Weight Bias and Support of Public Health Policies

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ABSTRACT

Weight Bias and Support of Public Health Policies

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Background. Public explicit weight bias attitudes have yet to be assessed in a Canadian representative sample. It is unknown if explicit weight bias negatively influences Canadian public perceptions of public health policies aimed at addressing obesity.

Objectives. To examine: (1) explicit weight bias, (2) public support of the Canadian Federal Government's public health policy recommendations to address obesity, and (3) the association between explicit weight bias and policy support in Canada.

Methods. Canadian adults (N=1003; 51% female; BMI=27.3±7.0 kg/m^2) completed an online survey in October 2018. Weight bias was measured with the Anti-Fat Attitudes Questionnaire in three subscales: *Willpower, Fear of fat, and Dislike*. Support of policy recommendations was measured on 4-point Likert scales. Logistic regressions (support vs oppose) were conducted after adjusting for age, race, gender and income.

Results. Support of policy recommendations ranged from 53% to 90%. *Willpower* was associated with support of 10 policies (e.g. changing infrastructure to encourage physical activity, OR=1.28, CI=1.14-1.43, $P<0.01$). *Dislike* was associated with support of three policies (e.g. taxation of sugar and artificially sweetened beverages, OR=1.19, CI=1.08-1.31, $P<0.01$). However, *Fear of fat* was negatively associated with support of two policies (e.g. mandating the use of front-of-package nutrition labelling, OR=0.82, CI=0.73-0.94, $P<0.01$)

Conclusions. Weight bias is associated with Canadian support of public health policies aimed at addressing obesity. Future studies should examine the influence of weight bias reduction interventions on policy support.

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CHAPTER 1: INTRODUCTION

1.0 General introduction

The World Health Organization defines obesity as abnormal or excessive fat accumulation that may impair health [1]. Obesity has been associated with an increased risk of developing co-morbidities that negatively impact quality of life (e.g. chronic back pain, type II diabetes, osteoarthritis, congestive heart failure and several types of cancers) [2-4]. Calculated as weight (kg)/ height (m^2), a BMI equal to or greater than 25 is classified as overweight while a BMI equal to or greater than 30 is classified as obesity.

Between 1975 and 2016, the worldwide prevalence of obesity almost tripled [1]. According to the World Health organization, worldwide, over 1.9 billion adults were classified with overweight and 650 million with obesity in 2016 [1]. Based on objectively measured anthropometric data from the Canadian Health Measures Survey, approximately one in four Canadian adults were classified with obesity between 2012 and 2013 [5]. Canadian adult obesity prevalence rates are expected to continue to increase over the next two decades; with the largest increases in men [5]. High pediatric obesity rates have also been documented in Canada and around the world. Worldwide, among children and adolescents (5-19 years), the prevalence of overweight and obesity increased from 4% in 1975 to 18% in 2016 [1]. In Canada, nearly 1 in 7 children and youth (6-17years) were classified with obesity between 2012 and 2013; with higher prevalence rates being reported in boys (15.3%) compared to girls (10.8%) [6]. Unlike adult obesity, the prevalence of pediatric obesity is expected to remain stable over the next two decades [5].

With the increased prevalence of obesity in Canada, weight bias, defined as holding negative or stereotypical beliefs and attitudes towards an individual because of their weight, is highly prevalent in North American society [7, 8]. Explicit weight bias is a deliberate type of weight bias such as the conscious belief that all individuals with obesity lack willpower and self-control [9, 10]. Over the past decade, the prevalence of weight bias has increased in the United States by 66% and has been documented in the workplace, educational institutions, health care settings, the media and interpersonal relationships [11-13]. Across Canada, the United States, Iceland and Australia, similar levels of explicit weight bias are held by the public [14]. Men reportedly hold stronger explicit weight bias attitudes compared to their female counterparts

while individuals classified with obesity express lower levels of explicit weight bias compared to individuals with lower BMIs [14].

Research has documented a range of adverse psychosocial and physical health consequences of weight bias experienced by individuals with obesity. Weight discrimination, defined as the behavioural manifestation of weight bias, is the fourth most common form of discrimination among US adults [13]. Perceived weight discrimination is harmful to mental health as it is associated with significant psychiatric morbidity and comorbidity [15]. A recent systematic review on the negative health consequences of weight bias reported on the increased likelihood of binge eating, decreased physical activity, and negative physiological stress responses associated with experiences of weight bias [16]. These adverse consequences of weight bias interfere with the quality of life of individuals with obesity and impede efforts to improve overall mental and physical health [16]. Although public weight bias attitudes have been documented in the US, public explicit weight bias attitudes have yet to be assessed in a Canadian representative sample [14].

Along with the increased risk of developing obesity-related co-morbidities, the high prevalence of obesity has become a major public health concern in Canada [17, 18]. To address obesity, the federal, provincial and municipal levels of government have proposed the implementation of initiatives, laws and regulations that target the contextual and behavioural factors associated with obesity (i.e. the determinants of obesity) [19, 20]. Although the Public Health Agency of Canada and the Canadian Institute for Health Information identified the following determinants of obesity: physical activity, sedentary behavior, screen time, diet and socioeconomic status, there are other factors associated with obesity development and progression [20]. Obesity etiology is highly complex and multifactorial as it involves genetic, physiological, environmental, psychological, social, economic and political factors [21, 22]. Population-level interventions such as the implementation of public health policies have the potential to impact Canadian obesity rates by influencing many of the societal, environmental and economic factors associated with obesity development and progression [22, 23]. As law has played a significant role in addressing chronic diseases in the past (e.g. the use of public policy in the control of tobacco smoking), it may play a critical role in addressing Canadian obesity rates [24, 25].

1.1 Addressing Obesity

In March 2016, the federal government of Canada released a report entitled, *Obesity in Canada: A Whole-of-Society Approach for a Healthier Canada* ("the Obesity Report") which summarized the current state of obesity in Canada [26]. The Obesity Report also contained the expert testimony of Canadian and International stakeholders presented to the Standing Senate Committee on Social Affairs, Science and Technology over the course of 12 meetings. Beginning with a summary of the causes and consequences of obesity, the Obesity Report concluded with 21 recommendations to address obesity rates in Canada [26]. These policy recommendations cover the spectrum of less intrusive to more intrusive policies [27].

As defined and illustrated in the Nuffield Council of Bioethics' Intervention Ladder, from a population perspective, less intrusive policies (i.e. policies at the lower rungs of the Intervention Ladder) enable individual choice in behaviour change (e.g. promoting physician counseling and the use of exercise in prescriptions) or guide choice by changing norms/ standards to healthier options (e.g. changing the infrastructure and designs of communities to encourage physical activity) [27]. On the other hand, more intrusive policies (i.e. policies at the higher rungs of the Intervention Ladder) guide choice through the use of disincentives/incentives (e.g. develop taxes and subsides to help Canadians of lower socio-economic status choose healthy lifestyle options), restrict or completely eliminate population freedom to choose (e.g. mandating the use of front-of-package nutrition labelling) [27]. Compared to less intrusive policies, more intrusive policies require stronger justification for their implementation [27]. Canadian public support or opposition of public health policies may potentially provide some justification for the implementation of evidence-based public health policies aimed at addressing obesity rates.

1.2 Canadian Support of Public Health Policies

Despite increases in public health initiatives to address obesity, little is known about Canadian public support or opposition of Canadian public health policies addressing obesity [28]. To our knowledge, only six previous studies have examined Canadian public support of public health policies [28-33]. Most of these studies primarily assessed support of specific types

of policies (e.g. weight discrimination reduction) [29-33]. Three of the six previous studies exclusively assessed support of public health initiatives aimed at childhood obesity [30, 31, 33]. Of these three studies, Potestio *et al.*, reported that Canadian adults did not consider an additional 5% taxation on high fat foods to be very important in the prevention of childhood obesity [31]. One study involving Canadian youth between the ages of 16-30 years exclusively examined support of nutrition policies [32]. Although Canadian youth highly supported policies that mandated the use of front-of-packaging symbols indicating high salt (76.8%) and sugar content (79.4%), overall, youth were more supportive of less intrusive policies compared to more intrusive policies [32]. Another study which assessed Canadian support of weight discrimination reduction policies reported that the majority of participants supported the implementation of specific laws to prohibit weight discrimination (e.g. prohibiting employers from denying qualified employees promotions because of their body weight, 88% support) [29]. Three of the six studies utilized small convenient samples such as undergraduate students and public samples of adults in Calgary and Sherbrooke [28, 30, 31]. While Canadian undergraduate students supported a variety of more intrusive public health policies, the students less consistently supported policies that required increases in taxation [28].

The limited studies have yet to assess public support of policy recommendations addressing both childhood and adulthood Canadian obesity rates in a Canadian representative sample. To date, no studies have specifically examined support or opposition of the 2016 Obesity Report policy recommendations (which included *both* less intrusive and more intrusive policy recommendations). Public support of public health policies indicates whether or not the public perceives the policies to be relevant and applicable to their daily lives [32, 34]. An assessment of public perceptions from a Canadian representative sample is essential seeing as Federal public health policies impact the health behaviours of the entire Canadian population [23]. Research assessing public perceptions has the potential to influence policy creation, implementation and adoption because policy makers are more likely to implement policies that they are perceive the public favours [35, 36]. Accountable governments must be aware of and consider public perceptions of policy action [34].

1.3 Correlates Associated with Canadian Support of Public Health Policies

In Canada and around the world, people primarily attribute obesity to causes within the individual's control (e.g. physical inactivity, sedentary behavior, and poor dietary habits) [14, 37]. The majority (55%) of a Danish representative sample (N= 1141 adults) agreed that "If fat people really wanted to lose weight, they could" [37]. A multinational study of N= 2866 adults across three different countries reported similar public perceptions that obesity is attributable to personal responsibility in Canada, the US and Iceland [14]. Attributing obesity to causes *within* the individual's control contributes to weight bias [38]. Previous studies that aimed to explain variations in public support of public health policies have investigated the relationship between perceptions of the personal responsibility of obesity and support of public health policies [28, 30, 31, 37, 39-43]. Although partisan affiliation explained little of the variance in support for public health policies addressing obesity, four studies reported that perceptions of the causes of obesity predicted support of policies aimed at addressing obesity [28, 39-41]. Individuals who attributed obesity to causes beyond the control of the individual (e.g. genetics) reported overall greatest support of public health policies while the attribution of obesity to causes within an individual's control (e.g. lack of willpower to exercise regularly) reduced the likelihood of support of certain types of policies [39, 40, 44, 45]. Individuals who perceive obesity to be beyond individual control seem to support *more intrusive* public health polices to address obesity [39, 40, 44, 45]. However, although studies have investigated the influence of perceptions of personal responsibility of obesity, studies have rarely examined two important explicit weight bias subscales, dislike of individuals with obesity and fear of gaining weight. An assessment of all three explicit weight bias subscales would provide a more comprehensive understanding of prevalent Canadian weight bias attitudes and the role each subscale plays in the relationship between explicit weight bias and support of public health policies related to obesity.

