

The ignored consequences of obesity and nutrition policies:
How a focus on weight influences psychosocial wellbeing

by

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AUTHOR'S DECLARATION

This thesis consists of material all of which I authored or co-authored: see Statement of Contributions included in the thesis. This is a true copy of the thesis, including any required final revisions, as accepted by my examiners.

I understand that my thesis may be made electronically available to the public.

STATEMENT OF CONTRIBUTIONS

This thesis consists in part of three manuscripts that have been prepared for publication.

Exceptions to sole authorship include:

Chapter 4: Raffoul A, Hammond D, Dubin J, Kelly AC, Kirkpatrick SI. The impact of calorie menu labelling on disordered eating and related psychosocial outcomes: A longitudinal study among young adults in Canada.

Chapter 5: Raffoul A, Gibbons B, Boluk K, Neiterman E, Hammond D, Kirkpatrick SI. “Maybe a little bit of guilt isn’t so bad for the overall health of an individual”: A mixed-methods exploration of young adults’ experiences with calorie labelling.

Chapter 6: Raffoul A, Kirkpatrick SI. Toward a holistic framework of eating- and weight-related behaviour: Implications for public health intervention and nutrition policy.

As lead author of these three chapters, I was responsible for conceptualizing the study designs, contributing to the data collection and/or measure selection, conducting the data analysis, and drafting the manuscripts. My co-authors provided guidance during each step of the research and provided feedback on draft manuscripts, with significant editorial contributions from my advisor, Dr. Sharon Kirkpatrick.

Under Dr. Sharon Kirkpatrick’s supervision, I also prepared the remaining chapters in this thesis, which were not written for publication.

ABSTRACT

Background: Eating- and weight-related disorders, including eating disorders, disordered eating, and overweight and obesity, share many risk factors across all levels of the socioecological model. However, public health policies tend to focus primarily on the reduction and prevention of obesity, with little attention to the impact of such policies on disordered eating and related indicators of psychosocial wellbeing, including internalized weight bias, weight stigma, and body image. Young adults may be particularly vulnerable to weight-related policies, as they are in a critical period of developing lifelong dietary habits. Though a wide variety of population-level policies aiming to prevent obesity and improve nutrition have the potential to elicit unintended consequences (e.g., calorie menu labelling), little research has explored this phenomenon in real-world policy contexts.

Purpose: The objectives of this dissertation were to: (1) investigate the impact of provincial menu labelling policies on disordered eating, internalized weight bias, weight stigma, and associated indicators of weight-related and psychosocial wellbeing among young adults; (2) explore young adults' feelings, perceptions, and experiences with calorie labelling policies, and; (3) develop a holistic framework for the prevention of eating- and weight-related disorders that draws on systems science and facilitates examination of potential unintended consequences of weight-related policies. Three manuscripts addressed these objectives through longitudinal analyses of data from the Canada Food Study, a mixed-methods study among young adults, and a critical narrative review.

Methods and results: The first manuscript (Chapter 4) is comprised of a longitudinal analysis that examined trends in the prevalence of disordered eating, internalized weight bias, experienced weight stigma, and associated indicators of weight-related and psychosocial wellbeing among Canadian young adults (n=689). Eight repeated measures logistic generalized estimating equations were conducted to assess changes over time for each of the outcomes of interest in relation to provincial calorie labelling policies in British Columbia (voluntary labelling), Ontario (mandatory calorie labelling), and Alberta, Quebec, and Nova Scotia (no labelling policy). The implementation of a calorie menu labelling policy did not significantly increase the odds of disordered eating, body image, internalized weight bias, experienced weight

stigma, or other general indicators of mental health, though there were significant differences in these outcomes by sociodemographic factors, including gender, race/ethnicity, and weight perception.

The second manuscript (Chapter 5) details a mixed-methods inquiry of young adults' experiences with calorie labelling, with a focus on its implications for their relationships with food. Participants (n=13) were recruited from a campus-based menu labelling study and individual semi-structured interviews were conducted, followed by a survey assessing sociodemographic factors and risk of disordered eating and body esteem. The data were inductively coded and informed by social constructionist frameworks. Four key themes included: (1) participants' support of and skepticism about labelling interventions, (2) the identification of knowledge and autonomy as mechanisms of labelling interventions, (3) the role of the individual's and others' relationships with food in experiences with labelling, and (4) disordered eating and dieting as lenses that shape experiences with interventions.

The third manuscript (Chapter 6) presents a critical narrative review that posits the application of systems science concepts to consider unintended consequences for eating- and weight-related disorders in public health policy. Drawing upon multiple and often contradictory framings for policy approaches to obesity and eating disorders, the proposed theoretical framework outlines how public health nutrition policies can increase the risks of disordered eating, weight stigma, and related psychosocial constructs. Such a framework can be used to examine whether and how weight-centric approaches result in policy resistance (i.e., individuals are not successful in achieving "healthy weights") and contribute to negative consequences. This framework will also empower researchers and practitioners to identify approaches to promote health holistically, including by reducing societal weight stigma and bias and its harmful implications.

Conclusions: This dissertation contributes to our understanding of how nutrition and weight-related policies may impact psychosocial wellbeing and eating- and weight-related disorders more broadly. The findings of the empirical studies and the development of a theoretical framework contribute to the scarce literature on how a focus on weight in public health policy influences psychosocial wellbeing among young adults in Canada.

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TABLE OF CONTENTS

EXAMINING COMMITTEE MEMBERSHIP	ii
AUTHOR’S DECLARATION	iii
STATEMENT OF CONTRIBUTIONS	iv
ABSTRACT	v
ACKNOWLEDGEMENTS	vii
LIST OF FIGURES	xii
LIST OF TABLES	xiii
LIST OF ABBREVIATIONS	xiv
CHAPTER 1: Introduction	1
1.1 Overview and scope	1
1.2 Dissertation organization	2
CHAPTER 2: Literature Review	3
2.1 Overweight and obesity	3
2.1.1 Factors associated with overweight and obesity	4
2.1.2 Elements of public health policy and intervention	6
2.1.3 Framing of higher weights and implications for intervention	7
2.2 Eating disorders and disordered eating	14
2.2.1 Disordered eating	15
2.2.2 Factors associated with eating disorders and disordered eating	16
2.2.3 Framing of disordered eating and implications for intervention	18
2.3 Eating- and weight-related disorders	22
2.3.1 Shared obesity and eating disorder prevention	23
2.3.2 Unintended consequences of obesity and weight-related policies.....	24
CHAPTER 3: Study Rationale and Objectives	25
3.1 Study rationale	25
3.2 Research questions and objectives.....	26

CHAPTER 4: The impact of calorie menu labelling on disordered eating and related psychosocial outcomes: A longitudinal study among young adults in Canada.....	27
4.1 Overview.....	28
4.2 Introduction.....	29
4.3 Methods.....	30
4.3.1 The Canada Food Study.....	30
4.3.2 Policy-level data.....	34
4.3.3 Statistical analyses	35
4.4 Results.....	36
4.4.1 Sample characteristics.....	36
4.4.2 Trends in disordered eating and weight-related outcomes	37
4.4.3 Trends in general psychosocial wellbeing outcomes.....	41
4.5 Discussion.....	44
4.6 Conclusions.....	47
CHAPTER 5: “Maybe a little bit of guilt isn’t so bad for the overall health of an individual”: A mixed-methods exploration of young adults’ experiences with calorie labelling.....	48
5.1 Overview.....	49
5.2 Introduction.....	50
5.3 Methods.....	52
5.3.1 Participants and recruitment	53
5.3.2 Data collection	54
5.3.3 Analyses.....	55
5.4 Results.....	56
5.4.1 Support of & skepticism about labelling interventions.....	58
5.4.2 Knowledge & autonomy as mechanisms of labelling interventions.....	59
5.4.3 Role of the relationship with food in experiences with labelling	62
5.4.4 Disordered eating and dieting as a lens in experiences with interventions.....	65
5.5 Discussion.....	67

5.6	Conclusion	70
CHAPTER 6: Toward a holistic framework of eating- and weight-related behaviour:		
Implications for public health intervention and nutrition policy		71
6.1	Overview.....	72
6.2	Introduction.....	73
6.3	Systems thinking as a tool to conceptualize complex health issues	74
6.4	A systems-informed, holistic framework of eating- and weight-related behaviour	75
6.4.1	Eating and weight-related disorders are interrelated	77
6.4.2	Drivers underlying behaviour are dynamic.....	77
6.4.3	Behaviour is nonlinear and contextual.....	78
6.4.4	How we frame eating and weight fuels the system.....	78
6.4.5	Actions elicit feedbacks	79
6.4.6	Policy resistance can generate unintended consequences.....	80
6.5	Implications of a systems approach to eating- and weight-related disorders	81
6.6	Applications to public health and nutrition policy.....	82
6.7	Conclusions.....	85
CHAPTER 7: General Discussion.....		86
7.1	Overview.....	86
7.2	Summary of key findings.....	86
7.3	Overall limitations and strengths of the dissertation.....	90
7.4	Implications for policy and future research	92
7.5	Conclusion	95
REFERENCES.....		96
APPENDICES.....		145
Appendix A: Supplementary materials for Chapter 4.....		145
Appendix B: Supplementary materials for Chapter 5.....		152

LIST OF FIGURES

Figure 1: Simplified socioecological model, modified from McLeroy et al. (1988) and Institute of Medicine (2005)	5
Figure 2: Recruitment and convergent mixed-methods study design.....	52
Figure 3: A holistic framework for the prevention of eating- and weight-related disorders through public health and nutrition policy.....	76

LIST OF TABLES

Table 1: Overview of dominant framings of higher weights among populations	8
Table 2: Overview of dominant framings of disordered eating among populations	18
Table 3: Baseline characteristics of weighted analytic sample of the 2016 Canada Food Study (n=689).....	37
Table 4: Prevalence of disordered eating and related psychosocial variables of weighted analytic sample, by wave, of the Canada Food Study (n=689)	38
Table 5: Adjusted odds ratios (AORs) of disordered eating and related psychosocial variables among young adults in the Canada Food Study, 2016-2018, in relation to provincial menu labelling policy (n=689).....	39
Table 6: Adjusted odds ratios (AORs) of indicators of general psychosocial wellbeing among young adults in the Canada Food Study, 2016-2018, in relation to provincial menu labelling policy (n=689).....	42
Table 7: Participant demographic characteristics of a mixed-methods study (n=13).....	57
Table 8: Overview of major themes and subthemes identified in a mixed-methods study (n=13)	58

LIST OF ABBREVIATIONS

AN	anorexia nervosa
AOR	adjusted odds ratio
BED	binge eating disorder
BESAA	Body Esteem Scale for Adolescents and Adults
BMI	body mass index
BN	bulimia nervosa
CIHR	Canadian Institutes of Health Research
CL	confidence limits
DSM-5	Diagnostic and Statistical Manual of Mental Disorders - 5th edition
EAT	Eating Attitudes Test
FDR	false discovery rate
Food-EPI	Food Environment Policy Index
GEE	generalized estimating equation
HAES	Health at Every Size
ORE	Office of Research Ethics
OSFED	other specified feeding or eating disorder
PHAC	Public Health Agency of Canada
RA	research assistant
SDOH	social determinants of health
SE	standard error

CHAPTER 1: Introduction

1.1 Overview and scope

Eating- and weight-related disorders, encompassing eating disorders, disordered eating, and overweight and obesity, present significant health risks to populations.¹⁻³ The overlap of risk factors for eating- and weight-related disorders presents a unique opportunity to develop prevention efforts that can reduce their incidence among the population as a whole.⁴⁻⁶ Nevertheless, each of these conditions have typically been addressed separately in Canadian public health policy, and no known policy has aimed to address the spectrum of eating- and weight-related disorders at a broader, population level.⁷ This is likely because of the focus on obesity, and neglect of eating disorders, among public health researchers and policymakers.^{8,9} In Canada, rising rates of overweight and obesity over the past few decades¹⁰ have resulted in increased attention to reducing weights and preventing weight gain among the population and ameliorating the physiological risks associated with higher weights.¹¹ However, neglecting to consider the whole of eating- and weight-related disorders when addressing obesity may result in unintended consequences,¹²⁻¹⁵ including an increased risk of disordered eating,^{16,17} greater internalized weight bias and stigmatization of people with higher weights,^{14,18,19} poorer psychological wellbeing,²⁰ and ironically, eventual weight gain.^{13,19,21}

This dissertation explores the unintended consequences of weight-focused policies on psychosocial wellbeing among Canadian young adults, an oft-neglected demographic in eating- and weight-related research,²² through longitudinal analyses of cohort study data and mixed-methods inquiry, which subsequently informed a critical review and theoretical framework of public policies that address eating- and weight-related disorders. The literature review explores contributors to obesity and disordered eating, first separately, at multiple levels of the socioecological model and varying perspectives that frame population-level approaches to their prevention and treatment. Subsequently, an overview of eating- and weight-related disorders more broadly details how these phenomena can be conceptualized collectively to improve public health policy.

1.2 Dissertation organization

This dissertation aimed to investigate psychosocial wellbeing among young Canadian adults in relation to weight-related population-level strategies. To achieve this overarching aim, this dissertation consists of several chapters, including this introduction, and three manuscripts that address three research questions and associated specific objectives.

Chapter 2 includes a comprehensive review of the literature surrounding the definitions and framings of obesity and/or higher weights and eating disorders and disordered eating, and highlights the potential contributions of a combined approach to conceptualizing eating- and weight-related disorders for public health policy. Chapter 3 summarizes the study rationale and objectives for each of the three subsequent chapters. Chapters 4, 5, and 6 are comprised of manuscripts corresponding to each of the three studies that have been prepared for publication. Collectively, this dissertation provides an investigation into the potential for weight-related population-level initiatives to elicit unintended psychosocial consequences by (1) analyzing trends of disordered eating, internalized weight bias, weight stigma, and indicators of psychosocial wellbeing in the context of weight-related policy, and (2) exploring the subjective experiences of individuals who live and interact with weight-related policy, with a focus on calorie and menu labelling. The results of these two studies informed a theoretical framework for the application of systems science concepts to avoid unintended consequences for eating- and weight-related disorders in public health policy. Finally, Chapter 7 provides an overarching, general discussion of the three manuscripts, including implications for public health policy and future research in the realm of eating- and weight-related disorders.

CHAPTER 2: Literature Review

2.1 Overweight and obesity

Overweight and obesity are defined as a level or magnitude of body fat characterized as excess through the calculation of body mass index (BMI). In non-pregnant adults aged 18 and older, BMI is calculated by dividing weight in kilograms by height in metres squared,²³ and then further categorized according to established cut-off points. A BMI equal to or greater than 25 is classified as overweight, and a BMI equal to or greater than 30 is classified as obesity, with additional sub-classifications for higher indices (e.g., *Obesity Class I*, *Obesity Class II*).²³

In Canada, measured height and weight data from 2007 to 2009 indicate that one in four adults had heights and weights that classify them as having obesity,¹⁰ while more recent self-reported data from 2018 place the estimate closer to one in five adults.²⁴ Obesity rates differ in relation to a multitude of socio-demographic factors, including age,²⁵ sex,^{10,26} Indigeneity and immigration,^{27,28} province of residence,^{24,29} and level of education.²⁹ Estimates of obesity prevalence differ within and among socio-demographic characteristics at the intersection of identities as well; for example, although fewer female than male Canadians have obesity in the general population, this trend is reversed among adults older than 65 years and among Inuit.¹⁰

Obesity is associated with a wide range of negative physiological health consequences, including increased mortality, cardiovascular disease, various types of cancers, and type II diabetes.^{10,30-32} Although there are fewer health risks associated with overweight than obesity,³¹ this BMI category holds significance because of its relatively high prevalence²⁴ and potential role in identifying individuals at risk of developing obesity and/or under-reporting their weight in studies.³³

Higher weight is also associated with several psychosocial consequences, including weight bias internalization,³⁴⁻³⁶ experienced weight stigma,^{37,38} and poor body image.³⁹ Weight bias encompasses negative stereotypes and beliefs against higher weights, such as assumptions that having a higher weight means that an individual is lazy or unintelligent,⁴⁰ while internalized weight bias is the agreement with and application of weight biases to one's self.³⁵ The evidence on weight bias, both generally and internalized, among Canadians is limited,⁴¹ but research from

the United States suggests weight bias internalization affects nearly half of individuals with higher weights,⁴² and particularly women.^{34,43} Weight bias internalization is associated with worsened health-related quality of life overall³⁷ alongside worsened mental health, including higher risks of depression, anxiety, low self-esteem, and eating disturbances⁴⁴ compared to individuals who do not internalize weight biases, regardless of their actual weight. Weight stigma, which includes experiences of discrimination because of one's weight, is also incredibly common among individuals with higher body weights, affecting up to 12% of the total United States population.⁴⁵ As with weight bias, Canadian-specific data on weight stigma are limited to specific, often clinical populations. Perceived weight stigma, in which individuals recognize or acknowledge that they have experienced discrimination because of their weight, increases the risks of greater daily stress and anxiety,⁴⁶ depression,^{47,48} maladaptive eating,⁴⁹ and avoidance of medical care.^{21,50} Indeed, weight stigma is hypothesized to be a significant mediator of the associations between obesity and a plethora of negative physical health consequences, including cardiovascular disease^{21,51} and ironically, eventual weight gain.⁵²⁻⁵⁴

In this chapter subsection, I provide an overview of the many factors associated with higher weights, and various frameworks that can be used to conceptualize its risks, prevention, and treatment among populations.

2.1.1 Factors associated with overweight and obesity

An array of inter-related factors is associated with overweight and obesity at multiple levels.⁵⁵ These factors and levels can be conceptualized within the socioecological model, a health promotion framework based upon ecological models,⁵⁶ that details the inter-related and layered influence of individual-, interpersonal-, institutional-, community-, and public policy-level factors on human health (**Figure 1**).⁵⁷ The socioecological model has been widely applied in weight-related research and practice, primarily in considering the impacts of policy design, implementation, and evaluation on weight-related outcomes.^{55,58}

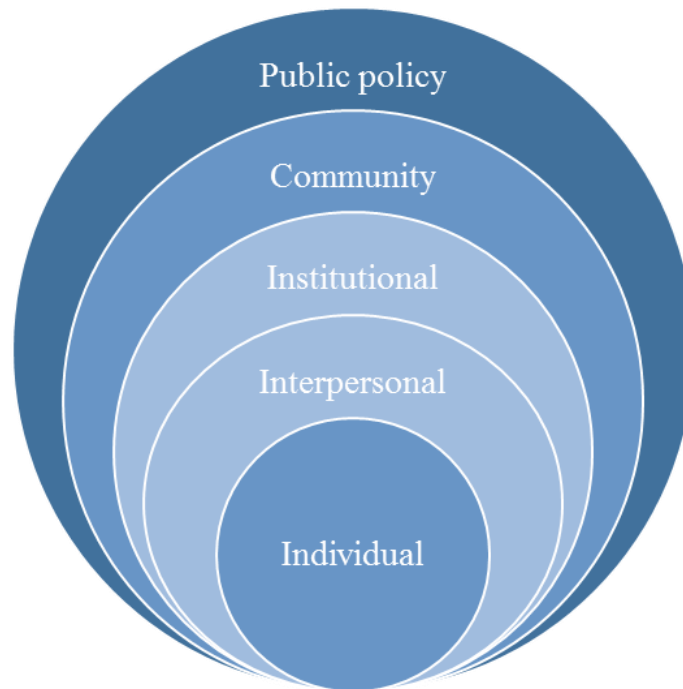


Figure 1: Simplified socioecological model, modified from McLeroy et al. (1988)⁵⁷ and Institute of Medicine (2005).⁵⁹

At the individual level, various contributors to weight status interact and influence risk of weight gain and/or difficulty losing weight. Complex and inter-related individual physical characteristics, including genetic and/or epigenetic predisposition to higher weights,^{60,61} metabolic adaptation and related processes that alter energy expenditure,⁶² and brain and information-processing related to mood and appetite,⁶³ collectively impact weight status. These physical characteristics and the processes associated with them may be reinforced and/or countered through associated behaviours; for example, metabolic adaptation to a higher weight, may occur after weight loss and is worsened by weight cycling, which often leads to weight regain among individuals trying to lose weight.⁶⁴ Individual-level behavioural contributors to weight status include dietary quality and diet-related knowledge, attitudes, and perceptions;^{65–67} physical activity and sedentary behaviour;^{68,69} sleep duration and patterns;⁷⁰ and engagement in dieting and weight loss behaviours.^{71,72} As previously noted, individuals' risks of gaining weight are influenced by their socio-demographic profiles, which affect physical and behavioural risk factors for weight gain, but are ultimately influenced by factors at broader societal levels.

At the inter-personal level, interactions with peers and family can influence and be influenced by an individual's weight status. Among adolescents and young adults, peers may influence the selection and maintenance of additional friends who have a similar weight status.⁷³ Peer groups also practice collective engagement in weight-related behaviours^{74,75} and contribute to the development of peer-based social norms surrounding weight loss intentions.⁷⁶ A greater focus of research has been on familial settings and their impact on childhood weight status, including family home organization and structure, such as family routines and household crowding;⁷⁷ parental food consumption, preparation, and restriction, associated with similar behaviours among children;^{78,79} and sibling birth order and associations with less healthful behaviours.^{80,81}

Within institutions and the communities that host them, social and cultural norms surrounding weight-related behaviours, such as social contexts surrounding food and physical activity, are pervasive and deeply entrenched in North American society.^{82,83} These norms are engrained into institutional- and community-level environments that dictate the availability, accessibility, and affordability of foods;^{84–86} and the built physical spaces that enable or hinder activity.^{87–89}

Finally, at the policy level of the socioecological model, policies across regional, provincial, national, and even global contexts impact individuals' risks of overweight and obesity^{90,91} through efforts and initiatives aimed at standardizing, altering, or regulating the aforementioned contributors to weight status at the individual, interpersonal, institutional, and community levels of the socioecological model. Examples of factors that have contributed to increasing weights globally that are considered targets for policy-level intervention include the commodification and globalization of the food supply^{91,92} and marketing of less healthful foods to children.⁹³

2.1.2 Elements of public health policy and intervention

The socioecological model is useful for capturing the array of factors that contribute to weight status among populations, but more nuanced conceptualizations of intervention are needed to evaluate the impact of policy. Public health interventions can occur at any of the aforementioned levels of the socioecological model but vary substantially in terms of structure and agency. Structural interventions target the social contexts and components that influence weight-related behaviour,^{94,95} while agentic interventions emphasize individuals and their behaviours as

catalysts of change.⁹⁵⁻⁹⁷ There is an assumption that interventions enacted among populations at the institutional, community, and policy levels are necessarily structural, when in fact, interventions enacted at the higher levels of the socioecological model may be agentic. Structure and agency exist on opposite ends of a population health spectrum but may frame the approaches by which we intervene at different levels. Thus, in considering population-level approaches to weight status, structural-agentic framings may influence intervention.

Furthermore, public health interventions can channel the use of prevention and/or treatment approaches to improving health that also intersect with structural-agentic framings of weight. Preventive interventions aim to avoid or delay negative health risks, and can be universal and primary, targeting and benefiting the entire population before the appearance of symptoms, or secondary and selective, targeting groups at the highest risk.⁹⁸ On the other hand, interventions can focus on treatment, which involves identifying individuals who are already affected by the health condition and reducing its associated risks.⁹⁸

Much of the difficulty in addressing the complexity of weight status and related health risks may partially stem from the foci on agency and treatment (i.e., weight loss) rather than structure and early prevention in Canadian policy.^{14,99,100} Additionally, differing framings of weight among the general public, policymakers, researchers, and activists may influence public health interventions and their effectiveness among populations.

2.1.3 Framing of higher weights and implications for intervention

The population-level increase in body weights over the past several decades^{10,101} has been met with reactions ranging from moral panic and the declaration of excess weight as endemic^{102,103} to fervent dismissals of any concrete association between weight and health.^{104,105} In this section, I highlight four dominant perspectives that serve as frameworks for conceptualizing higher weights (summarized in **Table 1**) and elucidate the implications of each framework for addressing obesity among populations.¹⁰⁶ The overview of framings is organized by the central tenets and implications for prevention and treatment. The interpretation that follows considers the implications of each framing for public health interventions and how they may differ in terms of structure-agency.

Table 1: Overview of dominant framings of higher weights among populations

Perspective	Central tenets	Implications for prevention	Implications for treatment
<i>Individualistic approaches to obesity</i>	<p>Individuals are responsible for their own weight and health.</p> <p>Individuals who cannot achieve a healthy weight do so by choice.</p>	Individuals are responsible for their actions; thus, prevention initiatives emphasize education about changing diet, exercise, and sleep.	<p>Individual-level behaviour, particularly diet and exercise, should be modified to achieve healthy weight.</p> <p>Emphasis on willpower and lifestyle.</p>
<i>Obesity as a chronic disease</i>	Obesity is a medical condition characterized by higher weight and negative physiological and/or psychological consequences.	<i>Less emphasis on prevention than treatment.</i>	Obesity should be treated through medication, surgery, and increased access to medical supports such as dietitians that can be equitably accessed.
<i>Obesity as a complex system</i>	<p>Weight is influenced by a complex set of drivers and feedback loops on individual, interpersonal, and global scales, conceptualized as a complex adaptive system.</p> <p>By focusing on one driver without considering the full system, we may elicit negative consequences.</p>	<p>Prevention requires vast systemic change across the socioecological model to avoid unintended consequences.</p> <p>Prevention must include consideration of multiple factors, not a limited focus on dietary intake, for example.</p>	<p><i>Less emphasis on treatment than prevention.</i></p> <p>Treatment involves widespread systemic change.</p>
<i>Fat studies and critical weight studies</i>	<p>Obesity is a societal construct rooted in healthism and neoliberalism.</p> <p>Fat is inherently harmless, but systemic oppression of fat people results in negative consequences for their wellbeing.</p>	<p>Larger bodies cannot be prevented and have always existed.</p> <p>Eliminating systemic oppression of larger bodies, particularly among marginalized peoples, will improve overall population health and wellbeing.</p>	<p>Since fat is not necessarily detrimental, treatment is unnecessary and harmful.</p> <p>Emphasis should be on health and wellbeing, rather than weight.</p>

Note. Table adapted from Ramos Salas et al.,¹⁰⁷ drawing upon key references summarized in following subsections.^{99,108,117,109–116}

2.1.3.1 *Individualistic approaches to weight*

Individualistic approaches to weight frame obesity as an individual-level problem requiring agentic change, targeting the individual level of the socioecological model (Figure 1); that is, individuals are deliberately responsible for the actions that led to their weight gain and are thus responsible for engaging in behaviours that will lead to weight loss.^{108,118} This ideology asserts that higher weight is necessarily associated with poor health and reflective of an individual's engagement in an unhealthy lifestyle, a phrase often used to blame individual choices, drawing upon agentic approaches to conceptualizing health.^{109,119} Further, the framing of obesity as a personal moral and social responsibility is a foundational element of weight bias, a set of negative beliefs and assumptions about individuals based on their (typically higher) weight.⁴⁰ Weight biases, which may be reinforced by agentic approaches, are associated with greater support of public policies that punish or penalize individuals who live in larger bodies, such as higher insurance premiums for people with obesity.¹²⁰

Individualistic frameworks for obesity are increasingly regarded as simplistic,^{12,90,121} failing to account for the vast array of contributors to weight at multiple levels of the socioecological model, and have been recognized as potential contributors to the growing incidence of both obesity and weight stigma over the past few decades.^{108,122} However, this agentic perspective is still a dominant factor driving Canadian public policy related to weight.^{99,123} A recent critical analysis of obesity prevention policies in Canada found that “obesity as an individual problem” was a prevailing theme in federal, territorial, and provincial policies targeting weight.¹⁴

2.1.3.2 *Obesity as a chronic disease*

An alternative approach frames obesity as a chronic disease. Originally posited two decades ago,¹²⁴ this narrative of overweight has become more widely accepted, and is now embraced by the American and Canadian medical associations^{125,126} and the World Health Organization.¹¹⁰ Although there are no formal guidelines for what constitutes a disease, obesity seemingly aligns with other disease designations because of its associated negative health risks, the magnitude of physiological and psychological impacts on the human body, and the complex nature of its prevention and treatment.^{127,128}

The framing of obesity as a chronic disease leads to two central points of discussion regarding (1) its definition and subsequent diagnosis, and (2) how it should be addressed in health care and public health contexts. For obesity to be designated as a chronic disease, it must pose harm to an individual's health;¹²⁷ thus, obesity cannot be defined solely as excess body fat,^{128,129} and BMI is an inappropriate measure of obesity, since not all individuals with a high BMI are necessarily "unhealthy".¹³⁰ Alternative methods to diagnosing obesity have been proposed, including the Edmonton Obesity Staging System,¹³⁰ which classifies disease presence and progression using multiple criteria related to implications for health, such as comorbidities, functional limitations, and organ damage.

