and Schulsinger in 1983 (see Tiggemann & Pennington, 1990). The Figure Rating Scale is one of the most widely used measures for body satisfaction and has been shown to be a valid and reliable measure of BD across various groups of the population across age, race, and sex (Cardinal, Kaciroti, & Lumeng 2006; McVey et al., 2009). Specifically, the "Figure Rating Scale" consists of a selection of schematic silhouettes and respondents are instructed to make two selections: "what they believe to be the best representation of their current silhouette and their ideal silhouette. The degree of

discrepancy between the two silhouettes is taken to be a measure of body-image related dissatisfaction" (Cardinal, Kaciroti, & Lumeng 2006). In our study, we categorized BD of participants based on whether or not they: wanted to lose some weight, wanted to lose a great amount of weight, wanted to stay the same weight, or wanted to gain some weight. These categories were then re-coded into dummy variables in which they were classified as either 0 or 1.

Level of favorability for the CHIC. The term favorability was used in the context of the survey to understand the interpretation, reaction, or general perception of the individual towards the CHIC. Respondents' level of favorability for the CHIC was assessed using the following question: "Are you... to the content and the ideas conveyed in this Charter?" to which they could answer either "1=very favourable," "2=somewhat favourable," "3=somewhat unfavourable," "4=very unfavourable," or "9='I don't know/prefer not to answer." A dichotomous variable was created to compare those respondents who were either "very favourable," or "somewhat favourable" (reference category since this is the normative response in the population) to the CHIC with those who were "somewhat unfavourable," or "very unfavourable" to the CHIC.

Body Mass Index. BMI was estimated using the formula for BMI = weight(kg)/height(m)^2 (Health Canada, 2012). Self-reported height and weight at the time of completing the survey were used. Dummy variables were created to categorize participants into the following BMI categories: underweight (< 18.5 kg/m^2), normal weight (18.5 to 24.9 kg/m^2), overweight (25.0 to 29.9 kg/m^2), or obese (≥ 30.0 kg/m^2). Calculating BMI scores based on self-reported height and weight data is often associated with a response bias leading to an underestimated BMI (Merrill & Richardson, 2009; Roland, 1990). However, it has been shown that when categorizing individuals into BMI categories, a large proportion of participants remain classified into the correct category (Ekström, Nilsson, & Bergström, 2015).

Sociodemographic characteristics. Respondents of the survey were also asked to provide information relevant to their age, sex, household income (re-categorized as the following: $34 000, between $35 000 – $99 000, or above $100 000), their level of completed education (re-

categorized as the following: high school, trade school or college, university or graduate degree), and their immigration status (whether they were born in Canada, US, Oceania, or Western Europe compared to elsewhere).

The complete survey is available upon request from the authors.

Procedures

Data were collected through an online survey conducted between June 10, 2014 and July 14, 2014 using the Web Panel of a polling firm which includes a representative sample of Québec internet users recruited using a probabilistic sampling approach. A sample of Québec residents that were adults over the age of 18 years was recruited. We requested that the polling firm draw about half the sample from individuals who had reported having children aged 14 to 17 years when enrolling in the panel. Parents of children in this age group were asked to provide an email address for their child in order for the team to invite them to respond to the survey as well (data not discussed in this paper). Upon receipt of the invitation to participate in the survey, adults read a consent form and upon indicating consent were redirected to the survey. Overall the survey required about 20 minutes to complete.

Statistical analyses

All analyses were conducted using SPSS Statistics (version 24.0.0.0).The variables height, weight, BMI, current silhouette rating, desired silhouette rating, level of discrepancy between current and desired silhouette rating, level of favourability for the CHIC, age, sex, household income, education, and immigration status were examined to assess missing values, distributions, and assumptions of multivariate analyses. Bivariate regression models were conducted using (Wald) Chi-Square tests to assess whether or not each predictor variable was associated with the main outcome variable, namely level of favourability towards the CHIC. Those variables that were statistically significant ($p < 0.05$) were retained for further analysis and were entered into all multivariate regression models to determine the unique impact of these measures after controlling for other effects of other variables on the outcomes.

Four separate stepwise logistic regression models were conducted. In the first regression, BD (dichotomous) was tested as a predictor of being unfavourable to the CHIC (dichotomous). We note that the statement of the findings may seem awkward due to the presence of double negatives. However, the interest was in predicting the characteristics of the minority of individuals who were unfavourable to the CHIC (i.e., as opposed to the normative response of the vast majority of the population to be favourable to the CHIC). Given that it is not possible to avoid the issue of double-negatives without comprising the quality of the statistical interpretation of our analyses, we maintain the usage of "Unfavourable to the CHIC" as the outcome variable.

Following these regressions, the original model was then adjusted for sex, age, household income, education, immigration status, and BMI. Based on prior knowledge regarding the variables BMI, sex, and age, we performed three additional logistic regression models to test whether or not these variables could potentially moderate the relationship between BD and the outcome. The potential moderating effects of these variables on the dependent variable were tested using interaction terms for BD with BMI (categorical), age (categorical), and sex (dichotomous).

Ethics

The project received ethical approval from the Research Ethics Committee of the Centre Hospitalier de l'Université de Montréal (CHUM).

