

Understanding the Decline in Milk and Milk Alternatives Consumption Among Secondary School Students in Ontario, Canada: A Qualitative Investigation

by

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AUTHOR'S DECLARATION

I hereby declare that I am the sole author of this 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.

ABSTRACT

Milk products are the most readily consumed food source of calcium among Canadians, yet milk and milk alternatives (MMA) consumption has declined over the past decade, and the prevalence of calcium inadequacy is high (Cluskey et al, 2015; Vatanparast et al, 2020). Little research has been carried out to understand reasons for this decline, especially in the Canadian context. The research objectives are to determine where youth obtain health information, explore their perceptions of MMA, and contextualize salient trends in survey data which indicate declining MMA consumption among Ontario youth. Semi-structured interviews, rooted in the Theory of Reasoned Action, were held with secondary school students (n=28; 43% women) from 6 census divisions in Ontario. Utilizing the photo elicitation method, participants were asked to discuss pictures of school vending machines to understand how students make food decisions within the school context. Transcripts were thematically analyzed via deductive and inductive approaches. Health class was an important source of health information for participants. Despite its reported low credibility as a source of health information, findings indicate that social media may be in part responsible for driving the observed trends in MMA consumption, as adolescents feel pressure to conform to gendered body ideals. Results indicate that a combination of egoistic (e.g., perceived taste, nutritional value) and altruistic (e.g., perceived environmental impacts) attitudes both motivate and deter adolescents when making food decisions including MMA, which may contribute to cognitive dissonance. Age- and place-based perspectives were considered, but differences did not emerge between subgroups. In efforts to increase MMA consumption among young Canadians, it may be beneficial to enhance health curricula by incorporating unbiased and truthful information about MMA. Future research should examine in more depth the role cognitive dissonance plays in dietary decision-making, and efforts to increase MMA consumption should aim to reduce cognitive dissonance among consumers. More research to understand how adolescent women make food decisions that are focused on health benefits is needed, as body image still appears to be driving food decisions among this demographic.

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DEDICATION

This thesis is dedicated to my Mom. Thank you for your love and support, and for shaping the person I am today.

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CHAPTER ONE: INTRODUCTION

1.1 RESEARCH PROBLEM

A large proportion of Canadians have inadequate calcium intake (Vatanparast et al, 2020). From 2004 to 2015 the prevalence of calcium inadequacy has increased at the population level from 58.0% to 68.0% among those who do not take supplements (Vatanparast et al, 2020). This corresponds to a drop in calcium intake from milk and milk alternative (MMA) sources over the same period (Vatanparast et al, 2020). Understanding this aspect in association with calcium intake is important because North Americans tend to choose MMA as their primary food source of calcium (Cluskey et al, 2015). That is, fluid milk, milk products, and plant-based alternatives which are nutritionally similar, according to Health Canada (2007). In addition to being a prominent dietary source of calcium, MMA are considered to be some of the best sources due to high nutrient bioavailability (Titchenal & Dobbs, 2007). Therefore, dropping rates of MMA consumption could be problematic due to the essential role calcium plays in promoting and maintaining health.

Adequate calcium intake is known to promote health in a variety of ways. It is associated with strong bones and teeth and lower rates of osteoporosis, a chronic skeletal disease in which bone becomes fragile and susceptible to fractures (Papadimitriou, 2017). Inadequate calcium intake, on the other hand, can lead to a substantial loss of productive, healthy years of life. In addition to health concerns, inadequate calcium at the population level means more healthcare dollars spent on hospitalizations due to hip fracture, for example. As such, it is important to promote MMA consumption as a means for achieving adequate calcium intake among the Canadian population to promote health and reduce economic burden.

While on the whole Canadians' calcium and MMA consumption is low, women are particularly at risk for inadequate intake. According to the 2015 Canadian Community Health Survey (n=13,616), MMA intakes were lower for women compared to men (Auclair et al, 2019). This gender difference is also apparent in patterns of calcium supplementation (Vatanparast et al, 2020). Previous findings from the 2004 Canadian Community Health Survey correspond, revealing that there was a higher prevalence of inadequate calcium intake among women, ranging from 47.5% to 86.9% compared to 26.5% to 80.1 % for men (Health Canada, 2012). In addition, osteoporotic fracture is more common among women compared to men (Osteoporosis Canada, 2020). Ultimately, a greater understanding of reasons for this gender difference is necessary.