As mentioned above, studies have demonstrated the negative consequences of weight bias on psychosocial and physical health [15, 16]. To date, it is unknown if explicit weight bias also negatively influences public perceptions of public health policies aimed at addressing obesity. Widespread awareness of weight bias and its negative consequences is not only a step towards preventing the creation and implementation of public health policies that are

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stigmatizing and harmful to individuals with obesity but a step towards eradicating weight bias. Research is needed to understand the influence of explicit weight bias on public health policy action.

1.4 Research questions

1. Does the Canadian public support or oppose the recommendations included in the 2016 Obesity Report?
2. What is the relationship between explicit weight bias and support or opposition of the recommendations included in the 2016 Obesity Report?

Specific objectives

To assess**:**

1. Canadian explicit weight bias attitudes
2. Canadian public support and opposition of the public policy recommendations included in the 2016 Obesity Report
3. The association between explicit weight bias and support of the public policy recommendations included in the 2016 Obesity Report

1.5 Hypotheses

Based on the previous literature, we hypothesize that overall, the Canadian public will support the policy recommendations included in the 2016 Obesity Report. Canadians will score highly on all three explicit weight bias subscales; however, *Willpower* mean score will be greater than the other two subscale scores (*Fear of fat* and *Dislike*). In addition, we hypothesize that individuals with higher explicit weight bias scores will be more likely to support *less intrusive* policy recommendations and less likely to support *more intrusive* policy recommendations.

CHAPTER 2: METHODS

2.1 Participants

Data were obtained from a cross-sectional online survey. A Canadian representative sample was drawn from a research panel coordinated by Survey Sampling International (SSI), a market research company. Based on power calculations, our target sample size was 385 Canadian adults (see Appendix on page 66 of this thesis). Quotas based on age, gender and province of residence allowed for a close approximation of Canadian census demographics (refer to Table 4 in the additional results section) [46]. All SSI participants were also members of SSI partner organizations which allowed for personalized incentives (e.g. airline miles). Canadian SSI participants over the age of 18 years old were eligible to partake in this study. Eligible SSI participants were informed of the study purpose, length of the survey and incentivization via email. The 20-minute survey was hosted on SurveyMonkey, an online survey platform. This research study received ethical approval from the Concordia University Research Ethics Board (Ethics certification number: 30009752). All participants completed an informed consent form (see Appendix on pages 56 and 57 of this thesis for the ethics certificate and informed consent form).

Although limited in that they do not generate a random sample of the target population, market research companies such as SSI are often used by researchers to combat the limitations associated with generating representative samples. In the past, acclaimed researchers, such as Dr. Rebecca Puhl from the Rudd Center for Food Policy and Obesity, have used SSI to generate nationally representative samples to assess public perceptions of obesity-related public health media campaigns and weight-related language used by health professionals [47-49].

2.2 Measures

I. *Demographic questionnaire*

The demographic questionnaire included questions assessing age, gender, race, income, and self-reported weight and height.

II. *Support of public health policies*

Participants indicated their level of support or opposition of 15 public health policy recommendations included in the Obesity Report. Support for each policy was

assessed on a 4-point Likert scale (1= strongly oppose, 4= strongly support). Previous studies have often utilized similar measures to assess public support of public health policies [28, 32, 50]. However, these previous studies included additional "Do not know" and "Neutral" options in their Likert scales. For the purpose of our study, we omitted these additional Likert scale options seeing as research has shown that 4-point Likert scales have higher reliability than 6-point scales [51].

The phrasing of the policies from the Obesity Report were reworded to increase readability and reduce participant burden. In order to ensure the intention of each policy was not changed with the rewording, these items were pilot-tested three times. University students *n*= 4 completed paper copies of the survey during the first pilot test. The second round of pilot testing involved *n*= 12 Canadian adults who completed the survey online using the SurveyMonkey platform. The final pilot test involved a sample of our target population (*n*= 84 Canadian adults) recruited by SSI. Unlike the data collected during the final pilot test, survey responses obtained from adults who participated in the first and second pilot tests were not analyzed. Participants who completed the survey during the first pilot test were specifically instructed to provide the researchers with information on phrasing and wording that was difficult to understand.

III.   *Explicit Weight Bias*

Crandall's [52] validated 13-item Anti-Fat Attitudes Questionnaire (AFA) was used to assess explicit weight bias. This scale was selected for its psychometric strength as reported in a recent systematic review [53]. The 13 items were divided into three different subscales, *Dislike* (n= 3 items), *Fear of Fat* (n= 3 items) and *Willpower* (n= 7 items). The *Dislike* subscale assessed antipathy towards individuals with obesity (e.g. I really do not like fat people much). The *Fear of Fat* subscale assessed emotions towards weight gain (e.g. I feel disgusted with myself when I gain weight) and the *Willpower* subscale assessed perceptions that weight gain is within the individual's personal control (e.g. some people are fat because they have no willpower). Respondents rated their responses on a 10-point Likert scale (0= very strongly disagree, 9= very strongly agree) for each item. Cronbach's alpha for the *Dislike, Fear of fat* and *Willpower* subscales were 0.88, 0.85 and 0.82, respectively.

2.3 Statistical Analysis

Statistical analyses were conducted using SPSS version 24. Univariate summary statistics was used to report on the percentage of participants who supported or opposed a specific policy. Upon agreement with the thesis committee during the thesis proposal, both support responses on the Likert scale ("strongly support", "support") were collapsed together and compared with both opposition responses ("strongly oppose", "oppose"). Descriptive statistics for explicit weight bias subscale scores included means and standard deviations. Pearson correlations were conducted to examine the relationships between each explicit weight bias subscale. To investigate the association between explicit weight bias and public support of public health policy, logistic regressions adjusting for age (18-44 vs. > 45 years), race (Caucasian vs. Other), income ($\leq$ \$24,999 vs. $\geq$ \$25,000) and gender (Male vs. Female) were conducted. To aid with data interpretation, the 15 policy recommendations examined in this thesis were categorized with the use of both qualitative (thematic analysis) and quantitative (factor analysis) analytic methods. These two types of analyses are described in detail below, in sections 2.31 and 2.32.

2.31 Thematic analysis [54]

I conducted a thematic analysis, a qualitative data analysis approach, to categorize the 15 policy recommendations into groups; highlighting the different types of public health policies. In doing so, not only did I gain a better understanding of the specific types of public health policies that the public supported or opposed but, also the specific type of policies that were related to explicit weight bias.

Developed by Braun and Clarke (2006) into a systematic method, a thematic analysis is a qualitative data analysis method of systematically organizing data into meaningful patterns (i.e. themes) that are relevant to the research question [54]. Our research question for this qualitative analysis was, "what specific types of public health policies aimed at addressing obesity are represented in the 15 policy recommendations?" I decided on conducting a thematic analysis due to the accessible and flexible nature of this qualitative approach. A thematic analysis is easily accessible for mixed methods

research being conducted by researchers who are not qualitative research experts [54]. In addition, thematic analysis can be conducted many different ways [54]. I utilized a deductive approach because I applied established public health concepts, Nuffield's Council on Bioethics' Intervention Ladder, to my data set (see Appendix on page 65 of this thesis for an illustration of the Intervention Ladder) [27].

I conducted this thematic analysis by following Braun and Clarke's six-phase approach to thematic analysis [54]. Firstly, I familiarized myself with the data by reading and re-reading the 15 policy recommendations and reviewing the literature on Nuffield's Council on Bioethics' Intervention Ladder. Next, I generated a set of codes based on the Intervention Ladder (eliminate, restrict, disincentives, incentives, new norms, choice, and educate). Each code corresponded with a rung of the Intervention Ladder and identified a specific type of policy. I then assigned each policy with the code that best described what type of policy it was. For example, the code for the highest rung of the Intervention Ladder was "eliminate". From a population perspective, all policies that in some way eliminated individual choice in behaviour change were assigned this code. After generating and assigning all codes, I identified four subthemes (eliminate choice, incentives/disincentives, enable choice, and educate) by combining codes that shared a common feature. For example, codes for two rungs of the Intervention Ladder were "disincentives", and "incentives". I combined these two codes to create one subtheme, "incentives/disincentives". A similar process of combining subthemes was used to create themes. For example, I combined the subthemes "incentives/disincentives", and "eliminate choice" to create the theme of "more intrusive" policies because both subthemes described policies that placed greater restrictions on individual choice in behavior change. On the other hand, the subthemes "enable choice" and "educate" were combined to create the theme of "less intrusive" policies. Next, I conducted a quality check of the different themes by comparing the themes to the subthemes and the codes identified. The last phase identified by Braun and Clarke involved the dissemination of the themes in the form of a journal article or a dissertation. The themes identified are further discussed in the additional results section of this dissertation on page 38.

2.32 Factors analysis

After the thematic analysis, a quantitative data analysis approach (factor analysis) was also undertaken to separate the 15 policy recommendations into groups based on types of public health policies. This factor analysis was conducted as an additional quantitative justification for the themes identified by the thematic analysis described above.

Factor analysis is a commonly used statistical approach to investigate the relationship between a set of observed variables and latent variables (i.e. factors) [55, 56]. Unlike observed variables, latent variables are theoretical constructs that cannot be directly observed but rather are inferred to exist within the data [55]. Specifically, I conducted a confirmatory factor analysis. A confirmatory factor analysis requires that the researchers have some knowledge, based on theory or empirical research, of the latent variables that exist in the data [55, 56]. Seeing as the thematic analysis had already identified the latent variables that existed within the 15 policy recommendations in the form of themes, this approach was most appropriate [55]. For the purpose of this thesis, the observed variable was the level of policy support indicated by our sample while the latent variables were the themes based on the Intervention Ladder (more and less intrusive policies). The relationship between the observed variables and the latent variables are referred to as factor loadings [55]. Factor loadings closer to -1 or 1 indicate a strong relationship between the observed variables and the latent variables. Observed variables load highly to latent variables that they are most related to while loading negligibly on the other latent variables [55]. Using this method, we identified groups of the observed variables (level of policy support) that differ in their relative standings on latent theoretical constructs (Intervention Ladder themes) [56].