The framing of obesity as a chronic disease posits benefits for improving or expanding access to treatment, as a disease designation may lead to medical benefits coverage, increased access to bariatric surgery and follow-up care, and greater medical education for trainees.¹¹¹ Some have suggested that this framing may also reduce stigma through increased use of person-first language that is common to disability studies, as well as greater awareness of the complexity surrounding obesity among health professionals and the general public.^{41,120,131,132} However, this framework lacks a focus on prevention and emphasizes treatment as a foundational focus, thereby only targeting the individual, and perhaps institutional (e.g., through increased medical care access) levels of the socioecological model (Figure 1). Based on this framework, public health policies should refrain from individualistic messaging and campaigns.²¹ However, chronic disease designation has not been shown to necessarily move policymakers away from pushing agentic change,^{133,134} nor to cease focusing on or stigmatizing individuals.

2.1.3.3 Obesity as a complex system

Complex systems science theories and methodologies can be utilized to better understand and elucidate the relationships among drivers of complex issues.^{135,136} These complex concerns, known as wicked problems, are incredibly difficult to address because their drivers are dynamic, necessarily inter-dependent, and nonlinear.^{135,137} Complex systems science lenses and methods are increasingly being called upon within public health, particularly with respect to obesity. According to Lee et al.,¹¹² obesity can be conceptualized as a wicked problem and a complex system because of its global scope and impact, heterogeneous rates of prevalence across and within countries, wide-ranging physiological and social impacts over varying timespans, multiple

causes at multiple levels, and the failure of single or reductionist solutions to address the problem.¹¹² The array of intertwined and complex factors that have contributed to an increase in weights across the population are difficult to simultaneously predict and control, resulting in static policy solutions to a dynamic public health matter.^{112,121}

Complex systems narratives of obesity have evolved from simplistic causal web diagrams^{12,138} to highly detailed maps featuring hundreds of inter-connected drivers of weight.^{113,122} These notions of obesity as a complex system differ from the previously detailed socioecological model of contributors to weight (Figure 1), because complex systems incorporate interactions across subsystems rather than only looking within them, and they are inherently structural rather than agentic.¹²¹ Further, in contrast with ecological approaches to health, systems approaches allow for the consideration of feedback loops,¹² frequently across levels of the socioecological model, which encapsulate the often cyclical relationship between variables that influence one another.¹³⁵ For example, if a healthy school program (institutional level, Figure 1) is deemed successful in altering students' behaviours (individual level), it may be implemented in more schools, thereby positively influencing more students and their behaviours.⁹⁷

Framing obesity as a complex system presents significant implications for planning policy and enacting population-level change. A systems approach does not mandate a solution that addresses all of the complexity underlying weight, but rather motivates researchers and policymakers to recognize the complexity and consider intended and unintended consequences. Systems-oriented change is incredibly complicated because of the vast array of drivers, inter-connections, and as a result, feedback loops,¹¹³ that must be anticipated when implementing obesity-related policy,^{112,114,121} requiring agreement, correspondence, and cooperation among stakeholders at a variety of levels and across many disciplines. However, even this complexity does not surpass the difficulty in modifying the deeply rooted, subconscious, agentic paradigms underlying many policymakers' beliefs surrounding weight.^{13,19,97} Systems orientations encapsulate the complexity of weight, and can work together with more critical perspectives of weight-related factors to prompt a paradigm shift^{13,135} away from the previously described individualistic framework to one that better accommodates complexity.

2.1.3.4 *Fat studies and critical weight perspectives*

Fat studies is an inter-disciplinary area of research that explores and critically examines societal perceptions surrounding weight, appearance, and their intersections with other elements of identity.^{115,139} Fat studies aligns closely with other areas of scholarship that examine struggles of power and oppression, such as racism and feminist scholarship,^{140,141} and makes use of the word “fat” in reclamation of a term that has traditionally carried negative connotations.^{116,139} It is relevant to note that fat studies is one part of critical fat scholarship, which also includes critical weight studies, focusing broadly on weight-related topics outside of fat, including eating disorders.^{142,143} Much of the discourse within fat studies revolves around the central tenet that fat is an axis of oppression,^{117,141,144} and that weight-based stigma and discrimination are perpetuated by not only societal norms and media that prefer thinness,^{145,146} but also overarching structural ideologies and policies that assert that fat is necessarily reflective of negative personality, competency, morality, and health-related characteristics.^{147–149}

In the context of weight and health, fat studies scholars are highly critical of individualistic approaches to weight and chronic disease framings that they posit medicalize and pathologize fat.¹⁵⁰ Critical weight scholars generally assert that obesity is a societal construct – that is, the relationship between weight and health is overstated and much of the association between the two constructs is mediated by other factors.¹³ For example, higher weight individuals are more likely to experience weight stigma in medical care settings,^{40,151} leading to avoidance of medical care that in turn worsens their health outcomes.^{105,152} Higher weight individuals also experience day-to-day stigma and discrimination,¹⁵³ which increases levels of cortisol and contributes to overall poorer metabolic health.^{46,132,154,155} Further, attempts to lose or modify weight are highly difficult and unsustainable,¹⁵⁶ and cause possibly irreparable damage to metabolic processes.^{64,157} Thus, fat scholars infer that all weight is inherently harmless and body diversity is natural within species,¹¹⁵ but that larger bodies are vilified by dominant healthism and agentic discourses that dictate that health is highly valued and controllable by individual factors.^{147,158}

One critical weight framework, Health at Every Size® (HAES),¹⁵⁹ has gained traction even within settings that traditionally embrace individualistic obesity discourse^{19,50,160,161} and asserts that health is not solely physical, but also social, emotional, and mental; weight is not the sole indicator of health; body diversity should be celebrated; and weight-neutral approaches to eating

and physical activity result in better health outcomes than weight-centric approaches.¹⁶² However, HAES, fat studies, and critical fat scholarship more broadly have been criticized for neglecting the demonstrated associations between higher weights and negative health consequences and over-emphasizing constructs, such as intuitive eating and enjoyable physical activity, which are difficult for much of the population to achieve in our current weight-centric climate.^{163,164}

Fat studies asserts that treatment of obesity and weight loss are socially-driven forms of oppression, given the previously noted negative health outcomes and low success rate,¹⁵⁶ and that they disproportionately affect vulnerable groups (e.g., women, individuals with lower education levels).^{165,166} Similarly, prevention of obesity is seen as perpetuating oppression and reinforcing that larger bodies are undesirable and to be avoided.¹⁵⁰ However, despite these assertions, foundational HAES concepts, such as weight neutrality in health messaging, have been successfully incorporated into obesity management and prevention interventions,^{13,161} and critical fat perspectives offer valuable insight to approaching all eating- and weight-related conditions.^{13,161}

2.2 Eating disorders and disordered eating

Eating disorders are psychiatric illnesses “characterized by a persistent disturbance of eating or eating-related behaviour that results in the altered consumption or absorption of food and that significantly impairs physical health or psychosocial functioning.”^{167(p329)} Eating disorders are defined and classified using the Diagnostic and Statistical Manual of Mental Disorders, 5th edition (DSM-5), which contains descriptions and criteria for clinicians aiming to diagnose anorexia nervosa (AN), bulimia nervosa (BN), binge eating disorder (BED), and other unspecified and other specified feeding or eating disorder (OSFED).¹⁶⁷ Briefly, AN is characterized by a severe fear of weight gain, persistence of health-compromising behaviours, dietary restriction, and disturbance in weight and shape perception; BN by recurrent episodes of food restriction, bingeing, compensatory behaviours like purging, and negative body evaluations; BED by recurring binge eating episodes not followed by a purging cycle; and OSFED by atypical and/or limited durations of the previous disorders.¹⁶⁷ Other patterns of eating disturbance, such as orthorexia nervosa (a pathological obsession with “healthy” eating)¹⁶⁸ or drunkorexia (co-occurring patterns of eating disturbance and binge drinking),¹⁶⁹ are colloquially discussed and treated but are not characterized as eating disorders in the DSM-5.

Eating disorders are among the most deadly psychiatric illnesses¹⁷⁰ and are severely underfunded¹⁷¹ and under-researched^{172,173} when compared to other illnesses in the DSM-5. Prevalence rates of eating disorders in non-clinical samples often vary widely and are assumed to underestimate actual prevalence at any given time.^{174–176} Among the general population, point prevalence may range from 0.3 to 1.2% for AN, 0.6 to 3.6% for BN, 0.5 to 3.6% for BED, and 0.3 to 3.4% for OSFED.^{174,177–181} Similar to overweight and obesity, prevalence for each eating disorder differs by a multitude of factors, including age,^{167,182} gender,^{174,179,183} weight,^{184,185} sexuality,^{186,187} and intersections of these identity axes.

Although health concerns vary by eating disorder type, severity, and duration, all eating disorders are associated with severe health consequences, including comorbidities with other psychiatric illnesses (e.g., substance use, mood disorders)^{167,188,189} and overall lower quality of life.¹⁹⁰ Prevalence of these disorders is seemingly low compared to overweight and obesity,^{10,24} but subthreshold pathology is common and, to a lesser extent than eating disorders, can have a

significant impact on individuals' daily functioning and overall health risk. Furthermore, societal norms, framings, and prevention and treatment approaches to higher weights are posited to have implications for the development, prevention, and treatment of eating disorders.⁸

In this chapter subsection, I will clarify the difference between eating disorders and disordered eating, provide a summary of the factors associated with both, and similar to the previous subsection on obesity (2.1.3), highlight frameworks used to conceptualize disordered eating treatment and prevention among populations.

2.2.1 Disordered eating

Whereas eating disorders are diagnosable psychiatric illnesses characterized by significant impairment to social, emotional, and/or physiological wellbeing,¹⁶⁷ disordered eating is less intrusive to daily functioning but more prevalent in the general population.^{2,191} All individuals with eating disorders exhibit disordered eating, but the vast majority of those who engage in disordered eating do not have an eating disorder; thus, future reference to disordered eating encompasses individuals with eating disorders and with sub-clinical threshold eating pathology.

There is no standardized definition for disordered eating, aside from its subthreshold nature in comparison to eating disorders, but it may encompass one or several attitudes and/or behaviours that are intended to modify weight and are harmful to health and wellbeing.^{192,193} Disordered eating attitudes may include fear of fat and/or weight gain, preoccupation with thinness, and body dissatisfaction, while behaviours may include fasting or meal skipping; the restriction of certain foods and/or limiting calories; taking non-prescribed weight loss medications, dietary supplements, and/or laxatives without a doctor's advice; self-induced vomiting; over-exercising; and using cigarettes and/or illicit substances for the purpose of weight loss and/or control.^{191,194,195} Disordered eating is associated with an increased likelihood of developing an eating disorder,^{17,191} as well as poorer dietary quality,¹⁹⁶ risk of weight gain and obesity,¹⁹⁷⁻¹⁹⁹ psychological distress,²⁰⁰⁻²⁰² and functional somatic symptoms.²⁰³

Prevalence of disordered eating can range from 16 to 63%,^{193,204-209} depending on the population of interest. Although much of the attention on disordered eating has thus far focused on the

period of adolescence, the transition period from adolescence into adulthood (hereafter referred to as young adulthood) is of particular importance because of the establishment of lifelong dietary patterns^{22,210} and tracking of disordered eating^{206,211} in this age group. Among young adults, prevalence estimates range between 16 and 30%,^{206,208,212} though Canadian data are limited to adolescents and outdated.^{193,205} Rates of disordered eating are highest among women and girls^{201,213,214} and higher weight individuals,^{204,215–217} and although disordered eating can be temporal (i.e., individuals fluctuate in and out of engaging in disordered eating), evidence suggests that it can track consistently over time.¹⁹¹

2.2.2 Factors associated with eating disorders and disordered eating

The socioecological model⁵⁷ (2.1.1, Figure 1) has been used to conceptualize risk factors associated with disordered eating and eating disorders at multiple levels of influence.^{218,219}

At the individual level, multiple risk factors may interact and pre-dispose an individual to engage in disordered eating and/or develop an eating disorder. Among girls, early puberty has been associated with an increased risk of engagement in disordered eating,²²⁰ though this increased risk appears to dissipate by mid-adolescence.²²¹ Additional theorized biological contributors to disordered eating and eating disorders include irregular neurobiology,²²² such as chemical imbalances and altered reward modulation, though prospective evidence on this is limited,²²¹ and genetic predisposition, particularly for AN and BN.²²³ Risk may be exacerbated by participation in activities, such as dance, swimming, wrestling, and modelling, that expose the body and/or involve the use of weight to classify participants;^{224,225} high levels of media consumption, with a more recent focus on social media;^{221,226} and self-weighing.²²⁷ These factors interact with psychological risks for disordered eating, including body dissatisfaction and poor body image,^{206,218,228} negative affect,¹⁸⁵ thin-ideal internalization,^{185,221} perfectionism (particularly for AN and BN),²²⁹ impulsivity (particularly for BN and BED),²³⁰ over-estimated weight perception, and internalized weight bias.^{231–233} Although higher BMI may be associated with increased risk of eating disorders, it is not the physical weight itself that exacerbates risk, but rather the association between weight and the noted psychological risk factors, such as internalized weight bias and experienced weight stigma,^{221,234} as previously detailed. Finally, the risk of eating

disorders and disordered eating is different or is exhibited differently by gender,²³⁵ age,¹⁸¹ and race/ethnicity.^{221,236} Contrary to commonly held beliefs, disordered eating and eating disorders are not more common among persons with high versus low socioeconomic status.^{237–239}

Familial influences can be highly influential in the development of disordered eating and eating disorders. These influences may include having at least one parent engaged in or encouraging dieting,²⁴⁰ teasing from family members about weight,^{16,241} and the family environment, including restriction of children's eating,^{242,243} a lack of family meals,^{16,244} and adverse childhood experiences, such as emotional or sexual abuse.²⁴⁵ Peers also play a role in disordered eating risk through modelling of behaviours as well as body-based harassment.^{246,247}

More broadly, a general culture of thinness is considered a driving force behind appearance ideals, culturally-bound expectations for how people should look, and is a structural foundation for the body dissatisfaction, internalized weight bias, and weight stigma that underlies disordered eating.^{162,248} Attaining the ideal body corresponds with more than only a physical form, because it is associated with beauty, wealth, and overall life satisfaction.²⁴⁹ Ideal bodies and weights are highly gendered constructs,²⁴⁸ with a greater emphasis on thinness, and increasingly muscularity,²⁵⁰ and signified curves (i.e., enhanced hips and breasts) among women²⁵¹ and muscularity with little body fat among men.²⁵² There are exceptions to these ideals; for example, American studies highlight a preference for curviness among Latina and Black women.²⁵³ Nonetheless, the common theme underlying current North American body ideals is the same: fat is bad. Appearance ideal messages are permeated through all forms of media,^{40,146} which perpetuate weight bias and contribute to risk of disordered eating among entire populations.²⁵⁴

Finally, within the realm of public policy, disordered eating is difficult to address because some contributors, such as body dissatisfaction, may be resistant to upstream change;^{9,255} thus, less is known about factors associated with these conditions at the policy level of the socioecological model. As a result, the discussion surrounding factors associated with disordered eating risk at the policy level are often collapsed with obesity,^{1,3,6,17,256,257} which shares many contributors to disordered eating risk at the individual, interpersonal, institutional, and community levels. However, as previously noted, agentic policies and individualistic framings of higher weights are most commonly used by policymakers; as such, there is concern that policy approaches to obesity may inadvertently increase the risk factors for eating disorders.^{4,5,258}

2.2.3 Framing of disordered eating and implications for intervention

Similar to overweight and obesity (2.1.2), the utilization of different theoretical perspectives that vary in structure-agency to frame disordered eating and eating disorders among populations can shape public health efforts to address their impacts.²⁵⁹ There is a paucity of eating disorder-related population-level initiatives, especially in comparison to obesity.^{8,259,260} I highlight three theoretical approaches to eating disorders, summarized in **Table 2**, that have implications for interventions targeting disordered eating among the general population.

Table 2: Overview of dominant framings of disordered eating among populations

Perspective	Central tenets	Implications for prevention	Implications for treatment
<i>Individualistic approaches to disordered eating</i>	Disordered eating is a result of the culmination of individual biopsychiatric and/or cognitive faults that lead to altered behaviour.	<i>Less emphasis on prevention than treatment.</i> Target individuals at the highest risk, for example, based on genetic predisposition, through early intervention.	Pharmacological and/or therapeutic treatments are necessary for addressing eating disorders, and to a lesser extent, subthreshold disordered eating.
<i>Sociocultural approaches to disordered eating</i>	Sociocultural influences on appearance, food, and weight are drivers of factors that put individuals at risk. Appearance ideals are most harmful to individuals who do not meet them.	Promotion of critical media literacy, restrictions on advertisements, and regulation of industry (e.g., fitness, weight loss supplements) are possible approaches.	<i>Less emphasis on treatment than prevention.</i>
<i>Feminist and social justice approaches to disordered eating</i>	Oppression of women and people at intersections of marginalized identities increases the risk of disordered eating among certain populations. Narrow appearance ideals are upheld by systems of power.	Eliminating appearance ideals, which systemically benefit those with the most privilege, will improve overall population health and wellbeing.	Greater access to treatment should be available to all, particularly those at the highest risk of being neglected, including higher weight and racial and ethnic minority individuals.

Note. Table draws upon key references summarized in following subsections.^{261–267}

2.2.3.1 *Individualistic approaches to disordered eating*

Individualistic framings of disordered eating and eating disorders differ slightly from those previously described for obesity (2.1.2.1) in that they are not always mutually exclusive from other approaches. However, individualistic approaches do frame disordered eating as a culmination of individual-level biopsychiatric and/or cognitive faults that result in altered behaviour, are mostly agentic, and often neglect to consider broader societal structures and their role in eliciting disordered eating attitudes, and subsequently, behaviours.^{261,268,269}

The biopsychiatric paradigm centralizes biology as the driving force behind eating disorders, emphasizing the role of neurobiological regulation processes and genetic heritability in eating disorder development.^{261,268} In this framework, broader societal contributors to disordered eating risk are perceived as triggers for disordered attitudes and behaviours in individuals with predisposed neurobiological risk.²⁶¹ Due to the focus on hereditary components, this framing can potentially elicit less stigma than the individualistic approach to obesity because genetic risk cannot be altered.^{270,271} Cognitive-behavioural models differ in that they emphasize the role of individual cognition, for example, related to body size overestimation and extreme drive for thinness, in the development of and engagement in disordered eating behaviours.²⁷² Nevertheless, cognitive-behavioural approaches may be individualistic in that they can neglect to consider societal contributors to cognition,^{272,273} or treat them only as triggers or moderators, instead focusing on individual-level predisposition to the cognitions related to disordered eating behaviour.²⁶¹

Individualistic frameworks for disordered eating emphasize treatment among individuals who already have disordered eating, through both pharmacological and/or therapeutic treatment.²⁶¹ Prevention of disordered eating in this paradigm revolves around early intervention for those at highest risk,^{236,259,262} addressing predisposed biopsychiatric risk factors, as well as cognitive dissonance and the cumulative impact of thoughts and behaviours on pathologized eating.^{274,275} Such approaches to prevention have been criticized for neglecting to include marginalized populations, including racialized populations and sexual minorities,²⁷⁵ and focusing disproportionately on populations at risk rather than the population as a whole.^{262,276,277}

2.2.3.2 *Sociocultural approaches to disordered eating*

Sociocultural theory, rooted in educational and developmental psychology, posits that social interactions and broader cultural ideologies shape individuals' attitudes, behaviours, and development.²⁷⁸ The application of sociocultural theory to disordered eating does not infer that sociocultural influences directly cause eating disturbances, but that these broad societal forces can influence individual psychosocial constructs, such as body dissatisfaction and appearance comparison, which may subsequently drive engagement in disordered eating behaviour.²⁷⁹

Sociocultural influences on disordered eating involve exposure to messaging that reinforces an appearance ideal, which can be perpetrated by family; peers; for-profit industries such as the food, diet, cosmetic surgery, and fitness industries; and mass media.^{221,236,263} A well-known applied application of the sociocultural framework for illustrating disordered eating risk is the work of Anne Becker et al. in Fiji: after the introduction of Western television in the island nation in 1995, there was a sharp and significant increase in disordered eating among girls and women.²⁵⁴ Sociocultural approaches to disordered eating are supported by a vast literature that details differing sociocultural norms surrounding weight and appearance based on many factors, such as country of residence,^{176,280} gender,^{250,252} sexuality,²⁸¹ and race and ethnicity,²²¹ and how prevalence rates of disordered eating are accordingly different within and among subpopulations characterized by these factors.

Sociocultural approaches to disordered eating are predominantly used to conceptualize population-level prevention and are typically structural in their attempt to modify social contexts and norms. However, it can be difficult to intervene and change values or norms that are culturally embedded⁹ and driven by industries seeking to profit from them.²⁶⁴ Sociocultural approaches to prevention aim to use a structural, population-level approach to intervention^{259,262,282} which may contribute to widening health disparities if they do not specifically target high-risk populations, such as those with a genetic predisposition.⁹⁵ Further, by targeting the entire population and the dominant appearance ideal, sociocultural approaches to disordered eating may fail to consider societal forces, such as power and oppression, that can shape eating disorder risk, particularly among marginalized people.^{283,284}

2.2.3.3 *Feminist and social justice perspectives on disordered eating*

Feminist perspectives provided a framework for much of the early conceptualizations of disordered eating,^{285,286} and there is a robust body of literature examining how the oppression of women translates to a higher prevalence of disordered eating among girls and women.^{174,179} This oppression is rooted in patriarchal systems that (1) encourage girls and women to take up minimal space, both physically and verbally, (2) place the emphasis of girls' and women's value on appearance, and (3) idealize a narrow body and appearance type that is hyper-feminine and overtly sexualized.^{286–289} Combined, these elements promote appearance ideals that increase susceptibility to engagement in disordered eating. Feminist approaches are the driving ideologies behind prevention initiatives that target girls and women through avenues such as critical media literacy and gender stereotype education.²⁶⁵ However, feminist frameworks for treating and preventing eating disorders among populations have been criticized for excluding men, trans, and non-binary individuals,^{187,290} to the detriment of these individuals since they are less likely than girls and women to seek treatment.²⁹¹ Further, traditional feminist frameworks have been accused of whitewashing the image of eating disorders, and contributing to a myth that disordered eating is a practice of thin, white, cis-gendered, and straight young women.^{292,293}

Others have suggested a social justice approach to eating disorders that integrates the field of critical weight studies (2.1.2.4) to examine the forces of power and oppression that determine disordered eating risk.^{266,267} Social justice perspectives to eating disorders are person-first models that empower individuals to recognize and resist the sociocultural factors that tell them their bodies are not adequate.^{266,275} A social justice perspective uses critical weight studies to explore how intersectionality—that is, the crossings of identity elements, such as age, race, Indigeneity, sexuality, and gender²⁹⁴—interacts with the overarching structural ideologies and policies that moralize appearance.²⁷⁵

For individuals affected by eating disorders, social justice framings can include promotion of greater access to, autonomy in, and awareness of treatment resources, as well as more cognizance of the complexity underlying eating disorders.²⁹⁵ The potential for the use of social justice perspectives of disordered eating may be greatest in the realm of prevention by inspiring and creating systems-level change to shift the paradigm underlying how we interact with food, weight, and bodies at the population level.^{259,265}

2.3 Eating- and weight-related disorders

As demonstrated in subsections 2.1.1 and 2.2.2, there are notable overlaps in the factors associated with both higher weights and disordered eating/eating disorders. Prompted by the connections between risk factors, in the mid- to late-1990s, researchers began to investigate a single construct of weight-related disorders, encompassing eating disorders, disordered eating, as well as overweight and obesity.^{296–299} The literature exploring connections between eating pathology and higher weights can be traced back decades,^{300–302} but only in recent years has there been a greater emphasis on shared treatment and/or prevention of these conditions.¹ Further, some scholars have modified the construct to eating- and weight-related disorders,² which may be more encompassing of pathologized eating that does not directly affect weight.

Each of eating disorders, disordered eating, and obesity is unique – despite questioning about whether obesity should be considered an eating disorder,³⁰³ there are distinct boundaries between pathologized eating, psychiatric illnesses, and the characterizations of weight and/or fat that designate obesity (see 2.1.2, *Framing of overweight and obesity*). There is some demonstrated overlap among disorders, as they are not mutually exclusive; for instance, risk of harmful weight-related behaviour is significantly elevated among individuals with higher body weights,^{217,304} and 33-87% of individuals with BN or BED have BMI values consistent with obesity.^{181,305,306}

Despite their differences, however, observing eating- and weight-related disorders on a spectrum and collectively, rather than each of eating disorders and obesity independently, has significant implications for both prevention and treatment. Eating- and weight-related disorders are inextricably linked by a paradigm that emphasizes the cultural value of thinness, the moral value of health, and individual autonomy as a means to attain an ideal weight.^{1,2,6,258,284} The overlap of risk factors such as internalized weight bias, experienced weight stigma, and disordered eating, in conjunction with stark differences by gender and race/ethnicity, introduces incredible potential for population-level, structural, and universal prevention policies that can reduce the risk of eating- and weight-related disorders overall.^{259,277}

2.3.1 Shared obesity and eating disorder prevention

As evident from sections 2.1.1 and 2.2.2, there is overlap in risk factors at multiple levels of the socioecological model across eating- and weight-related disorders, and as a result, shared prevention efforts may target these factors to ameliorate their risks.

Much of the focus of shared prevention has centralized on disordered eating attitudes and behaviours among youth and their associated risk with weight gain and/or eating disorders.^{3,197,207,231,307,308} Disordered eating attitudes, including body dissatisfaction, over-estimation of weight, and internalized weight bias, can elicit disordered eating behaviours, such as fasting, self-induced vomiting, and over-exercising.¹⁷ Among youth and young adults, intentional weight change (i.e., trying to lose, gain, or maintain weight), referred to hereafter as *dieting*, is considered a major risk factor for eating- and weight-related disorders.^{213,221,309} This risk exists whether the methods used to diet are healthy, such as increasing intake of fruits and vegetables and/or reducing consumption of fast food, or disordered, such as self-induced vomiting or fasting, although the latter carries worse health consequences.²¹³ Dieting and disordered eating are each associated with psychological consequences, including dietary restraint and disinhibition,³¹⁰⁻³¹² and physiological consequences, including metabolic adaptation and less awareness of satiety.^{62,313,314} These consequences can then elicit weight gain and/or worsened psychopathology.