Results

Table 1 presents participant characteristics of the study sample. The cooperation rate for the survey was 41.3%, which is comparable to the typical cooperation-rate observed in similar study designs (Gauvin & Steiger, 2014). Following the deletion of participants not in the appropriate age range and/or having missing, aberrant, or extreme outlier values, the final analyses are based on n=1738 participants out of the total respondents that participated in the survey (N=2180). Based on our sample characteristics, the majority of the respondents of our study (n=1645) attested that were "somewhat" or "very" favourable to the CHIC (94.64%), compared to a minority that responded as "somewhat" or "very" unfavourable to the CHIC

5.35%). Furthermore, the sample included n=1208 (69.50%) individuals who wanted to lose weight, n=428 (24.62%) individuals who wanted to stay the same weight, and n=102 (5.86%) individuals who wanted to gain weight of which many (n=982; 56.50%) were women, and were born in the United States or Canada (n=1599; 92%).

In our preliminary analyses, we compared BD categories of those participants who wanted to lose some weight with those who wanted to lose a greater amount of weight, those who wanted to stay the same weight, and those who wanted to gain some weight. According to our initial results, those individuals who wanted to lose a greater amount of weight were less likely to be unfavourable towards the CHIC (OR= 0.68; 95% CI: 0.34-1.38). However, our findings suggested that the attitudes towards the Québec CHIC for those who wanted to gain weight (OR= 2.89; 95% CI: 1.15-7.23) were similar to those who did not have any BD (i.e. wanted to stay the same weight) (OR=2.33; 95% CI: 1.38-3.94). Specifically, both these categories of respondents were found to be more likely to be unfavourable to the Québec CHIC. It is important to note however, that since only a small minority of our respondents (n=102) wanted to gain weight, we cannot provide meaningful results with regards to this category of participants. In consideration of the potential consequences of an increased margin of error and reduced statistical power, we therefore decided to exclude those respondents who wanted to gain weight and re-created another set of dummy variables to compare only who wanted to lose weight with those who had no BD.

Our final set of analyses are presented in Table 2. As can be seen, those with BD (those wanting to lose weight) were less likely to be unfavourable towards the CHIC. After controlling for the variables sex, age, household income, education, immigration status, and BMI category, the association between BD and level of favourability for the CHIC remained statistically significant even though slightly attenuated. Results suggest that compared to those with no BD (i.e. those who were content with their current weight), individuals who reported a desire to have a thinner silhouette were less likely to be unfavourable towards the CHIC (OR= 0.38; 95% CI: 0.23-0.63) – adjusting for the aforementioned variables. Further examination of associations also suggested that sex, age, level of education, and BMI category are associated with one's level of favourability towards the CHIC. Those respondents who were men (OR= 3.70; 95% CI: 2.12-6.43), overweight (OR=1.95; 95% CI: 1.00-3.80), obese (OR=2.91; 95% CI: 1.43-5.91),

or had less than high school education (OR=1.93; 95% CI: 1.10-3.41) were more likely to be unfavourable towards the CHIC whereas compared to other age groups, younger adult respondents between the ages of 18 to 25 years were less likely to be less unfavourable (OR= 0.15; 95% CI: 0.03-0.71). This model also suggested that those participants who were categorized in the underweight BMI category were significantly more likely to be unfavourable to the CHIC (OR= 10.68; 95% CI: 2.03-56.10).

Given the broad confidence interval that was associated with a relatively small number of underweight participants (n=38), we elected to remove these participants from the set of analyses aimed at testing interaction effects. Table 3 presents the main effects model excluding those participants in the underweight category as well as the three additional models that were created to test potential moderating effects of the variables BMI, age, and sex on the relationship between BD and lack of favourability for the CHIC. Given the number of respondents that were dropped from the 18 to 25 years age category due to the exclusion of the underweight participants, we also created a new age category in which we pooled together the 18 to 25 year old participants with those who were in the nearest age group – i.e., those between 26 to 35 years old. The new age category therefore included those participants who were 18 to 35 years of age. According to this model, we found that compared to those with no BD, participants who reported a desire to have a thinner silhouette remained less likely to be unfavourable towards the CHIC (OR=0.38; 95% CI: 0.22-0.61) while adjusting for the effects of sex, age, household income, education, immigration status, and BMI category. These findings are very similar to those presented in the model 5a (i.e. including the underweight respondents). As shown in Table 3, there were no moderating effects of the variables sex, age, or BMI on BDas none of the interaction terms achieved statistical significance.

Discussion

The role of BD in influencing individual perception

The purpose of this study was to investigate the associations between BD and level of favourability for the CHIC, a health promotion tool created through a government-catalyzed initiative designed to encourage healthy body images in the population. Findings show that higher level of BD is associated with lower likelihood of being unfavourable to the CHIC. That

is, in keeping with the hypothesis, those who wanted to lose weight were less likely to be unfavourable to the CHIC in comparison to those who did not want to modify their weight or those who wanted to gain weight.

Further examination of associations also suggested that age, sex, level of education, and BMI are also important factors to consider in discussing level of favourability for the CHIC. Findings showed that those who are men, have less than high school education, and/or are in a at-risk BMI category are more likely to be unfavourable towards the CHIC in comparison to women, those with greater than high school education, and those who have normal BMI. Our findings also suggested that younger adults (aged between 18-25 years old) were less likely to be unfavourable towards the province-wide initiative. It is to note that while the sub-category of underweight participants was not retained for the remainder of our analyses, it is none-the-less important to discuss the effects of an underweight BMI category given the relevance of this matter in the topic of ED. Therefore, with respect to findings showing that those participants who had an underweight BMI were more likely to be unfavourable to the Charter, we caution that our study included a relatively small sample size of underweight participants) and that this finding further requires replication. These results are consistent with the existing literature that increased BD is associated with greater preoccupation with health-related behaviours (Austin, Haines & Veugelers, 2009; Neumark-Sztainer et al., 2006).