Based on the results of our thematic analysis, two latent variables (Factor 1 and Factor 2) were entered into the factor analysis. We wanted to examine the relationship between support of each policy recommendation and the two themes identified by the thematic analysis (more and less intrusive policies). A Maximum Likelihood extraction method was conducted as part of this factor analysis. Extraction was accompanied by an Oblimin rotation with Kaiser Normalization due to speculation that the 15 policy

recommendations were related and to aid with interpretation of the factor loadings. The results of this factor analysis are described in the additional results section of this dissertation on page 38.

CHAPTER 3: RESULTS

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Abstract

Objectives: We aimed to examine: (1) explicit weight bias, (2) public support of the Canadian Federal Government's public health policies to address obesity, and (3) the association between explicit weight bias and policy support.

Study Design: Cross-sectional study.

Methods: Canadian adults (N=1003; 51% female; BMI=27.3 ±7.0 kg/m^2) completed an online survey measuring weight bias with the Anti-Fat Attitudes Questionnaire in three subscales: *Willpower, Fear of fat, and Dislike*. Support of policy recommendations was measured on 4-point Likert scales. Logistic regressions (support vs oppose) were conducted after adjusting for age, race, gender and income.

Results: *Willpower* was significantly positively associated with both the *Dislike* and *Fear of fat* subscales (r= 0.3 and 0.6; *P* < 0.001). Support of policy recommendations ranged from 53% to 90%. *Willpower* was associated with support of 10 policies (e.g. changing infrastructure to encourage physical activity, OR=1.28, CI=1.14-1.43, *P*<0.01). *Dislike* was associated with support of three policies (e.g. taxation of sugar and artificially sweetened beverages, OR=1.19, CI=1.08-1.31, *P*<0.01). However, *Fear of fat* was negatively associated with support of two policies (e.g. mandating the use of front-of-package nutrition labelling, OR=0.82, CI=0.73-0.94, *P*<0.01).

Conclusion: Weight bias is associated with Canadian support of public health policies aimed at addressing obesity. Future studies should examine the influence of weight bias reduction interventions on policy support.

Keywords: Canada; Obesity; Weight stigma

Introduction

Obesity has become an international public health issue, but with its increase, the prevalence of weight bias and stigma has grown unabated. Weight bias, the tendency to associate negative or stereotypical beliefs and attitudes with an individual because of their weight, is highly prevalent in North American society.[1,2] Explicit weight bias is a specific deliberate type of weight bias such as the conscious belief that individuals with obesity lack willpower and self-control.[3,4] Research has documented a range of adverse psychosocial and physical health consequences of weight bias.[5] These adverse consequences interfere with the quality of life of individuals with obesity and impede efforts to improve overall mental and physical health.[6] Although weight bias attitudes have been documented in the US public, explicit weight bias attitudes have yet to be assessed in a Canadian representative sample.[7]

To address obesity in Canada, the federal, provincial and municipal levels of government have been implementing initiatives, laws and regulations (e.g. mandatory calorie labeling on menus) to promote changes in public dietary and physical activity behaviors.[8] In March 2016, Canada's federal government released: *Obesity in Canada: A Whole-of-Society Approach for a Healthier Canada* ("the Obesity Report").[9] The Obesity Report contained the expert testimony of Canadian and International stakeholders presented to the Standing Senate Committee on Social Affairs, Science and Technology and concluded with 21 policy recommendations. In accordance with Nuffield's Council of Bioethics' Intervention Ladder, these policy recommendations cover the spectrum of less intrusive to more intrusive policies. From a population perspective, less intrusive policy recommendations enable individual choice in behavior change (e.g. promoting physician counseling and the use of exercise in prescriptions) or guide choice by changing norms/ standards to healthier options (e.g. changing the infrastructure and designs of

communities to encourage physical activity).[10] On the other hand, more intrusive policies guide

choice through the use of disincentives/incentives (e.g. develop taxes and subsides to help

Canadians of lower socio-economic status choose healthy lifestyle options), restrict or

completely eliminate population freedom to choose (e.g. prohibit the use of partially

hydrogenated oils to minimize trans-fat content in food).[10]

To our knowledge, only six previous studies have examined Canadian public support of public

health policies.[11-16] These studies primarily assessed support of specific types of policies (e.g.

weight discrimination reduction and nutrition policies).[11,13-16] These limited studies have not

assessed public support of public health policy recommendations addressing both child and adult

Canadian obesity rates in a Canadian representative sample. The assessment of a Canadian

representative sample is essential seeing as Federal public health policies impact the

health behaviors of the entire Canadian population. To date, no studies have specifically

examined support or opposition of the 2016 Obesity Report policy recommendations.

Studies conducted both in Canada and internationally reported that the attribution of obesity to

causes beyond the control of the individual (e.g. genetics) was associated with the greatest

support of public health policies.[17-20] Attributing obesity to causes *within* the individual's control

contributes to weight bias.[21] Although Canadians support the implementation of specific laws to

prohibit weight discrimination (the behavioural manifestation of weight bias), it is unknown if

explicit weight bias negatively influences Canadian public perceptions of the 2016 Obesity

Report policy recommendations.[11] Research is needed to understand the influence of explicit

weight bias on public health policy support.

The purpose of this study was to examine: (1) explicit weight bias, (2) public support of the Canadian Federal Government's public health policy recommendations to address obesity, and (3) the association between explicit weight bias and policy support in Canada. We hypothesize that overall, the Canadian public will support the policy recommendations included in the Obesity Report. Based on the previous literature, we hypothesize that individuals with higher explicit weight bias scores will be more likely to support *less intrusive* policy recommendations and less likely to support *more intrusive* policy recommendations.

Methods

Study Design: Cross-sectional study.

Procedure and participants

Data were obtained from a cross-sectional representative sample from a research panel coordinated by Survey Sampling International (SSI), a market research company. Quotas based on age, gender and province of residence allowed for a close approximation of Canadian census demographics.[22] Participants over the age of 18 years old were eligible to partake in this online study and were contacted via email. The 20-minute survey was hosted on SurveyMonkey. This research study received ethical approval from the Concordia University Research Ethics Board (Ethics certification number: 30009752). All participants completed an informed consent form.

Measures

Demographic questionnaire

The demographic questionnaire included items assessing age, gender, race, and annual household income.

Explicit weight bias

To assess explicit weight bias, Crandall's 13-item Anti-Fat Attitudes Questionnaire (AFA) was used.[23] The AFA consists of three subscales, *Dislike* (n=3 items), *Fear of Fat* (n=3 items) and *Willpower* (n=7 items). The *Dislike* subscale assesses antipathy towards individuals with obesity (e.g., I really do not like fat people much). The *Fear of Fat* subscale assesses emotions towards weight gain (e.g., I feel disgusted with myself when I gain weight) and the *Willpower* subscale assesses perceptions that weight gain is within the individual's personal control (e.g., some people are fat because they have no willpower). Responses were rated on a 10-point Likert scale (0=very strongly disagree, 9=very strongly agree). Higher scores in each subscale are indicative of greater weight bias attitudes. Cronbach's alpha for the *Dislike*, *Fear of fat* and *Willpower* subscales were 0.88, 0.85 and 0.82, respectively.

Support of public health policies

Participants indicated their level of support or opposition of 15 different public health policy recommendations included in the Obesity Report. Policy support was assessed on a 4-point Likert scale (1= strongly oppose, 4= strongly support). For analysis purposes, support responses ("strongly support", "support") were collapsed together and compared with opposition responses ("strongly oppose", "oppose"). Phrasing of the policies was reworded to increase readability and reduce participant burden. All items were pilot-tested three times among approximately 100 participants in order. University students *n*= 4 completed paper copies of the survey during the first pilot test. The second round of pilot testing involved *n*= 12 Canadian adults who completed the survey online using the SurveyMonkey platform. The final pilot test involved a sample of our target population (*n*= 84 Canadian adults) recruited by SSI. Unlike the data collected during the final pilot test, survey responses obtained from adults who participated in the first and second

pilot tests were not analyzed because participant data were not collected. Rather, these participants were specifically instructed to provide the researchers with information on phrasing and wording that was difficult to understand.

Data Analysis

Statistical analyses were conducted using SPSS version 24. Pearson correlations were conducted to examine the relationships between the three explicit weight bias subscales. Finally, to investigate the association between explicit weight bias and support for each policy recommendation, logistic regressions adjusting for age (18-44 vs. $\geq$ 45 years), race (Caucasian vs. Other), income ($\leq$ $24,999 vs. $\geq$ $25,000) and gender (Male vs. Female) were conducted.

Results

In total, 1,006 participants completed the survey between Oct 15th and Oct 26th, 2018. Three participants were removed from data analysis due to unreliable and illogical survey responses, resulting in a final sample of 1,003 (Table 1). The *Willpower* mean score was 4.9 (2.1) compared to *Dislike* [2.6 (1.9)] and *Fear of fat* [3.0 (2.1)]. The *Willpower* subscale was significantly positively associated with both the *Dislike (*r =0.3; *P* < 0.001*)* and *Fear of fat (*r =0.6; *P* < 0.001*)* subscales while the *Dislike* subscale was significantly positively associated with the *Fear of fat (*r=0.7; *P* < 0.001*)* subscale.

The percentage of participants who supported each of the 15 public health policy recommendations is presented in Table 2. Overall, Canadian public support of the 15 policy recommendations ranged from 53.1% to 90.4%. The majority of policies (n= 9, 60%) received strong endorsement (84.0% - 97.5% support). All strongly supported policies (n= 9) were policies categorized as *less intrusive,* such as encouraging improved training for physicians

regarding diet and physical activity (90.4%) and encouraging the use of nutrition labelling on menus and menu boards in food service establishments (89.3%). The remaining six policies received moderate endorsement (50.0% - 83.7% support). The majority of these moderately endorsed policies (n= 4, 67%) were categorized as *more intrusive* [e.g. prohibiting the advertising and promotion of food and beverages to children (66%), and taxing sugar and artificially sweetened beverages (53.1%)].

Table 3 presents adjusted logistic regression results. Higher mean scores on the *Willpower* subscale was significantly associated with a greater likelihood of support of 10/15 policies. Eight out of ten of these policies were *less intrusive* policies (e.g. changing infrastructure to encourage physical activity, OR=1.28, CI=1.14-1.43, *P* < 0.01). A higher *Dislike* score was significantly associated with a greater likelihood of supporting one *less intrusive* policy and two *more intrusive* policies (e.g. taxation of sugar and artificially sweetened beverages, OR=1.19, CI=1.08-1.31, *P* < 0.01). On the other hand, increases in the *Fear of fat* subscale score was significantly associated with a decreased likelihood of supporting two *less intrusive* policies (e.g. mandating the use of front-of-package nutrition labelling, OR=0.82, CI=0.73-0.94, *P* < 0.01).