Understanding patterns of MMA consumption during adolescence is an important avenue for understanding the overall picture of MMA consumption among Canadians. Researching this age group provides insight as to what is influencing the dietary behaviours of current and future generations of Canadians. According to the World Health Organization, adolescence is defined as the phase of life between childhood and adulthood, between 10 and 19 years of age (2020). Currently there is limited research to understand attitudinal and behavioural factors influencing adolescents' MMA consumption in Canada. Existing research focuses on college students' perceptions of MMA or calcium, which has less transferability as this demographic is more educated and less diverse than the general Canadian population (Marcinow et al, 2017; Rose et al, 2018). More research is needed to contextualize the population-level findings that calcium and MMA intake is low among Canadians, and this is an ideal demographic to research.

1.2 RESEARCH CONTEXT

In Canada, existing guidelines and policies help to shape food decisions at the population level in order to prevent disease and promote health. Canada's Food Guide was first developed in 1942 by the federal government, and has undergone 9 revisions since. It is a well-known and widely instituted resource; most Canadians (>80%) have seen or heard of Canada's Food Guide (Slater & Mudryj, 2018). However, the most recent revision, released in January 2019, did not feature MMA like the 2011 version did. Instead, the guide advised Canadians to "eat protein foods", including low-fat MMA, as part of a healthy eating pattern, placing more emphasis on plant-based sources of protein (Health Canada, 2020). This change calls into question whether Canadians' MMA consumption will drop further following the release of the 2019 guidelines, and translate to greater prevalence of inadequate intake of calcium and vitamin D at the population level.

While the federal guidelines are voluntary, more stringent policies exist at the provincial level to promote healthy eating. In Ontario, the *School Food and Beverage Policy P/PM 150* was implemented by the Ontario Ministry of Education in 2011 to limit the sale of foods high in fat, sugar, and sodium in publicly funded Ontario schools (Ontario Ministry of Education, 2020). According to this policy, foods are divided into "sell most (>80%)", "sell less (<20%)", or "not permitted for sale" categories based on nutrition criteria (Ontario Ministry of Education, 2020). As such, MMA products sold in Ontario schools must contain calcium which is equal to or more than 15% of daily value, less than 480mg of sodium, and preferably less than 360mg of sodium and less than 20% milk fat. This impacts what MMA products can be purchased in Ontario elementary and secondary schools, however it does not impact what MMA products can be

brought to school from home. Moreover, this policy does not affect what can be sold in Ontario private schools.

In Canada, there is limited research to understand reasons for the decline in consumption of MMA. Previous research has employed quantitative methodologies using cross-sectional survey data to provide a snapshot of Canadians' dietary consumption habits. Little research has used qualitative methodologies to understand *how* and *why* Canadians are making food decisions which lead to low calcium and vitamin D intake. Prior to the release of the latest version of Canada's Food Guide in 2019, Marcinow and colleagues investigated young adults' perceptions towards calcium and health, finding motivators for calcium consumption such as perceived positive outcomes associated with adequate intake (e.g. strong nails), and barriers including high cost, inconvenience of milk products, and negative practices of dairy farmers (2017). It is important to understand factors influencing consumption in light of the changes to the Food Guide.