The second objective of this study was to explore the potential moderating effects of the variables BMI category, age, and sex on the association between BD and level of favourability for the CHIC. Our results showed no statistically significant moderating effect of these variables in influencing one's level of favourability for the CHIC. To our knowledge however, this is the first study to investigate the possible moderating role of these variables in influencing one's reaction towards population-level health promotion initiatives in conjunction with BD.

With respect to the implications of the CHIC in the population, the message revealed in our findings implicates that while those who experience a higher degree of dissatisfaction towards their current body image (BD) tend to have positive health related concerns aimed towards diminishing BD, those who experience less or no BD seem to present a less motivated, "laissez-faire" attitude with regards to how they react towards health promotion initiatives such as the Québec CHIC. It may be a plausible explanation that because those who do not experience

BD are not faced with the challenges and impacts of adhering to sociocultural norms of body image ideals, matters concerning these types of issues are simply less relevant and are easily overlooked. Given the nature of this study to present one of the first efforts to investigate how individual characteristics may influence approaches related to the promotion of body images, fruitful research should seek to explore similar effects in other types of health promotion initiatives.

Strengths and Limitations

This study includes both strengths and weaknesses. The generalizability of our research is an important strength. Our population-based study provides one of the few research contributions in examining the associations between individual BD and reaction to health promotion initiatives. The results of this study are representative of the Québec population of internet users. Among our sample, approximately half of the participants were females (56.50%), one-third of the participants were between the ages of 46 and 55 years old (35.27%), and nearly half were of middle class socio-economic status (45.45%). Participants' levels of education were distributed as 38.49% having a university degree and 26.06% having a high school education or less. The findings can also be extended to contexts and populations with similar populations and sociocultural standards for body image and thinness (Swami, 2015; Tiggemann & Zaccardo, 2015; Tuoyire, Kumi-Kyereme, & Amo-Adje, 2017)

There are however several limitations. First, the current study was based on self-reported height and weight data and a potential response bias associated with these variables that must be considered (Merrill & Richardson, 2009; Roland, 1990). This is important because understanding how at-risk segments of the population interpret health-promotion programs will allow us to identify and develop appropriate interventions and recommendations that promote health in the populations who are at the greatest risks for developing health problems. Also, there was no measure of other disordered eating or maladaptive eating attitudes which would have allowed for sensitivity analyses.

Conclusions and Future Directions

The findings of this study indicate that BD substantially influences the uptake of a large-scale initiative to promote healthy body image and that other sociodemographic characteristics are also associated with uptake of such initiatives. This is a finding that provides fruitful directions for research and requires replication and extension. Future studies should further explore the role of lower education, sex, and age in this association as well as examine how those population subgroups who are at the greatest health risks perceive health promotion programs.

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Tables

See Appendix III for Tables.

Chapter 4: Discussion

4.1. Review of research findings and implications

The purpose of this study was to investigate the associations between BD and level of favourability for the Québec CHIC, a health promotion tool created through a government-catalyzed initiative designed to encourage healthy body images in the population. We had hypothesised that a higher level of BD will be associated with a lower likelihood of being unfavourable to the CHIC. Additionally, we were also interested in exploring the potential moderating role of BMI, age, and sex with regards to this association.

Our results show that having a higher level of BD is associated with lower likelihood of being unfavourable to the CHIC. What this suggests is that, in keeping with the hypothesis, those who wanted to lose weight were less likely to be unfavourable to the CHIC in comparison to those participants of the study who did not want to modify their weight or those who wanted to gain weight (OR= 0.38; 95% CI: 0.23-0.63). This is a finding that has been well documented in the surrounding field of research. Body image scholars have extensively suggested that BD is a key component in addressing one's preoccupation with health- and weight-related concerns and their engagement in healthier lifestyle habits which include physical activity and eating choices (Austin, Haines & Veugelers, 2009; Goldfield, 2010; Van den Berg & Neumark-Sztainer, 2007; Warren, 2012). Consistently, the message revealed in our finding implicates that while those who experience a higher degree of dissatisfaction towards their current body image (BD) tend to have positive health related concerns aimed towards diminishing BD, those who experience less or no BD seem to present a less motivated, "laissez-faire" attitude with regards to how they react towards health promotion initiatives such as the Québec CHIC.

Further analysis of these associations also suggested that age, sex, level of education, and BMI are also important factors to consider in discussing level of favourability for the CHIC. Our results showed that those who are men (OR= 3.70; 95% CI: 2.12-6.43), have less than high school education (OR=1.93; 95% CI: 1.10-3.41), and/or are in an at-risk BMI category (underweight= (OR= 0.36; 95% CI: 0.22-0.59); overweight OR=1.95; 95% CI: 1.00-3.80; obese OR=2.91; 95% CI: 1.43-5.91) are more likely to be unfavourable towards the CHIC in comparison to women, those with greater than high school education, and those who have

normal BMI. Our results also suggested that younger adults (aged between 18-25 years old) were less likely to be unfavourable towards the province-wide initiative (OR= 0.15; 95% CI: 0.03-0.71). This is a finding that is complementary to the widespread knowledge that increased BD is a primary subject of matter during one's period of adolescence and young adulthood. Additionally, with respect to these findings showing that those participants who had an underweight BMI were more likely to be unfavourable to the Charter, we caution that our study included a relatively small sample size of underweight participants (n=55) and that this result is one that requires replication to be validated.