Discussion

The present study is the first to assess explicit weight bias and to examine public perceptions of the 2016 Obesity Report policy recommendations in a Canadian representative public sample of adults. Compared to disliking individuals with obesity and fearing weight gain, the Canadian public highly perceived weight gain to be within the individual's personal control based on their willpower. As all policies were either strongly or moderately endorsed, results illustrate relatively small variation in Canadian public readiness to adopt the 15 policy recommendations. Nevertheless, participants report the greatest support for *less intrusive* policies that enable

individual choice, and lower support for *more intrusive* policies. Explicit weight bias was differentially associated with support of these policies. While believing individuals with obesity lack willpower was associated with support of 10 policies (the majority of which were *less intrusive* policies), greater fear of weight gain was associated with a decreased support of *more intrusive* policies.

To our knowledge, this study is the first to assess explicit weight bias attitudes using three different subscales (*Dislike, Willpower* and *Fear of fat*) in a Canadian representative public sample. Canadian support of public health policies that place more responsibility on the individual (i.e. *less intrusive* policies) reflects prevalent Canadian perceptions that weight gain is within the individual's personal control. The majority (55%) of a Danish representative sample (N= 1,141, aged 20-70) agreed that "If fat people really wanted to lose weight, they could".[24] Similarly, large samples (N=2,179) across the US, Canada, Iceland and Australia reported moderate to high perceptions that weight gain is within the individual's personal control.[7] In this previous study, an unrepresentative sample of Canadian adults reported the lowest *Willpower* mean scores (4.6) compared to adults from the US (6.3) and Iceland (6.3) respectively.[7] In comparison, the current study reported a mean score of 4.9 in the *Willpower* subscale in our Canadian representative sample. The lower *Willpower* mean subscale score (4.6) reported in the previous study could be attributed to the fact that 83% of Canadian participants were female and women have a tendency to endorse lower levels of weight bias compared to men.[7] A multinational study which assessed dislike of individuals with obesity reported that adults (N= 4,283, 79% from the US) from Australia, the US, Britain, Canada moderately preferred thinner people to individuals with overweight and obesity.[25] Canadians in the current study reported low levels of aversion to individuals with obesity; demonstrated in a *Dislike* mean subscale score of

2.6 evaluated on a 10-point Likert scale. Although Canadians believe that individuals with obesity are responsible for their weight gain, such perceptions do not seem to translate into a dislike and hatred of individuals with obesity.

The findings of this study are consistent with the limited existing literature assessing public support of public health policies aimed at addressing obesity.[12,18,26,27] However, as policy types assessed in previous studies were similar (but not identical), the overall range of support varied between studies. For example, Barry et al. (2009) reported that American public support of policies aimed at addressing obesity ranged from 24.6% to 68.3%,[18] noticeably less supportive of policies compared to our more recent Canadian sample.[18] Similarly, a more recent 2012 Canadian replication of the Barry et al. (2009) study reported that Canadian young adults (N= 521, mean age 20) support of *more intrusive* policy recommendations ranged from 37.8% to 78.9%.[12] Based on our findings that the public is less supportive of *more intrusive* policies, we speculate that the lower support reported in these two previous studies may be attributed to the types of policies assessed. Indeed, the current sample's support for more intrusive policies (e.g. taxation of sugar and artificially sweetened beverages) is consistent with prior studies.[12,18,26,27] Previous research involving Canadian youth, age 16-30 years old, also reported similar high support of *less intrusive* nutrition policy compared to *more intrusive* policies.[15]

The current study's results suggest similarities between the Canadian public and Canadian key policy makers. In 2014, Raine et al. (2014) surveyed key policy influencers' support of proposed policies aimed at addressing obesity and found nearly unanimous support (80% - 99% support) for less intrusive individual-focused policies (e.g. provide programs to educate the general public about the importance of regular physical activity).[28] Raine et al. (2014) also reported weak

endorsement of restrictive *more intrusive* policies. Our findings also indicated strong public endorsement of these types of *less intrusive* policies and weaker endorsement of *more intrusive* restrictive policies. Similarities in Canadian key policy influencer and Canadian public support of public health policies may perhaps be attributed to similar perceptions of personal responsibility for obesity. For instance, Raine et al. (2014) reported that 55.5% of key policy influencers viewed obesity as a personal responsibility while only 1.7% viewed obesity as a societal responsibility.[28] Our study findings concerning the *Willpower* subscale of explicit weight bias indicate that similar views are held by the Canadian public. Since both key policy influencers and the public view obesity as a personal responsibility, support of public health policies that place responsibility on the individual by enabling and guiding individuals to change their behaviours (i.e. *less intrusive* policies) is to be expected. Nevertheless, the Raine et al. study was conducted in a small subsample of policymakers (from Manitoba and Alberta only). Future studies should utilize a larger sample of key policy influencers representing the 13 Canadian provinces and territories and investigate whether the relationship between explicit weight bias and policy support also exists in a larger sample of key policy influencers across the country.

Seeing as current study findings indicate that the Canadian public highly perceived weight gain to be within the individual's personal control, it is understandable that *Willpower* was significantly associated with support of 10/15 policies in the present study. Previous studies have reported that one of the strongest predictors of public support of policies aimed at addressing obesity was beliefs about the etiology of obesity.[18,26] Low-level individual blame was positively related to support of compensatory policies (i.e. policies directed towards helping or protecting society) that are considered *more intrusive* such as requiring warning labels of foods with high sugar or fat content.[12,17,18,26] However, in our study, *Willpower* was positively associated with

support of primarily *less intrusive* policies whereas other studies reported a negative association between *Willpower* and support of *more intrusive* policies. We speculate that the overall level of policy support reported by the Canadian public reflects perceptions that obesity is a significant health issue that warrants governmental intervention. However, public weight bias attitudes influence the extent to which the public wants the government to intervene. Specifically, Canadians who attribute obesity to a lack of willpower endorse public health policies that place more responsibility on the individual by enabling and guiding individuals to change their own behaviours (i.e. *less intrusive* policies). Perhaps Canadians who blame individuals with obesity do *not* favourably weigh improvements in population obesity rates against the loss of liberty that comes with the implementation of *more intrusive* policies.[10]

Considering the aforementioned studies on public perceptions in Canada and around the world demonstrate views that obesity is attributable to personal responsibility, a change in public understanding and perceptions of obesity etiology is necessary.[7,24] Knowing that strong beliefs of personal responsibility of obesity are related to holding weight bias attitudes, government should intervene with aims of facilitating such a change in public perceptions of obesity by endorsing public health messages that emphasize the complexity of obesity and the influence of external factors (e.g. genetic and food environment) on obesity development and progression.[7,21] Weight bias reduction interventions which aim to reduce individual blame for obesity by targeting beliefs regarding obesity etiology effectively decreased weight bias in a sample of Australian undergraduate students.[29] Future research should consider evaluating the effects of weight bias reduction interventions focusing on the complexity of obesity etiology and the difficulty of individual weight control among the public. Specifically, studies should examine the influence of such interventions on explicit weight bias and public support of governmental interventions to

address obesity. In addition, future studies should extend the current study by assessing whether Canadian public experiences of weight bias influence their support of public health policies.

This paper has several strengths. The assessment of all three subcomponents of explicit weight bias (*Willpower*, *Dislike*, and *Fear of fat)* in a large Canadian representative public sample provides a comprehensive understanding of negative attitudes towards people living with obesity and the role each subcomponent plays in the relationship between weight bias and public policy support. Previous studies often only examined one subscale of explicit weight bias while others did not consider representative samples of the country of interest.[7,12,17,18,24,26] To date, few studies have assessed Canadian public support of public health policies aimed at addressing obesity. In fact, this study is the first to utilize a large Canadian representative sample to assess public support of the new 2016 Senate obesity recommendations from the Canadian Federal Government. The classification of the types of policies, into *less intrusive* and *more intrusive* policies provided insight into the category of policies that are most supported by the Canadian public.

With regards to limitations, the current study relies on participants' self-reported attitudes and beliefs which are susceptible to socially desirable responding. Although the 2016 Canadian Obesity Report included 21 policy recommendations aimed at preventing obesity, our study only assessed 15 out of the 21 recommendations. Six of the excluded policy recommendations required participants to have specialized knowledge on obesity or were redundant with the remaining policies. A notable strength of the current study was that our sample was an accurate representation of the Canadian public in terms of age, sex and province of residence. However, compared to the Canadian 2016 Census results, our sample demographics suggest an

underrepresentation of people with low household income and an over-representation of Caucasian Canadians.

The present study contributes to evidence-informed public health action by emphasizing the importance of considering the public voice. Although such evidence informs public policy development and implementation, the results presented herein do not suggest the exclusive implementation of policy recommendations that received strong public endorsement. It is not only important to consider public acceptability of public policy, but the policies implemented must also be evidence-based and have the potential to effectively improve health behaviours. In the future, an evaluation of the effectiveness of the implemented public health policies in changing population health behaviours and addressing obesity rates is warranted.

Authors and contributors: All authors were involved in the conception and design of this study.

The first author was responsible for the acquisition of data, conducting the data analysis and

interpreting the results with guidance from the second and third authors. The first author drafted

the manuscript which was revised and edited by the second and third authors. All authors

approved the final version of this manuscript.