Dieting, and the disordered eating attitudes that precede and co-occur with it, have been the target of shared prevention initiatives aiming to reduce the risk of eating disorders and obesity.³¹⁵ Although dieting occurs at the individual level of the socioecological model, it is influenced by interpersonal, institutional, community, and public policy factors^{16,259} which are thus salient structural targets for shared prevention among populations. The vast majority of shared prevention has been targeted to adolescents, a high-risk population for many of the interconnected risk factors.¹⁶ Despite the established links between eating disorders and obesity and ongoing commentary on the potential impact of shared prevention,^{1,8,276} the literature on the efficacy of such interventions is scarce.^{316,317} Promising interventions are most often school-based and/or online; address healthful physical activity, nutrition, weight-based teasing, body

image, weight bias, and media consumption; target youth universally, regardless of gender or size; and focus on health, rather than weight.^{6,258,325,326,284,318–324}

Shared prevention initiatives have targeted the individual, interpersonal, institutional (most often through schools), and less frequently, community levels of the socioecological model, but in Canada, no known policy aims to address the spectrum of eating- and weight-related disorders at a broader level.⁷ Since there are clashing ideologies within population-level approaches to these conditions independently (see Tables 1 and 2), there is growing concern that there may also be potential for incongruences across conditions.^{1,8,117,327–329} In considering multiple approaches to multiple conditions across diverse populations, we need to embrace more complex frameworks for framing, developing, and analyzing shared prevention initiatives for eating- and weight-related disorders.

2.3.2 Unintended consequences of obesity and weight-related policies

Given the focus on obesity prevention in Canadian policy,⁹⁹ there has been growing concern about the potential of interventions to elicit policy resistance and unintended consequences in relation to eating- and weight-related disorders, particularly among youth.^{3,328,330,331} Considering the higher rates of overweight and obesity in comparison to eating disorders,^{10,174,213,260} and the moral panic surrounding fatness that has proliferated in North American society over the past few decades,^{54,332,333} the general assumption is that obesity and nutrition-related policies may inadvertently have an unintentional, negative impact on disordered eating, rather than vice versa.

The few studies that have explored unintended consequences of obesity and weight-related interventions on psychosocial wellbeing and the spectrum of eating- and weight-related disorders have been experimental or clinical.^{328,334–337} Measures of disordered eating and related psychosocial constructs, including internalized weight bias and experienced weight stigma, are often excluded from studies that investigate the impacts of obesity and food policy among populations.^{334,338} As such, there is a significant gap in our knowledge of how a focus on obesity prevention in public health policy might influence the spectrum of eating- and weight-related disorders.

CHAPTER 3: Study Rationale and Objectives

3.1 Study rationale

This dissertation aims to address several research gaps. As previously detailed, there is a paucity of Canadian research assessing internalized weight bias, weight stigma, disordered eating and other psychosocial indicators related to weight,^{8,166,260} particularly in the ever-changing, dynamic context of weight-related policy.^{14,339}

Despite the potential for weight-related initiatives to elicit negative, unintended consequences for eating- and weight-related disorders,^{15,72,161,340} we have limited knowledge about their incidence in relation to existing and newly enacted policy.³³⁴ The vast literature that exists on weight-related initiatives often neglects the role of psychosocial wellbeing (i.e., disordered eating, internalized weight bias, body image) prior to or after the implementation of an intervention.^{97,328} The limited evidence that does exist on psychosocial wellbeing is often centralized to individual- or interpersonal-oriented initiatives, such as individual weight loss plans, rather than public health policy,^{256,334,341} and tends to focus on children and adolescents. Young adulthood and the transition into adulthood is a critical period for the development of eating- and weight-related behaviour,^{206,210,211} but is often neglected in eating- and weight-related disorder prevention research.²²

Additionally, considering the potential for weight-related population-level interventions to elicit unintended consequences, we know very little about individuals' experiences living in the contexts in which these policies are enacted. Population-level policies are often implemented in a top-down approach, with implications for the ways in which individual persons react to and engage with them.⁹⁷ In particular, policies such as calorie menu labelling are being quickly and widely enacted worldwide^{342,343} despite little real-world evidence on their potential impacts on psychosocial wellbeing.³⁴⁴ Since individual-level indicators of psychosocial wellbeing such as disordered eating, body image, and internalized weight bias are shaped by broader societal forces,^{221,259} it is important to consider individuals' attitudes, perceptions, and experiences in relation to interventions aiming to change their weight.

To address these gaps, this research drew upon quantitative analyses of secondary data, a mixed methods analysis, and the development of a theoretical framework. This thesis will not only help to fill the gap in the literature on unintended consequences of such interventions but will inform future weight-related policy development and further the study of holistic eating- and weight-related disorder prevention at the policy level.

3.2 Research questions and objectives

The overall aim of this research was to investigate psychosocial wellbeing among young Canadian adults in relation to population-level weight-related strategies. To address this objective, this dissertation research aimed to address the following questions:

1. What trends have occurred in the prevalence of disordered eating, internalized weight bias, experienced weight stigma, and associated indicators of weight-related behaviour and psychosocial wellbeing among young adults over the past three years?
 - a. What are the potential impacts of existing provincial- and federal-level weight-related policies (i.e., calorie labelling) enacted over this period on these trends?
2. How do young adults feel about, perceive, and experience weight-related population-level interventions (e.g., calorie labelling)?
 - a. Do these attitudes, perceptions, and experiences differ between individuals with and without disordered eating thoughts and/or behaviours?
3. How can the application of systems science prevent unintended consequences for eating- and weight-related disorders?
 - a. What are the implications of systems science approaches to eating- and weight-related disorders for public health nutrition policies?

CHAPTER 4: The impact of calorie menu labelling on disordered eating and related psychosocial outcomes: A longitudinal study among young adults in Canada

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Supplementary materials for this chapter can be found in **Appendix A**.

4.1 Overview

Calorie menu labelling policies are becoming increasingly popular worldwide. Concerns have been raised for the potential of calorie labels to worsen disordered eating and overall psychosocial wellbeing, particularly among vulnerable populations such as women and individuals with eating disorders. The present study aimed to investigate the potential unintended consequences of calorie menu labelling interventions on psychosocial wellbeing among young Canadian adults.

Longitudinal data were drawn from three waves of the Canada Food Study (n=689). Eight repeated measures logistic generalized estimating equations were conducted to assess changes over time for each of disordered eating, internalized weight bias, experienced weight stigma, and associated indicators of weight-related and psychosocial wellbeing. Statistical analyses were contextualized by a policy scan that identified provincial calorie labelling policies in British Columbia (voluntary labelling), Ontario (mandatory calorie labelling), and Alberta, Quebec, and Nova Scotia (no labelling policy).

The implementation of a calorie menu labelling policy did not significantly increase the adjusted odds of disordered eating, internalized weight bias, experienced weight stigma, or other general indicators of mental health, though there were significant differences in these outcomes by sociodemographic factors, including age, gender, race/ethnicity, and weight perception.

The findings of this study contribute to the scarce literature assessing trends in disordered eating and psychosocial wellbeing in the ever-changing, dynamic context of weight-related policy. Significant differences in these psychosocial measures of wellbeing existed by sociodemographic factors, underscoring the need for future research to confirm the findings obtained in this study and to further investigate the unintended consequences of public health nutrition policies that also incorporates the social determinants of health.

4.2 Introduction

Nutrition labelling on menus has gained traction worldwide as a means of supporting healthy eating.^{345,346} Menu labels are intended to draw attention to characteristics of foods and beverages at the point of purchase using numeric information (e.g., caloric, sodium, sugars, or saturated fats content in a given amount) or interpretive images or logos intended to represent the healthfulness of the food (e.g., traffic light labelling, “high in” designations).^{345,347} Menu labels are intended to inform consumer decisions to support healthy food choices, as well as to encourage food industry transparency and reformulation efforts.³⁴² There is a growing focus on calorie labels at the point of purchase, with mandatory calorie labelling policies introduced in a number of jurisdictions,³⁴³ including the Canadian province of Ontario.³⁴⁷ Ontario’s *Healthy Menu Choices Act*, which mandates calorie labels in chains with 20 or more locations,³⁴⁷ has been shown to increase noticing and use of nutrition information, especially among women, individuals with higher health literacy, and those who report dieting to lose weight.³⁴⁸

Concerns have been raised about the potential for calorie labelling to elicit unintended consequences for psychosocial wellbeing, particularly pertaining to disordered eating.^{335,336,344,349} Disordered eating includes harmful weight-related attitudes and behaviours, such as severe caloric restriction and self-induced vomiting.¹⁹¹ Among youth and young adults, disordered eating is associated with increased risk of eating disorders; these disorders severely impact quality of life and carry one of the highest mortality rates of any psychiatric illness.^{170,190} Thus, the prevention of disordered eating among youth should be a public health priority,²⁶⁰ and public health stakeholders should ensure that policies do not unintentionally promote disordered weight-related behaviours.

The widespread presence of calorie labels on restaurant menus may exacerbate eating pathology among individuals with disordered eating, who tend to exhibit heightened preoccupation with calories and anxiety surrounding food choices.³³⁸ Menu labels may promote calorie counting, which has been associated with negative weight-related psychosocial outcomes, including poor body image, internalized weight bias, and weight stigma. Each of these has its own consequences for long-term health,^{44,350} including increased likelihood of intentional weight control efforts, which are important risk factors for both obesity and eating disorders.^{197,310} However, evidence

on the potential for weight-related initiatives such as calorie menu labelling to elicit negative, unintended consequences for eating disorders and psychosocial wellbeing is limited to studies conducted in online or experimental settings^{335–337,351} and sheds little light on the real-world impact of labelling policies. One experimental campus-based study found that the introduction of calorie labels did not worsen eating pathology among university students,³³⁵ though hypothetical survey-based studies have found that individuals with eating pathology report greater use of labels³³⁶ and individuals with diagnosable eating disorders report ordering significantly fewer or more calories than individuals without eating disorders.³³⁷

To investigate the potential unintended consequences of calorie menu labelling interventions on psychosocial wellbeing, a longitudinal analysis was undertaken to examine trends in the prevalence of disordered eating, internalized weight bias, experienced weight stigma, and associated indicators of weight-related and psychosocial wellbeing among young Canadian adults over three years. This research was conducted across jurisdictions without calorie labelling policies and those that introduced calorie labelling policies during the study period. We hypothesized that poorer psychosocial and weight-related outcomes would be observed in jurisdictions that introduced mandatory calorie labelling policies compared to jurisdictions with voluntary and/or no calorie labelling policies.

4.3 Methods

4.3.1 The Canada Food Study

The Canada Food Study is a national cohort survey of youth and young adults that aims to explore eating patterns and trends over a period of time.³⁵² The Canada Food Study was reviewed by and received ethics clearance from the University of Waterloo Office of Research Ethics (ORE #21631) and all participants provided electronic consent to participate.

In Wave 1 (October to December 2016), participants were recruited by trained research assistants through in-person intercept sampling at various sites (i.e., mall, transit hub, park, other shopping district), stratified by region or neighbourhood type, in five urban centres across Canada (Edmonton, Alberta; Halifax, Nova Scotia; Montreal, Québec; Toronto, Ontario; and Vancouver,

British Columbia). Eligible participants had to reside in one of the five cities; be between the ages of 16 and 30 years; have access to the Internet and a laptop, desktop computer, or tablet; and not have previously been enrolled in the study.

At the point of recruitment, individuals who agreed to participate provided their email address (n=6,720), received \$2 cash remuneration, and were then sent an invitation via email to complete the first survey in English or French. Just under half (n=3,234, 48.1%) attempted the survey, which took an average of 53 minutes to complete, and were provided with a \$20 e-transfer or e-gift card. Data quality checks resulted in the exclusion of 191 participants who terminated the survey after the demographic questions, 41 who selected an incorrect month in an embedded data quality check, and 2 who exhibited a suspicious pattern of responses. The final Wave 1 dataset available for analysis included information for 3,000 respondents. Additional details can be found in the Wave 1 Technical Report.³⁵²

Most participants (n=2,992) were invited to participate in Wave 2 (October to December 2017); eight participants asked to withdraw or were removed based on unusual email activity targeted to research staff. Participants were sent an email with a link to the survey, as well as multiple follow-up reminders, and again received \$20 remuneration upon survey completion. A total of 1,115 (37.3%) participants completed the survey; after removing data from participants who were ineligible (e.g., entered an ineligible age or used an ineligible smartphone device) and/or for whom there were data quality concerns, the final Wave 2 sample consisted of 1,022 respondents.³⁵³ The same procedure was followed for Wave 3 (October to December 2018). After excluding participants who were ineligible or had data quality concerns, nearly three-quarters of participants were retained (n=759, 74.2%).

To support longitudinal analyses, we drew upon the data for individuals who participated in Waves 1 and 3. Wave 2 data from these participants were included in the modelling, to be detailed. Participants who did not report living in one of the provinces of interest (n=18) at Wave 1 and who relocated to another province between Waves 1 and 3 (n=30) were excluded. Additional exclusions included participants who did not respond to the item querying weight perception (n=12) and a small number of participants who identified a nonbinary gender identity (i.e., gender queer or different identity) (n=4) or did not report their gender (n=6). The final analytic sample consisted of 689 participants.

4.3.1.1 *Disordered eating and weight-related variables*

The disordered eating, weight-related, and psychosocial variables were measured and operationalized consistently across all three waves of the Canada Food Study. A list of the survey items used in the present study is provided in **Appendix A**.

Disordered eating was assessed using a three-item measure³⁵⁴ that includes one attitudinal item, assessing preoccupation with thinness, from the Eating Attitudes Test (EAT) and two behavioural measures, assessing self-induced vomiting and binge eating, adopted from the Youth Risk Behavior Surveillance System. This 3-item measure has been shown to show higher specificity and slightly better sensitivity than behavioural items alone when compared to more comprehensive measures such as EAT-26 or EAT-48.³⁵⁴ EAT-26 is indicative of disordered eating in non-clinical young adult samples^{355–358} and is one of the most widely used eating disorder screening measures in research and clinical practice.^{359,360} A binary variable was derived to identify participants who had no indication of disordered eating and those who may possibly have disordered eating, as indicated by endorsement of the attitudinal and at least one of the behavioural items, as recommended by the original study authors.³⁵⁴ For the attitudinal item, respondents could indicate always, usually, often, sometimes, rarely, or never being preoccupied with a desire to be thinner. Endorsement was indicated by a response of often, usually, or always among men and usually or always among women, accounting for gendered differences in ascribing to a thin ideal. For the behavioural items, endorsement for both men and women was indicated by responses of ever engaging in self-induced vomiting in the past 3 months and binge eating once a month or more in the past 3 months.³⁵⁴

A single item from the Body Image States Scale³⁶¹ was used to briefly identify and conceptualize body image (“Right now I feel _____ with my body size and shape”). There were nine potential response options to this item (extremely, mostly, moderately, or slightly satisfied; neither dissatisfied nor satisfied; extremely, mostly, moderately, or slightly dissatisfied), which were collapsed into “neutral/satisfied” and “dissatisfied”. Internalized weight bias was assessed using a single item from the Fear of Fat subscale of the Anti-Fat Attitudes Questionnaire regarding worry about becoming fat,³⁶² to which participants could indicate whether they strongly disagree, disagree, are neutral, agree, or strongly agree. These categories were collapsed into “neutral/disagree” and “agree”, which were subsequently labelled “no” and “yes”, respectively.

Experienced weight stigma was measured by asking participants how often they have been bullied or harassed, excluded, or treated unfairly because of their weight over the past 12 months, with any identification of discrimination (i.e., any response other than “never”) as indicative of experienced weight stigma, similar to previous research.³⁶³

4.3.1.2 *General measures of psychosocial wellbeing*

To further operationalize psychosocial wellbeing, additional indicators of mental health were used. Single items querying experiences of anxiety and depression (categorized as “yes” or “no” within the last 12 months) were adopted from the Population Assessment of Tobacco and Health study, a longitudinal study conducted by the National Institutes of Health and U.S. Food and Drug Administration.³⁶⁴ Single items assessing life stress (“Thinking about the amount of stress in your life, would you say that most days are...”; collapsed into “not at all/a bit stressful” and “very/extremely stressful”) and mental health (“In general, would you say your mental health is...”; categories collapsed into “poor/fair” and “good/excellent”) were derived from the Canadian Health Measures Survey.³⁶⁵

4.3.1.3 *Covariates*

Age, gender, race/ethnicity, perceived income adequacy, and weight perceptions were identified as covariates based on previous research demonstrating their associations with weight-related behaviours.^{217,237,366} Participants self-identified their gender using the measure recommended by the Canadian Institutes of Health Research³⁶⁷ to assess gender identity in population health research. Participants who identified as trans men (n=2) and trans women (n=2) were included in the man and woman categories, respectfully. Race/ethnicity was measured using a question from the Canadian Community Health Survey,³⁶⁸ and racial and/or ethnic identities were classified into the following six categories by the Canada Food Study team: White, Chinese, South Asian, Black, Indigenous inclusive (includes mixed), and mixed/other; the latter category included participants who selected more than one race/ethnicity or did not respond to this item. Perceived income adequacy was assessed by asking: “Thinking about your total monthly income, how difficult or easy is it for you to make ends meet?” Responses were collapsed into difficult, neither easy nor difficult, easy, or “don't know/refuse to answer”. Finally, weight perception was assessed using a measure from the Canadian Community Health Survey³⁶⁸ that asked participants

to identify whether they perceived themselves as “underweight”, “just about right”, or “overweight”.

To account for the possibility that participants who notice labels may experience impacts on psychosocial wellbeing differentially than those who do not, a single question was used to assess noticing of nutrition information (“The last time you visited a restaurant, did you notice any nutrition information?”) and included as a covariate. Participants also self-reported their city and province of residence at each wave, which allowed for analysis of differences in their exposure to provincial policies.

4.3.2 Policy-level data

Consideration of how trends in psychosocial outcomes were associated with policies related to menu labelling leveraged a scan of relevant federal and provincial policy-level data, as Canada has not introduced labelling policy nationally.³⁶⁹ The policy analysis drew upon a prior comprehensive scan of food environment-related policies conducted using the Food Environment Policy Index (Food-EPI), which supports assessment of food environment policies and infrastructure.³⁷⁰ Food-EPI was developed by INFORMAS, the International Network for Food and Obesity/non-communicable diseases Research, Monitoring and Action Support,³⁷¹ and has been applied to explore food environments in over 30 countries.³⁷⁰ Using Food-EPI, Vanderlee et al.³⁷² conducted a policy scan of food environment-related policies in place as of January 1, 2017. The resulting series of Food-EPI Canada reports highlight food environment policy and supporting government infrastructure across Canada and each province and territory independently.³⁷²

Drawing on Food-EPI Canada, relevant policy-level data from the Food-EPI Canada federal³⁶⁹ and select provincial reports (i.e., Alberta, British Columbia, Nova Scotia, Ontario, Québec)^{373–377} were used. Since the timeframe for Food-EPI Canada was contemporaneous with Wave 1 of the Canada Food Study, a rapid review was conducted to assess changes to labelling policies at the federal and provincial levels up until October 2018, when data collection for Wave 3 of the Canada Food Study commenced. Using strategies for searching grey literature,³⁷⁸ a Google search and searches of targeted federal and provincial websites for relevant policies enacted after

January 1, 2017 and before October 1, 2018 were conducted to search for updated policies. Only one province (Ontario) introduced a calorie menu labelling policy during the study period (January 2017, after Wave 1 data collection).³⁴⁷ Another province had voluntary labelling measures in place prior to the start of data collection (British Columbia),³⁷⁴ and the remaining provinces (Alberta, Nova Scotia, Quebec) had no labelling policies in place. Thus, similar to previous research,³⁴⁸ a single nominal “condition” variable was created to identify participants’ exposure to calorie labelling policy depending on their city/province of residence. A condition of 0 indicated a province with no menu labelling legislation (i.e., the reference), 1 indicated a province with voluntary menu labelling at Wave 3, and 2 indicated a province with mandatory calorie labelling at Wave 3.

4.3.3 Statistical analyses

Analyses were conducted using SAS® Studio (Version 9.04, SAS Institute, Cary, NC). Post-stratification sample weights, which allow for greater alignment between the analytic sample and Canadian population proportions, were constructed by age and sex using population estimates from the 2016, 2017, and 2018 Canadian Census³⁷⁹ for Waves 1, 2, and 3, respectively.^{352,353} For the descriptive statistics, sample weights for each year were applied for each individual wave of data collection. For the longitudinal analyses, separate post-stratification longitudinal panel weights were generated for Wave 1 (2016) to account for attrition by Wave 3 (2018).

Descriptive statistics were generated for each of the psychosocial and weight-related variables and covariates across the analytic sample at each wave. To inform interpretation, sensitivity analyses, by X^2 tests of association and a cut-off of $p < 0.05$, were conducted to assess differences in the covariate and outcome variables between participants in the analytic sample and those who dropped out or were excluded. Trends in the outcomes of interest (disordered eating, weight stigma, body image, internalized weight bias, anxiety, depression, stress, and mental health) were assessed with two-sample t -tests, split by gender, and the longitudinal panel weights.

Eight repeated measures logistic generalized estimating equations (GEEs) were conducted to assess changes over time for each of the outcomes. GEE generates population-averaged

estimates by modelling mean responses of participants over multiple points of data collection, whilst accounting for the missing data of individuals who did not participate at Wave 2 (n=224). A variable to indicate the wave of the Canada Food Study was included in each model. In each model, the same covariates were included, alongside an interaction term between the condition and wave variables to assess changes in time. The Benjamini-Hochberg procedure³⁸⁰ was applied for the resulting *p*-values from all the regression analyses to account for the false discovery rate (FDR) using a conservative cut-off of 0.05.

4.4 Results

4.4.1 Sample characteristics

At baseline, the mean age of the sample was 23.4 years (SE=0.20) (**Table 3**). Over half of respondents were women (57.2%) and nearly half of the sample was White only (47.5%). Sensitivity analyses revealed the analytic sample significantly differed from the full baseline sample by gender ($p < 0.0001$), with fewer men who had data for Waves 1 and 3; by race/ethnicity ($p < 0.001$), with lower proportions of Indigenous and mixed/other people in the analytic sample; by income adequacy ($p < 0.0001$), with fewer participants responding “don't know” or refusing to answer the item in the analytic sample; and by internalized weight bias ($p < 0.05$), with more respondents in the analytic sample responding “yes” (see Appendix A).

Table 3: Baseline characteristics of weighted analytic sample of the 2016 Canada Food Study (n=689)

Variable	% (n)¹
Age (mean)	23.4
Province	
Alberta	15.3 (102)
British Columbia	23.3 (155)
Nova Scotia	16.6 (111)
Ontario	26.4 (176)
Quebec	18.3 (122)
Gender	
Man	42.8 (284)
Woman	57.2 (380)
Race/ethnicity	
White only	47.5 (316)
Chinese only	10.4 (69)
South Asian only	8.7 (58)
Black only	5.7 (38)
Indigenous inclusive	2.3 (16)
Mixed/other/not stated/missing	25.5 (170)
Income adequacy	
Easy	28.8 (192)
Neither easy nor difficult	40.3 (268)
Difficult	23.3 (155)
“Don't know”/refuse to answer	7.6 (51)
Weight perception	
Underweight	9.7 (65)
Just about right	64.4 (428)
Overweight	25.9 (171)

¹ Totals for each variable may not equal 689 because of sample weights and rounding.

4.4.2 Trends in disordered eating and weight-related outcomes

Wave-specific estimates of each of the outcome variables of interest are displayed in **Table 4**. At baseline, approximately 9% of the sample were at risk of disordered eating. Nearly two-thirds of the sample were neutral or satisfied with their appearance, but over half reported worrying about becoming fat (52.6%) and nearly one-fifth reported experiencing weight stigma in the past year (18.1%). There were no significant differences over time in disordered eating, body image, internalized weight bias, or experienced weight stigma between Waves 1 and 3 (data not shown).

Table 4: Prevalence of disordered eating and related psychosocial variables of weighted analytic sample, by wave, of the Canada Food Study (n=689)

Variable	Wave 1	Wave 2	Wave 3
	(2016)	(2017) ¹	(2018)
	% (n) ^{2,3}		
Disordered eating risk			
Possible disordered eating	9.1 (61)	11.0 (50)	10.4 (73)
Low disordered eating risk	90.9 (603)	89.0 (398)	89.6 (623)
Body image			
Dissatisfied	31.2 (207)	28.3 (128)	29.9 (209)
Neutral/satisfied	68.8 (456)	71.7 (322)	70.1 (488)
Internalized weight bias			
Yes	52.6 (348)	52.0 (234)	51.7 (354)
No	47.4 (314)	48.0 (216)	48.3 (330)
Experienced weight stigma in past year			
Yes	18.1 (120)	19.4 (87)	14.4 (101)
No	81.9 (543)	80.6 (357)	85.6 (598)
Anxiety in past year			
Yes	67.4 (440)	66.0 (290)	70.7 (490)
No	32.6 (213)	34.0 (149)	29.3 (204)
Depression in past year			
Yes	66.9 (439)	66.3 (290)	70.0 (483)
No	33.1 (217)	33.7 (148)	30.0 (207)
Stress in daily life			
Very/extremely stressful	24.2 (161)	25.1 (113)	21.6 (151)
Not at all/a bit stressful	75.8 (503)	74.9 (336)	78.4 (547)
Mental health in daily life			
Poor/fair	30.1 (199)	29.8 (134)	33.2 (232)
Good/excellent	69.9 (462)	70.2 (315)	66.8 (466)

¹ 224 respondents participated in Waves 1 and 3, but not Wave 2.

² Totals for each variable may not equal 689 because of sample weights and rounding. In addition, not all participants responded to each of the variables of interest.

³ Year-specific sample weights were applied to each wave.

There were no statistically significant interactions between the study wave and labelling policies (i.e., no labelling policy, voluntary labelling policy, mandatory calorie labels), disproving the original hypothesis (**Table 5**). Individuals who reported noticing menu labels did not have significantly elevated adjusted odds of disordered eating, body image, internalized weight bias, or experienced weight stigma compared to those who did not report noticing labels.

Table 5: Adjusted odds ratios (AORs) of disordered eating and related psychosocial variables among young adults in the Canada Food Study, 2016-2018, in relation to provincial menu labelling policy (n=689)¹

Parameters	Model Outcomes ² AOR (95% CL) ^{3,4}			
	Disordered eating risk	Body image	Internalized weight bias	Weight stigma in past year
Wave*condition				
Wave 1*No labelling policy	1.00	1.00	1.00	1.00
Wave 2*Mandatory labels	0.90 (0.34, 2.38)	0.67 (0.38, 1.18)	0.68 (0.42, 1.10)	1.27 (0.64, 2.54)
Wave 2*Voluntary policy	1.92 (0.77, 4.82)	0.42 (0.22, 0.80)	1.23 (0.70, 2.18)	1.68 (0.82, 3.43)
Wave 2*No labelling policy	1.48 (0.85, 2.57)	0.96 (0.60, 1.53)	1.08 (0.74, 1.57)	1.43 (0.90, 2.26)
Wave 3*Mandatory labels	0.98 (0.46, 2.10)	0.82 (0.47, 1.42)	1.00 (0.58, 1.74)	1.37 (0.74, 2.55)
Wave 3*Voluntary policy	1.01 (0.37, 2.81)	0.53 (0.25, 1.16)	1.48 (0.80, 2.74)	1.17 (0.51, 2.66)
Wave 3*No labelling policy	1.21 (0.68, 2.14)	0.78 (0.51, 1.20)	1.12(0.74, 1.70)	0.94 (0.55, 1.60)
Age	0.93 (0.88, 0.99)	0.96 (0.93, 1.01)	0.98 (0.94, 1.02)	0.95 (0.90, 1.00)
Gender				
Man	1.00	1.00	1.00	1.00
Woman	1.25 (0.71, 2.20)	1.44 (1.01, 2.06)	1.91 (1.38, 2.63)	0.97 (0.65, 1.44)
Race/ethnicity				
White only	1.00	1.00	1.00	1.00
Chinese only	0.36 (0.15, 0.91)	0.99 (0.57, 1.72)	1.03 (0.59, 1.79)	1.10 (0.56, 2.14)
South Asian only	2.55 (1.12, 5.80)	2.06 (1.04, 4.10)	1.27 (0.66, 2.48)	1.89 (0.98, 3.63)
Black only	0.67 (0.16, 2.82)	1.02 (0.52, 2.02)	0.38 (0.19, 0.75)	1.14 (0.51, 2.55)
Indigenous inclusive	0.13 (0.02, 1.00)	2.00 (1.05, 3.84)	0.73 (0.36, 1.48)	3.08 (1.27, 7.46)
Mixed/other/not stated	1.53 (0.82, 2.85)	1.44 (0.93, 2.23)	1.06 (0.71, 1.58)	1.46 (0.90, 2.37)
Income adequacy				
Easy	1.00	1.00	1.00	1.00
Neither easy nor difficult	0.67 (0.43, 1.03)	0.99 (0.69, 1.40)	1.01 (0.77, 1.33)	0.83 (0.55, 1.27)
Difficult	1.38 (0.78, 2.43)	1.34 (0.89, 2.02)	1.29 (0.91, 1.82)	1.43 (0.93, 2.21)
Don't know/refuse to answer	0.60 (0.26, 1.35)	0.81 (0.41, 1.58)	0.84 (0.48, 1.46)	0.98 (0.50, 1.93)

Parameters	Model Outcomes ² AOR (95% CL) ^{3,4}			
	Disordered eating risk	Body image	Internalized weight bias	Weight stigma in past year
Weight perception				
Just about right	1.00	1.00	1.00	1.00
Underweight	0.28 (0.11, 0.72)	2.71 (1.65, 4.44)	0.30 (0.17, 0.53)	1.84 (1.01, 3.33)
Overweight	3.37 (2.03, 5.60)	9.57 (6.73, 13.59)	3.73 (2.59, 5.38)	4.18 (2.86, 6.12)
Noticing of labels				
No	1.00	1.00	1.00	1.00
Yes	0.52 (0.30, 0.91)	1.21 (0.52, 1.10)	1.18 (0.86, 1.60)	0.93 (0.60, 1.45)

¹ AORs derived from logistic generalized estimating equations.