To date, we know that although age, sex, and BMI have been extensively studied in the literature as predictors of BD, the impact of level of education has not been well-documented with respect to this relationship. Furthermore, to our knowledge, no previous research has studied the association of these factors with regards to how they might influence one's interpretation, perception, or reaction to large-scale health promotion efforts. Based on the findings of our research, we can conclude that in general, women, those with higher levels of education, and those who are in the normal weight BMI category tend to have more positive responses towards these types of actions. However, some considerations are important to discuss in the justification of these findings. Although we know that today, both men and women are exposed to the unrealistic societal pressures to attain unrealistic body ideals, culturally, there still remains a greater cultural discrimination that is overtly expressed towards women particular to the topic of thinness (Grogan, 2016; Runfola et al., 2013). We know that generally, women tend to experience greater levels of BD and that that these associations become even more prominent in those who are classified into unhealthy BMI weight categories (Runfola et al., 2013; Bearman, et al., 2006; Coelho et al., 2016). Justifiably, these are the segments of the populations who experience higher levels of BD, and as a result, exhibit greater levels of preoccupation and support for health related initiatives.

The second objective of this study was to explore the potential moderating effects of the variables BMI category, age, and sex on the association between BD and level of favourability for the CHIC. Despite the reasonable evidence in the literature that provides valid justification to explore their potential effects as moderating variables, our results showed no statistically significant effect of these variables in influencing the association between BD and one's level

of favourability for the CHIC. As we have mentioned, however, this research project, was to our knowledge, the first study to investigate the possible moderating role of these variables in influencing one's reaction towards population-level health promotion initiatives in conjunction with BD. Therefore, before we can reasonably conclude these findings and their relevant implications, further research must be conducted to validate these associations.

4.2. Sensitivity analyses

A sensitivity analysis was conducted to assess the stability of the relationship between BD and the outcome variable (i.e. and level of favourability for the CHIC). Initially, we had categorized the BD variable into the following four groups: those who wanted to stay the same weight, those who wanted to lose some weight, those who wanted to lose more weight, and those who wanted to gain some weight. We compared the findings of the categories with another model which included those who had any BD (i.e., wanted to lose some weight, more weight, or wanted to gain weight) with those who wanted to stay the same weight. Given the small proportion of individuals who wanted to gain weight (n=145) and the complicated effect that it had on the overall model (i.e., large confidence intervals for the interaction terms which could not be interpreted appropriately), a decision was made to remove the category of those individuals who wanted to gain weight. Therefore, another variable was created in which only those who had BD were contained and compared with those who wanted to stay the same weight (i.e., did not have BD). In comparing the models with different categorization of BD, we found that the effects of having BD, age, sex, level of education, and BMI were maintained. Given the resilient nature of these effects on the level of favourability for the CHIC, the parsimonious representation of the data was retained.

4.3. Strengths and limitations

The current study plays a key role in the identification of future directions of investigation for the promotion of healthy body images in certain at-risk populations. This is important because understanding how at-risk segments of the population interpret health-promotion programs will allow us to identify and develop appropriate interventions and recommendations that promote health in the populations who are at the greatest risks for developing various types

of health-related problems. However, much like all research, it entails both, some notable strengths and limitations.

The generalizability of our research is an important strength to consider with regards to the external validity of findings (Belanger & Moullec, 2017a; Belanger & Moullec, 2017b; Campbell et Stanley, 1963). Our population-based study provides one of the few research contributions in examining the large-scale associations between individual BD and reaction to health promotion initiatives. The results of this study are representative and can be generalized to the Québec population who have access to internet. Although we know that certain complex factors regarding social and cultural preoccupations with a body image ideals must be considered, the findings of this study can be extended to contexts and populations which have similar western sociocultural standards for thinness (Swami, 2015; Tiggemann & Zaccardo, 2015; Tuoyire, Kumi-Kyereme, & Amo-Adje, 2017).

With regards to the internal validity of our research, a potential selection bias must be discussed (Belanger & Moullec, 2017a; Belanger & Moullec, 2017b; Campbell et Stanley, 1963). Although a sampling technique based on random selection in a panel was used to obtain data from a representative sample of the population, the cooperation rate for the survey was 41.3%. Although this is not optimal, experts suggest that this rate is comparable to the typical cooperation-rate observed in similar study designs (Gauvin & Steiger, 2014). Also, given that only people with access to internet were sampled, there is a segment of the population which was not included. Furthermore, we know that the current study was based on self-reported height and weight data which might indicate an observation bias, particularly, an imperfect BMI calculation (Merrill & Richardson, 2009; Roland, 1990). However, it is important to note that the "Figure Rating Scale"(Stunkard, Sorensen, & Schulsinger, 1983) is an instrument that has been shown to be a valid and reliable measure of BD across various groups of the population (Cardinal, Kaciroti, & Lumeng 2006; Lynch et al., 2009). By using the scale as a comparative tool to BMI and excluding those participants who were classified as extreme outliers, we minimize the risk of this potential bias.