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RESULT TABLES

Table 1. Demographic characteristics of study sample

Characteristic	Total Sample (N=1003)
Gender, No. (%)	
Female	510 (50.8)
Male	479 (47.8)
Age, No. (%)	
18-44	470 (47.3)
45 or older	523 (52.7)
Race/ethnicity, No. (%)	
Caucasian/White	733 (73.1)
Other	260 (25.9)
Annual household income, No. (%)	
$\leq$ $24,999	186 (18.5)
$\geq$ $25,000	809 (80.7)
Weight bias subscale score [mean (SD)]	
Willpower	4.9 (2.1)
Fear of fat	3.0 (2.1)
Dislike	2.6 (1.9)

Table 2. Canadian Public Support of Public Health Policies

Policy	Policy Category	Support (%)[a]
Strong Endorsement (84.0% - 97.5%)		
Encourage improved training for physicians regarding diet and physical activity	Less intrusive (enable choice)	90.4
Require that the daily intake value for protein be included in the Nutrition Facts table	Less intrusive (enable choice)	89.7
Implement campaigns to increase public awareness of healthy active lifestyles and healthy eating	Less intrusive (educate)	89.3
Encourage the use of nutrition labelling on menus and menu boards in food service establishments	Less intrusive (enable choice)	89.3
Revise Canada's food guide to include meal-based guidelines	Less intrusive (educate)	89.4
Implement breakfast and lunch programs at school and childcare facilities and programs that improve physical activity, and nutrition literacy	Less intrusive (enable choice)	88.1
Promote the Canadian Physical Activity Guidelines of 60 minutes of moderate to vigorous-intensity physical activity per day for children and 150 minutes of moderate to vigorous-intensity physical activity per week for adults	Less intrusive (educate)	87.5
Change the infrastructure and designs of communities to encourage physical activity	Less intrusive (enable choice)	86.0
Promote physician counseling and the use of exercise in prescriptions	Less intrusive (enable choice)	84.6
Moderate endorsement (50.0% - 83.7%)		
Mandate the use of front-of-package nutrition labelling	Less intrusive (enable choice)	83.7
Prohibit the use of partially hydrogenated oils to minimize trans-fat content in food	More intrusive (eliminate choice)	81.5
Strictly limit the use of permitted health claims and nutrient content claims on packaged foods	Less intrusive (enable choice)	76.2

Develop taxes and subsides to help Canadians of lower socio-economic status choose healthy lifestyle options	More intrusive (incentives/ disincentives)	72.1
Prohibit advertising and promotion of food and beverages to children	More intrusive (eliminate choice)	66.0
Taxation of sugar and artificially sweetened beverages	More intrusive (incentives/ disincentives)	53.1

[a] Support is defined as the percentage of respondents who selected "strongly support" or "support" for a specific policy.

Note: Policy categories are based on the Nuffield Council of Bioethics' Intervention Ladder.[10] *Less intrusive* policies educate, enable choice in behavior change or guide population choice by changing norms while *more intrusive* policies eliminate, restrict or guide choice with the use of incentives/disincentives. Compared to less intrusive policies, *more intrusive* policies place greater restrictions on population choice in behavior change.[10]

Table 3. Correlates of Public Health Policy Support

Public Health Policy	Willpower		Fear of fat		Dislike	
	OR	95%CI	OR	95%CI	OR	95%CI
Prohibit advertising and promotion of food and beverages to children	0.97	0.90-1.04	1.08	0.98-1.19	1.11	1.00-1.23
Implement breakfast and lunch programs at school and childcare facilities and programs that improve physical activity, and nutrition literacy	1.19*	1.05-1.35	0.86	0.74-1.00	0.95	0.82-1.10
Revise Canada's food guide to include meal-based guidelines	1.11	0.98-1.26	0.89	0.77-1.05	1.04	0.89-1.22
Prohibit the use of partially hydrogenated oils to minimize trans-fat content in food	1.16*	1.06-1.28	1.07	0.94-1.21	0.98	0.85-1.10
Mandate the use of front-of-package nutrition labelling.	1.10	0.99-1.21	0.82*	0.73-0.94	1.22*	1.07-1.39
Strictly limit the use of permitted health claims and nutrient content claims on packages foods.	0.98	0.90-1.07	1.01	0.90-1.12	1.11	0.99-1.24
Encourage the use of nutrition labelling on menus and menu boards in food service establishments.	1.28*	1.13-1.46	0.77*	0.66-0.90	1.09	0.93-1.27
Change the infrastructure and designs of communities to encourage physical activity.	1.28*	1.14-1.43	0.94	0.81-1.09	1.06	0.91-1.23
Require that the daily intake value for protein be included in the Nutrition Facts table.	1.35*	1.17-1.55	0.85	0.72-1.01	0.96	0.80-1.13
Encourage improved training for physicians regarding diet and physical activity.	1.28*	1.11-1.47	1.00	0.84-1.20	0.91	0.76-1.09
Promote physician counseling and the use of exercise in prescriptions.	1.15*	1.04-1.27	0.90	0.79-1.03	1.10	0.96-1.26
Taxation of sugar and artificially sweetened beverages.	1.00	0.93-1.07	1.01	0.92-1.11	1.19*	1.08-1.31
Develop taxes and subsides to help Canadians of lower socio-economic status choose healthy lifestyle options.	1.10*	1.01-1.20	1.00	0.90-1.11	0.97	0.87-1.08

	OR	CI	OR	CI	OR	CI
Implement campaigns to increase public awareness of healthy active lifestyles and healthy eating.	1.22*	1.07-1.39	0.87	0.74-1.02	0.99	0.84-1.16
Promote the Canadian Physical Activity Guidelines of 60 minutes of moderate to vigorous-intensity physical activity per day for children and 150 minutes of moderate to vigorous-intensity physical activity per week for adults.	1.22*	1.09-1.37	1.02	0.87-1.19	0.95	0.81-1.10

Logistic regression analyses exploring the relationship between explicit weight bias and public health policy support (support/strong support vs oppose/strongly oppose) after adjusting for age (18-44 vs. > 45 years), race (Caucasian vs. Other), income ($\leq$ \$24,999 vs. $\geq$ \$25,000) and gender (Male vs. Female). OR= Odd ratios, CI= Confidence intervals, *= $P < 0.05$

3.1 Additional Results

This section describes findings that were not included in Manuscript 1. These additional results do not directly address our primary research questions and objectives but contribute to our understanding of the relationships between weight bias and public policy support.

3.11 Thematic analysis results

Table 5 presents the results of the thematic analysis. Two overarching themes were identified from the thematic analysis: *less* and *more intrusive* policies, consistent with Nuffield's conceptualization [27]. These themes reflect the degree to which policies influence population choice in behavior change. *More intrusive* policies (i.e. policies at the higher rungs of the Intervention Ladder) restrict and eliminate population freedoms to a greater extent than *less intrusive* policies. Within each overarching theme, additional subthemes were identified. Each subtheme emphasizes the different types of policies that fall within the *more* and *less intrusive* policy categories. The following *more intrusive* subthemes were identified: (1) eliminate choice, and (2) incentives/disincentives. In contrast, within the *less intrusive* theme, the following subthemes were identified: (1) enable choice and (2) educate.

3.1.2 Factor analysis results

Table 6 presents the results of the factor analysis and illustrates the factor loading patterns. The majority of policy recommendations (10) have large to moderate positive loadings on Factor 2 with weaker positive and negative loadings on Factor 1. These ten policies were therefore better correlated with latent variable Factor 2 compared to the latent variable Factor 1. On the other hand, three policy recommendations have large to moderate positive loadings on Factor 1 with weaker loadings on Factor 2. These three policies were therefore better correlated with latent variable Factor 1 compared to latent variable Factor 2. However, two polices, (1) strictly limit the use of permitted health claims and nutrient content claims on packages foods and (2) prohibit the use of partially hydrogenated oils to minimize trans-fat content in food, were

equally weakly correlated to both factors. These policies did not load better on one latent variable and therefore cannot be grouped with either factor. The results of the factor analysis provide some justification for the themes identified by the thematic analysis where polices were categorized according to their level of intrusiveness, *less* and *more intrusive* policies.

3.1.3 Explicit weight bias and support of more and less intrusive policies

Table 7 presents the results of logistic regressions examining the relationship between each of the three explicit weight bias subscales, W*illpower, Dislike* and *Fear of fat*, and support of the two main types of policies identified by the thematic analysis (*more and less intrusive policies*). Although this analysis was not identified apriori as an objective, we thought it was important to report these results to help explain our primary analyses.

The results of this additional analysis indicate significant associations between certain explicit weight bias subscales and support of exclusively *less intrusive* policies. Higher mean scores on the *Willpower* subscale was significantly associated with a greater likelihood of supporting *less intrusive* policies (OR=1.15, CI=1.06-1.25, $P < 0.01$). Although *Fear or fat* was also significantly associated with *less intrusive* policies, increases in *Fear of fat* subscale score was significantly associated with a decreased likelihood of supporting *less intrusive* policies (OR=0.89, CI= 0.80-0.99, $P < 0.05$). There were no significant associations between each of the three explicit weight bias subscales and support of *more intrusive* policies.

3.2 Additional Results Tables

Table 4. Participant baseline characteristics

Characteristic	Total Sample (N=1,003)	Canadian Demographics [a] (N= 35,151,728)
Gender, No. (%)		
Female	510 (50.8)	50.5
Male	479 (47.8)	49.5
Age, No. (%)		
18- 44	114 (46.9)	47.3
45 or older	523 (52.7)	52.7
Race/ethnicity, No. (%)		
Caucasian/White	733 (73.1)	57.1
Other	260 (25.9)	36.9
Annual household income, No. (%)		
$\leq$ \$49,999	464 (46.2)	74.4
$\geq$ \$50,000	531 (52.9)	25.6
Weight, mean (SD), kg	79.3 (23.2)	
Height, mean (SD), m	1.7 (0.12)	
BMI, mean (SD), kg/m^2	27.3 (7.0)	
Weight bias subscale score, mean (SD)		
Willpower	4.9 (2.1)	
Fear of fat	3.0 (2.1)	
Dislike	2.6 (1.9)	

Note: [a] Canadian demographics are based on results from the 2016 Canadian Census. Canadian demographics on sex, age and province of residence were obtained from SSI and used to generate combined quotas [46].

Table 5. Thematic Analysis: Categorization of Obesity Report Policy Recommendations

Policy	Themes (subthemes)
Encourage improved training for physicians regarding diet and physical activity	Less intrusive (enable choice)
Implement campaigns to increase public awareness of healthy active lifestyles and healthy eating	Less intrusive (educate)
Encourage the use of nutrition labelling on menus and menu boards in food service establishments	Less intrusive (enable choice)
Revise Canada's food guide to include meal-based guidelines	Less intrusive (educate)
Implement breakfast and lunch programs at school and childcare facilities and programs that improve physical activity, and nutrition literacy	Less intrusive (enable choice)
Promote the Canadian Physical Activity Guidelines	Less intrusive (educate)
Change the infrastructure and designs of communities to encourage physical activity	Less intrusive (enable choice)
Promote physician counseling and the use of exercise in prescriptions	Less intrusive (enable choice)
Require that the daily intake value for protein be included in the Nutrition Facts table	Less intrusive (educate)
Mandate the use of front-of-package nutrition labelling	Less intrusive (enable choice)
Prohibit the use of partially hydrogenated oils to minimize trans-fat content in food	More intrusive (eliminate choice)
Strictly limit the use of permitted health claims and nutrient content claims on packaged foods	Less intrusive (enable choice)
Develop taxes and subsides to help Canadians of lower socio-economic status choose healthy lifestyle options	More intrusive (incentives/ disincentives)
Prohibit advertising and promotion of food and beverages to children	More intrusive (eliminate choice)
Taxation of sugar and artificially sweetened beverages	More intrusive (incentives/disincentives)

Note: Thematic analysis organizing the 15 policy recommendations into different themes and subthemes; highlighting the different types of policies. Each subtheme corresponds with the rungs of the Nuffield's Council on Bioethics' Intervention Ladder.