² Disordered eating risk modelled as odds of possible risk versus low risk. Body image modelled as odds of “dissatisfied” versus “neutral/satisfied.” Internalized weight bias and weight stigma in past year modelled as odds of “yes” versus “no.”

³ CL = confidence limits.

⁴ Bolded AORs are statistically significant based on confidence limits and after application of Benjamini-Hochberg procedure, accounting for the false discovery rate of 0.05.

The adjusted odds of disordered eating risk were significantly higher among people who perceived themselves as overweight (AOR=3.37, CL 2.03, 5.60) and lower among people who perceived themselves as underweight (AOR=0.28, CL 0.11, 0.72) compared to those who reported their weight was “just about right.” After accounting for the FDR, there were no significant differences in disordered eating adjusted odds by gender, race/ethnicity, income adequacy, or noticing of labels (Table 5). Both those who perceived themselves as overweight (AOR=9.57, CL 6.73, 13.59) and underweight (AOR=2.71, CL 1.65, 4.44) had elevated adjusted odds of being dissatisfied with their bodies. Women had 1.91 higher adjusted odds of internalized weight bias than men (CL 1.38, 2.63), and Black participants had significantly lower adjusted odds of internalized weight bias than White participants (AOR=0.38, CL 0.19, 0.75). Finally, participants who perceived themselves as overweight also had significantly higher adjusted odds of internalized weight bias (AOR=3.73, CL 2.59, 5.38) and experienced weight stigma in the past year (AOR=4.18, CL 2.86, 6.12) than those who perceived their weight as just about right.

4.4.3 Trends in general psychosocial wellbeing outcomes

At baseline, approximately two-thirds of the sample reported anxiety (67.4%) and depression (66.9%) in the past year (Table 4). Approximately one quarter of the sample found that their daily lives were very or extremely stressful (24.2%), as opposed to not at all or a little bit stressful (75.8%), and that their mental health in their daily lives was poor or fair (30.1%). There were no significant differences in anxiety, depression, stress, or overall mental health between Waves 1 and 3 for men, but women reported significant increases in anxiety and depression ($p < 0.05$).

Table 6: Adjusted odds ratios (AORs) of indicators of general psychosocial wellbeing among young adults in the Canada Food Study, 2016-2018, in relation to provincial menu labelling policy (n=689)¹

Parameters	Model Outcomes ² AOR (95% CL) ^{3,4}			
	Anxiety in past year	Depression in past year	Stress in daily life	Mental health in daily life
Wave*condition				
Wave 1*No labelling policy	1.00	1.00	1.00	1.00
Wave 2*Mandatory labels	1.65 (0.88, 3.07)	1.43 (0.78, 2.60)	0.88 (0.47, 1.62)	1.65 (0.93, 2.93)
Wave 2*Voluntary policy	0.91 (0.48, 1.73)	0.97 (0.53, 1.80)	1.79 (0.91, 3.52)	1.02 (0.52, 1.99)
Wave 2*No labelling policy	1.03 (0.68, 1.56)	1.06 (0.67, 1.68)	1.06 (0.67, 1.69)	0.84 (0.60, 1.19)
Wave 3*Mandatory labels	1.89 (1.00, 3.58)	1.61 (0.90, 2.90)	0.71 (0.42, 1.21)	1.03 (0.61, 1.73)
Wave 3*Voluntary policy	1.66 (0.82, 3.36)	1.98 (1.02, 3.83)	1.50(0.73, 3.04)	1.52 (0.82, 2.84)
Wave 3*No labelling policy	1.00 (0.60, 1.66)	1.22 (0.77, 1.91)	0.89 (0.55, 1.45)	1.13 (0.77, 1.66)
Age	0.89 (0.85, 0.93)	0.88 (0.84, 0.92)	0.92 (0.88, 0.96)	0.92 (0.88, 0.96)
Gender				
Man	1.00	1.00	1.00	1.00
Woman	2.80 (1.96, 3.99)	1.83 (1.29, 2.60)	1.95 (1.35, 2.80)	1.51(1.06, 2.17)
Race/ethnicity				
White only	1.00	1.00	1.00	1.00
Chinese only	0.84 (0.46, 1.53)	0.54 (0.30, 0.97)	0.59 (0.35, 0.99)	0.93 (0.55, 1.58)
South Asian only	0.52 (0.25, 1.06)	0.52 (0.26, 1.02)	0.72 (0.37, 1.4)	0.72 (0.43, 1.22)
Black only	0.31 (0.15, 0.63)	0.43 (0.21, 0.90)	0.67 (0.36, 1.24)	0.36 (0.16, 0.82)
Indigenous inclusive	3.08 (0.47, 20.1)	5.12 (1.21, 21.70)	1.85 (0.97, 3.51)	1.47 (0.59, 3.69)
Mixed/other/not stated	0.59 (0.37, 0.92)	0.72 (0.46, 1.12)	0.79 (0.53, 1.17)	0.84 (0.55, 1.29)
Income adequacy				
Easy	1.00	1.00	1.00	1.00
Neither easy nor difficult	1.83 (1.30, 2.58)	1.62 (1.18, 2.21)	1.35 (0.93, 1.96)	1.59 (1.23, 2.06)
Difficult	2.79 (1.75, 4.45)	2.94 (1.95, 4.43)	2.19 (1.47, 3.27)	1.99 (1.34, 2.94)
Don't know/refuse to answer	2.14 (1.07, 4.32)	2.16 (0.99, 4.69)	1.47 (0.71, 3.06)	0.94 (0.55, 1.59)

Parameters	Model Outcomes ² AOR (95% CL) ^{3,4}			
	Anxiety in past year	Depression in past year	Stress in daily life	Mental health in daily life
Weight perception				
Just about right	1.00	1.00	1.00	1.00
Underweight	1.08 (0.63, 1.85)	1.24 (0.71, 2.15)	2.02 (1.12, 3.64)	1.14 (0.64, 2.03)
Overweight	1.88 (1.25, 2.84)	1.65 (1.06, 2.57)	1.48 (1.01, 2.15)	1.91 (1.35, 2.71)
Noticing of labels				
No	1.00	1.00	1.00	1.00
Yes	1.00 (0.68, 1.47)	0.85 (0.59, 1.23)	1.14 (0.77, 1.69)	0.73 (0.55, 0.98)

¹ AORs derived from logistic generalized estimating equations.

² Anxiety in past year and depression in past year modelled as odds of “yes” versus “no.” Stress in daily life modelled as odds of “very/extremely” versus “not at all/a bit.” Mental health in daily life modelled as odds of “poor/fair” versus “good/excellent.”

³ CL = confidence limits.

⁴ Bolded AORs are statistically significant based on confidence limits and after application of Benjamini-Hochberg procedure, accounting for the false discovery rate of 0.05.

Similar to the models predicting change in disordered eating and weight-related psychosocial outcomes, there were no significant interactions between the study wave and labelling policies on the outcomes of anxiety, depression, stress, or overall mental health (**Table 6**), again disproving the original hypothesis. Each one-year increase in age was associated with significantly lower adjusted odds of experiencing anxiety, depression, stress, or poor mental health overall. Individuals who found it difficult to make ends meet had significantly higher adjusted odds of anxiety (AOR=2.79, CL 1.75, 4.45), depression (AOR=2.94, CL 1.95, 4.43), stress (AOR=2.19, CL 1.47, 3.27), and poor mental health (AOR=1.99, CL 1.34, 2.94) than those who found it easy to make ends meet. Significantly elevated adjusted odds of anxiety, depression, and poor overall mental health were also found among those who found it neither easy nor difficult to make ends meet (Table 6). Participants who perceived themselves as overweight had higher adjusted odds of anxiety (AOR=1.88, 1.25, 2.84) and poor mental health in their daily life (AOR=1.91, CL 1.35, 2.71). There were no significant differences in any of the indicators of general psychosocial wellbeing by noticing of labels.

4.5 Discussion

The implementation of calorie menu labelling policies was not significantly associated with increased adjusted odds of disordered eating, body image, internalized weight bias, experienced weight stigma, or other general indicators of mental health among young adults in Canada. Despite concerns that calorie labelling policies may increase the risk of disordered eating and worsen psychosocial wellbeing,^{335,336,344,349} there was no effect of mandatory labelling on these constructs nearly two years after the implementation of the policy in Ontario.³⁴⁷ No prior studies have explored this association in the context of real-world policy implementation; however, one pre-post campus-based calorie labelling study similarly found no impact of the presence of labels on the eating pathology of university students.³³⁵ One online survey that presented hypothetical calorie labels and ordering scenarios to adults found menu labelling did not influence the orders of individuals with disordered eating generally, but did impact the orders of individuals with anorexia nervosa, bulimia nervosa, and binge eating disorder.³³⁷ This may suggest that the influence of calorie menu labels on ordering food is more pronounced among individuals with

diagnosable eating disorders than those with sub-clinical disordered eating, although the effect has not been assessed outside of experimental settings using hypothetical outcomes.

Additionally, although the introduction of a mandatory calorie labelling policy did not increase the prevalence of disordered eating across the sample, we cannot ascertain whether the introduction of labelling policies worsened existing disordered eating or overall psychosocial wellbeing in individuals. Several cross-sectional studies have found that the noticing and use of calorie menu labels is associated with dieting and harmful weight-related behaviours,^{336,381,382} but it remains unclear whether individuals who engage in disordered eating actively seek out labels in their attempts to modify their weight. In the present study, noticing of labels on restaurant menus was not associated with the psychosocial outcomes of interest, which suggests that noticing and its associations with weight-related behaviour and psychosocial wellbeing may recede over time.

Although these analyses could have been extended to assess the impact of multiple policies on the outcomes of interest, the policy contrasts between provinces and between waves of data collection in this study were limited, and as such, differences in disordered eating and psychosocial wellbeing could only be investigated among mandatory, voluntary, and no calorie labelling policy jurisdictions. The introduction of Canada's *Healthy Eating Strategy*³⁸³ and forthcoming policy changes to federal legislation surrounding front-of-package labelling and restrictions on food marketing to children provide a unique opportunity for future quasi-experimental research. This study provides a roadmap for future work that strives to leverage food policy research and reduce disordered eating risk across populations.⁴

In accordance with existing research, there were significant differences in the weight-related and general indicators of psychosocial wellbeing by age, gender, race/ethnicity, income, and weight perception. Aligning with previous research, women had increased adjusted odds of internalized weight bias, anxiety, depression, and stress compared to men.^{42,384} Differences in race were also observed, as Black participants had significantly lower adjusted odds of internalized weight bias and anxiety than White participants. Previous evidence suggests differing prescriptions to thin-ideal internalizations by young adult Black American women,³⁸⁵ though this finding should be interpreted while considering the small number of Black participants (5.7%, n=38) in the present sample. Though there were no associations between perceived income adequacy and disordered

eating or the other weight-related psychosocial outcomes, individuals who perceived it difficult or neither easy nor difficult to make ends meet had significantly higher adjusted odds of poor general mental health outcomes than those who found it easy to make ends meet, aligning with previous research.³⁸⁶ Finally, individuals who perceived themselves as overweight had significantly elevated adjusted odds across nearly all of the psychosocial outcomes of interest. Internalized weight bias and weight stigma is associated with a plethora of negative attitudinal and behavioural outcomes,⁴⁴ and in recent years has provided the fuel for increased calls to implement weight-inclusive health policies that best reduce the likelihood of perpetuating weight bias.³⁵⁰

The findings of this study should be interpreted in light of several limitations. Nearly three-quarters of the Wave 1 Canada Food Study sample were lost to participant attrition by Wave 3, limiting the statistical power of the analytic sample. This was of particular concern in analyses of outcomes by race/ethnicity, where some groups were highly under-represented (e.g., Indigenous participants), or by gender, where nonbinary participants were too few and excluded from the analyses. However, the sensitivity analyses (summarized in Appendix A) revealed there was a significant difference between the original sample and the present analytic sample for only one outcome of interest (internalized weight bias), which suggests the impact of attrition on this study's conclusions are likely minimal. Future analyses may benefit from more complex weighted GEE models that may include the full baseline sample and account for missingness in subsequent waves. Further, the use of analytic survey weights allowed for greater alignment between the study sample and Canadian population estimates by age and sex. An additional limitation of the present analyses was the use of brief measures to assess each of the outcomes of interest and their dichotomous operationalizations. Future research exploring the impacts of food and weight-related policies on indicators of psychosocial wellbeing may benefit from more extended, validated measures of complex constructs (e.g., internalized weight bias, body image) that cannot be fully captured by single-item measures. Given the limited sample size of the present analyses, the use and dichotomization of such measures was necessary to maximize statistical power.

4.6 Conclusions

These findings contribute to the scarce literature assessing trends in disordered eating, internalized weight bias, weight stigma, and other psychosocial indicators in the ever-changing, dynamic context of weight-related policy. The implementation of a mandatory calorie menu labelling policy in the Canadian province of Ontario was not associated with increased adjusted odds of disordered eating, weight stigma, body image, internalized weight bias, anxiety, depression, stress, or mental health among young adults. Significant differences in these psychosocial measures of wellbeing existed by age, gender, race/ethnicity, weight perception, and income adequacy, underscoring the need for future research on the unintended consequences of public health nutrition policies that also incorporates the social determinants of health. A recent systematic review found a paucity of evidence exploring the effects of weight-related public health messages more broadly on indicators of disordered eating,³³⁴ finding only one study measured disordered eating behaviour and very few directly measured the influence of weight-related public health messaging on disordered eating risk.³³⁴ This is problematic since nutrition policy is a key leverage point for the prevention of eating disorders,^{4,338} and further emphasizes the need for public health research that more holistically considers psychosocial wellbeing.

CHAPTER 5: “Maybe a little bit of guilt isn’t so bad for the overall health of an individual”: A mixed-methods exploration of young adults’ experiences with calorie labelling

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Supplementary materials for this chapter can be found in **Appendix B**.

5.1 Overview

Menu labelling, and more specifically calorie labelling, has been posited as an intervention to improve nutrition literacy and the healthfulness of consumers' food purchases. However, there is some concern calorie labelling may unintentionally trigger or exacerbate disordered eating among vulnerable persons, including individuals with poor body image or eating disorders. The purpose of this research was to explore young adults' experiences with labelling, with a focus on its implications for their relationships with food. Individual semi-structured interviews were conducted with thirteen participants from a campus-based menu labelling study. Interview data were inductively coded and informed by a social constructionist framework and supported by survey data assessing disordered eating and related constructs. Four key themes included: (1) participants' support of and skepticism about labelling interventions, (2) the identification of knowledge and autonomy as mechanisms of labelling interventions, (3) the role of the individual's and others' relationships with food in experiences with labelling, and (4) disordered eating and dieting as lenses that shape experiences with interventions. Participants' perceptions of and experiences with calorie labels differed by their gender, body esteem, and disordered eating risk. The results provide insight into the complexity of young adults' interactions with labelling interventions and context for future research exploring the unintended consequences of public health nutrition interventions.

5.2 Introduction

Rising rates of obesity over the past few decades³⁰ have resulted in increased attention to reducing weight and preventing weight gain among individuals. The “war on obesity” has predominantly focused on weight loss and/or maintenance and addressing the physiological risks associated with higher weights^{14,332} while neglecting possible psychosocial consequences, such as internalized weight bias and poor mental health.^{8,14} Weight-centric approaches may promote *healthism*, which places responsibility for health at the individual level, such that illness or poor health represent a moral failing of the individual rather than the government.³⁸⁷ Two critical reviews of Canadian weight-related policies have illustrated how public health documents pertaining to higher weights in the population tend to frame obesity as an “individual problem”,^{14,100} neglecting to consider the role of social determinants of health (SDOH). Weight-related public health interventions have also been criticized for their emphases on individual *agency* versus societal *structure* in their promotion of “healthy weights”.¹⁰⁹

More recently, the federal government of Canada introduced the *Healthy Eating Strategy* to improve dietary patterns through agentic and structural changes, for example, by promoting nutrition literacy and curtailing marketing.³⁸³ The strategy encompassed nutrition labelling,³⁸⁸ an increasingly popular policy approach among governments and health organizations.³⁴² Menu and front-of-package labels may display numeric characteristics of a food or beverage (e.g., caloric, sodium, sugar, or saturated fat content of a specified serving size), or use interpretive images or logos to represent the “healthfulness” of the food (e.g., traffic light labelling).^{347,388} Labels channel agency and structure via their efforts to promote informed choices among individuals *and* their encouragement of reformulation and transparency among the food industry.^{342,388} Menu labelling increasingly focuses on calories, for example, in jurisdictions such as Ontario, Canada, where mandatory calorie labels on restaurant menus were introduced in 2017.³⁴⁷

In tandem with regulations and proposals related to labelling interventions in numerous countries,³⁴³ there are concerns about their potential to elicit unintended consequences for people with disordered eating and eating disorders.³⁴⁴ This is of particular concern among youth and young adults, who are at a vulnerable developmental stage whereby engagement in dieting behaviour can increase lifetime risk of eating disorders and eventual weight gain.^{3,8,330}

Disordered eating is characterized by attitudes and/or behaviours, such as severe caloric restriction or self-induced vomiting, that are intended to modify weight and are harmful to health.¹⁹¹ Disordered eating affects up to 30% of young adults,^{206,208} is most prevalent among women^{204,214} and individuals with higher weights,^{204,217} and can subsequently increase risk of eating disorders, diagnosable psychiatric illnesses characterized by significant impairment to social, emotional, and/or physiological wellbeing.¹⁶⁷

Concerns have arisen about calorie labels because they may oversimplify the nutritional and social values of food^{389–391} (though generally, the caloric content of foods is correlated with its overall healthfulness)³⁹² and reinforce behaviours associated with disordered eating, such as calorie counting.^{344,393} Apprehension regarding the potential for labels to unintentionally generate disparities by creating “in-groups” who can change their behaviour and “out-groups” constrained by circumstances including disordered eating has also been raised.³⁴⁹ Individuals trying to modify their weight appear to actively seek out nutrition information^{381,382,394} and those engaged in disordered eating appear more likely to use labels than those who are not.^{336,395} In an online retail simulation that exposed individuals to hypothetical calorie labels, those with anorexia nervosa or bulimia nervosa stated they would order items with significantly fewer calories and those with binge eating disorder opted for items with more calories compared to individuals without eating disorders.³³⁷ However, a pre-post campus-based experimental study found calorie labels did not worsen eating disturbance among undergraduate women after one month of implementation.³³⁵

One American university-based mixed-methods study found some young adults recognize that labelling initiatives may elicit negative consequences for individuals with disordered eating,³⁹⁶ but quantitative evidence suggests many young adults support such policies³⁹⁷ and do not perceive labels as harsh.³⁹⁸ This seemingly contradictory policy support may be reflective of a desire for transparency at the point of food purchase and/or consumption, along with societal norms that emphasize individual responsibility in achieving and maintaining healthy eating and weights.^{332,399} There is a paucity of other research exploring how individuals experience labelling, particularly in relation to disordered eating risk, but mixed-methods research has been suggested as a means of exploring the unintended consequences of such interventions.³⁴⁹ Accordingly, we conducted a mixed-methods study to explore how young adults feel about,

perceive, and experience weight-related population-level interventions, with a focus on calorie labelling. Furthermore, we sought to examine whether attitudes, perceptions, and experiences differed by gender, body esteem, and disordered eating risk.

5.3 Methods

This study used a convergent mixed-methods design (**Figure 2**), in which qualitative and quantitative data were collected separately and used in conjunction.⁴⁰⁰ Qualitative data were yielded by semi-structured, one-on-one interviews, and quantitative data collected using a survey consisting of socio-demographic and food- and body-related measures. The study was reviewed by and received clearance from the University of Waterloo Office of Research Ethics (ORE #40501).

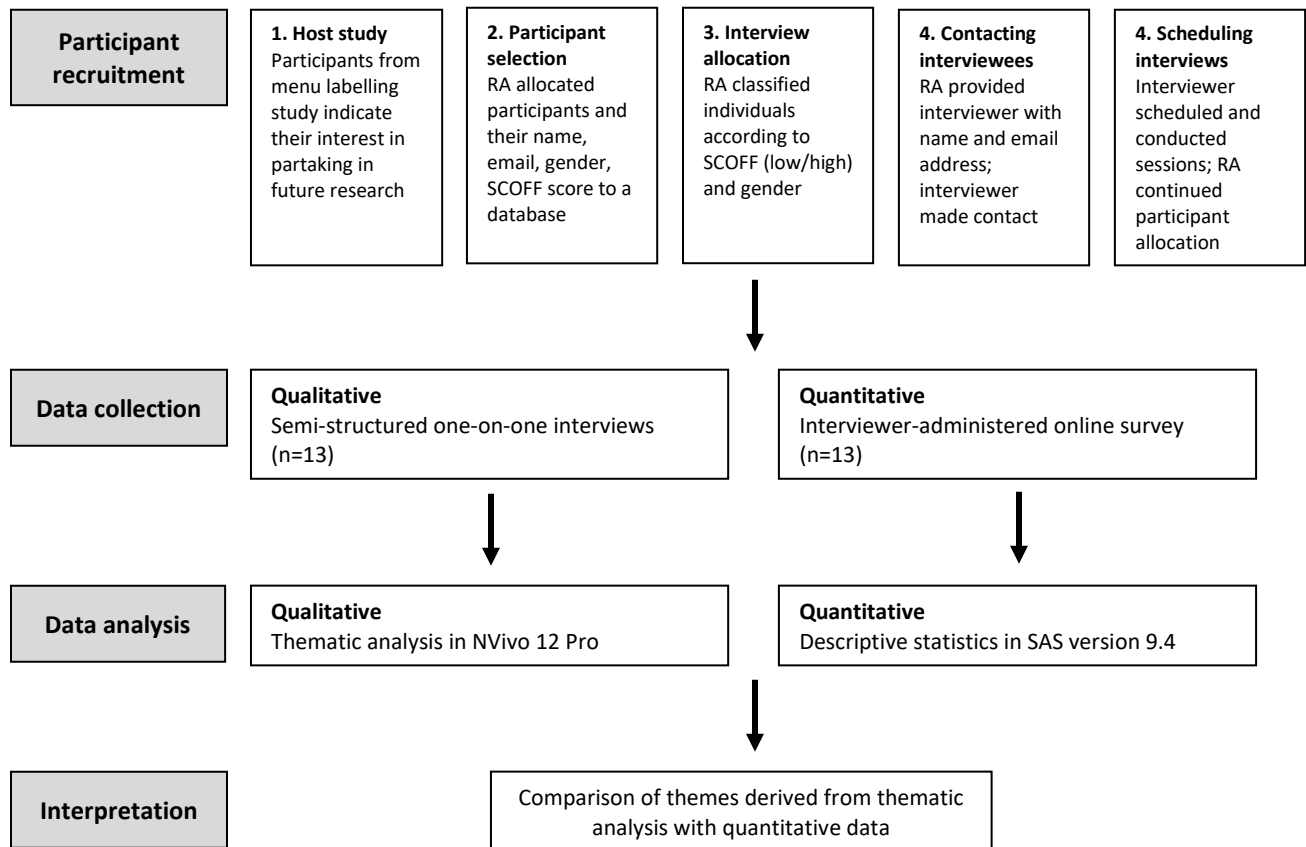


Figure 2: Recruitment and convergent mixed-methods study design.

Note: Figure adapted from Holmes et al.⁴⁰¹ RA = research assistant. SCOFF = brief measure to assess eating disorder risk among non-clinical populations.⁴⁰²

5.3.1 Participants and recruitment

Participants were recruited from a larger study (n=1,623) conducted at the University of Waterloo in March and April 2019. This larger study used a pre- and post-intervention design to evaluate young adults' notice of, use, and perceptions of traffic light and numeric calorie labels, as well as the impact of labels on food and beverage purchasing. Calorie labelling was introduced at two residence cafeterias, which were randomized to numeric or traffic light labels, while a third residence cafeteria received no labels. The traffic light labels presented caloric information within a green circle for low-calorie, amber circle for middle-calorie, or red circle for high-calorie food and beverage items based on the UK Food Standards Agency guidelines for traffic light labels.⁴⁰³ In the intervention sites, posters indicating the meanings of the labels, as well as daily recommended calorie intake (2,000 per day) were visible at the point of food purchase. Eligible participants included University of Waterloo students who had made a purchase at the cafeteria that day. Those who consented were invited to complete exit surveys querying their socio-demographic characteristics, noticing and use of labels, and other food-related factors. At all three cafeterias, surveys were administered during a period of one and a half weeks prior to the introduction of the labels and two weeks after the introduction of the labels.

Participants' interest in related research was queried; those responding affirmatively (n=343) represented the sampling frame for the present study. Purposive sampling via maximum variation was used,⁴⁰⁴ with the aim of achieving variation across disordered eating status, as well as gender since the prevalence of disordered eating differs by gender identity.²³⁵ The host study assessed gender using a measure recommended by the Canadian Institutes of Health Research (CIHR)³⁶⁷ that asks participants to select their current gender identity from "man", "woman", "trans male/trans man", "trans female/trans woman", "gender queer/gender non-conforming", or "different identity". Disordered eating risk was assessed using SCOFF, a 5-item measure to assess eating disorder risk among non-clinical populations.⁴⁰² Affirmation of two or more SCOFF items is indicative of potential disordered eating⁴⁰² and was designated as 'high' risk whereas participants who scored 0 or 1 were classified as 'low' risk. A trained research assistant categorized participants into one of six groups based on gender identity (man or woman or trans/nonbinary) and disordered eating risk and provided the names and email addresses of

participants in each category to the interviewer. Consideration was not given to the labelling condition implemented in the cafeteria in which the respondent completed the host study survey or timing of the survey. At the time of the study, calorie labelling was in place in chains with more than 20 outlets in Ontario,³⁴⁷ including branded on-campus outlets, and it was assumed participants had some baseline exposure to labels regardless of which campus cafeteria they frequented.