Given the nature of this study, a potential response bias may also threaten the internal validity of this research. It is possible that given social customs to adhere to and support these types of actions, participants felt persuaded to act overly favourably to the CHIC when

responding to the survey. A complimentary strength to this however, is that the online questionnaire setting of the study provided respondents the opportunity to access the Québec CHIC website. Therefore, they were able to carefully consider the values that are represented by the charter and formulate a decision based on their direct experience rather than conceptual reasoning. Additionally, it is important to note the time-frame that was considered in this research (Belanger & Moullec, 2017a; Belanger & Moullec, 2017b; Campbell et Stanley, 1963). It should also be acknowledged that since this was a cross-sectional study, we can only describe the associations between the variables. We are limited in that we cannot predict, explain, or make inferences regarding the causes and effects of the observed relationships between BD and favourability for the CHIC.

We would also like to further note that the sub-group categories of our samples were not tested to ensure power. The findings of our research should therefore be replicated with a sample group with adequate power for testing effects and interactions. Finally, it is to consider is that the current study did not include a measure of other types of DE, or maladaptive eating attitudes. Consequently, it was not possible for us to conduct the optimal sensitivity analyses with regards to these behaviours.

4.4. Future research directions

The current study provides scientific insight and fruitful research directions pertaining to the role of individual perspectives in the effectiveness of a health promotion program in our population. First, future investigations should seek to further explain why certain segments of the population may react differently to these types of actions. Specially, qualitative investigation procedures could be considered to further explore this phenomenon. The advantage of this strategy is that it would allow us to obtain in-depth information regarding subjective themes otherwise not accessible through quantitative methods (Lehoux, 2017; Pope & Mays, 1995). Furthermore, fruitful research should also seek to better understand the associations of lower education in relation to one's reactions towards health promotion programs. Although it is not yet clearly understood in the literature, it is important to further examine why those individuals who have higher levels of education seem to react with greater positivity to public health actions compared to those who have lower levels of education.

An experimental study design would also allow us to overcome the limitations of a cross-sectional study design. Future research should seek to evaluate the effects of time (i.e., explore the stability of attitudes across-time) and compare levels of favourability towards health-related initiatives with other populations (i.e., different provinces across Canada). Moreover, given that 92% (n=1599) of our study sample was born in Canada or the U.S, it would be equally interesting to scientifically examine how these types of attitudes compare to those who are from non-Western countries. Comparative and longitudinal investigations of these associations would allow us to better explain the predictive and causal nature of these findings.

Finally, we have also mentioned previously that the current study presents one of the first efforts, to our knowledge, to examine the potential moderating effects of BMI group, age and sex on the association between BD and the promotion of public health efforts. Given the preliminary nature of this investigation, further examinations of the association of these variables and their impacts are required in future studies. Future literature should consider exploring potential mediating pathway of these variables in influencing the outcome results as opposed to having a moderating effect.

Chapter 5: Concluding Remarks

Unhealthy eating practices (i.e., such as disordered eating and maladaptive eating attitudes) and their dangerous health consequences have become a significant public health issue. In the recent years, there has been an ongoing and persistent effort made public health experts, governments, and their partners to address this issue and to promote healthy body images. To our current knowledge however, how individual perceptions may influence the large-scale impact of these types of initiatives in the population have not been investigated. With the objective of fulfilling this relevant gap in the scientific literature, the current study presented one of the first efforts to examine the impact of individual risk factors on the uptake of health promotion actions in our society. This study indicated that individual BD substantially influences the acceptance of population level health promotion actions and that other sociodemographic characteristics are also associated with the uptake of such initiatives. Our results also demonstrated that at-risk individuals may interpret a health-related intervention differently than the entire population and may impel practitioners to offer supplementary interventions for at-risk populations. Replication of research methods and fruitful extension of this research in future studies can have important implications for reducing the personal and societal burdens of ED and DE in our populations.

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Appendix I:

Literature search strategies

Farah Islam

February 2017-2018

Literature search history:

Question 1:	**What is the current state of literature surrounding the Québec Charter for a Healthy and Diverse Body Image (CHIC)?**			
	Search Tool	**Key words or MeSH used**	**Results**	**Notes**
	Atrium	(Québec Charter for a Healthy and Diverse Body Image) OR (Charte Québécoise pour une image corporelle saine et diversifiée)	268	**Limitation:** peer reviewed journal articles only
			117	**Limitation:** peer reviewed journal articles between 2005 and 2017
			3	**Total:** total records after title review, abstract review, and duplicates
	Google Scholar	N/A	1	Google Scholar used to locate following report from supervisor: Overcoming the Unhealthy Pursuit of Thinness… (Gauvin & Steigner, 2012)
	Google Scholar		3	**Note:** further search prompted after looking through articles using related articles function and snowboalling method