Table 6. Factor Analysis: Categorization of Obesity Report Policy Recommendations

Policy	Factor 1 (More Intrusive)	Factor 2 (Less Intrusive)
Taxation of sugar and artificially sweetened beverages.	**0.688**	-0.099
Prohibit advertising and promotion of food and beverages to children.	**0.473**	0.107
Develop taxes and subsides to help Canadians of lower socio-economic status choose healthy lifestyle options.	**0.373**	0.193
Prohibit the use of partially hydrogenated oils to minimize trans-fat content in food.	0.236	0.316
Strictly limit the use of permitted health claims and nutrient content claims on packaged foods.	0.263	0.213
Mandate the use of front-of-package nutrition labelling.	0.188	**0.387**
Promote the Canadian Physical Activity Guidelines	0.034	**0.512**
Change the infrastructure and designs of communities to encourage physical activity.	0.065	**0.531**
Revise Canada's food guide to include meal-based guidelines	0.090	**0.527**
Implement breakfast and lunch programs at school and childcare facilities and programs that improve physical activity, and nutrition literacy.	0.014	**0.566**
Encourage the use of nutrition labelling on menus and menu boards in food service establishments.	-0.002	**0.603**
Encourage improved training for physicians regarding diet and physical activity.	-0.002	**0.605**
Promote physician counseling and the use of exercise in prescriptions.	0.087	**0.531**
Require that the daily intake value for protein be included in the Nutrition Facts table.	-0.180	**0.716**
Implement campaigns to increase public awareness of healthy active lifestyles and healthy eating.	0.316	**0.648**

Note: Confirmatory factor analyses exploring the relationships between the 15 policy recommendations and two factors (i.e. latent variables). Each value represents a factor loading and indicates the magnitude of the correlation between support of each policy and each factor. Policy items more closely correlated with the same factor are grouped together and bolded under that specific factor. For example, the factor loadings of the first three policies bolded underneath Factor 1 (more intrusive) indicate that each of those policies were more closely related to Factor 1 (more intrusive) because their factor loadings are closer to 1.

Table 7. Associations between explicit weight bias subscale score and support of the two types of policy, *more intrusive and less intrusive policies*

Policy Type	Willpower		Fear of fat		Dislike	
	OR	95%CI	OR	95%CI	OR	95%CI
More Intrusive Policies	1.05	0.97-1.13	1.03	0.94-1.14	1.09	0.99-1.20
Less Intrusive Policies	1.15**	1.06-1.25	0.89*	0.80-0.99	1.05	0.95-1.17

Note: Logistic regression analyses exploring the relationship between explicit weight bias and public health policy support (support vs oppose) of two types of policies after adjusting for age (18-44 vs. > 45 years), race (Caucasian vs. Other), income ($\leq$ \$24,999 vs. $\geq$ \$25,000) and gender (Male vs. Female). Support of *more intrusive* policies was defined as supporting $\geq$ 10 out of 11 *more intrusive* polices while opposition of *more intrusive* polices was defined as supporting < 10 out of 11 *more intrusive* polices. Support of *less intrusive* policies was defined as supporting $\geq$ 3 out of 4 *less intrusive* polices while opposition of *less intrusive* polices was defined as supporting < 3 out of 4 *more intrusive* polices. OR= Odd ratios, CI= Confidence intervals, **= *P < 0.01, *= P< 0.05.*

CHAPTER 4: DISCUSSION

4.0 Discussion

The purpose of this study was to assess Canadian public support of the 15 policy recommendations proposed in the 2016 Obesity Senate Report and to explore the relationship between explicit weight bias and support of each policy recommendation. The primary outcomes are discussed at length in Manuscript 1. However, this discussion section focuses on the supplementary results that were conducted but were not included in Manuscript 1.

As discussed above, a thematic analysis was conducted to separate the 15 policy recommendations into groups; highlighting the different types of public health policies. To further justify the results of our qualitative thematic analysis, a quantitative factor analysis was also conducted. The majority of the 15 policy recommendations were grouped similarly by both the thematic analysis and the factor analysis. However, two polices identified by the thematic analysis as *more intrusive* policies including: (1) strictly limit the use of permitted health claims and nutrient content claims on packaged foods and; (2) prohibit the use of partially hydrogenated oils to minimize trans-fat content in food, were equally weakly correlated to both factors in the factor analysis and therefore could not be grouped exclusively with either factor.

After categorizing the 15 policy recommendations, additional logistic regressions were conducted to investigate the relationship between explicit weight bias and support of the two main policy categories identified by the thematic analysis (*more* and *less intrusive* policies). Unlike the results reported in Manuscript 1 which reflect an examination of the relationship between explicit weight bias and support of each policy recommendation, the results of these logistic regressions provide more insight on how explicit weight bias influences support of specific types of policies *(more* or *less intrusive*). The findings of this analysis indicate associations between explicit weight bias and support of *less intrusive* policies. A higher *Willpower* mean score, which indicates greater weight bias attitudes, was significantly associated with a greater likelihood of supporting *less intrusive* policies. This result supports both our hypothesis and the outcome of our primary analysis which showed that *Willpower* was positively associated with support of 10 policies; the majority of which were *less intrusive* policies. This association between *Willpower* subscale score and support of *less intrusive* policies is understandable seeing as *Willpower* subscale mean score (4.9) was higher compared to the mean scores of the other two subscales (*Dislike* and *Fear of fat*) (3.0 and 2.6). Compared to disliking

individuals with obesity and fearing weight gain, the Canadian public highly perceived weight gain to be within the individual's personal control based on their willpower. Speculation as to why *Willpower* was associated with *less intrusive* policies is discussed in Manuscript 1 seeing as this result was also an outcome of our primary analysis.

Seeing as Manuscript 1 does not include a discussion of the *Fear of fat* subscale mean score, I have decided to expand on the *Fear of fat* results in this discussion. In our Canadian public sample, the *Fear of fat* mean subscale score was 3.0 evaluated on a 10-point Likert scale. This low score indicated that *Fear of fat* was not highly prevalent in our Canadian public sample. However, a large study involving 31, 636 participants from the Netherlands reported that approximately 74% of women between the ages of 16 and 25 expressed some degree of fear of gaining weight [57]. Lower prevalence rates of fear of weight gain were reported in males, and females over the age of 65 [57]. Perhaps, similarly, in Canada, *Fear of fat* is highly prevalent in only a small proportion of the Canadian public, young females, and this high prevalence is overshadowed when only considering the mean scores of the overall sample (not gender and age specific).

To our knowledge, previous research has not investigated the relationship between *Fear of fat* and support of public health policies. In our study, increases in *Fear of fat* subscale score was significantly associated with a decreased likelihood of supporting *less intrusive* policies. Although this *Fear of fat* finding somewhat supports our primary outcome of a negative association between *Fear of fat and two policies: (1) more intrusive* and (2) *less intrusive*, our hypothesis of a positive association was not supported. Fear is considered an emotion that is related to avoidance of a stimulus, in this case weight gain [58]. One argument postulates that individuals with obesity represent a feared "possible self" (i.e. what people are afraid of becoming) [59, 61]. Possible selves are defined as "cognitive components of hopes, fears, goals, and threats" [59]. They are "selves" to be approached or avoided in the future [59]. If individuals who fear weight gain perceive *less intrusive* policies to be ineffective in aiding their "avoidance" of weight gain, we speculate that these individuals would not support *less intrusive* policies.

In terms of the *Dislike* subscale, a Danish study demonstrated a small direct effect of *Dislike* on public support of a *less intrusive* policy, informational campaigns aimed at addressing obesity [37]. However, our results demonstrated that a higher *Dislike* score was not associated with a greater likelihood of supporting either *more intrusive* or *less intrusive*

policies. This result did not support our hypothesis of a positive association between *Dislike* and support of less *intrusive* policies, and a negative association between *Dislike* and *more intrusive* policies. We speculate that associations between the explicit weight bias subscales and *more intrusive* policies were not detected because only a small number of policies ($n=$ 4), were classified as *more intrusive* policies. The remaining 11 policies were classified as *less intrusive* policy recommendations.

In the future, research should further examine the differential associations between Canadian public perceptions of *more* and *less intrusive* public health policies and weight bias. Specifically, researchers should utilize qualitative methods such as focus groups and interviews to gain a deeper and richer understanding of the rationale behind public perceptions of *more* and *less intrusive* public health policies.

CHAPTER 5: CONCLUSION

5.0 Conclusion

Few studies have assessed Canadian public perceptions of Federal public health policies. Although the government enforces policy action, the public also has a critical role to play by inspiring and advocating for certain issues to be given political consideration [28]. The dissemination of our study results comes at a pivotal time as the Senate has commenced implementation of the 2016 Obesity Report policy recommendations. For instance, in February 2019, the government released the new Canadian Food Guide, a recommendation that was proposed in the 2016 Obesity Report [60]. Our assessment of public support informs policy prioritization by indicating the specific types of polices aimed at addressing obesity that the public is ready to adopt.

Study findings which indicate strong Canadian public endorsement of *less intrusive policies* that place more responsibility on the individual reflect prevalent Canadian explicit weight bias attitudes. Although the evidence acquired from this thesis informs public policy development and implementation, we do not simply suggest the implementation of only policy recommendations that received strong public endorsement. It is not only important to consider public acceptability of public policy, but the policies implemented must also be evidence-based and have the potential to significantly improve population obesity rates. Exclusively implementing *less intrusive* public health policies is not an effective approach to addressing obesity because the complex and multifactorial nature of obesity (e.g. physiological, genetic, and environmental factors) requires a multifaceted approach [61]. In addition, the exclusive implementation of *less intrusive* policies may further reinforce public weight bias beliefs that obesity is within the control of the individual. Future research should evaluate the effectiveness of implemented public health policies in changing population health behaviours and addressing obesity rates.