The interviewer contacted those eligible via email requesting participation in an interview and survey aiming to explore young adults' feelings, perceptions, and experiences with population-level nutrition policies. The recruitment emails are included in **Appendix B**. Participant recruitment was iterative to achieve a diverse sample by gender and disordered eating status. Thirteen one-on-one interviews were carried out in March and April 2019. Participants were provided with \$15 CAD cash remuneration. Recruitment efforts and data collection concluded with the end of the academic term in mid-April.

5.3.2 Data collection

Data collection was conducted in a private on-campus location. Prior to the interviews, consent was requested (Appendix B). Following the interview and survey, the interviewer conducted verbal debriefing, revealing the study's focus on experiences of policy in relation to eating disorder risk. All participants consented to the inclusion of their data following debriefing. After each session, audio recordings were transcribed verbatim and survey responses were deidentified and participants assigned pseudonyms to link their qualitative and quantitative data.

5.3.2.1 Semi-structured interviews

The interview guide (Appendix B) was designed to allow participants to detail their experiences in a "free flow of consciousness",⁴⁰⁵ while keeping the interview on track. General questions, such as 'What is your favourite food to cook or eat?', were posed to establish trust prior to inquiring about participants' relationships with food, thoughts on food policy and particularly labelling, and the potential implications of food policy on their own and others' relationships with food. Interviews were approximately an hour in length.

5.3.2.2 *Surveys*

Following the interview, participants completed a short survey, hosted on a University of Waterloo Qualtrics server, that queried age, gender identity³⁶⁷ as described previously, and race/ethnicity using a modified version of a measure combining Indigeneity and race/ethnicity.³⁶⁸ Weight perception was measured by asking participants whether they consider themselves ‘overweight’, ‘underweight’, ‘just about right’, ‘don’t know’, or ‘refuse to answer’.³⁶⁸ Body esteem was assessed using the Body Esteem Scale for Adolescents and Adults (BESAA), a 23-item trait measure that uses a 5-point Likert scale to indicate frequency of agreement from 0 (never) to 4 (always). BESAA consists of three subscales (appearance, weight, and attribution) with high internal consistency (Cronbach’s $\alpha = 0.92, 0.81, 0.94$) and is designed to measure body-related self-evaluation among adolescents and young adults across genders;⁴⁰⁶ higher scores reflect greater body esteem. Finally, the 26-item Eating Attitudes Test (EAT-26) was used to measure disordered eating attitudes and behaviours. EAT-26 is a shortened (26 item) version of the 40-item EAT but more detailed and specific than brief measures such as SCOFF.^{407,408} The EAT-26 uses a 6-point Likert scale to indicate frequency of agreement from 1 (never) to 6 (always) and consists of three subscales (dieting, bulimia, and food preoccupation/control) with high sensitivity; higher scores indicate greater eating pathology. A score of 20 or higher is indicative of severe eating pathology, although a score below 20 does not exclude the possibility of disordered eating.⁴⁰⁷ The measure includes four behavioural items that are not included in the score that inquire about occurrences of binge eating, self-induced vomiting, laxative or supplement use, and excessive exercise over the past six months, as well as a question regarding ever having been treated for an eating disorder.

5.3.3 **Analyses**

Aligning with the convergent mixed-methods design,⁴⁰⁰ quantitative and qualitative data were analysed separately and integrated during the final analytic stage (Figure 2). Quantitative data were analyzed using SAS, version 9.4 (SAS Institute, Cary, North Carolina). Descriptive statistics were derived to describe the sample characteristics, including mean BESAA and EAT-26 scores.^{406,407}

Interview transcripts were initially analyzed using NVivo 12 Pro (QSR International Pty Ltd., Doncaster, Victoria, Australia). Transcripts were inductively coded and analyzed by two independent researchers using a thematic analysis framework.⁴⁰⁹ After familiarizing themselves with the data, the two researchers completed line-by-line open coding, axial coding of the open codes, and selective coding of the axial codes. The axial and selective coding stages were guided by a social constructionism epistemological perspective, which is “concerned with elucidating the processes by which people come to describe, explain, or otherwise account for the world in which they live.”^{410(pp3-4)}

Prior to selective coding, the quantitative and qualitative data were combined in NVivo 12 Pro, allowing for cross-comparison of codes and themes by variables of interest, including EAT-26 scores, BESAA scores, and the four EAT-26 behavioural items. The primary researcher explored cross-comparisons independently and all final themes were reviewed by the research team, as detailed below. Several procedures were used to ensure the quality and rigor of the results and compiled into an audit trail,⁴¹¹ which is summarized in Appendix B.

5.4 Results

Participant characteristics (n=13) are summarized in **Table 7**. An overview of the themes and subthemes are displayed in **Table 8** and detailed in the following sections. The first two themes explore how young adults feel about, perceive, and experience calorie menu labelling. The subsequent two themes detail the ways in which attitudes, perceptions, and experiences with labels differ by participant gender, body esteem, and disordered eating risk.

Table 7: Participant demographic characteristics of a mixed-methods study (n=13)

Characteristic	n
Age (mean)	18.8
Gender	
Man	3
Woman	10
Race/ethnicity	
Caribbean	3
East Asian (e.g., Chinese, Japanese, Korean)	2
South Asian (e.g., East Indian, Pakistani, Sri Lankan)	4
Southeast Asian (e.g., Cambodian, Indonesian, Laotian, Vietnamese)	1
White	3
Weight perception	
“Underweight”	2
“About the right weight”	8
“Overweight”	3
BESAA score (mean)	51.0
EAT-26 score (mean)	7.7

Note: BESAA = Body Esteem Scale for Adolescents and Adults, a 23-item measure that measures body-related self-evaluation among young adults across genders; higher scores reflect greater body esteem.⁴⁰⁶

EAT-26 = Eating Attitudes Test-26, higher scores indicate greater eating pathology.⁴⁰⁷

Table 8: Overview of major themes and subthemes identified in a mixed-methods study (n=13)

Major theme	Corresponding subthemes
Support of & skepticism about labelling interventions	Policy support for menu labelling Skepticism towards food policy or labels
Knowledge & autonomy as mechanisms of population-level interventions	Awareness, education, and information - Calorie awareness - Food allergies or intolerances Noticing and use of labels - Counting calories & doing math - Colour associations of labels Obesity and health consequences of poor diets
Role of the relationship with food in experiences with labelling	Personal connections with food Food & relationships with others/Societal pressures surrounding food Short- and long-term influences of labels Negative impact of labels on relationship with food
Disordered eating and dieting as a lens in experiences with interventions	Overindulging and/or bingeing Regret and shame associated with food Restrictive food and/or dieting behaviour Speaking for a friend

5.4.1 Support of & skepticism about labelling interventions

Regardless of gender, body esteem, and disordered eating risk, most participants voiced support of *and* skepticism about labelling interventions—support for their intention to improve population health, but skepticism related to the capacity of labels to change their own and others’ food-related attitudes and behaviours.

Policy support for labelling and related policies (e.g., Canada’s Food Guide)⁴¹² was exhibited by eleven participants, who detailed the perceived benefits of such policies for themselves and/or others and their usefulness in comparison to no policy. Jen, a 23-year old international student from China, explained:

“Those who want to know, and before they never had the resources or there’s no way for them to know the exact calorie content in one specific things, now they—they’re being provided this opportunity. Those who care are still going to care, which hopefully can change their purchasing decision and help them make more healthier choices.”

Participants described how having some information about the nutritional content of their food was better than none, and that the clarity and perceived usefulness of information on menu labels through displays of calories and/or traffic lights was high. Overall, there was a sense that governments want to help people be their healthiest selves.

On the other hand, twelve participants were *skeptical about food policies and/or labels*. There was heterogeneity in terms of liking or using labels, but, overall, participants identified potential limitations in terms of their effectiveness, particularly among the university-aged student population. For example, Cassie, an 18-year old White woman with high body esteem and a low risk of disordered eating, noted:

“We know that we’re supposed to eat healthy and exercise and do all those things, but we’re still not doing it. Changing policy isn’t necessarily going to change the way that people think about food and how they consume it.”

Several participants described considerations influencing food decisions beyond personal choice and the use of labels, including limited financial resources and access to cooking facilities, the convenience of buying less healthful fast foods, and lack of time to buy and prepare healthy foods.

5.4.2 Knowledge & autonomy as mechanisms of labelling interventions

All participants, regardless of their personal characteristics, identified *awareness, education, and information* about the caloric content of foods and beverages as the avenue through which labels may lead individuals to make healthier decisions. For example, Maya, a 19-year-old South Asian woman, stated: *“I think it’s more about being aware, rather than making a change. They want to let people know.”* The suggestion that labels contribute to raising awareness about calories in foods connects to the previously described support of labelling policies due to a desire to know

about the healthfulness of their food. Some participants identified other values of labels, such as avoiding allergens.

In describing the usefulness of labels to inform purchases, eight participants exhibited *calorie awareness*, detailing the meaning of calories and the calorie content of certain foods and beverages. Some participants highlighted the shortcomings of a focus on calories, as evident in the following excerpt from Cassie: “*Some healthy foods like nuts, like healthy fats and oils, those are great for you but they might be higher in calories than something that’s not necessarily good for you.*” The five participants who did not exhibit calorie awareness in their interviews were international students. There were no differences in *calorie awareness* by body esteem or disordered eating risk.

In detailing their thought process, all participants drew attention to the *noticing and use of labels*, both within the context of the host labelling study and in their experiences of encountering calorie labels in their daily lives. Rahul, an 18-year old South Asian male, detailed that although he does not care about the caloric content of his food or use labels, he cannot help but notice the labels when he is ordering food:

“So you just put your eyes over there every time, not [...] like intentionally, but yes, still your eyes goes over there, because it’s bright and it’s saying something, so yeah. I see it every day. I don’t like read it every day, but, like, I see it in like the calories.”

Participants with disordered eating scores above the sample average talked about and referenced their noticing of labels in greater depth than participants whose scores were within one point of the average and/or below it, though there were no differences by body esteem.

In discussion about traffic light labels used in the host study, eight participants, who mostly had average body esteem and elevated disordered eating scores, described the *value assigned to the colours of labels* in traffic light labels and how different colours aligned with knowledge about the value of calories and their associations with the healthfulness of foods. For example, Emily, an 18-year-old woman, detailed “*the associations that people have like cultural associations with red, yellow, and green is like: Red is bad. Yellow, ehh. And green is good.*” Relatedly, there was some concern regarding the lack of clarity about what the colours mean. For example, one

participant expressed she did not know how it was determined what was a high- versus medium-calorie item, but suggested the labelling of an item with red means “it must be bad”.

Pertaining to *autonomy as a mechanism* of labels, nine participants detailed *counting calories*, often associated with “*doing the math*”, as a component of ordering foods when calorie labels were present. Although several described counting calories as a tool others could employ, Monica, a 19-year-old East Asian woman with a previously diagnosed and treated eating disorder, described how doing the math influenced her use of labels:

“I remember like, even calculating for one of the drinks because, um, I don’t know if you’ve had bubble tea yourself, but you can change like the ice levels and the sugar levels, and I remember like, trying to meticulously calculate what—what it was like.”

Of the nine participants who discussed counting, four indicated counting calories themselves as opposed to highlighting the benefits of others doing it; two of them had above-average EAT-26 scores and weight perceptions aside from “just about right”, and one had a history of eating disorders and self-reported binge eating in the past six months. The four participants who did not mention counting calories or “doing the math” had low disordered eating risk and above-average body esteem scores.

Participants also described the role labelling initiatives play in preventing and/or reducing *obesity and related health consequences*. The nine participants who identified negative health consequences as a justification for labelling policies were nearly split on whether the onus of responsibility for preventing harmful health behaviours in relation to obesity was government’s (i.e., structural) or solely an individual’s (agentic) responsibility. For example, Helen, an 18-year-old Southeast Asian woman with average BESAA and EAT-26 scores, identified the government as a purveyor of information and a motivating force for individuals to make change:

“I feel like the rates of obesity and health issues has increased and it can create a burden on the health care system, and the government maybe wants to prevent it. The government is saying let’s implement these strategies and kind of inform Canadian citizens how to prevent.”

On the other hand, some participants, like Cassie, perceived the government's actions as burdening the individual with the burden of choice surrounding food:

“I mean, we like to think that, like, the government wouldn't try and make us feel bad about ourselves, but they definitely do because they don't, you know, want to be known for having an obese population. Like, that just doesn't reflect well on our country as a whole. So maybe like a little bit of guilt isn't so bad for, like, the overall health of an individual.”

The nine participants who highlighted the role diet-related initiatives play in preventing or reducing obesity seemed to cast higher weights and chronic disease as the outcomes of individual choice. Like previous subthemes related to individual agency and autonomy as mechanisms of change for labels, the analysis revealed no differences by gender, body esteem, or disordered eating risk. While participants saw the government as an influencing factor on food purchases, other factors, such as relationship with others, were also identified as potentially important.

5.4.3 Role of the relationship with food in experiences with labelling

Participants described the varying ways in which they interact with food in their daily lives and the meaning, emotions, and value they get from food, with potential implications for their experiences of labels. Five participants described positive relationships with food (two had above-average disordered eating scores and “overweight” weight perceptions), two described a neutral relationship with food (neither had elevated disordered eating or body esteem risks), and six described a relationship with food that was at least partly contentious (two had above-average disordered eating scores and one had history of an eating disorder). Participants' *personal connections with food* were often predicated on external factors, and although descriptions of their individual relationships with food are outside the scope of this paper, they did contribute to analyses present in the following subthemes.

All participants described the role of *food in their relationships with others* and the influences family, friends, and even strangers can have on their food choices when eating out. The *societal pressures surrounding food* occurred in public and/or private spaces and included pressures that

were both spoken (i.e., comments from others) and unspoken (e.g., judgmental looks from friends, others taking less food in the cafeteria) that subsequently interacted with participants' experiences with labels and influenced their food-related purchases. Although men described societal pressures surrounding food, this subtheme was more prevalent in the responses provided by women. Monica described one instance in which the use of labels foods was significantly impacted by societal pressures: *"I remember one time I was ordering UberEATS and I wasn't just looking at the calorie labels, but I was conscious of what my friends were ordering as well, because they were getting smaller items."* She then shared that she ended up ordering a lower calorie item in line with her friends' choices.

All participants described *short- and long-term influences of labels* on their purchasing decisions and physical and emotional wellbeing and its interaction with their relationships with food. Short-term influences were considered those that affected the food purchase itself and any self-identified thoughts or emotions after the food purchase was made and during the consumption of the food. Long-term influences were those that persisted after the meal was consumed (i.e., later that day, week, and beyond). Perceptions related to influences of labels on participants' food-related decisions were elicited by a hypothetical scenario that asked participants to consider how a green, amber, or red label on their favourite food would affect their purchasing decision and associated feelings. Five participants reported the colour of the label would not affect their decision (one had below- and above-sample-averages for body esteem and disordered eating, respectively) and eight said the colour would influence them to not purchase a food *or* purchase and consume a lesser amount of it (four had above-average disordered eating scores and one had history of an eating disorder). In response to a question inquiring whether they had noticed nutrition information the last time they visited a restaurant, eight participants said yes and half of those stated it influenced what they ordered. Even among participants who did not report the labels would influence their purchasing decision, a slight emotional reaction was apparent. For example, Daniel, a 19-year-old White man who perceives himself as overweight and had an above-average disordered eating risk score, said: *"I guess it would bother me slightly depending on if I saw that my food was like—if I saw the food that I eat, compared to another food that is—that I consider very unhealthy."* Participants' descriptions of seeing a green label (indicating a

low-calorie item) and choosing this item left them with a positive emotion that went away quickly.

In contrast, participants identified that long-term influences of labels were mostly negative. Negative long-term influences were reported by six participants, including three with above-average disordered eating scores (Cynthia, Arjun, Maya) and four who identified one or more of eating binges, self-induced vomiting, or exercising more than 60 minutes a day to control their weight in the past six months (Emily, Cynthia, Monica, Maya). For some participants, like Maya, the long-term consequences of labels influenced her eating later in the day:

“I wanted to take a dessert and, uh, it was a chocolate brownie, and it was like, a lot of calories I remember at the time. And that made me not take it, frankly speaking, because I was like: I already had the pizza, I don’t want to, like, rupture my stomach. It’s already packed, taken a lot. And I was like okay, let’s just not take this. So I just saw the calories. I—I did not take it. It made me feel that, like kind of if—if the calorie thing wouldn’t have been there, I would have just taken it and not given a damn. But I did, and that was the first time I didn’t think about even the money part. I just saw, like, I wanted the brownie, I didn’t care how much it was, and just saw that: oh, too much calories, can’t take. It lingered till I was in the bus, and I was telling my friends: I should have taken that, I should have taken that, I should have taken that. And they were, like, joking about it with me, but then I was like: ugh, like let it go, let it be, and when I reached home, I had the craving again. So I just took some—so I just made my own custard and ate it, because I was craving something sweet.”

Although Maya made the decision to not purchase and eat a brownie after seeing its caloric content, her craving for something sweet lingered until later that evening, likely prompted by her avoidance of the food after seeing the label.

All participants identified at least one potential *negative impact of labels on their and/or others’ relationships with food*, with references to the potential mental, physical, and emotional consequences. Nine participants identified only negative consequences for others’ relationships with food (two had above-average disordered eating scores), while four reported these negative consequences may also impact their own relationship with food (three had above-average

disordered eating scores and/or a history with an eating disorder). Five participants explicitly stated labels may have adverse effects for individuals with eating disorders or contribute to a greater number of eating disorders among the population. Other negative consequences identified by participants included driving more people to dieting, eliciting shame or embarrassment around eating, pressuring people to eat less, affecting how people think about food, targeting insecure populations (e.g., adolescent girls, people with higher weights), eliciting body-shaming, and leading people to fixate on the calories rather than overall nutrition.

5.4.4 Disordered eating and dieting as a lens in experiences with interventions

For several participants, their own disordered eating and/or weight management efforts interacted with their attitudes, perceptions, and experiences with labelling interventions. As opposed to the previous theme, which captured the role of the relationship with food and experiences with labels, this theme focused on restrictive and/or maladaptive eating-related behaviours in relation to labels.

Eight of the thirteen participants detailed instances of *overindulging and/or “bingeing”* or having what they perceived as “too much” of certain foods, which were usually less healthful and low in nutritional value, despite the presence of calorie and/or nutrition labels. Although there were no stark differences by gender, body esteem, or disordered eating status between participants who did and did not report instances of bingeing, all participants detailed guilt, shame, and/or frustration related to the eating occasion. For example, Monica, who had previously been in treatment for an eating disorder characterized by episodes of binge eating, describes a recent example of bingeing: *“When I’m trying to study or I’m bored, I think that I should eat a piece of chocolate, and then reach for another piece and then it gets kind of bad sometimes.”* Monica further described she could not stop eating the chocolate and how seeing the evidence of her binge through the wrappers in the trash elicited feelings of guilt and shame.

Likewise, nine participants described instances of feeling *ashamed about and/or regret* related to their food choices. For some participants, this had to do with the shame of choosing a high-calorie food after seeing the label, but for Cynthia, it was related to the fact she consumed more than she wanted:

“Regret comes with the fact that I know I should have stopped, that it wasn’t necessary, and I would have known I was full, but I still continued eating. You regret those decisions on a health sort of vibe, in that you know that your body’s telling you that you’re full, you don’t need it anymore, but you’re still shoving it in your mouth.”

For Cynthia, who had a higher-than-average EAT-26 score, low body esteem, and overweight perception, this instance occurred after ordering and consuming food at a restaurant without calorie labels. She hypothesized the presence of labels may have led her to order and consume less food, and that the stress of the eating occasion had to do with the type of food she was eating in a public place. Two other participants expressed a similar sentiment, hypothesizing that the guilt around consuming certain foods might be alleviated if they had more knowledge and information to fight overconsumption.

Nine participants described behaviours or thoughts that were restrictive or aligned with attempts to modify their weight. These included references to intentional weight loss, gain, or maintenance by reducing intake of fast food or replacing soda with water or through maladaptive strategies such as severe caloric restriction. The participants who reported *restrictive food and/or dieting behaviours* had varying scores on BESAA and EAT-26, but the participants whose eating pathology seemed most severe had higher disordered eating scores and detailed how their weight modification attempts intersected with their label-related experiences. Arjun, a 19-year-old South Asian man who perceives himself as underweight, described his attempts to add weight and “bulk”:

“My initial calorie goal set was I think, uh, 2,900, or maybe a bit more, uh, and I was trying to hit that everyday, but it was really hard. I’d get it maybe, like, once every three days, and... yeah, as I kept going to the gym, I kept trying to hit those calorie goals, but it was really difficult. So, uh, I resorted to trying to eat, like, higher calorie foods because I noticed a lot of the stuff that [my family] ate at home was fairly low-calorie.”

Arjun detailed bulking and cutting, with alternating cycles of a high-calorie diet to gain weight (“bulking”) and severe caloric restriction and excessive exercise to “carve” muscle out of the fat (“cutting”). Speaking to the role of labels, Arjun described: *“They help me choose high—higher calorie, low sugar, low cholesterol foods, uh, which is good.”* Similarly, other participants

(including Cynthia, Jen, and Helen) detailed how labels allowed them to achieve weight-related goals.

Twelve participants appeared to distance themselves from the influences of labels by *speaking for a friend*, describing one or more friends with rigid eating patterns and/or attempting to modify their eating patterns in ways that might influence their experiences with labels. Notably, six participants detailed a dichotomy observed among peers of their age – some young people are hyper-aware and conscious of their diets and others have “unhealthy” dietary patterns, as demonstrated by Jen:

“I feel like the locals, or at least the students around me, they’re kind of like two extremes. One can be super, super healthy... And on the other hand, my other roommate... she only eats rice, chicken nuggets, and pepperoni.”

Jen later detailed how her roommate may claim to look at labels when purchasing foods outside the home, but indicated she incorrectly interprets the nutrition information and proceeds to have an “unhealthy” diet. The six participants who described this healthy-unhealthy dichotomy did not themselves identify with it, but rather invoked it when describing the eating patterns and use of labels of those around them.

5.5 Discussion

The findings of this mixed-methods study highlight the complexity underlying young adults’ interactions with calorie labels. Participants exhibited both support and skepticism with regard to labels and identified ways in which they might help them or others make healthy choices or choices consistent with weight-related motivations. Participants who were women, had low body esteem, and/or had an elevated risk of disordered eating experienced labels and their after-effects differently than other participants.

Participants’ support for labelling interventions is endorsed by existing quantitative research. Previous Canadian and international research demonstrates that young adults support food-related policies, such as calorie menu labels and informational campaigns.^{397,413} Moreover, research among university-educated young adults also demonstrates higher health literacy

compared to the general population, which is in turn associated with increased use of nutrition and menu labels.⁴¹⁴ Nearly all participants in this study, however, expressed skepticism regarding the effectiveness of labels among their age group and/or the trustworthiness of the information. Several highlighted structural challenges to their and others' ability to engage in healthy eating. Thus, perhaps their skepticism was rooted in the understanding that individualistic policies such as labelling cannot support healthy eating patterns if they do not address structural barriers. At the same time, participants aligned with cultural narratives that assign responsibility for unhealthy eating to individual choice and preference, underscoring tensions in experiences of seemingly straightforward interventions, such as calorie labels.

Participants identified potential negative consequences of labelling on their own and others' relationships with food, mirroring a previous mixed-methods study exploring traffic light labelling among university-aged students.³⁹⁶ Although 60% of participants supported labels and their implementation, nearly half expressed concern they may exacerbate eating disorders.³⁹⁶ A study conducted at the same institution as the current study did not find that a brief labelling intervention exacerbated eating pathology.³³⁵ However, as demonstrated by the participants in this study, the negative implications of labels may be more complex than eating pathology itself, and may include constructs such as one's relationship with food, shame and embarrassment around eating with others, and fixating on calories versus overall nutrition. These potential outcomes are difficult to operationalize and assess, especially in short-term studies. The distinction between short- and long-term negative reactions to calorie labels may also be a potential avenue for future research exploring the negative consequences of labelling on relationships with food.

Several participants also detailed the usefulness of labels for their attempts to modify their weight and/or muscle mass. The healthfulness of the weight-related behaviours aside, young adults' use of labels to achieve potentially disordered and unrealistic body ideals may again reflect broader cultural narratives surrounding health and food-related behaviour. These behaviours are shaped by gender and cultural norms that dictate body ideals,⁴¹⁵ and although the use of labels to achieve such ideals may be a cause for concern, it is more likely a symptom of a diet-focused culture more broadly. Thus, disordered eating and dieting do not seem to be caused

by labels and food-related policies but are rather a lens through which participants experience the interventions and are possibly exacerbated or at least reinforced by them.

The goal of this study was not to evaluate the effectiveness of labels but the results echo other calls for combining such interventions with complementary policies that target the SDOH,⁴¹⁶ such as subsidies for healthful foods or restricting harmful food marketing practices, as well as evaluating their intended and unintended outcomes in different population subgroups and contexts. In considering unintended consequences, it is important to bear in mind that labels and similar interventions are implemented within a broader culture of healthism that reinforces individual responsibility for health, weight, and the moral value we ascribe to them.^{144,147} Consequently, it is necessary to address and dismantle “diet culture” in which calorie labelling and other interventions related to healthy weights are embedded. Otherwise, societal pressures that contribute to disordered eating may be perpetuated by interventions such as labels that promote comparison and shame in public settings. Future research should explore the effects of labels on food and beverage purchasing and consumption decisions when an individual is alone versus in a group setting. Future research should also consider the implications of labels in different cultural subgroups and contexts. Indeed, the difference in knowledge and focus on calories between domestic and international students in this study may be indicative of a North American emphasis on calories and a broader “diet culture” that emphasizes the value of thinness and counting calories as an avenue to achieve it.³⁹³ Consequently, experiences of labels may be quite different in South Asia or the Caribbean, where this study’s international student participants were originally from.

Although we attempted to employ maximum variation techniques through purposive sampling, recruitment was limited by the timeline of the host study and the school term; therefore, the study included fewer participants with disordered eating and fewer men, trans, and non-binary individuals into the sample than intended, and as such, the results are skewed to university-aged women. The focus of the study on policies in relation to eating disorder risk was only partially disclosed in recruitment efforts but it is possible students with strong reactions to labels that related to their own eating disturbances may have been reticent to participate. Selective bias in university-based study samples is not unique to this study,⁴¹⁷ but limits generalizability to young adults more broadly. Finally, as is common in qualitative and mixed-methods research, the

limited sample size may hinder the generalizability of the results to postsecondary students and the general Canadian population. However, these results provide context to guide future inquiry into the unintended consequences of weight-related interventions on a larger, more generalizable scale, and inform future food-related policies.

5.6 Conclusion

This study provides the first known foray into mixed-methods research on the topic of unintended consequences of weight-related policy. More specifically, this study focused on calorie menu labelling and its effects on psychosocial wellbeing among individuals with and without disordered eating. Participants expressed support for and skepticism of labelling interventions and described how they use knowledge and autonomy to modify health behaviour. Participants also described how their relationships with food, disordered eating, and dieting attempts provide an intersecting lens through which they experience labelling interventions. Future investigations into the effectiveness of menu labelling should explore the roles of disordered eating, body esteem, and one's relationship with food pre- and post-intervention and over extended periods of time. The findings of this study contribute to the nascent literature on preventing potential unintended consequences related to eating disorders and negative psychosocial outcomes more broadly.

CHAPTER 6: Toward a holistic framework of eating- and weight-related behaviour: Implications for public health intervention and nutrition policy

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6.1 Overview

The prevention of obesity continues to be a predominant focus of public health, often with approaches that emphasize individual behaviour. However, policies focusing on weight-related behaviour change can result in policy resistance and, on occasion, unintended consequences, including increased risks of disordered eating and eating disorders. The application of systems science may be a valuable tool to inform a more holistic framework that considers the complex interactions that exist among the array of drivers that underlie eating- and weight-related behaviour and shift the focus of public health away from weight as an indicator of health and weight loss as an outcome. Such a framework can highlight how current weight-centric approaches result in policy resistance (i.e., clashes within a system that result in a different outcome than originally intended) and contribute to negative consequences, and how antagonistic framings of eating and weight may elicit unintended consequences for population health. This framework will therefore empower researchers and practitioners to identify approaches to promote health holistically.