1.3 RESEARCH OBJECTIVES

This research is part of a broader research program called COMPASS, a prospective longitudinal cohort (2012- 2021) of high school students in Canada (www.compass.uwaterloo.ca). On an annual basis, COMPASS collects health information on students in grades 9-12 using classroom-administered questionnaires. This includes a 24-hour recall to assess students' dietary intake. In addition to the student-level data collected, COMPASS also collects information on the schools and the neighbourhoods surrounding the schools. Student- and school-level data from the 2012/13 to 2017/18 waves were analyzed to understand the percentage of Ontario students meeting federal guidelines for MMA over time

and as students grew older (mean n= 33,119) (Butler et al, 2020a). This quantitative investigation provides a good description of the trends in students' MMA consumption in Ontario, but does not explain *how* or *why* these trends exist. As such, I conducted a qualitative follow-up investigation to meet the following objectives: (i) *from where do young people attain health information*; (ii) *what are their perceptions of MMA products?*; and (iii) *how would they interpret the patterns in the quantitative data collected from their peers in the COMPASS study*. The expectation is that this work will provide a description of factors contributing to low levels of MMA consumption among Canadians.

1.4 CONTRIBUTIONS

This thesis will address: i) the limited knowledge about Canadian adolescents' attitudes and behaviours regarding MMA; ii) explore adolescents' perceptions of MMA in more depth; and iii) contribute to theoretical explanations for dietary behaviour. As such, a qualitative approach will be taken to explain reasons for the trends observed. According to the literature review, not enough has been written about Canadian adolescents specifically in this regard. Theoretically, this work will explore links between attitudes and subjective norms, and how those in turn influence behavioural intentions and resulting behaviour. In other words, the Theory of Reasoned Action (TRA) influenced this work, and the expectation is that this work will contribute to its theoretical development.

1.5 GEOGRAPHIES OF HEALTH

This thesis has been situated within the subdiscipline of health geography, which is considered appropriate due to the trajectory the field has taken over recent decades. Since the

mid-nineteenth century, this subdiscipline of human geography has broadened in what has been recounted as the ‘cultural turn’ (Moon et al, 1998). Prior to the mid-nineteenth century, medical geography research fell into one of two streams: disease ecology or health care. Since the ‘cultural turn’ these two streams have become intertwined, and the subdiscipline now incorporates research that fits with the Ottawa Charter for Health Promotion’s definition of health, “a resource for everyday living that allows us to cope with, manage, and even change our environments” (Epp, 1986). This is in contrast to the way health was conceptualized prior to this time when health was primarily concerned with disease and medicine. Since the mid-nineteenth century people were not only concerned with treating illness once it occurred, but there was new interest in modifying lifestyles and unhealthy behaviours to prevent illness from occurring in the first place. The role of the social, cultural, economic, and political environments were increasingly recognized as contributors to health and well-being. As a result, a broader range of diseases with more complex etiologies are now included in health geography research. In his report titled “Health geography in Canada: where are we headed?”, Luginaah adds that environment and health has emerged as a reckoning third research stream in the subdiscipline, particularly in the context of Canadian geographers (Luginaah, 2009). Luginaah identifies a broader question that he believes remains in the subdiscipline of health geography: How can we continue to identify, classify and reduce the risks to health that result from environmental and social inequalities, behavioural determinants (without victim blaming) and often location-specific determinants? (Luginaah, 2009). This research will help to push the sub-discipline forward by responding, in a way, to this question.

Concurrent with the shift from medical to health geography was a broadening of epistemologies underlying the research. While the positivist epistemology was predominant in

the field of medical geography, the re-conceptualized health geography incorporates other ways of knowing, including constructivist and pragmatist epistemologies. This research, which is grounded in a social constructivist epistemology, and aims to be used in promoting health and preventing non-communicable disease, fits within the re-conceptualized geography of health. For these reasons, health geography is an appropriate lens through which to frame the knowledge provided in this thesis.

A central concept in health geography research is *place*, which is evident by the formation of the journal *Health and Place* in 1995 (Kearns & Moon, 2002) for publishing research “where place matters with regard to health, health care, and health policy” (Moon, 1995). Place has become a salient theme in health geography research, as its importance to health has been recognized (Kearns & Moon, 2002). In the context of this thesis, place is an essential consideration to the understanding of health development. In the context of this research, place refers to urban communities in Southern Ontario. The contextual factors (i.e., aspects of the environment) in this place, such as political environment, differ greatly from those of other places where factors of MMA consumption has been researched. Previous research to understand MMA consumption behaviour in the Global North has focused on behaviour among those residing in the United States. Currently, little is known about the contextual and compositional (i.e., factors of the individual) factors influencing MMA consumption behaviour in this place. This thesis will examine MMA consumption behaviour from the perspective of people residing in urban, non-farming communities in Southern Ontario. Perspectives from these urban places are important to understand in the context of MMA consumption, as other Canadian research has reported that differences may exist between urban and rural places (Minaker et al, 2006; Downs et al, 2012). As such, this research will focus agency within communities of urban consumers

who make decisions within their specific cultural, ecological, and social contexts (Robbins, 2012).