Our study demonstrated that explicit weight bias is associated with support and opposition of governmental public health policies addressing obesity. Perceptions that weight gain is within the individual's personal control (i.e. *Willpower)* was positively associated with support of 10 policies, primarily *less intrusive* policy recommendations. Improvements in public knowledge of the complex and multifactorial nature of obesity has the potential to improve population explicit weight bias attitudes [62]. Research has documented that the majority of the

Canadian and American public primarily attribute obesity to internal factors such as lack of willpower [14]. However, a recent shift in public perceptions of obesity etiology is demonstrated in an increase in the percentage of individuals who acknowledge the external factors that contribute to obesity development and progression (e.g. unhealthy food environment) [63]. Canadians have begun to see obesity as not solely a personal problem but rather as a community problem of poor food and physical activity environments [63]. Future research should develop, implement and assess the effectiveness of public weight bias reduction interventions that aim to improve Canadian public knowledge of obesity etiology. Similar to policies aimed at addressing obesity, it would be important to assess the effectiveness of weight bias reduction interventions that cover the spectrum of *less intrusive* (e.g. create public health campaigns that promote positive body diversity) and *more intrusive* (e.g. mandatory post-secondary curricula on weight-related issues for pre-service student teachers, health professionals, and public health practitioners) interventions [64]. It is essential that changes in public perceptions of obesity etiology are monitored and researchers investigate how these changes influence explicit weight bias and public perceptions of governmental interventions.

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APPENDIX

CERTIFICATION OF ETHICAL ACCEPTABILITY
FOR RESEARCH INVOLVING HUMAN SUBJECTS

Name of Applicant: Iyoma Edache

Department: Faculty of Arts and Science\Health, Kinesiology, and Applied Physiology

Agency: N/A

Title of Project: Canadian Public Support for Obesity Public Policies

Certification Number: 30009752

Valid From: July 20, 2018   To: July 19, 2019

The members of the University Human Research Ethics Committee have examined the application for a grant to support the above-named project, and consider the experimental procedures, as outlined by the applicant, to be acceptable on ethical grounds for research involving human subjects.

_____

Dr. James Pfaus, Chair, University Human Research Ethics Committee

INFORMATION FORM AND CONSENT

Title of research project:	**Canadian Public Support for Obesity Public Policies**
Primary Investigator (PI):	Iyoma Edache, B.Sc., M.Sc. Candidate, Department of Exercise Science, Concordia University
PI Contact Information:	Loyola campus SP building 7141 Sherbrooke St. West Science Pavilion, Room 165.26 Montreal, QC H4B 1R6 Phone: (514) 848-2424 x 5186
Supervisor:	Angela Alberga Ph.D., Researcher, Department of Exercise Science, Concordia University
Supervisor Contact Information:	Loyola campus SP building 7141 Sherbrooke St. West Science Pavilion, Room 165.31 Montreal, QC H4B 1R6 Phone: (514) 848-2424 x 3371
Source of funding for the study:	Concordia University Faculty of Arts and Science Research Start-up FRQ-S Chercheur Boursier Junior 1 Research Grant

1. Introduction.

We invite you to participate in this research project. However, before agreeing to participate, please take the time to read, understand and carefully consider the following information.

This form may contain words that you do not understand. We invite you to ask any questions you may have to the researcher responsible for the research project or a member of their research staff and ask them to explain any word or information that is not clear. The contact information of the primary research investigators can be found at the start of this document.

2. Nature and objectives of the research project.

The purpose of this research project is to assess public support or opposition of recommended obesity public policies. For this project, we expect to recruit approximately 1000 French and English-speaking Canadian adults over the age of 18.

3. How the research project will proceed.
3.1 Duration and number of visits.

Your participation in this research project will involve a one-time completion of a 30-45-minute online survey.

3.2 Nature of your participation.

The first section of the online survey will ask you to provide some personal information. Questions in the first section of the survey relate to personal information (age, race, sex, education, income etc.) and information about your health behaviours. In the second section of the survey, you will be asked questions on your attitudes and beliefs about weight. In the third section of the survey, you will be asked to indicate your level of support or opposition for a number of recommended obesity public policies.

4. Advantages associated with the research project.

By sharing your perceptions of recommended obesity public policies, you have the potential to influence future development and implementation of obesity public policies in Canada. This research gives participants an opportunity to express their support or opposition of different of obesity public policies that may be implemented in Canada.

5. Risks associated with the research project.

5.1 Risk of fatigue.

It is estimated that the entire survey will take 30-45 minutes to complete. This may cause fatigue for participants. If you feel tired at any time, you may stop and take a break. If you decide to take a break from the survey, as long as you do not close the survey webpage, you can continue answering the questions from where you left off.

5.2. Risk of psychological discomfort.

Some of the questions in the survey involve personal and sensitive information. You do not have to answer any questions that you are not comfortable with. If you consent to partake in this study, you can still submit an incomplete survey.

6. Confidentiality.

While you are taking part in this research project, the principal investigator of this project will collect information about you that is necessary to meet the scientific objectives of this research project. We will not allow anyone to access the information, except people directly involved in conducting the research**.** All the information collected will remain confidential to the extent provided by law.

The principal investigator of this research project will keep this research data for at least five years. The research data may be published or be the subject of scientific discussions, but it will not be possible to identify you.

7. Voluntary participation and possibility of withdrawal.

Your participation in this research project is voluntary. You are free to refuse to participate. You may also withdraw from this project at any time, without giving a reason, by simply **not** clicking the "submit" button to submit the completed survey.

If you submit an incomplete survey, the information already collected in the context of this project will nevertheless be kept, analyzed or used to ensure the integrity of the project.

8. Future research projects.

      By participating in this research, you are agreeing that your research data may be used to carry out other research projects. These research projects will be evaluated and approved by the Research Ethics Board at Concordia University prior to their realization. Please note that your research data will be kept securely by the researcher responsible for this research project on Concordia University's computer servers. Your research data will be retained for as long as it can be useful for the advancement of scientific knowledge. When it is no longer needed, your research data will be destroyed. Please note that at any time you may request that your research data not be used by contacting the researcher responsible for this research project.

      Your research data may be published or be part of scientific discussions, but it will not be possible to identify you.

9. Compensation.

      You will receive compensation for your participation from the market research company, Survey Sampling International.

10. Participant's Declaration

  Title of research project: **Canadian Public Support of Obesity-Related Public Policy**

I have read and understood this form. I have had the chance to ask questions and any questions have been answered. I agree to participate in this research under the conditions described.

By clicking the "Next" button below, you are consenting to partake in this research study.

If you have questions about the scientific or scholarly aspects of this research, please contact the primary investigator. Their contact information is on page 1.

If you have concerns about ethical issues in this research, please contact the Manager, Research Ethics, Concordia University, 514.848.2424 ex. 7481 or oor.ethics@concordia.ca.

"Next"

Anti-fat Attitudes Questionnaire [52]

Please indicate your level of agreement with each statement

| 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |

Very
strongly
disagree

Very
strongly
agree

Dislike

1. I really don't like obese people much.
2. I don't have many friends that are obese.
3. I tend to think that people who are obese are a little untrustworthy.
4. Although some obese people are surely smart, in general, I think they tend not to be quite as bright as normal weight people.
5. I have a hard time taking obese people too seriously.
6. Obese people make me somewhat uncomfortable.
7. If I were an employer looking to hire, I might avoid hiring an obese person.

Fear of Fat

8. I feel disgusted with myself when I gain weight.
9. One of the worst things that could happen to me would be if I gained 25 pounds.
10. I worry about becoming obese.

Willpower

11. People who weigh too much could lose at less some part of their weight through a little exercise.
12. Some people are obese because they have no willpower.
13. obese people tend to be fat pretty much through their own fault.

*** *The AFA is scored using a Likert-type response format (0 = very strongly disagree; 9 = very strongly agree). Higher scores indicate stronger anti-fat attitudes. For the purpose of the present study, we replaced all reference to "fat" people with "obese "people because the policies included in the Obesity Report are aimed at addressing Canadian obesity rates.*

Full List of The Obesity Report Recommendations [26]

**RECOMMENDATION 1
The committee recommends that the federal government, in partnership with the provinces and territories and in consultation with a wide range of stakeholders, create and implement a National Campaign to Combat Obesity, which includes goals, timelines and annual progress reports.

RECOMMENDATION 2
The committee recommends that the federal government:
- ➢ Immediately conduct a thorough assessment of the prohibition on advertising food to children in Quebec; and,
- ➢ Design and implement a prohibition on the advertising of foods and beverages to children based on that assessment.

RECOMMENDATION 3
The committee recommends that the federal government:
- ➢ Assess the options for taxation levers with a view to implementing a new tax on sugar-sweetened as well as artificially-sweetened beverages; and,
- ➢ Conduct a study, and report back to this committee by December 2016, on potential means of increasing the affordability of healthy foods including, but not limited to, the role of marketing boards, food subsidies and the removal or reduction of existing taxes.

**RECOMMENDATION 4
The committee further recommends that the Indigenous and Northern Affairs Canada immediately:
- ➢ Address the recommendations made by the Auditor General with respect to the Nutrition North program and report back to this committee on its progress by December 2016;

RECOMMENDATION 5
The committee further recommends that the federal government conduct assessments of the Children's Fitness Tax Credit, the Working Income Tax Benefit and the Universal Child Care Benefit with a view to determining how fiscal measures could be used to help Canadians of lower socio-economic status, including our Aboriginal population, choose healthy lifestyle options.

RECOMMENDATION 6
The committee recommends that the Minister of Health immediately undertake a complete revision of Canada's food guide in order that it better reflect the current state of scientific evidence. The revised food guide must:
- ➢ Be evidence-based;
- ➢ Apply meal-based rather than nutrient-based principles;
- ➢ Effectively and prominently describe the benefits of fresh, whole foods compared

to refined grains, ready-to-eat meals and processed foods; and,
> Make strong statements about restricting consumption of highly processed foods.

RECOMMENDATION 7
The committee further recommends that the Minister of Health revise the food guide on the guidance of an advisory body which:
> Comprises experts in relevant areas of study, including but not limited to nutrition, medicine, metabolism, biochemistry, and biology; and,
> Does not include representatives of the food or agriculture industries.

RECOMMENDATION 8
The committee therefore recommends that the Minister of Health prohibit the use of partially hydrogenated oils, to minimize trans-fat content in food, unless specifically permitted by regulation.

RECOMMENDATION 9
The committee further recommends that the Minister of Health:
> Reassess the daily value applied to total carbohydrates based on emerging evidence regarding dietary fat and the fat promoting nature of carbohydrates;
> Ensure that the regulatory proposals for serving size have addressed all of the concerns raised by stakeholders during public consultation, and,
> Require that the daily intake value for protein be included in the Nutrition Facts table.