6.2 Introduction

Eating- and weight-related disorders, including eating disorders, disordered eating, and overweight and obesity, present significant health risks to populations.^{1-3,418} Much of the focus of public health policies surrounding eating- and weight-related disorders centres on the prevention of eating- and weight-related behaviours relevant to obesity.⁴ Obesity, or higher weights characterized by excess fat most often determined body mass index (BMI), affects up to one quarter of Canadian adults¹⁰ and is associated with a plethora of negative health consequences.^{10,30-32} However, disordered eating and eating disorders also pose a significant threat to population health, despite being neglected by public health researchers and policymakers.^{9,419} Eating disorders, including anorexia nervosa, bulimia nervosa, and binge eating disorder (BED), are of significant public health concern given their associations with cardiovascular disease, suicidality, and substance use.^{188,189,420} An estimated 3-5% of Canadians are affected by eating disorders,^{179,180} which have the highest mortality rate of any psychiatric illness and are likely underdiagnosed in the general population.^{170,179} Disordered eating, a disorder which encompasses harmful weight-related attitudes and behaviours, such as self-induced vomiting, severe caloric restriction, and use of non-prescribed diet pills, is a significant risk factor for the development of both eating disorders and obesity.^{191,221}

There is a well-established literature that outlines the overlap of behaviours shared by eating- and weight-related disorders, including weight loss attempts and high levels of media consumption.^{17,191} These behaviours are associated with a multitude of overlapping risk factors, or drivers, that exist at the individual, interpersonal, institutional, and broader policy levels of the socioecological model, such as the proliferation of weight loss advertisements and gender-specific body ideals in recent decades.^{253,264,421} The relationship between the drivers and behaviours associated with eating- and weight-related disorders are often mediated by psychosocial factors, such as internalized weight bias, weight stigma, and poor body image,^{1,17} that differentially influence an individual's risk for developing these conditions.

Given the well-documented overlap of drivers, behaviours, and psychosocial mediators for eating- and weight-related disorders, there have been many calls for policymakers to consider the potential for public health policies targeting obesity to influence eating disorders and disordered

eating.^{4,8} Each of these conditions is part of their own complex system and present unique public health challenges, but they are also interrelated systems that may be conceptualized through an integrated framework. Shared prevention interventions, such as the school-based Planet Health curriculum, have been shown to reduce obesity and eating disorder risk among girls up to 2 years after implementation³¹⁹ and save tens of thousands of dollars in health care costs.⁴²² There has also been concern about the potential for obesity-related public health policies to cause unintended consequences for disordered eating and eating disorders,^{8,328,329,423} especially if policies focus on weight loss rather than overall health.³⁵⁰ Weight-focused public health policies may increase weight biases (i.e., negative attitudes and stereotypes about people with higher weights) and weight-based stigma and discrimination by emphasizing the value of thinness, the moral value of health, and individual autonomy as a means to attain an “ideal” or “healthy” weight.^{2,6,258,284}

By embracing a single framework that encompasses all eating- and weight-related disorders, public health researchers and policymakers may be able to plan and evaluate policies that better leverage the existing inter-connections between these conditions. The benefits of such an approach include more effective policies that could have substantial implications for individuals, society, and health care systems, and the potential to consider and anticipate unintended consequences, thereby avoiding harm. In this paper, we propose a holistic framework for the prevention of eating- and weight-related disorders that draws on systems science and facilitates examination of potential unintended consequences of public health and nutrition policies.

6.3 Systems thinking as a tool to conceptualize complex health issues

Complex systems science is increasingly being used as a tool to conceptualize and address public health concerns.^{112,424–426} Systems science is rooted in complexity science and chaos theory⁴²⁷ and asserts that a complex system is a compilation of drivers and interconnections that are interdependent, dynamic, and nonlinear.¹³⁵ In public health, systems science has been used to conceptualize tobacco use, the spread of and vaccination against communicable diseases, and most extensively, obesity.^{96,97}

Although much can be said about the under-utilization of systems methods, such as agent-based modeling and systems dynamics modeling, in public health research and practice,⁴²⁶ systems science concepts can be valuable tools for hypothesizing the relationships among drivers and the impacts of public health policies on a population. As a system is made up of multiple drivers, a policy or intervention impacting one driver in a complex system will undoubtedly have ripple effects throughout the entire system, potentially reinforcing feedback loops among other drivers.^{12,428} All systems have an underlying paradigm that is the “source” of the system,¹³⁵ providing the fuel for the drivers, feedbacks, and agentic actions by individuals that occur within it. Paradigms are akin to ideologies, in that we cannot see them until we try to step outside the system and question its workings, such as through modelling.¹³⁵ The system as a whole has a goal, but various subsystems, actors, and stakeholders in a system can have competing goals;¹³⁵ when a policy is enacted in a system, it pulls the goals of actors and subsystems in different directions, creating policy resistance.⁴²⁹ A policy cannot be successful overall if it creates significant resistance among a segment of the actors, and it may generate unintended consequences that harm the system in the end.^{424,429,430}

6.4 A systems-informed, holistic framework of eating- and weight-related behaviour

Systems models of obesity are plentiful,^{12,112,113,121,426} and the application of systems science to higher weights has highlighted that the dynamism of body weight cannot be addressed by static public health policy solutions,^{112,121} such as one-on-one nutrition education that fails to incorporate the range of economic and social factors that dictate food availability and choice. The integration of disordered eating and eating disorders into complex systems frameworks of higher weights, however, is lacking, and existing models depend upon a paradigm that is weight-centric, neglecting to consider many psychosocial contributors to weight status. In conceptualizing the complex system underlying eating- and weight-related disorders, systems science constructs can provide insight into shared prevention initiatives and create opportunities for overcoming philosophical challenges to integrating the often disparate fields of obesity and eating disorders.^{4,6,258} Importantly, a complex systems-informed framework for the prevention of

eating- and weight-related disorders may help us to better address the complexity of all these issues and the interconnections between them, as well as shed insight into how unintended consequences can be anticipated in policy research and planning.

Previous frameworks that have integrated the prevention of eating- and weight-related disorders have focused on single unintended consequences of public health approaches (e.g., weight stigma),⁴³¹ investigated isolated interventions among vulnerable populations,^{6,16,319} theorized the reasons for disparities across disorders,^{6,318,326} or mapped out shared risk factors and emphasized the need for comprehensive policies that address the spectrum of drivers.¹⁷ Building upon this work, we present six key elements that comprise a complex systems framework for eating- and weight-related disorders, outlined in **Figure 3** and in the following sections, and illustrate how such a framework may be applied to public health and nutrition policy.

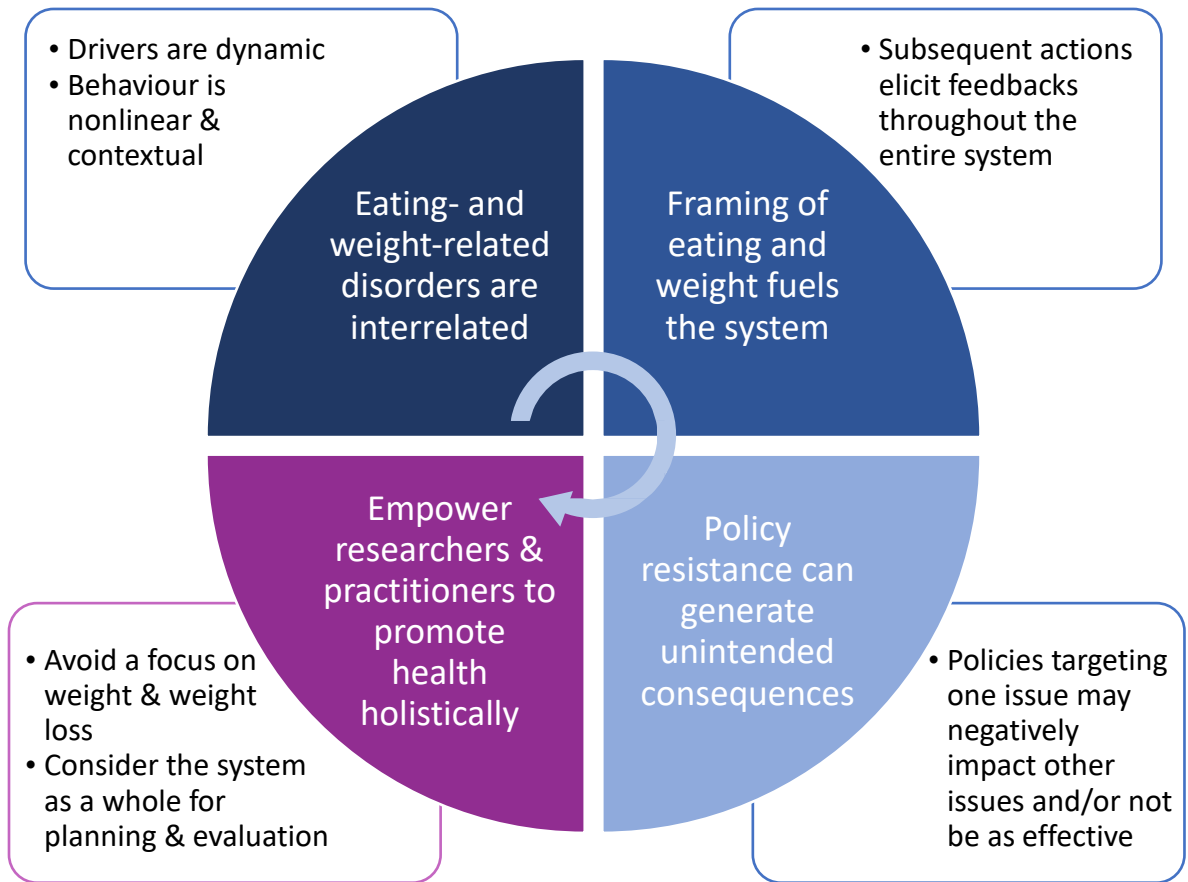


Figure 3: A holistic framework for the prevention of eating- and weight-related disorders through public health and nutrition policy.

6.4.1 Eating and weight-related disorders are interrelated

Eating disorders and obesity are unique, and there should always remain a distinction between the pathologized eating and diagnosis that characterizes eating disorders and the varying characterizations of weight and/or fat that designate obesity. There is, however, overlap among these disorders, as risk of disordered eating is significantly elevated among individuals with higher body weights,^{217,304} and a sizable portion of individuals with bulimia nervosa or binge BED have BMI values consistent with obesity.^{181,305,306}

Eating- and weight-related disorders share several behaviours, drivers, and mediators across the socioecological model. At the individual level, dieting and other weight modification attempts, high levels of media consumption, and body dissatisfaction are associated with disordered eating and weight gain.^{17,197,211,317,432} In broader interpersonal, institutional, and community contexts, experiencing weight stigma and internalizing weight biases is also associated with eating- and weight-related disorders.^{37,132,418,433} Finally, policies targeting weight loss specifically, rather than food- and weight-related behaviours and environments, may exacerbate weight biases among populations.^{339,350,423} The overlap of driving forces reinforces the extent to which the elements of eating- and weight-related disorders are related and highlights the need for recognition of their interconnections.

6.4.2 Drivers underlying behaviour are dynamic

Each of the drivers underlying eating- and weight-related behaviour are dynamic, constantly shifting according to social norms, broader social policy, and their interactions with one another. The dynamism of eating- and weight-related drivers is evident from cell to society, for example, through dynamic biological responses of bodies to changes in weight and hunger cues³⁸⁹ and societal norms related to appearance ideals that individuals feel pressure to conform to.²⁵⁰ Beyond the actions of individuals within the system, food and dieting industries consistently adapt their marketing strategies to increase profits and encourage purchasing of products that may harm health.^{4,434,435} Public health policies that fail to recognize the dynamism of eating- and weight-related behaviour, and the drivers from different levels that influence them, may fail to

fully address the complexity of weight and the contexts in which pathologized eating may flourish.

6.4.3 Behaviour is nonlinear and contextual

Relatedly, behaviours and the drivers that influence them within the complex system of eating- and weight-related disorders are nonlinear and contextual. That is, the link between a driver, such as experiencing weight discrimination, and an associated behaviour, such as binge eating, is never linear as it is influenced by societal contexts, including previous experiences of weight stigma and weight perception.^{436,437} There are no simple cause-and-effect relationships between drivers of eating- and weight-related behaviour, thus lending to the appropriateness of applying a systems lens.¹¹²

Complex systems approaches reject the notion that change only occurs in a linear manner from the top down,⁹⁶ and embrace that nonlinear interactions between levels of the socioecological model are important leverage points for public health intervention. For example, if a healthy school program at the institutional level is deemed successful in altering students' behaviours at the individual level, it may be implemented in more schools, thereby positively influencing more students and their behaviours.⁹⁷ However, as previously noted, each eating- and weight-related disorder exists within its own system, and so the nonlinearity and contexts that define and frame each issue must be considered before they are conceptualized through a single systems lens.

6.4.4 How we frame eating and weight fuels the system

In systems science, the framing of a system, also known as its underlying paradigm, shapes our entire view of the system and its core central beliefs. Paradigms are the most difficult leverage point of a system to tackle, but generate the most significant changes.¹³⁵ The paradigm underlying much of the conversation surrounding eating and weight has been criticized for being weight-centric and individualistic,^{20,117,438} placing too much significance on the moral, health, and societal value of weight; and asserting individuals can modify their weight through willpower and changes to their individual behaviours.¹⁶¹ Subsequently, policies that follow from

such a paradigm will inevitably encourage individual-level behaviours for weight change.^{97,100} As previously described, drivers for eating- and weight-related behaviours exist beyond the individual level of the socioecological model, which means that weight-centric and individualistic policies neglect to consider the institutional and policy-level factors that may have a greater impact on overall health and wellbeing.

In contrast, critical weight studies, a more social justice-oriented approach to conceptualizing weight, asserts that weight-based stigma and discrimination are perpetuated by structural ideologies and policies that assert fat is necessarily reflective of negative personality, competency, morality, and health-related characteristics.^{147–149} Proponents of weight-inclusive paradigms posit that weight-centric and individualistic paradigms currently fuel public health and nutrition policies, reinforcing harmful eating- and weight-related behaviours among populations that have contributed to increasing weights and disordered eating.^{20,132,350} Critical reviews of Canadian weight-related policies have illustrated how official public health documents pertaining to weight frame obesity as an “individual problem,”^{14,100} thus leading to policies that follow suit. The discrepancy between the multilevel, dynamic nature of the drivers underlying eating- and weight-related disorders and the current paradigms that fuel public health and nutrition policies has the potential to generate policy resistance, to be detailed.

Thus, the framing of eating- and weight-related disorders is reflective of the paradigms that underlie their complex systems and has significant implications for the actions elicited within a system and their subsequent feedbacks. If effective policies are to be enacted among populations, there must be consistency across the subsystems and agents in the complex system underlying eating- and weight-related disorders, or we may unintentionally do more harm than good.

6.4.5 Actions elicit feedbacks

The actions elicited within a complex system that are taken to address drivers and behaviours are fuelled by its framings and inevitably prompt feedbacks across the system, including at the individual or broader policy levels.⁴³⁹ For example, weight-centric and individualistic paradigms may feed into policy-level interventions that encourage individuals to strive to lose weight, which in turn may lead them to engage in dieting behaviours. Dieting behaviours are associated

with increased risk of weight gain or regain, which may reinforce governmental and health agencies' implementation of obesity-related policies,^{109,332,440} which continue to create feedbacks throughout the system.

By instead conceptualizing eating- and weight-related disorders as a single construct and system, rather than independent conditions requiring individual intervention, we may be able to hypothesize how actions elicited in one realm impact the other. With such an approach, in anticipation of feedback loops occurring across the entire spectrum of eating- and weight-related disorders, policymakers who aim to improve food environments, for example, may consider consistent monitoring and surveillance of disordered eating and other indicators of eating disorders, as well as obesity,^{4,257} to reduce the likelihood of policy resistance.

6.4.6 Policy resistance can generate unintended consequences

Donella Meadows succinctly defined policy resistance as “fixes that fail.”¹³⁵ In the realm of public health, policy resistance is often the result of a mismatch between the complexity of a system and the overly simplistic, often reductionist approach of a policy that is resisted by a system.⁴²⁹

As previously described, there has been growing concern about the potential of policies to elicit policy resistance and unintended consequences in relation to eating- and weight-related disorders, particularly among youth.^{3,328,330,331} Considering the higher rates of overweight and obesity in comparison to eating disorders,^{10,174,260} and the moral panic surrounding fatness that has proliferated in North American society over the past few decades,^{54,332,333} the general assumption is that obesity and nutrition-related policies may inadvertently have an unintentional, negative impact on disordered eating, rather than vice versa. Despite this potential, research on weight-related public health campaigns often fails to consider disordered eating in evaluation;³³⁴ thus, we cannot ascertain the impact of obesity policies on disordered eating.

Policy resistance in regard to eating- and weight-related disorders may lead to significant investments in policies not yielding their desired outcomes. For example, policies that focus on obesity neglect to consider that nearly 90% of individuals with BED have obesity,³⁰⁶ and that

decreasing the stigma surrounding eating disorders and shifting to more weight-neutral approaches can potentially boost treatment-seeking for BED.^{350,418} BED presents significant costs to individuals' qualities of life and the health care system more broadly,¹⁹⁰ independent of its obesity-related health costs. Policymakers may be investing in obesity prevention policies that fail to impact a large segment of the population and missing an opportunity to generate greater change for improved health and wellbeing.

6.5 Implications of a systems approach to eating- and weight-related disorders

Considering the key elements that comprise a complex systems framework of eating- and weight-related disorders, informed by a systems science lens, can allow us to explore the potential for public health and nutrition policies to elicit policy resistance that is negative for all weight-related conditions. It is important to note that policies themselves do not cause resistance— it is their context in a system, including their underlying paradigms, framing, development, enactment, and evaluation, that elicits actions and feedbacks among drivers, and subsequently, behaviours. Effective approaches to the interconnected issues of obesity, disordered eating, and eating disorders could have substantial implications for individuals and society, including the health care system.

One proposed solution for addressing the incongruence across eating- and weight-related disorders suggests shifting the existing paradigm underlying these conditions to one that is weight-neutral and focused on overall wellbeing, rather than solely on physiological health, weight, or appearance.^{19,20,119,350} This is based on the summarized body of literature underlying obesity and disordered eating that warns against the role of framing weight negatively; if we do not emphasize the importance of or centralize weight in our approaches to healthfulness, we can help to ameliorate the thin-ideal internalization, dieting attempts, and weight stigma that contribute to eating- and weight-related disorders.^{327,418,441}

Since most obesity-related initiatives utilize and build upon the individualistic paradigm, one significant concern is they may elicit greater weight bias than policies with holistic foci.^{14,97,100}

Greater weight bias and stigma towards others is associated with greater support of punitive policies that are ineffective for addressing chronic disease risk^{120,442} as well as a greater risk of perpetuating weight-based discrimination, which is associated with poorer overall health and risk of weight gain among victims of this stigma.^{46,132,443,444} If individuals internalize the weight biases present within society and even potentially perpetuated by policies, they are at a greater risk of disordered eating and eating disorders, poorer mental health overall, engagement in health-compromising behaviours, avoidance of health-promoting behaviours, and eventual weight gain.^{35,49,295,445,446} Internalized weight bias is significantly correlated with thin-ideal internalization, and both lead to poor body image and the dieting-weight gain/regain cycle and/or eating pathology.^{20,447,448}

Questions remain, then, about the types of population-level weight-related initiatives that have the potential to elicit policy resistance, if any. Systems are dynamic and complex, and policies that fail to recognize this complexity may result in both unintended consequences and failed intervention across a system.^{121,429} Much of the simplicity that plagues population-level public health initiatives for obesity and eating disorders is rooted in the individualistic approaches to both conditions; thus, policies and interventions that fail to consider their potential impact on other tangentially related drivers and conditions can elicit unintended and potentially, counterproductive consequences.

6.6 Applications to public health and nutrition policy

In the section that follows, we briefly highlight three examples of public health intervention and nutrition policies that may have salient implications for the system of eating- and weight-related disorders more broadly, justifying the need for a holistic framework: (1) weight-related educational campaigns and initiatives, (2) menu and front-of-package nutrition labelling, and (3) weight-related school-based initiatives.

Weight-related educational campaigns and initiatives enacted by governmental and health organizations may elicit policy resistance for eating- and weight-related disorders through several avenues. Firstly, such initiatives can elicit stigmatization of individuals with higher body weights through the use of shaming language and imagery.^{21,108,449,450} The use of images that

show individuals with larger bodies as headless and fragmented, for example, by holding a measurement tape around their torso or engaging in stereotypically unhealthful behaviours such as eating fast food, reinforces negative attitudes about higher weights.^{234,451–453} As previously detailed, weight stigma and discrimination, perpetrated by individuals in a population consuming such content, and internalized weight bias are both associated with poorer overall psychosocial and physiological health.^{17,35,445} An additional avenue by which educational campaigns may elicit unintended psychosocial consequences is through emphasizing weight, rather than overall wellbeing, as a primary outcome or goal of health-promoting behaviours, and individualistic, agentic change as a solution for weight loss.^{20,329} Governments' efforts to promote overall wellbeing are confusing or contradictory, and often rely upon "healthy weights" as a goal;⁴⁵⁴ for example, one web-based Government of Ontario document recommends engagement in intuitive eating practices for the purpose of weight loss and management.⁴⁵⁵ This emphasis on weight may inadvertently result in an unintended consequence if individuals engage in dieting;⁴⁴⁰ indeed, individuals who underestimate their weight or misperceive their "obese" status gain less weight over time than those who are aware of their higher weight.³¹¹ Thus, public health and nutrition policies may elicit resistance through language, imagery, and "healthy weight" discourse that are not inclusive^{20,448} and potentially harmful for the broader system of eating- and weight-related disorders.

Concerns have also been raised regarding the potential for menu and front-of-package labelling to elicit policy resistance for psychosocial wellbeing, particularly among individuals with disordered eating.^{335,337,344} Menu and front-of-package nutrition labels can be presented through displays of the numeric caloric content of a food item or the use of images or logos to represent the "healthfulness" of the food, such as through traffic light labelling or "high in" designations for nutrients of interests.^{347,388} Eating disorder advocates have argued that these labels may reinforce elements of diet culture that are associated with eating disorder symptomatology, such as calorie tracking and counting.^{344,393} Research does suggest that individuals who are dieting actively seek out nutritional labelling information,^{381,382,394,395} individuals with eating disorders order food items with significantly fewer or more calories in hypothetical scenarios, depending on their diagnosis, than individuals without eating disorders,³³⁷ and cross-sectional evidence suggests that individuals engaged in disordered eating are more likely to use labels than those

who are not.^{336,395} The application of a holistic framework, informed by systems science, can help to address concerns that menu and front-of-package labelling policies may elicit unintended consequences for disordered eating. For example, if labelling policies do not elicit disordered eating among individuals who are not affected by it, but rather interact with and/or exacerbate existing eating pathology, they may be used as a tool or mechanism to sustain dieting attempts or disordered eating behaviour. Public health and nutrition policies that reinforce cultural narratives around weight and food may not necessarily *cause* harm, but they do not alleviate the focus on weight that is prevalent in discussions surrounding health.⁴⁴⁸ Public health and nutrition researchers and practitioners, then, may consider menu and front-of-package labelling that does not focus on calories, to not explicitly link labels to weight loss intentions, and/or combine labelling policies with interventions that more structurally improve healthy eating.

Finally, the application of a holistic, systems-informed framework for conceptualizing eating- and weight-related disorders may benefit the enactment of select weight-related school-based policies. Potentially harmful school-based policies contribute to a unique school weight climate that interacts with other elements of the school and neighbouring environment,⁴⁵⁶ and may be classified into two realms: curriculum content and school regulations. Curricula surrounding nutrition and physical activity are often laden with “healthy weights” narratives,^{457,458} emphasizing the importance of health-related behaviours, such as engaging in physical activity and consuming more fruits and vegetables in congruence with their role in weight loss or maintenance. Similar to the previous discussion of governmental educational campaigns, weight-centric messaging in school curricula surrounding health behaviour has the potential to stigmatize youth with higher body weights and increase their risk of disordered eating.^{328,456,459} Educators, who are susceptible to the same weight-centric societal norms as the rest of the population, often feel ill-equipped to deliver weight-related content in classrooms,^{299,460} yet nutrition and physical activity are mandated curriculum content in many Canadian provinces. Further, regulatory school policies regarding the restriction of food for the purpose of weight loss and/or gain prevention,^{461,462} weighing of students,⁴⁶³ and informing parents of their child’s weight through measures such as BMI report cards^{464–466} may potentially elicit negative psychosocial reactions (e.g., poor body image, increased internalized weight stigma), and result in an increased risk for eating- and weight-related disorders overall. As previously detailed,

school-based shared prevention initiatives that do not focus on weight or weight loss as a goal (e.g., the Planet Health curriculum), while considering the potential that youth may feel pressure to lose weight, have been shown to not only reduce the risk of eating- and weight-related disorders,³¹⁹ but also reduce health care costs associated with these conditions.⁴²² Thus, the application of the proposed systems framework may holistically improve health and wellbeing among individuals and populations, thereby making public health interventions and nutrition policies more effective.

6.7 Conclusions

We have presented a holistic framework for the prevention of eating- and weight-related disorders and demonstrated its applicability to addressing potential unintended consequences of weight-related nutrition policies. In alignment with calls to integrate systems thinking into public health policy planning and evaluation,^{96,467} the proposed framework posits how even the use of systems thinking can significantly contribute to raising awareness about potential unintended consequences of public health and nutrition policies. A framework of eating- and weight-related behaviour can shift the focus of public health away from weight as an indicator of health and weight loss as an outcome of policy and intervention³⁵⁰ and empower researchers and practitioners to identify approaches to promote health more holistically.

CHAPTER 7: General Discussion

7.1 Overview

Eating- and weight-related disorders, which include eating disorders, disordered eating, and overweight and obesity, share many risk factors across all levels of the socioecological model and pose significant public health risks for Canadians. Although public health policies targeting obesity and overall diet have been plentiful in recent decades, there have been no evaluations of such policies that assess their impacts on disordered eating and related indicators of psychosocial wellbeing. The possibility of obesity and nutrition-related policies eliciting unintended consequences for psychosocial wellbeing poses risks across the spectrum of eating- and weight-related disorders; thus, shared consideration is a salient leverage point for public health research and policy.

This dissertation addressed psychosocial wellbeing among young Canadian adults in relation to population-level weight and nutrition-related strategies. The main objectives were to: (1) investigate trends in the prevalence of disordered eating, internalized weight bias, experienced weight stigma, and associated indicators of weight-related behaviour and psychosocial wellbeing among young adults over the past three years in the context of provincial calorie labelling policies; (2) explore how young adults feel about, perceive, and experience weight-related population-level interventions (e.g., calorie labelling), and whether their attitudes, perceptions, and experiences differ by their own disordered eating risk; and (3) theorize how the application of systems science can aid researchers and policymakers in anticipating unintended consequences of weight-related policies for eating- and weight-related disorders.

7.2 Summary of key findings

Chapter 4 details a quasi-experimental study and longitudinal analysis among Canadian young adults that explored disordered eating, internalized weight bias, experienced weight stigma, body image, anxiety, depression, stress, and overall mental health in relation to provincial menu labelling policies. To our knowledge, there are no prior investigations of how nutrition and

weight-related policies, enacted among populations-at-large, might unintentionally impact disordered eating and psychosocial wellbeing. The study hypotheses were that poorer psychosocial outcomes would be observed in jurisdictions that introduced mandatory calorie labelling policies compared to jurisdictions with voluntary and/or no calorie labelling policies, and that the impact of labelling policies would be most pronounced among women and younger participants.