Question 2:	**What is the relationship between BMI category (i.e. whether the individual is underweight, normal weight, overweight, obese) and their reaction (i.e. their understanding, perception, or response) to a program or intervention that promotes healthy weights and body images?**			
	Search Tool	**Key words or MeSH used**	**Results**	**Notes**
	Atrium	((Body mass index) OR (BMI AND category*)) AND (understanding* OR perception* OR reaction*) AND ("body image" OR ("health promotion" AND program) OR)	41,165	**Limitation:** None
			19,919	**Limitation:** peer reviewed journal articles only
			13,302	**Limitation:** peer reviewed journal articles only from 2010 to 2017
			12, 962	**Limitation:** peer reviewed journal articles only from 2010 to 2017 in English or French
			11,995	**Limitation:** peer reviewed journal articles only from 2010 to 2017 in English or French and exclude: children; childhood obesity; adolescent; diet; perception

	Atrium	((Body mass index*) OR underweight OR overweight OR obese) AND (understanding* OR perception* OR reaction* OR response OR attitude) AND ((public health) OR (health promotion) OR (health prevention))	190, 387	**Limitation:** Peer reviewed, 2010 to 2017, English or French **Limitation:** Peer reviewed, 2010 to 2017, English or French, exclude children, childhood obesity, age,
	PubMed	("Body Mass Index"[All Fields] OR "Body weight"[All Fields]) AND "Health Promotion"[Mesh]	3122	Note: MeSH terms
		"Body Mass Index"[All Fields] OR "Body weight"[All Fields] AND "Health Promotion"[Mesh] AND "perception*"[All Fields]	89	Note: MeSH terms
			5	**Total:** records after title review, abstract review, and duplicates

Question 3:	**What is the relationship between body image satisfaction of an individual and their perception of health promotion intervention?**			
	Search Tool	**Key words or MeSH used**	**Results**	**Notes**
	Pubmed	((("body image satisfaction" OR "body image dissatisfaction" OR "body image discrepency")) AND (understanding* OR perception* OR reaction)) AND (((health promotion OR health prevention OR public health) AND intervention))	4	**Limitation:** none
		((("body image satisfaction" OR "body image dissatisfaction" OR "body image discrepancy")) AND (understanding* OR perception* OR reaction)) AND (health promotion OR public health OR initiative OR program)	79	**Limitation:** none
		(((((("body image satisfaction") OR "body image dissatisfaction") AND "motivation") OR "interest") AND "weight loss") OR "dieting"	4452	**Limitation:** none
		(((((("body satisfaction") OR "body dissatisfaction" OR "body image discrepancy") AND "body image") OR body image) AND motivation*) AND weight loss*	3141	**Limitation:** peer reviewed journal articles between 2000 and 2017 only
			1656	**Limitation:** peer reviewed journal articles between 2010 - 2017
			44	**Limitation:** peer reviewed journal articles between 2010 - 2017

Question 4:	What is the relationship between body-related dissatisfaction, unhealthy eating habits, and BMI?			
	Search Tool	**Key words or MeSH used**	**Results**	**Notes**
	Pubmed	((body image* OR body related) AND (satisfaction OR dissatisfaction OR discrepancy)) AND (eating disorders OR disordered eating)	1606	None
			1297	**Limitation:** year: articles from 1998/01/01 to 2018/12/31; species: human; languages: english, french, spanish
			889	**Limitation:** year: articles from 1998/01/01 to 2018/12/31; species: human; languages: english, french, spanish; age: 19-64 (inclusive)
		((body image* OR body related) AND (satisfaction OR dissatisfaction OR discrepancy)) AND (eating disorders OR disordered eating) AND (body mass index* OR BMI)	319	**Limitation:** year: articles from 1998/01/01 to 2018/12/31; species: human; languages: english, french, spanish; age: 19-64 (inclusive)
		(("body image" OR body related) AND (satisfaction OR dissatisfaction OR discrepancy)) AND (eating disorders OR disordered eating) AND (body mass index* OR BMI) AND (Canada OR United States* OR West)	92	**Limitation:** year: articles from 1998/01/01 to 2018/12/31; species: human; languages: english, french, spanish; age: 19-64 (inclusive)
			32	Filter to exclude: duplicates, irrelevant title/abstracts (i.e. related to treatment, adolescents, etc); retained for preliminary assessment
			17	judged as relevant for the objective of the current paper

Etc…	Additional literature retrieved though further research			
	Search Tool	**Key words or MeSH used**	**Results**	**Notes**
	Google Sch. Expert Rec. Snowballing Etc…	Details N/A	24	Additional research retrieved though Google scholar, literature snowballing, expert recommendations, etc… Purpose: Used to located additional "literature grise"

Appendix II : Detailed contributions of the presented article: “Promoting Healthy Body Images in Populations: Does body-image related dissatisfaction influence reactions to Québec’s Charter for a Healthy and Diversified Body

Farah Islam, M.Sc. student, is the primary author of the presented manuscript. Under the supervision of her fellow co-authors, her role in this study included conducting an in-depth literature review, cleaning and preparation of the database, execution and interpretation of the analyses, writing and revising of the manuscript for publication in a scientific journal.

Lise Gauvin, Ph.D., was the master's thesis director for Farah Islam. She participated in conceptualization, design, and execution of the study, and revision of the work conducted by Farah Islam. She is also the principal investigator on the investigation which allowed for the creation of the dataset.

Howard Steiger, Ph.D., reviewed and commented on the manuscript.

Mylène Baptista, reviewed the statistical analyses conducted by Farah Islam.