RECOMMENDATION 10
The committee further recommends that the Minister of Health assess whether sugar and starch should be combined under the heading of total carbohydrate within the Nutrition Facts table and report back to this committee by December 2016.

RECOMMENDATION 11
The committee therefore recommends that the Minister of Health implement strict limits on the use of permitted health claims and nutrient content claims based on a measure of a food's energy density relative to its total nutrient content.

RECOMMENDATION 12
The committee therefore recommends that the Minister of Health:
> Immediately undertake a review of front-of-package labelling approaches that have been developed in other jurisdictions and identify the most effective one;
> Report back to this committee on the results of the review by December 2016;
> Amend the food regulations to mandate the use of the identified front-of-package approach on those foods that are required to display a Nutrition Facts table; and,
> Encourage the use of this labelling scheme by food retailers and food service establishments on items not required to display a Nutrition Facts table.

RECOMMENDATION 13
The committee therefore recommends that the Minister of Health encourage nutrition

labelling on menus and menu boards in food service establishments.

**RECOMMENDATION 14

The committee therefore recommends that the federal government increase funding to ParticipACTION to a level sufficient for the organization to:

➢ Proceed with Active Canada 20/20; and

➢ Become the national voice for Canada's physical activity messaging.

RECOMMENDATION 15

The committee further recommends that the Minister of Health and the Minister of Sport and Persons with Disabilities together use the recently established National Health and Fitness Day to promote the Canadian Physical Activity Guidelines.

**RECOMMENDATION 16

The committee further recommends that the Public Health Agency of Canada provide sustained or bridged funding for pilot projects that have been assessed as effective.

RECOMMENDATION 17

The committee further recommends that the Minister of Health in discussion with provincial and territorial counterparts as well as non-governmental organizations already engaged in these initiatives:

➢ Encourage improved training for physicians regarding diet and physical activity;

➢ Promote the use of physician counselling, including the use of prescriptions for exercise;

➢ Bridge the gap between exercise professionals and the medical community by preparing and promoting qualified exercise professionals as a valuable part of the healthcare system and healthcare team;

➢ Address vulnerable populations, such as Canadians of lower socio-economic status including Canada's Aboriginal population, and pregnant women;

➢ Advocate for childcare facility and school programs related to breakfast and lunch programs improved physical education, physical activity and nutrition literacy courses; and,

➢ Engage provincial governments in discussions about infrastructure requirements for communities that encourage active transportation and active play.

RECOMMENDATION 18

The committee further recommends that the federal government provide funding under the New Building Canada Fund to communities for infrastructure that enables, facilitates and encourages an active lifestyle, both indoors and outdoors.

**RECOMMENDATION 19

The committee therefore recommends that the Public Health Agency of Canada implement a strategy to increase the visibility, uptake and use of the Best Practices Portal by stakeholders across the country.

RECOMMENDATION 20

The committee therefore recommends that Health Canada design and implement a public

awareness campaign on healthy eating based on tested, simple messaging. These messages should relate to, but not be limited to:

- ➢ Most of the healthiest food doesn't require a label;
- ➢ Meal preparation and enjoyment;
- ➢ Reduced consumption of processed foods; and,
- ➢ The link between poor diet and chronic disease.

RECOMMENDATION 21
The committee further recommends that Health Canada and other relevant departments and agencies, together with existing expertise and trusted organizations, implement a comprehensive public awareness campaign on healthy active lifestyles.

*Note: ** indicates that a specific recommendation was excluded from the present study.*

Nuffield Council on Bioethics: The Intervention Ladder [27]
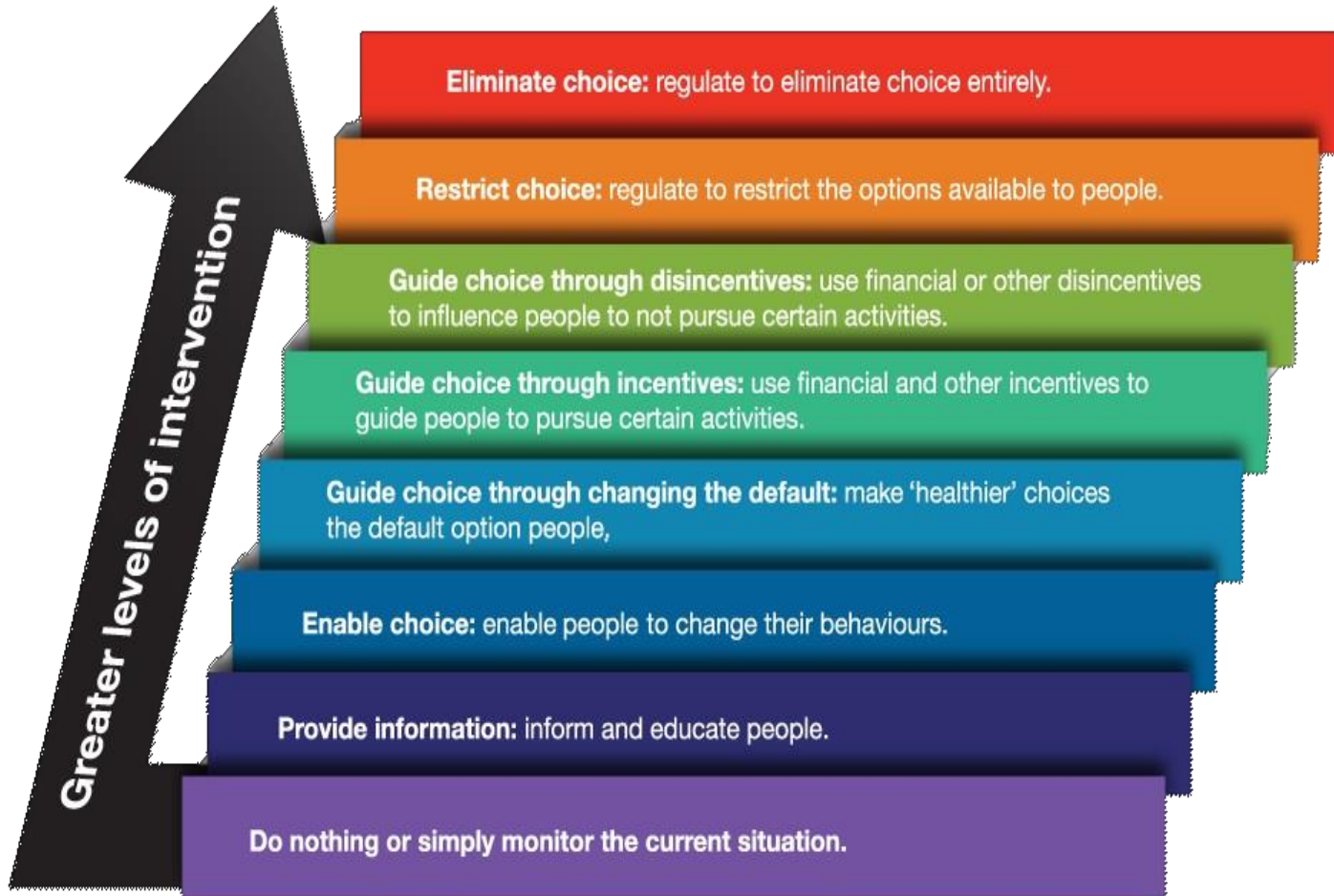
Sample Size Calculation

Equation: $$n = \frac{Z^2 P(1-\bar{P})}{d^2}$$

Here n is the sample size, Z is the statistic corresponding to level of confidence, P is expected prevalence (that can be obtained from similar studies or a pilot study conducted by the researchers), and d is precision (corresponding to effect size).

Z= 95% CI

d= 5% precision (effect size).

P= expected prevalence:

- **More Intrusive policies** -> Average support for each policy was approximately 50% support (based on Barry et al study). However, there was some variation where certain economic policies received 68% support and others received 29% support. More recent study based on Barry et al by Lange & Faulker average support was 54%. Again, there was huge variation with 78% to 41%

Equation 1: n = 0.95^2 0.5(1-0.5)/ 0.05^2

$\quad\quad\quad$ = 90.25

- **Less Intrusive policies**-> Trend shown in Raine et al, Morin & Roy that individual received more support than more intrusive. Raine at all, all individual level policies received greater than 80% support.

Equation 2: n = 0.95^2 0.8(1-0.8)/ 0.05^2

$\quad\quad\quad$ = 57.76

Based on my sample size calculation I will need a minimum of 91 participants.

*** For the expected prevalence, I looked at relevant studies and the specific policies that were similar to mine. I then calculated the average support for each type of policy, *more intrusive and less intrusive*.

Using this sample size calculation online software(https://www.checkmarket.com/sample-size-calculator/): It is estimated that I require 385 participants but should send out 642 surveys for an estimated response rate of 60%. This is based on a margin of error of 5% (maximum expected difference between the true population and a sample estimate).

Canadian Population = 35, 151, 728 (based on 2016 census)

Canadian adult population (greater than 18) = approx. 29,000,000 (based on 2016 census)

Proof of Manuscript Submission to *Public Health*

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Abstract:
Objectives: We aimed to examine: (1) explicit weight bias, (2) public support of the Canadian Federal Government's public health policies to address obesity, and (3) the association between explicit weight bias and policy support.

Study Design: Cross-sectional study.

Methods: Canadian adults (N=1003; 51% female; BMI=27.3 ±7.0 kg/m2) completed an online survey measuring weight bias with the Anti-Fat Attitudes Questionnaire in three subscales: Willpower, Fear of fat, and Dislike. Support of policy recommendations was measured on 4-point Likert scales. Logistic regressions (support vs oppose) were conducted after adjusting for age, race, gender and income.

Results: Willpower was significantly positively associated with both the Dislike and Fear of fat subscales (r= 0.3 and 0.6; P < 0.001). Support of policy recommendations ranged from 53% to 90%. Willpower was associated with support of 10 policies (e.g. changing infrastructure to encourage physical activity, OR=1.28, CI=1.14-1.43, P<0.01). Dislike was associated with support of three policies (e.g. taxation of sugar and artificially sweetened beverages, OR=1.19, CI=1.08-1.31, P<0.01). However, Fear of fat was negatively associated with support of two policies (e.g. mandating the use of front-of-package nutrition labelling, OR=0.82, CI=0.73-0.94, P<0.01).

Conclusion: Weight bias is associated with Canadian support of public health policies aimed at addressing obesity. Future studies should examine the influence of weight bias reduction interventions on policy support.