In contrast to the initial hypotheses, no associations were found between the implementation of calorie labelling policies and any of disordered eating, internalized weight bias, experienced weight stigma, body image, nor the indicators of overall psychosocial wellbeing within the two-year period of the study. As previously detailed, prior evidence on the influence of labelling policies on disordered eating and psychosocial wellbeing is scant. One pre-post campus-based calorie labelling study found no impact of the presence of labels on the eating pathology of university students;³³⁵ one hypothetical-scenario online survey found calorie labelling did not influence the orders of individuals with disordered eating, but did impact the orders of individuals with AN, BN, and BED;³³⁷ and a series of cross-sectional studies demonstrated associations among reported calorie label noticing, label use, and weight loss attempts.^{336,381,382}

Inspired by the announcement of Canada's *Healthy Eating Strategy* in 2016,³⁸³ the initial goal of Chapter 4 was to explore the unintended consequences of a plethora of obesity and nutrition policies on disordered eating and psychosocial wellbeing. The study was limited to provincial calorie labelling policies, as only one policy was implemented during the study period (i.e., Ontario's mandatory calorie labelling policy). However, the analyses and interpretation of results provide a template for future investigations into forthcoming nutrition policies across Canada, leveraging food policy research to assist in reducing disordered eating risk across populations.⁴ The results presented in Chapter 4 suggest calorie labelling initiatives may not elicit disordered eating among populations, which may assuage concerns surrounding the potential for such policies to elicit unintended consequences.^{335,336,344,349} Nevertheless, the results should be interpreted in light of the fact that although the policies did not seem to elicit disordered eating among individuals who were not affected by it, the impact of policies on existing disordered eating could not be determined because a binary variable was used to designate disordered eating risk. That is, calorie labelling and related policies may interact with or exacerbate disordered

eating, but it is unlikely that they will “trigger” it among those who are not already vulnerable. Further, disordered eating does not carry with it the risks that eating disorders do, and eating disorders may in fact provide a different lens through which individuals experience not only calorie labels, but also food environments more broadly.

Extending the results of Chapter 4, Chapter 5 sheds additional insight into the complexity of young adults’ feelings about and perceptions and experiences of weight-related population-level interventions, again with a focus on calorie menu labelling policies. A mixed-methods study was conducted whereby university students participated in a one-on-one semi-structured interview, followed by a survey assessing sociodemographic characteristics, body esteem, and disordered eating risk. Although previous studies have queried university students about the potential for labelling policies to elicit unintended consequences for disordered eating,³⁹⁶ this was the first inquiry into how their experiences are shaped by, and subsequently shape, interactions with calorie and/or other forms of menu labelling.

In Chapter 5, the social constructionist perspective through which data were inductively coded provided insight into the processes of how participants’ attitudes, perceptions, and experiences of policies interact with broader societal contexts and norms surrounding food and weight.⁴¹⁰ Four key themes were identified: (1) participants’ support of and skepticism about labelling interventions, (2) the identification of knowledge and autonomy as mechanisms of labelling interventions, (3) the role of the individual’s and others’ relationships with food in experiences with labelling, and (4) disordered eating and dieting as lenses that shape experiences with interventions.

Participants’ support of labelling policies in Chapter 5 echoes similar findings among young adults in Canada.³⁹⁷ However, participants’ perceptions of labelling policies were nuanced, as they demonstrated skepticism toward the potential for such policies to elicit meaningful change among young adults and/or to have much power beyond increasing knowledge and autonomy among individuals. It seems young adults’ perceptions of food policy align with broader cultural narratives that assign responsibility for unhealthy eating to individual choice and preference.

In light of the findings of Chapter 4, it may be plausible that public health obesity and food policies do not in fact *cause* or elicit negative reactions to food and weight among young adults,

but that they exist within (and perhaps perpetuate) a more general “diet culture”.⁴⁶⁸ Indeed, participants highlighted elements of their experiences with labelling policies that extended beyond disordered eating and weight modification–relationships with food, shame and embarrassment around eating with others, fixating on calories versus overall nutrition–and tapped into cultural norms surrounding body and food ideals more broadly.^{264,442} Participants who either reported disordered eating and dieting behaviours directly (i.e., in their interviews) or whose EAT-26 scores were indicative of eating disorder risk described that labels were useful in their pursuits of appearance ideals. This aligns with the previously described cross-sectional and quantitative research which has found that individuals who are dieting to lose weight notice and use labels more often.^{336,381,382} However, the findings of the present studies add a layer of nuance, in that labels seem more like a tool to ascribe to diet culture than a systemic perpetuator of its goals. Again, labelling policies may not elicit or increase disordered eating among the general population (supported by Chapter 4), but may rather reinforce the diet culture that surrounds and exacerbates disordered eating among those already engaged in it (supported by Chapter 5).

Chapter 6 builds on the inquiries described in Chapters 4 and 5 by positing a holistic framing for the prevention of eating- and weight-related disorders that draws on systems science and facilitates further examination of policy resistance that may arise from weight-related policies. Although an existing body of research has demonstrated the potential for shared prevention of obesity and eating disorders through school curricula,^{317,435} policy approaches to promoting population health that incorporate disordered eating and eating disorders into obesity prevention are severely lacking.²⁶⁰ By embracing a single, holistic framework that encompasses all eating- and health-related disorders, public health researchers and policymakers may be able to plan and evaluate interventions that better leverage the inter-connections between these conditions and their drivers.

The framework draws upon systems science, which is rooted in complexity theory and explores “wicked problems” that are necessarily interconnected, nonlinear, and dynamic.^{135,136} Although systems science has been used to conceptualize and model drivers and interventions for obesity,^{12,112,113,121,426} its applications to weight-related population-health have channeled dominant obesity discourse and approaches to weight, neglecting to consider the full spectrum of

disordered eating and eating disorders. The results of Chapters 4 and 5 reveal stark differences in disordered eating, internalized weight bias, and related indicators of one's relationship with food by sociodemographic factors, such as gender, highlighting the incredible and untapped potential for population-level, structural interventions that target the overlapping shared drivers for the spectrum of eating- and weight-related disorders. Systems approaches are necessarily structural,⁴²⁵ in that they identify and embrace the many factors at various levels that ultimately influence individual and population health and wellbeing.

7.3 Overall limitations and strengths of the dissertation

Each of the studies in this dissertation carries unique limitations and strengths related to methodology and scope. In Chapter 4, the use of data from the Canada Food Study limits the generalizability of the study findings to all Canadians, as recruitment was conducted among young adults living in urban centres.³⁵² Participant attrition may further limit interpretation of the results, as the final analytic sample was less than one-quarter of the original analytic sample. To ameliorate this limitation, sensitivity analyses were conducted and revealed minimal differences between the original and analytic samples in the outcome variables (see Appendix A). In addition, longitudinal panel weights were applied to ensure the sample proportions aligned with Canadian Census data, by age and sex, for each of the corresponding years of analysis. However, the small numbers of individuals with a nonbinary gender identity and who belonged to racial and ethnic minority groups limit the generalizability of the sample to these subpopulations. Finally, the use of GEE models was a strength, as they handle missing data adequately by modelling the mean responses of participants over multiple points of data collection.⁴⁶⁹⁻⁴⁷¹ The use of GEE models allowed for the inclusion of respondents who did not participate at Wave 2, avoiding a smaller sample size and thereby maximizing the potential statistical power of the analyses.

The brief measures used in the Canada Food Study also limit the study's findings, as complex constructs such as weight bias internalization and body image, for example, cannot fully be captured by single-item measures.^{361,472} The Canada Food Study aims to explore dozens of facets related to young adults' food-related attitudes and decisions,³⁵² which meant that the selection of

psychosocial measures was constrained by the desired overall survey length. However, given the dearth of population-level research that considers disordered eating, internalized weight bias, body image, and weight stigma,³³⁴ the use of such measures, albeit brief, provides insight into how these constructs might be influenced by broader public health policy. The trends analysis further strengthened the study's conclusions, as it allowed for a "true" baseline against which the differences-in-differences analysis of policies across provinces and time could be compared. Quasi-experimental studies allow for the "messiness" and complexity of real-life intervention to be evaluated more accurately than lab research,⁴⁷³ adding value to the study's findings.

Chapter 5 was a mixed-methods study, and although such research does not strive to be generalizable to populations,⁴⁰⁰ it should be noted the results are not transferable to all young adults in Canada. Several measures were put in place *a priori* in anticipation of and to minimize potential limitations. Purposive sampling, via maximum variation techniques⁴⁰⁴ that aimed to recruit a gender-diverse sample, was employed, but failed to recruit an equal number of participants who were men, trans, or nonbinary compared to women. As such, gender-specific comparisons between participants were limited and the findings are biased towards the responses of university-aged women. Partial disclosure of the study's true purpose was also employed so as not to dissuade individuals who may have been unwilling to discuss issues related to eating disorders from participating, though the impact of this on recruitment efforts is not known. Nonetheless, the study did include a number of individuals who had elevated disordered eating risk, were actively engaged in one or more disordered eating behaviours, and/or had a history of an eating disorder. Given the inherent biases and subjectivity of qualitative methods,^{411,474} several procedures were employed to ensure the rigor of the data analysis (see Appendix B), including a comprehensive audit trail⁴⁷⁵ comprised of reflexive journaling, peer debriefing, and a secondary coder.

Finally, the proposed framework in Chapter 6 built upon a narrative review of the literature surrounding systems science approaches to health and eating- and weight-related disorders. Narrative reviews may not fully capture the literature with the rigor of systematic reviews, and as such, this chapter no doubt has the authors' biases built into its framing and conclusions. However, the purpose of a narrative review is to provide critique, interpretation, and deepen understanding of complex issues.⁴⁷⁶ As such, Chapter 6 proposes one framework for the

conceptualization of eating- and weight-related disorders via systems science, rather than imposing an objective truth.

7.4 Implications for policy and future research

This dissertation has several implications for policy and future research, including discourse regarding how public health obesity and nutrition policies may reinforce diet culture; the importance of monitoring and evaluating disordered eating-related measures; the inclusion of SDOH lenses that extend beyond individual behaviour in research and policy; and the importance of embracing complexity while recognizing the salience of independent leverage points for improving population health.

Diet culture has been posited by feminist scholars and critical weight activists alike^{264,468,477} as a sort of pollutant that permeates all elements of Western culture, dictating that food choices, health status, and thinness are tied to individuals' morality and values. The global dieting industry is worth hundreds of billions of dollars⁴⁷⁸ and reinforces diet culture through mass media messaging that aims to sell products and services to young adults by promising happiness via weight loss.²⁴⁹ The food industry similarly engages in practices that reinforce diet culture, reinforcing a health halo around certain foods that are marketed to promote weight loss, muscle gain, or weight-related outcomes more broadly.^{4,479} As previously noted, it may be difficult to disentangle the influence of obesity and nutrition policies on disordered eating, weight bias, body image, and weight stigma from that of diet culture and the dieting and food industries more broadly. As such, policies such as calorie labelling may be viewed as implicit illustrations of diet culture rather than independent perpetrators of harm.

However, given the potential for such policies to reinforce diet culture, weight-inclusive policies, which alter food environments to promote healthy behaviours rather than encouraging weight loss, may be posited as a solution to improve health without doing additional harm.^{132,350} For example, calorie labels next to menu items in Ontario are accompanied by a statement positing how many calories the average adult should consume in a day.³⁴⁷ Given the general association between the caloric content of foods and their overall healthfulness,³⁹² it may be posited that

calorie labelling aims to inform consumers about the healthfulness of menu items, thereby informing them about how to best make a healthy decision. However, given the broader context of diet culture and the associations between calories, weight loss/control, and dieting in our culture, calories and their restriction are more likely viewed through the lens of weight modification, as demonstrated in Chapter 5. Weight-inclusive policies promote healthy behaviours without encouraging weight loss and are thus less likely to promote or exacerbate adherence to diet culture among populations. The results of Chapter 5 and the framework proposed in Chapter 6 may pave the way for future public health policy and research that promotes health without focusing on weight. Despite incongruencies in framings and philosophies, obesity and nutrition-related policies can successfully promote health, both physical and psychosocial, through weight-inclusive or weight-neutral messaging.

Further, this dissertation provides justification for increasing the monitoring, surveillance, and inclusion of comprehensive measures related to disordered eating and psychosocial wellbeing in obesity and nutrition public health policy research, rather than brief measures, for example, that only assess ‘no’ versus ‘potential’ disordered eating risk. A recent systematic review found only a dozen studies that measured the influence of weight-related public health messaging on disordered eating risk, with just a single study that measured disordered eating behaviour directly.³³⁴ These numbers clearly pale in comparison to the copious number of studies that have examined the impacts of weight-related interventions on body weight and obesity. Although the results of Chapter 4 demonstrate no differences over time in disordered eating, internalized weight bias, or weight stigma, the dichotomization of these constructs may not capture the nuance of how policies interact with existing disordered eating, as seen in Chapter 5. Public health researchers and policymakers cannot afford to continue neglecting eating disorders in policy planning and evaluation given their significant impact on psychosocial and health-related quality of life among populations.^{8,9} Food policy can be a key leverage point for the prevention of eating disorders, as food industries profit through the marketing of diet foods and ambiguous portion sizing that lends to binge eating,^{4,338} but the psychosocial drivers that underlie the system of eating- and weight-related disorders more broadly must be measured and evaluated before and after implementation. To achieve this, public health research that explores anything related to

obesity, weight-related behaviour more broadly, or nutrition should implement measures of disordered eating and/or psychosocial wellbeing in general.

The results of Chapters 4 and 5 underscore the need for a SDOH lens that extends beyond individual behaviour and recognizes the structural contributors to eating- and weight-related behaviour that disproportionately affect women, youth, and racialized individuals. Critical weight and social justice approaches to conceptualizing eating- and weight-related disorders, as summarized in Chapter 2 (2.1.3.4, 2.2.3.3), recognize the structural factors that influence disordered eating risk and harmful weight-related behaviour among intersections of oppressed groups.^{144,438,480} Such perspectives tie into weight-inclusive frameworks that shift the focus of public health policies away from weight loss per se, instead promoting food environments and policies that equitably and structurally improve population health. Calorie labelling policies are not explicitly enacted to encourage weight loss, but they implicitly focus on weight through the statement that accompanies calorie labels on menus suggesting how many daily calories the average adult should consume.³⁴⁷ Future research in this realm might consider more comprehensive and purposive sampling techniques than those used here to recruit more diverse research samples, allowing for deeper investigation into how SDOH play a role in a population's reception to public health policy.

Relatedly, Chapter 6 highlights the importance of not only embracing complexity in public health approaches to eating- and weight-related disorders, but also recognizing there are common leverage points in the system. Such leverage points may include changes to policies that focus on or encourage weight loss, that can independently generate significant change if they are reframed, for example by implementing weight-inclusive language and imagery in educational campaigns. A common misunderstanding of systems science and its application to public health is that it generates unrealistic expectations for what policymakers and stakeholders can realistically implement and change.^{424,481} Rather, the framework in Chapter 6 posits there are key leverage points that underlie the system of eating- and weight-related disorders that public health policy can target. Exploiting such leverage points can ensure interventions that have the largest benefit possible while minimizing unwanted effects. For example, future research might explore how policy changes to restrictions surrounding the marketing of diet foods^{260,338,435} influences the spectrum of eating- and weight-related disorders, rather than eating disorders alone. The siloing

of obesity policies from those that aim to reduce eating disorders only results in missed opportunities and reduced financial savings for public health and health care systems, as shared prevention initiatives can be effective and reduce associated health care costs.^{247,258,308,482} The application of systems science does not infer that multiple related interventions must be implemented at once but rather that the whole system should be considered when planning, implementing, and evaluating interventions.

7.5 Conclusion

Overall, this dissertation contributes to our understanding of how public health policies pertaining to weight and nutrition may impact psychosocial wellbeing and the spectrum of eating- and weight-related disorders more broadly. The findings of the empirical studies and the development of a theoretical framework contribute to the scarce literature on how a focus on weight in public health policy may influence psychosocial wellbeing among young adults in Canada. Additional research is needed to further disentangle the complexity of eating- and weight-related disorders and how obesity and nutrition policies might unintentionally do more harm than good across the spectrum of conditions. This dissertation provides early evidence that nutrition policies may not have measurable, unintended consequences for disordered eating and psychosocial wellbeing, but that they may exacerbate or interact with elements of young adults' relationships with food. The analyses in Chapters 4 and 5, and their subsequent influence on the development of the framework in Chapter 6, have implications for future inquiries into the prevention of eating- and weight-related disorders among populations.

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APPENDICES

Appendix A: Supplementary materials for Chapter 4

This appendix includes supplementary materials for Chapter 4: *The impact of calorie menu labelling on disordered eating and related psychosocial outcomes: A longitudinal study among young adults in Canada.*

The following materials are included in this appendix:

1. List of survey items used in analyses
2. Overview of sensitivity analyses exploring differences between analytic and original Canada Food Study sample

1. List of survey items used in analyses

Age

How old are you? [*numeric*]

*Gender*³⁶⁷

What is your current gender identity?

- Man
- Woman
- Trans male/trans man
- Trans female/trans woman
- Gender queer/gender non-conforming
- Different identity – Please specify: [open-ended]
- Don't know
- Refuse to answer

*Race/ethnicity, Indigeneity*³⁶⁸

People living in Canada come from many different cultural and racial backgrounds. Are you...?

(Select all that apply)

- White
- Chinese
- South Asian (e.g., East Indian, Pakistani, Sri Lankan)
- Black
- Filipino
- Latin American
- Southeast Asian (e.g., Cambodian, Indonesian, Laotian, Vietnamese)
- Arab
- West Asian (e.g., Afghan, Iranian)
- Japanese
- Korean
- Other – Please specify: [open-ended]
- Don't know
- Refuse to answer

Are you an Aboriginal person, that is, First Nations (North American Indian), Métis or Inuk (Inuit)?

- Yes
- No
- Don't know
- Refuse to answer

Province

What province or territory do you live in?

- Alberta
- British Columbia
- Manitoba
- New Brunswick
- Newfoundland and Labrador
- Northwest Territories
- Nova Scotia
- Nunavut
- Ontario
- Prince Edward Island
- Quebec
- Saskatchewan
- Yukon

Perceived income adequacy

Thinking about your total monthly income, how difficult or easy is it for you to make ends meet?

- Very difficult
- Difficult
- Neither easy nor difficult
- Easy
- Very easy
- Don't know
- Refuse to answer

Weight perception

Do you consider yourself...

- Overweight
- Underweight
- Just about right
- Don't know
- Refuse to answer

Noticing nutrition information

The last time you visited a restaurant, did you notice any nutrition information?

- Yes
- No
- Don't know
- Refuse to answer

Disordered eating³⁵⁴

I am preoccupied with a desire to be thinner.

- Always
- Usually
- Often
- Sometimes
- Rarely
- Never
- Don't know
- Refuse to answer

In the past 3 months, how often have you gone on eating binges? (*Eating a large amount of food while feeling out of control*)

- Never
- Less than 1 time a month
- 1 to 3 times a month
- Once a week
- 2 to 6 times a week
- Once a day
- More than once a day
- Don't know
- Refuse to answer

In the past 3 months, how often have you made yourself sick (vomited) to control your weight?

- Never
- Less than 1 time a month
- 1 to 3 times a month
- Once a week
- 2 to 6 times a week
- Once a day
- More than once a day
- Don't know
- Refuse to answer

Body image³⁶¹

Right now I feel . . .

- Extremely satisfied with my body size and shape
- Mostly satisfied with my body size and shape
- Moderately satisfied with my body size and shape
- Slightly satisfied with my body size and shape
- Neither dissatisfied nor satisfied with my body size and shape
- Slightly dissatisfied with my body size and shape
- Moderately dissatisfied with my body size and shape
- Mostly dissatisfied with my body size and shape
- Extremely dissatisfied with my body size and shape
- Don't know
- Refuse to answer

Internalized weight bias³⁶²

I worry about becoming fat.

- Strongly disagree
- Disagree
- Neutral
- Agree
- Strongly agree
- Don't know
- Refuse to answer

Experienced weight stigma²⁹⁵

In the last 12 months, how often have you been bullied or harassed, excluded, or treated unfairly because of your weight?

- Never
- Less than once a month
- Monthly
- Weekly
- Daily
- Don't know
- Refuse to answer

Anxiety³⁶⁴

When was the last time that you had significant problems with feeling very anxious, nervous, tense, scared, panicked, or like something bad was going to happen?

- Past month
- 1 to 12 months ago
- Over a year ago
- Never
- Don't know
- Refuse to answer

Depression³⁶⁴

When was the last time that you had significant problems with feeling very trapped, lonely, sad, blue, depressed, or hopeless about the future?

- Past month
- 1 to 12 months ago
- Over a year ago
- Never
- Don't know
- Refuse to answer

Stress³⁶⁵

Thinking about the amount of stress in your life, would you say that most days are...

- Not at all stressful
- Not very stressful
- A bit stressful
- Very stressful
- Extremely stressful
- Don't know
- Refuse to answer

Overall mental health³⁶⁵

In general, would you say your mental health is...

- Poor
- Fair
- Good
- Very good
- Excellent
- Don't know
- Refuse to answer

2. Sensitivity analyses exploring differences between original and analytic sample

To explore differences between the original Canada Food Study sample at Wave 1 (n=3000) and the analytic sample of Chapter 4 (n=689), a series of χ^2 analyses were conducted. In the table below, I have included the results of the tests assessing differences between each of the predictor and outcome variables at Wave 1 versus Wave 3. Significant p -values (< 0.05) are indicated with an asterisk (*), and additional details are provided on the differences between Waves 1 and 3.

Variable	χ^2	$p > \chi^2$	Details
<i>Province</i>	2.16	0.71	
<i>Age</i>	17.20	0.25	
<i>Gender</i>	19.04	<0.0001*	Fewer men in the analytic sample
<i>Race/ethnicity</i>	21.49	0.0007*	Fewer Indigenous people and people belonging to the mixed/other race/ethnicity group in the analytic sample
<i>Income adequacy</i>	31.44	<0.0001*	Fewer participants “don't know” or refused to answer the item in the analytic sample
<i>Weight perception</i>	0.01	0.99	
<i>Noticing of nutrition information</i>	0.54	0.46	
<i>Disordered eating</i>	3.79	0.05	
<i>Body image</i>	1.79	0.18	
<i>Internalized weight bias</i>	5.63	0.02*	More participants responded “yes” in the analytic sample
<i>Weight stigma</i>	0.73	0.39	
<i>Anxiety</i>	0.10	0.76	
<i>Depression</i>	0.30	0.59	
<i>Stress</i>	0.34	0.56	
<i>Overall mental health</i>	1.17	0.28	

Appendix B: Supplementary materials for Chapter 5

This appendix includes supplementary materials for Chapter 5: *“Maybe a little bit of guilt isn’t so bad for the overall health of an individual”*: A mixed-methods exploration of young adults’ experiences with calorie labelling.

The following materials are included in this appendix:

1. Recruitment emails (initial and follow-up) sent to eligible participants
2. Electronic consent form that participants were asked to complete on a laptop prior to the start of the interview
3. Interview guide
4. Post-interview survey, delivered online after the interview
5. Debriefing script
6. Post-debriefing consent form
7. Debriefing, feedback & appreciation letter, printed on institutional letterhead and provided to participants after the study
8. Resource list for participants, printed on institutional letterhead and provided to participants after the study
9. Additional details on data quality & rigor

1. Recruitment emails (initial and follow-up) sent to eligible participants

Initial recruitment email:

Hello,

You recently participated in a study titled “Comparing the effects of numbers versus traffic light symbols on menus to help Canadians make healthier food choices”, led by Kirsten Lee and Dr. Sharon Kirkpatrick at the University of Waterloo, and indicated that you may be interested in participating in future research studies.

You are invited to participate in a study exploring young adults’ feelings about, perceptions of, and experiences with policies related to food and nutrition. This study is being conducted as part of Amanda Raffoul’s PhD thesis, under the supervision of Dr. Sharon Kirkpatrick.

As a participant in this study, you will be asked to take part in an interview led by the student investigator. During this interview, you will be asked questions about your eating-related attitudes and behaviours, as well as for your thoughts on policies and interventions that aim to change the diet of the population overall. Following the interview, you will be asked to respond to questions about your socio-demographic characteristics (e.g., gender, age, race/ethnicity) and eating-related attitudes and behaviours.

Participation in this study is voluntary and will take approximately **60 minutes** of your time. You will receive **\$15 Interac for your time**. This study has been reviewed and received ethics clearance through a University of Waterloo Research Ethics Committee.

If you are interested in participating, please reply to this email by (*date 3 days later*).

Thank you for considering participation in this study.

Follow-up recruitment email:

Hello,

We recently sent you an email regarding participation in a study exploring young adults' feelings about, perceptions of, and experiences with policies related to food and nutrition.

This study is being conducted as part of Amanda Raffoul's PhD thesis, under the supervision of Dr. Sharon Kirkpatrick.

You have been invited to participate in this study because you recently took part in a study titled "Comparing the effects of numbers versus traffic light symbols on menus to help Canadians make healthier food choices", led by Kirsten Lee and Dr. Sharon Kirkpatrick at the University of Waterloo, and indicated that you may be interested in participating in future research studies.

As a participant in our study, you will be asked to take part in an interview led by the student investigator. During this interview, you will be asked questions about your eating-related attitudes and behaviours, as well as for your thoughts on policies and interventions that aim to change the diet of the population overall. Following the interview, you will be asked to respond to questions about your socio-demographic characteristics (e.g., gender, age, race/ethnicity) and eating-related attitudes and behaviours.

Participation in this study is voluntary and will take approximately **60 minutes** of your time.

You will receive \$15 for your time. This study has been reviewed and received ethics clearance through a University of Waterloo Research Ethics Committee.

If you are interested in participating, please reply to this email by (*date 3 days later*).

Thank you for considering participation in this study.

2. Electronic consent form that participants were asked to complete on a laptop prior to the start of the interview



Study title: Examining young adults' perceptions of population-level nutrition policies

Dear student,

You are invited to participate in a research study exploring young adults' feelings about, perceptions of, and experiences with population-level nutrition policies. This study is being conducted as part of Amanda Raffoul's PhD thesis under the supervision of Dr. Sharon Kirkpatrick. Funding for this study has been provided by a Social Sciences and Humanities Research Council Doctoral Canada Graduate Scholarship (Raffoul) and an Early Researcher Award from the Ontario Ministry of Research and Innovation (Kirkpatrick).

What you will be asked to do

As a participant in this study, you will be asked to take part in an interview led by the student investigator. During this interview, you will be asked about your food-related attitudes and behaviours, as well as your thoughts on policies and interventions that aim to change the diet of the population overall. Following the interview, you will be asked to respond to questions about your socio-demographic characteristics (e.g., gender, age, race/ethnicity), and your eating-related attitudes and behaviours (e.g., "the last time you visited a restaurant, did you notice any nutrition information?", or to what extent do you agree with statements such as "I am preoccupied with trying to change my body weight" and "I have gone on eating binges where I feel that I may not be able to stop").

Participation and remuneration

Participation in this study is voluntary and will take approximately 60 minutes of your time. You will receive \$15. The amount received is taxable. It is your responsibility to report

this amount for income tax purposes. You may decline to answer any questions presented during the study if you so wish. Further, you may decide to withdraw from this study at any time by advising the researcher and may do so without any penalty. You can request your data be removed from the study up until Fall 2019 as it is not possible to withdraw your data once papers and publications have been submitted to publishers.

Personal benefits of the study

There are no other personal benefits to participation.

Risks to participation in the study

We want you to be aware of the possible risks/side effects associated with participation in this research.