Appendix III :

Tables

Table 1

Participant Characteristics of 1738 adults surveyed in 2014 in the province of Québec, Canada

Characteristic	N	(%)
Body dissatisfaction		
Want to lose weight	1208	(69.50)
Want to stay same (ref)	428	(24.62)
Want to gain weight	102	(05.86)
Sex		
Women (ref)	982	(56.50)
Men	756	(43.49)
Age (years)		
< 18	0	(0)
18-25	203	(11.68)
26-35	169	(9.72)
36-45	483	(27.79)
46-55 (ref)	613	(35.27)
56-65	270	(15.53)
≥ 65	0	(0)
Household income		
< 34,000	189	(10.87)
35,000 – 99,000 (ref)	790	(45.45)
≥ 100,000 $	566	(32.56)
Other/prefer not to answer	193	(11.10)
Education		
High school/ secondary trade school/ or less	453	(26.06)
Some college/ or college level trade	586	(33.71)
University degree or higher (ref)	669	(38.49)
Other/prefer not to answer	30	(1.72)
Immigration status		
Born in the U.S or CA (ref)	1599	(92.00)
Other	139	(7.99)
BMI category		
Underweight	38	(2.18)
Normal weight (ref)	680	(39.12)
Overweight	609	(35.04)
Obese	411	(23.64)

Favourability to the CHIC		
Higher	1645	(94.64)
Lower	93	(5.35)

Note. BMI = body mass index; CHIC = Québec Charter for a Healthy and Diverse Body Image.*$p < 0.05$; **$p < 0.01$; ***$p < .001$.

Table 2

Results of logistic regression analyses testing whether level of body dissatisfaction is associated with likelihood of being unfavourable towards the Québec CHIC in 1738 adults surveyed in 2014 in the province of Québec, Canada (hypothesis 1).

Model	1	2	3	4	5a
Body Dissatisfaction					
None (ref)	1.00	1.00	1.00	1.00	1.00
Want to lose weight (ref)	0.54[0.34-0.84]**	0.53 [0.33-0.84]**	0.49 [0.31-0.78]***	0.49 [0.31-0.78]***	0.38 [0.23-0.63]***
Sex	-				
Women (ref)	-	1.00	1.00	1.00	1.00
Men	-	4.29 [2.59-7.12]***	4.15 [2.48-6.92]***	4.13 [2.45-6.95]***	.370 [2.12-6.43]***
Age (years)	-	-			
18-25	-	-	0.18 [0.04-0.76]*	0.14 [0.03-0.63]**	0.15 [0.03-0.71]*
26-35	-	-	0.76 [0.33-1.78]	0.80 [0.34-1.88]	0.93 [0.39-2.21]
36-45	-	-	0.86 [0.49-1.50]	0.89 [0.51-1.56]	0.92 [0.52-1.62]
46-55 (ref)	-	-	1.00	1.00	1.00
56-65	-	-	0.79 [0.42-1.46]	0.75 [0.40-1.41]	0.78 [0.41-1.46]
Household income	-	-	-		
< 34,000	-	-	-	0.65 [0.24-1.71]	0.64 [0.24-1.71]
35,000 – 99,000 (ref)	-	-	-	1.00	1.00
≥ 100,000 $	-	-	-	0.76 [0.45-1.28]	0.73 [0.43-1.23]
Other/prefer not to answer				1.50 [0.66-3.43]	1.70 [0.74-3.92]
Education	-	-	-		
High school	-	-	-	2.14 [1.23-3.72]**	1.93 [1.10-3.41]*
Some college/trade	-	-	-	1.15 [0.62-2.10]	1.05 [0.57-1.94]

University degree or higher (ref)	-	-	-	1.00	1.00
Other/prefer not to answer	-	-	-	2.64 [0.53-13.07]	2.93 [0.59-14.53]
Immigration status	-	-	-		
Born in CA or US (ref)	-	-	-	1.00	1.00
Other	-	-	-	0.93 [0.38-2.23]	0.98 [0.40-2.37]
BMI category	-	-	-	-	
Underweight	-	-	-	-	10.68 [2.03-56.10]**
Normal (ref)	-	-	-	-	1.00
Overweight	-	-	-	-	1.95[1.00-3.80]*
Obese	-	-	-	-	2.91[1.43-5.91]**

Note. The data is presented as OR [95% CI] ŧ *p < 0.10 *p < 0.05; **p < 0.01; ***p <.001*. BMI = body mass index; BD = body dissatisfaction; CHIC = Québec Charter for a Healthy and Diverse Body Image.

Table 3

Results of logistic regression analyses testing whether level of body dissatisfaction is associated with likelihood of being unfavourable towards the Québec CHIC in 1700 adults surveyed in 2014 in the province of Québec, Canada and whether this relationship is moderated by the variables BMI-category, age, and sex (hypothesis 2).

Model	5b	6	7	8
Body Dissatisfaction				
None (ref)	1.00	1.00	1.00	1.00
Desire skinner figure	0.37 [0.22-0.61]***	0.62 [0.21-1.75]	0.53 [0.19-1.48]	0.36 [0.17-0.76]**
Sex				
Female (ref)	1.00	1.00	1.00	1.00
Male	3.75 [2.15-6.53]***	3.67 [2.09-6.42]	5.08 [1.96-13.14]***	3.81 [2.18-6.63]***
Age (years)				
18-35	0.40 [0.17-0.96]*	0.41 [0.17-0.97]*	0.40 [0.16-0.95]*	0.49 [0.14-1.67]
36-45	0.93 [0.52-1.63]	0.91 [0.51-1.60]	0.92 [0.52-1.62]	0.40 [0.12-1.28]
46-55 (ref)	1.00	1.00	1.00	1.00
56-65	0.75 [0.40-1.42]	0.74 [0.39-1.41]	0.75 [0.40-1.42]	1.23 [0.51-2.97]
Household income				
< 34,000	0.68 [0.26-1.82]	0.70 [0.26-1.86]	0.69 [0.26-1.84]	0.69 [0.26-1.85]
35,000 – 99,000 (ref)	1.00	1.00	1.00	1.00
≥ 100,000 $	0.79 [0.46-1.34]	1.25 [0.73-2.12]	1.26 [0.74-2.14]	1.26 [0.74-2.15]
Other/prefer not to answer	1.60 [0.69-3.67]	1.61 [0.70-3.3]	1.61 [0.70-3.70]	1.54 [0.67-3.55]
Education				
High school	1.78 [1.01-3.14]*	1.79 [1.01-3.15]*	1.78 [1.01-3.13]*	1.81 [1.03-3.21]*

Some college/trade	0.91 [0.48-1.71]	0.90 [0.48-1.69]	0.92 [0.49-1.73]	0.93 [0.49-1.75]
University degree or higher (ref)	1.00	1.00	1.00	1.00
Other/prefer not to answer	2.80 [0.56-13.95]	2.82 [0.56-14.20]	2.74 [0.55-13.73]	2.74 [0.54-13.92]
Immigration status				
Born in US or CA (ref)	1.00	1.00	1.00	1.00
Other	0.93 [0.38-2.26]	0.89 [0.38-2.27]	0.95 [0.39-2.29]	0.93 [0.38-2.26]
BMI category				
Normal (ref)	1.00	1.00	1.00	1.00
Overweight	2.01 [1.03-3.92]	2.99 [1.26-7.09]*	1.93 [0.98-3.77]	2.02 [1.03-3.98]*
Obese	3.03 [1.49-6.15]**	3.01 [1.02-8.88]*	2.96 [1.46-6.00]**	2.99 [1.45-6.14]*
BMI x BD	-		-	-
Normal x None (ref)	1.00	1.00	1.00	1.00
Overweight x BD		0.41 [0.11-1.45]	-	-
Obese x BD		0.75 [0.18-3.08]	-	-
Sex x BD				
Women x None (ref)	1.00	1.00	1.00	1.00
Men x BD	-	-	0.62 [0.20-1.95]	-
Age x BD	-	-	-	
18-35 x BD	-	-	-	0.65 [0.11-3.64]
36-45 x BD	-	-	-	3.18 [0.83-12.08]
46-55 x BD	1.00	1.00	1.00	1.00
56-65 x BD	-	-	-	0.34 [0.09-1.28]

Note. The data is presented as OR [95% CI] ŧ *p < 0.10 *p < 0.05; **p < 0.01; ***p <.001*. BMI = body mass index; BD = body dissatisfaction; CHIC = Québec Charter for a Healthy and Diverse Body Image.

Appendix IV:

Figures

Figure 1: Conceptual model

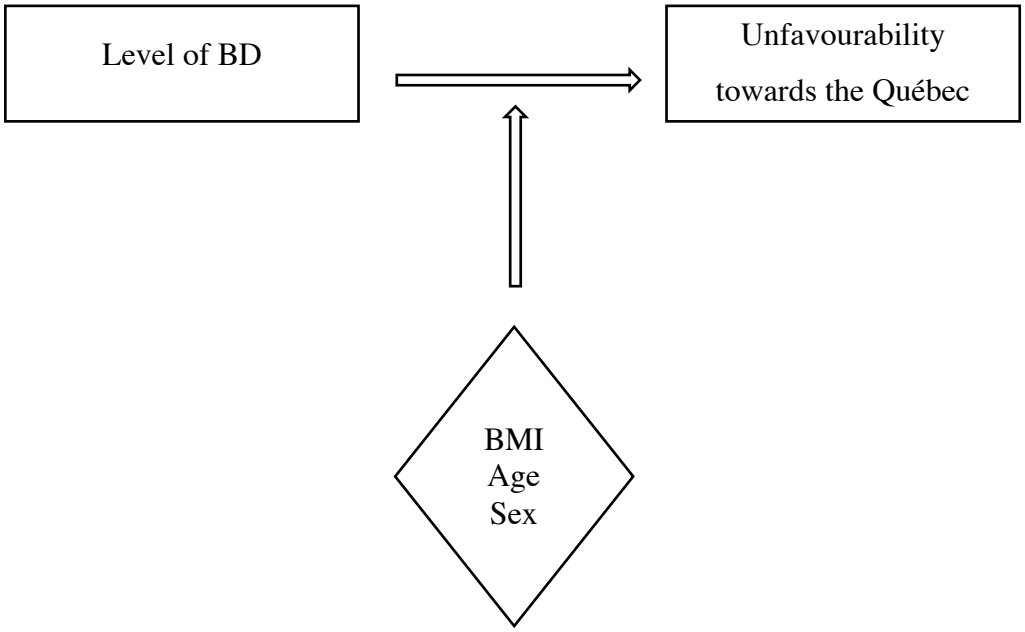

Figure 2: Participant Flow Diagram