Some students may feel distressed in answering personal questions about themselves or their eating behaviours. You may decline to answer any questions presented during the study if you so wish. In the event that you develop any negative reactions, or are concerned that you may, please contact the student investigator, Amanda Raffoul at araffoul@uwaterloo.ca. You may also contact Dr. Sharon Kirkpatrick at 519-888-4567 x37054 (sharon.kirkpatrick@uwaterloo.ca), University of Waterloo Counselling Services at 519-888-4567 x32655, or University of Waterloo Health Services at 519-888-4096.

Confidentiality

All personal information you provide is considered completely confidential. Your name will not be included or in any other way associated with the data collected in the study when it is reported, for example, in presentations or publications. With your permission, some of your responses during the interview may be included as direct quotes, but you will be referred to by a fake name. With your consent, the interview will be recorded with an electronic audio recording device. Only the student investigator, her supervisors, and a hired transcriptionist will have access to the audio recordings. The recording and survey data will be stored on a password-protected computer that can only be accessed by the student investigator and transcriptionist. All information that could identify you will be removed from the data within 1 week and stored separately. The data, with identifying information removed, will be kept for a

period of at least 7 years following publication of the research. When information is transmitted over the internet privacy cannot be guaranteed. There is always a risk your responses may be intercepted by a third party (e.g., government agencies, hackers). University of Waterloo researchers will not collect or use internet protocol (IP) addresses or other information which could link your participation to your computer or electronic device without first informing you. The dataset without identifiers may be shared publicly. Your identity will be kept confidential.

Questions and research ethics clearance

This study has been reviewed and received ethics clearance through a University of Waterloo Research Ethics Committee (ORE #40501). If you have questions for the Committee contact the Office of Research Ethics, at 1-519-888-4567 ext. 36005 or ore-ceo@uwaterloo.ca. For all other questions, after receiving this letter, or if you would like additional information to assist you in reaching a decision about participation, please feel free to ask the student investigator or the faculty supervisor listed at the top of this sheet.

Thank you for your interest in our research and for your assistance with this project.

Consent of Participant

I have read the information presented in the information letter about a study being conducted by Amanda Raffoul under the supervision of Dr. Sharon Kirkpatrick of the School of Public Health and Health Systems at the University of Waterloo.

I have had the opportunity to ask any questions related to this study, to receive satisfactory answers to my questions, and any additional details I wanted. I am aware that I may withdraw from the study at any time by advising the researchers of this decision.

I understand that my participation in this study involves one face-to-face interview and the completion of one questionnaire, requiring approximately 60 minutes in duration and taking place in a private meeting space. I understand that I can refrain from answering any of the questions on the survey or during the interview.

I am aware that my identity will remain confidential.

I am aware that I may allow my interview to be audio recorded to ensure an accurate recording of my responses.

I understand that there are minimal risks anticipated to me as a participant in this study.

This study has been reviewed by and received ethics clearance through a University of Waterloo Research Ethics Committee (ORE#40501).

By signing this consent form, I am not waiving my legal rights or releasing the investigator(s) or involved institution(s) from their legal and professional responsibilities.

With full knowledge of all foregoing, I agree, of my own free will, to participate in this study.

I agree of my own free will to participate in this study.

YES NO

I agree to have my interview audio recorded.

YES NO

I agree to the use of anonymous quotations in any thesis or publication that comes of this research.

YES NO

3. Interview guide

Introduction and consent:

Hi, thank you for coming in today. My name is Amanda Raffoul. Before we get started, I would like you to review this form, and if you consent to participate in this study, please agree at the bottom of the consent form. Please let me know if there is anything I can clarify.

[Direct participant to the Information & Consent letter on the laptop]

[If participant has consented to participate and for the interview to be recorded, turn on audio recorder]

Thank you for volunteering your time for this study. Over the next hour, I will ask you some questions so that we can have a discussion and then ask you to complete a questionnaire. I ask that you please answer my questions as honestly as you can. Feel free to take your time to respond. With your consent, I will be recording the interview and might take a few notes on my notepad as we go, writing about things that can't be heard, such as body language. Please remember, you can choose to withdraw from the interview or not answer any questions you do not wish to answer at any time.

If you are ready, we will get started.

Interview:

Question type	Question/prompt	Probes
1. Warm-up	What is your favourite food to cook or eat?	
2. Transition	How often do you cook your own food at home?	<ul style="list-style-type: none">- What kinds of food do you cook?- Tell me more about the preparation of these foods, like how you make them or what kinds of ingredients you use.
3. Main question	Some people describe having a “relationship with food”, which captures how they interact with food in their daily lives and the meaning, emotions, and value that they get from food. In your own words, how would you describe your relationship with food?	<ul style="list-style-type: none">- What feelings do you associate with food? (i.e., eating, preparing, buying)- Can you tell me more about that?
4. Follow-up	Are there any foods that make you feel good or bad?	<ul style="list-style-type: none">- What are they?- Do these foods make you feel the same way in all situations? Eating alone versus with friends, eating at home versus in a restaurant, etc. How/how not?- Do these foods influence your interactions with other people? Friends, family, roommates, etc. How/how not?
5. Transition	What do you think about Canadians’ diets, or how Canadians overall relate to food?	<ul style="list-style-type: none">- Can you tell me more about that?- Do you think they are healthy? Why/why not?

6.	Main question	Recently, the Government of Canada began working on a <i>Healthy Eating Strategy</i> to improve the overall diets of Canadians. Have you heard of this initiative?	<ul style="list-style-type: none"> - (If yes) Could you tell me what you know about this initiative? Or what it entails? - (If no or unsure) It's a national framework for policies and recommendations to encourage 'healthy eating'. Some examples of policies and recommendations include dietary guidance (like a recent update to Canada's Food Guide), calorie labelling, and changing nutrition labels on packaged foods.
7.	Follow-up	Why do you think governments develop interventions or make policies related to food?	<ul style="list-style-type: none"> - What impact do you think these policies have?
8.	Follow-up	How do these food-related policies affect you?	<ul style="list-style-type: none"> - Do you think they influence your food-related behaviour? Why/how? - Think back to our discussion about your "relationship with food". Can you tell me more about the role that policies might have on your relationship with food?
9.	Main question	You recently participated in a study in a residence cafeteria on campus. Can you tell me more about that?	<ul style="list-style-type: none"> - (If yes) Did you notice any changes in the cafeteria around the time of the study? - (If no) In that study, labels within the cafeteria you visited may have been modified to include nutrition information for each food and beverage. These labels indicated the number of calories in each item, possibly using red, amber/yellow, and green to identify high, medium,

		and low-calorie items. Do you remember this now?
		- What do you think the purpose of that study was?
10	Follow-up	<p>I would like you to close your eyes and think back to that period of time when the labels in the residence cafeteria might have been different than usual. You are approaching the place where you choose the foods and beverages you are going to purchase. You see that the cafeteria is offering [<i>participant's favourite food to cook from Q1</i>]. The label for the item shows its calorie content with a green circle. Please open your eyes. Can you tell me how you would feel in this situation?</p>
		<ul style="list-style-type: none"> - Can you tell me the first thought that popped into your head? Why do you think this was first? How did that make you feel? - Do you think this feeling would linger, or go away quickly? Why/why not? - Would you still choose this food? Why/why not? - What if the circle was red or amber? How would you feel? Would you still choose this food? Why/why not?
11	Main question	<p>Aside from the recent experiment in your residence cafeteria, recent laws have made it so that restaurants with more than 20 locations must display calories for each menu item. Have you noticed this in any food settings you've visited or on sites or apps you've used to order food? Can you name a specific time when you saw calorie labels and tell me how you felt or reacted?</p>
		<ul style="list-style-type: none"> - How did it make you feel? Did this reaction influence your purchasing decision? (i.e., did you order something different than you might have otherwise?) - Did this feeling linger, or did it go away quickly?
12	Follow-up	<p>You mentioned that this type of scenario, where you encounter a calorie label in a restaurant or on an app, would make you feel [<i>name participant's feeling</i>]. Again, I would like you to think about your own</p>
		<ul style="list-style-type: none"> - What do you think the aim of this intervention (calorie labels) is? - How do you think calorie labelling might affect other people's relationship with food?

relationship with food overall, which you mentioned is [*summarize response to Q3*]. Can you tell me about how seeing labels with calorie content makes you feel, considering your relationship with food?

Are there any positive/negative implications?

13 Wrap-up Is there anything else you would like to talk about?
.

[*turn off audio recorder*]

4. Post-interview survey, delivered online after the interview

1. Do you consider yourself...
 - 'Underweight'
 - 'Just about the right weight'
 - 'Overweight'
 - Don't know
 - Refuse to answer
2. In the last 12 months, have you noticed a symbol that warns about "high sugar" or "high sodium" on food packages?
 - Yes
 - No
 - Don't know
 - Refuse to answer
3. [*if yes to previous question*] In the last 12 months, has the "high sugar" or "high sodium" symbol led you to do any of the following? (Select all that apply)
 - Look at the nutrition facts table or ingredients for more information
 - Buy the product but eat less of it
 - Buy another similar product without the warning
 - Avoid the type of product altogether
 - None of the above
 - Don't know
 - Refuse to answer
4. The last time you visited a restaurant, did you notice any nutrition information?
 - Yes
 - No
 - Don't know
 - Refuse to answer
5. [*if yes to previous question*] Did the nutrition information influence what you ordered?
 - a. Yes
 - b. No
 - c. Don't know
 - d. Refuse to answer
6. [*if yes to question 7*] In the past 6 months, have you done any of the following because of nutrition information in restaurants? (Select all that apply)
 - Ordered something different
 - Ate less of the food you ordered
 - Changed which restaurants you visit
 - Ate at restaurants less often
 - None of the above

- Don't know
 - Refuse to answer
7. I like what I look like in pictures.
- Never
 - Seldom
 - Sometimes
 - Often
 - Always
 - Refuse to answer
8. Other people consider me good looking.
- Never
 - Seldom
 - Sometimes
 - Often
 - Always
 - Refuse to answer
9. I am proud of my body.
- Never
 - Seldom
 - Sometimes
 - Often
 - Always
 - Refuse to answer
10. I am preoccupied with trying to change my body weight.
- Never
 - Seldom
 - Sometimes
 - Often
 - Always
 - Refuse to answer
11. I think my appearance would help me get a job.
- Never
 - Seldom
 - Sometimes
 - Often
 - Always
 - Refuse to answer
12. I like what I see when I look in the mirror.
- Never
 - Seldom

- Sometimes
 - Often
 - Always
 - Refuse to answer
13. There are lots of things I'd change about my looks if I could.
- Never
 - Seldom
 - Sometimes
 - Often
 - Always
 - Refuse to answer
14. I am satisfied with my weight.
- Never
 - Seldom
 - Sometimes
 - Often
 - Always
 - Refuse to answer
15. I wish I looked better.
- Never
 - Seldom
 - Sometimes
 - Often
 - Always
 - Refuse to answer
16. I really like what I weigh.
- Never
 - Seldom
 - Sometimes
 - Often
 - Always
 - Refuse to answer
17. I wish I looked like someone else.
- Never
 - Seldom
 - Sometimes
 - Often
 - Always
 - Refuse to answer

18. People my own age like my looks.

- Never
- Seldom
- Sometimes
- Often
- Always
- Refuse to answer

19. My looks upset me.

- Never
- Seldom
- Sometimes
- Often
- Always
- Refuse to answer

20. I'm as nice looking as most people.

- Never
- Seldom
- Sometimes
- Often
- Always
- Refuse to answer

21. I'm pretty happy about the way I look.

- Never
- Seldom
- Sometimes
- Often
- Always
- Refuse to answer

22. I feel I weigh the right amount for my height

- Never
- Seldom
- Sometimes
- Often
- Always
- Refuse to answer

23. I feel ashamed of how I look.

- Never
- Seldom
- Sometimes
- Often

- Always
 - Refuse to answer
24. Weighing myself depresses me.
- Never
 - Seldom
 - Sometimes
 - Often
 - Always
 - Refuse to answer
25. My weight makes me unhappy.
- Never
 - Seldom
 - Sometimes
 - Often
 - Always
 - Refuse to answer
26. My looks help me to get dates.
- Never
 - Seldom
 - Sometimes
 - Often
 - Always
 - Refuse to answer
27. I worry about the way I look.
- Never
 - Seldom
 - Sometimes
 - Often
 - Always
 - Refuse to answer
28. I think I have a good body.
- Never
 - Seldom
 - Sometimes
 - Often
 - Always
 - Refuse to answer
29. I'm looking as nice as I'd like to.
- Never
 - Seldom

- Sometimes
- Often
- Always
- Refuse to answer

30. I am terrified about being overweight.

- Never
- Rarely
- Sometimes
- Often
- Usually
- Always
- Refuse to answer

31. I avoid eating when I am hungry.

- Never
- Rarely
- Sometimes
- Often
- Usually
- Always
- Refuse to answer

32. I find myself preoccupied with food.

- Never
- Rarely
- Sometimes
- Often
- Usually
- Always
- Refuse to answer

33. I have gone on eating binges where I feel that I may not be able to stop.

- Never
- Rarely
- Sometimes
- Often
- Usually
- Always
- Refuse to answer

34. I cut my food into small pieces.

- Never
- Rarely
- Sometimes

- Often
- Usually
- Always
- Refuse to answer

35. I am aware of the calorie content of foods that I eat.

- Never
- Rarely
- Sometimes
- Often
- Usually
- Always
- Refuse to answer

36. I particularly avoid food with a high carbohydrate content (i.e. bread, rice, potatoes, etc.)

- Never
- Rarely
- Sometimes
- Often
- Usually
- Always
- Refuse to answer

37. I feel that others would prefer if I ate more.

- Never
- Rarely
- Sometimes
- Often
- Usually
- Always
- Refuse to answer

38. I vomit after I have eaten.

- Never
- Rarely
- Sometimes
- Often
- Usually
- Always
- Refuse to answer

39. I feel extremely guilty after eating.

- Never
- Rarely
- Sometimes

- Often
 - Usually
 - Always
 - Refuse to answer
40. I am preoccupied with a desire to be thinner.
- Never
 - Rarely
 - Sometimes
 - Often
 - Usually
 - Always
 - Refuse to answer
41. I think about burning up calories when I exercise.
- Never
 - Rarely
 - Sometimes
 - Often
 - Usually
 - Always
 - Refuse to answer
42. Other people think that I am too thin.
- Never
 - Rarely
 - Sometimes
 - Often
 - Usually
 - Always
 - Refuse to answer
43. I am preoccupied with the thought of having fat on my body.
- Never
 - Rarely
 - Sometimes
 - Often
 - Usually
 - Always
 - Refuse to answer
44. I take longer than others to eat my meals.
- Never
 - Rarely
 - Sometimes

- Often
 - Usually
 - Always
 - Refuse to answer
45. I avoid foods with sugar in them.
- Never
 - Rarely
 - Sometimes
 - Often
 - Usually
 - Always
 - Refuse to answer
46. I eat diet foods.
- Never
 - Rarely
 - Sometimes
 - Often
 - Usually
 - Always
 - Refuse to answer
47. I feel that food controls my life.
- Never
 - Rarely
 - Sometimes
 - Often
 - Usually
 - Always
 - Refuse to answer
48. I display self-control around food.
- Never
 - Rarely
 - Sometimes
 - Often
 - Usually
 - Always
 - Refuse to answer
49. I feel that others pressure me to eat.
- Never
 - Rarely
 - Sometimes

- Often
 - Usually
 - Always
 - Refuse to answer
50. I give too much time and thought to food.
- Never
 - Rarely
 - Sometimes
 - Often
 - Usually
 - Always
 - Refuse to answer
51. I feel uncomfortable after eating sweets.
- Never
 - Rarely
 - Sometimes
 - Often
 - Usually
 - Always
 - Refuse to answer
52. I engage in dieting behavior.
- Never
 - Rarely
 - Sometimes
 - Often
 - Usually
 - Always
 - Refuse to answer
53. I like my stomach to be empty.
- Never
 - Rarely
 - Sometimes
 - Often
 - Usually
 - Always
 - Refuse to answer
54. I have the impulse to vomit after meals.
- Never
 - Rarely
 - Sometimes

- Often
- Usually
- Always
- Refuse to answer

55. I enjoy trying new rich foods.

- Never
- Rarely
- Sometimes
- Often
- Usually
- Always
- Refuse to answer

56. In the past 6 months, have you...

- a. Gone on eating binges where you feel that you may not be able to stop?
 - Yes
 - No
 - Refuse to answer
- b. Ever made yourself sick (vomited) to control your weight or shape?
 - Yes
 - No
 - Refuse to answer
- c. Ever used laxatives, diet pills or diuretics (water pills) to control your weight or shape?
 - Yes
 - No
 - Refuse to answer
- d. Exercised more than 60 minutes a day to lose or to control your weight?
 - Yes
 - No
 - Refuse to answer

57. Have you ever been treated for an eating disorder?

- Yes
- No
- Refuse to answer

58. What is your age?

59. What is your gender?

- Woman
- Man
- Trans male/trans man
- Trans female/trans woman

- Gender queer/gender non-conforming
- Different identity (please specify): _____
- Don't know
- Prefer not to answer

60. What racial or cultural group do you belong to?

- White
- Indigenous (First Nations, Métis, or Inuk (Inuit))
- East Asian (e.g., Chinese, Japanese, Korean)
- South Asian (e.g., East Indian, Pakistani, Sri Lankan)
- African
- Caribbean
- Latin American
- Southeast Asian (e.g., Cambodian, Indonesian, Laotian, Vietnamese)
- Arab
- West Asian (e.g., Afghan, Iranian)
- Other (please specify): _____
- Don't know
- Refuse to answer

Thank you for answering those questions!

Please let the interviewer know that you are finished.

5. Debriefing script

Thank you for participating in the interview and completing this questionnaire and interview. The research team greatly appreciates your participation in this study.

I would now like to tell you a bit more about the study. The debriefing letter that I gave you describes the details of the study. You can keep this copy. I will go over the main points with you now. When you began the study, you were told the purpose of this study was to learn more about young adults' feelings about, perceptions of, and experiences with population-level nutrition policies. However, we left out a few details. What this means is the study was actually different than what we explained in the beginning. Some studies involve deception – that is, we tell the truth about the study, but leave out some details about what we are looking for. This is one of those studies. Do you have any questions?

The primary goal of this study was to understand how young adults feel about, perceive, and experience weight-related population-level interventions (such as calorie labelling), and whether these attitudes, perceptions, and experiences differ between individuals with different eating behaviours. All participants completed the same interview and questionnaire, but we will use the results of the questionnaires to examine whether the interview responses differ based on body image, disordered eating, and other demographic measures like age and gender.

The reason that we needed to use deception in this study was because we needed participants' behavior and attitudes to be as natural as possible. Thus, we could not give participants complete information before their involvement in the study because it may have influenced their behaviour in a way that would make investigations of the research question invalid. If participants knew the objectives of the study beforehand, their behavior and attitudes may have been influenced by this knowledge.

We apologize for omitting details, but we hope that you understand the need for use of deception now that the purpose of the study has been more fully explained to you. Do you have any questions about deception and why it was used in this study?

Do you have any questions or concerns about the use of deception in this study? Would you like to speak with me or my faculty supervisor about your concerns or questions? After you leave, if you have questions, comments, or concerns about the study or any feelings of

discomfort, please contact the study researchers or the Office of Research Ethics. Contact information is on the debriefing letter I gave you.

This study involves some aspects that you were not told about before starting; therefore, it is very important that you not discuss your experiences with any other students who potentially could be in this study until after the end of the term. If people come into the study knowing about our specific predictions, as you can imagine, it could influence their results, and the data we collect would not be useable for helping us to understand whether people's thoughts on and perceptions of nutrition-related policies differ based on their own relationship with food and eating. Also, since you will be given a copy of this feedback letter to take home with you, please do not make this available to other students.

Even though this study involved some deception, the personal information given to you about confidentiality, data storage, and security still applies. All data collected are confidential and securely stored at all times. These details are outlined in the debriefing letter. We would also like to assure you that most research does not involve the use of deception.

Because some elements of the study were different from what was originally explained, we have another consent form for you to read and sign if you are willing to allow us to use the information that you have provided. This form is a record that the purpose of the study has been explained to you, and that you are willing to allow your information to be included in the study. Will you allow us to use the information you provided?

[Direct participant to the Post-debriefing Consent form on the laptop]

Thank you again for your participation. I will provide you with a feedback letter that you can take with you, which provides details of your participation in this study today, as well as a resource list if you are looking for additional information or support related to the topics we have discussed today.

6. Post-debriefing consent form

Study title: Exploring young adults' feelings about, perceptions of, and experiences with weight-related population-level interventions

Faculty Supervisor: Dr. Sharon Kirkpatrick, School of Public Health and Health Systems, 519-888-4567 ext. 37054, sharon.kirkpatrick@uwaterloo.ca

Student investigator: Amanda Raffoul, School of Public Health and Health Systems, araffoul@uwaterloo.ca

During the debriefing session, I learned that it was necessary for the researchers to disguise the real purpose of this study. I realize that this was necessary since having full information about the actual purpose of the study might have influenced the way in which I responded to the tasks and this would have invalidated the results. Thus, to ensure that this did not happen, some of the details about the purpose of the study initially were not complete. However, I have now received a complete verbal and written explanation as to the actual purpose of the study and have had an opportunity to ask any questions about this and to receive acceptable answers to my questions.

I have been asked to give permission for the researchers to use my data (or information I provided) in their study and agree to this request. I am aware that I may withdraw this consent by notifying the Faculty Supervisor of this decision.

This study has been reviewed and received ethics clearance through a University of Waterloo Research Ethics Committee (ORE#40501). If you have questions for the Committee contact the Office of Research Ethics, at 1-519-888-4567 ext. 36005 or ore-ceo@uwaterloo.ca.

I agree to have my information and responses used in this study.

YES NO

7. Debriefing, feedback & appreciation letter, printed on institutional letterhead and provided to participants after the study



Dear student,

Thank you for your participation in our research study, "Exploring young adults' feelings about, perceptions of, and experiences with weight-related population-level interventions".

In the information letter, we described the project as an opportunity to learn more about young adults' feelings about, perceptions of, and experiences with population-level nutrition policies. Students completed an in-person interview, followed by a questionnaire.

However, the primary goal of this study was to understand how young adults feel about, perceive, and experience weight-related population-level interventions (such as calorie labelling), and whether these attitudes, perceptions, and experiences differ between individuals with and without disordered eating thoughts and/or behaviours.

We did not reveal details regarding the specific purpose of the study because we did not want to influence your responses or actions. If we can discover how young adults feel about weight-related policies, and whether this differs based on their eating attitudes and behaviours, we can use this information to provide recommendations on policies related to menu labelling or other population-level initiatives aimed at keeping Canadians healthy. The use of deception will not affect stipulations for receiving honoraria. We apologize for omitting details about our study. We hope that you understand the need for deception now that the purpose of the study has been more fully explained to you. We would also like to assure you that most research does not involve the use of deception.

Now that the research project has been fully explained, we want to remind your identity will be kept confidential (using pseudonyms) and any personal identifying information will not be shared publicly. All information that could identify you will be removed from the data within 1 week and stored separately. We will keep identifying information for a minimum of 7 years and our study records for a minimum of 7 years. Your consent form will remain stored in a locked research office at the School of Public Health and Health Systems. All records will be destroyed according to University of Waterloo policy.

Your participation is completely voluntary. You have the right to choose not to participate and may withdraw within the minimum 7 years that we will keep identifying information. To withdraw from the study, please contact Amanda Raffoul at araffoul@uwaterloo.ca. You may also contact Dr. Sharon Kirkpatrick at 519-888-4567 x37054 (sharon.kirkpatrick@uwaterloo.ca). It is not possible to withdraw your consent once papers and publications have been submitted to publishers, after which time, your data cannot be destroyed. Preliminary study results will be available in Fall 2019. Please contact Amanda Raffoul (araffoul@uwaterloo.ca) if you are interested in obtaining these results.

This study, including the use of deception, has received clearance by the University of Waterloo Research Ethics Committee (ORE #40501). If you have questions for the Committee, contact the Office of Research Ethics, at 1-519-888-4567 ext. 36005 or ore-ceo@uwaterloo.ca.

Please do not hesitate to contact us if you have any additional questions. Thank you again for your participation in this study.



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8. Resource list for participants, printed on institutional letterhead and provided to participants after the study



If you are concerned about your eating, the following supports are available.

IN-PERSON COUNSELLING & SUPPORT

- **University of Waterloo Counselling Services** – Provide counselling services to University of Waterloo services; call for intake or appointment, or check website for group scheduling
 - <https://uwaterloo.ca/campus-wellness/counselling-services>
 - 519-888-4567 ext. 32655
- **Campus Wellness Eating Disorder Support Group** – Biweekly drop-in support group for University of Waterloo students struggling with disordered eating or issues with food
 - <https://uwaterloo.ca/campus-wellness/events/eating-disorder-support-group>
- **University of Waterloo Health Services**
 - <https://uwaterloo.ca/campus-wellness/health-services>
 - 519-888-4096

TELEPHONE AND ONLINE HELPLINES

- **NEDIC (National Eating Disorder Information Centre) Helpline** – Toll-free, open everyday from 9am to 5pm EST
 - 1-866-833-4220
- **Kids Help Phone** – Toll-free, 24/7, confidential counselling for youth 20 years and younger
 - <https://kidshelpphone.ca>
 - 1-800-668-8868
- **Good2Talk** – Toll-free, 24/7, confidential counselling for post-secondary students
 - 1-866-925-5454

INFORMATION ON HEALTHY EATING AND EATING DISORDERS

- **Health Canada – Canada's Food Guides**
 - <https://www.canada.ca/en/health-canada/services/canada-food-guides.html>
- **NEDIC**
 - <http://nedic.ca/>
- **Waterloo-Wellington Eating Disorders Coalition**
 - <http://eatingdisorderscoalition.ca/>
- **Canadian Mental Health Association**
 - <https://ontario.cmha.ca/documents/understanding-and-finding-help-for-eating-disorders/>
- **University of Waterloo – The Body Project**
 - <https://uwaterloo.ca/campus-wellness/health-promotion/body-project>



9. Additional details on data quality & rigor

Several procedures were conducted to ensure the quality and rigor of the results and compiled into an audit trail.⁴¹¹

The interviewer (AR) engaged in reflexive journaling throughout data collection and analysis to identify and record changes made to the interview guide prompts and codes, conclusions drawn, and challenges encountered. Reflexivity recognizes the influence of a researcher's beliefs and biases throughout the planning, development, analysis, and dissemination stages of the study.⁴⁷⁴ Although the lead researcher ascribes to critical perspectives of population-level weight-based interventions, including menu labelling, other members of the research team brought differing perspectives that allowed for nuanced and alternative interpretations of the data.

Next, the second coder (author BG) had little knowledge of the content area and independently coded a sample of transcripts following the same procedure, and in later stages using the same codebook, as the lead investigator to ensure the reliability of the assigned codes. Percent agreement, derived by dividing the total number of analysts' agreements by the number of codes overall,⁴⁸³ was calculated on a trial of three transcripts during the open coding stage to ensure no significant biases were introduced in the earliest stage of analyses. The coders achieved 78% agreement and discussed their decisions before AR moved forward with open coding the remaining transcripts. Afterwards, the coders engaged in subjective assessment,⁴⁸³ whereby after coding separately, they met in-person or via email to discuss the assigned codes line-by-line and achieve agreement on discrepancies.

Finally, additional researchers beyond the two coders engaged in peer debriefing and secondary coding and analysis.⁴⁷⁴ The interviewer consulted with two members of the research team (EN and SIK) to ensure interviews were conducted without leading or unnecessary probing. In addition, the lead investigator engaged in peer debriefing with additional members of the research team and external content experts who were not familiar with the data after each of the open, axial, and selective coding stages; throughout this process, the peers asked questions and challenged the researcher's assumptions, thus lending validity to the study results.