1.6 CHAPTER OUTLINE

This thesis is organized into 5 chapters. The introduction is followed by a review of the existing literature. Next, an explanation of the methodology and research design is given, followed by qualitative results. The thesis ends with a discussion of the findings and conclusions. Ethics approval for this research was obtained by the University of Waterloo Research Ethics Board, and the process for obtaining ethics approval is included in the explanation of the research design.

CHAPTER TWO: LITERATURE REVIEW

2.1 INTRODUCTION

This chapter provides a review of the substantive literature that informs this thesis. The objectives of this literature review are to assess:

1. Existing nutrition policies and guidelines that could influence adolescent MMA consumption in Ontario, Canada;
2. Individual- and interpersonal- factors influencing adolescent MMA consumption;
3. Factors of the built environment influencing adolescent MMA consumption; and
4. Methodological approaches used to research adolescent dietary behaviour.

First, the methodology used for the literature review will be outlined. Next, sections 2.3 and 2.4 will describe how different political and organizational sectors play a role in helping adolescents make healthy food choices through a discussion of current Canadian nutrition guidelines, and Ontario's school nutrition policy. The following section (section 2.5) reviews how adolescents' dietary behaviours are shaped by factors in their individual and social spheres. In addition, this section reviews geographic- and built environment- factors. The final section provides an overview of the theoretical context and research methods used to research adolescent dietary behaviour change. This chapter concludes with a review of the key findings regarding gaps in the literature and suggests future research directions.

2.2 METHODOLOGY

To understand reasons for MMA consumption, or lack thereof, among Ontario high school students, it is assumed that there are multiple levels of factors which together influence behaviour, and that many of these factors have been reported on in the peer-reviewed and grey literature. To answer the first objective *to assess the existing nutrition policies and guidelines that could*

influence adolescent MMA consumption in Ontario, Canada, a grey literature search was initially conducted. Specifically, policy documents and reports were accessed from Health Canada, the Ontario Ministry of Education, the Canadian Paediatric Society, and Food Secure Canada. Only documents describing a current policy or guideline with potential to impact high school students' MMA consumption were selected. To collect peer-reviewed literature published in scholarly journals, multiple databases were used including SCOPUS and PubMed. Descriptive search terms including [adolescen* OR youth OR "young adult"] AND ["nutrition policy" OR "nutritional standard*"] were searched such that articles were returned if the keywords were present in the article title, abstract, or identifiers. The date range 2015 to 2020 was used to limit the search to the most recent 5 years of published literature, and the language was restricted to English. Additionally, the country of affiliation was limited to Canada in order to ensure that articles returned were most in line with the first objective. After taking these factors into consideration, the data itself was analyzed. Articles were selected based on their relevance, and sorted by province to distinguish the Ontario compared to other province/territory policy environments.

To answer the second objective, *to assess individual- and interpersonal- factors influencing adolescent MMA consumption*, the two aforementioned databases were searched for peer-reviewed journal articles. Key word search strategies were developed, and articles were retrieved if the following key words were present in the article title, abstract, or identifiers: [adolescen* OR youth OR "young adult*" OR "high school"] AND [milk OR "milk alternatives" OR "dairy products"] AND [knowledge OR attitudes OR practices] OR ["social norms" OR "social group" OR "peer group" OR friend*]. The date range 2015 to 2020 was used to limit the search to the most recent 5 years of published literature, and the language was restricted to English. Canadian research of relevance was limited, so articles were only excluded if the country was outside of North America. In addition, research was only included if the sample was healthy and

without clinical diagnosis. Furthermore, the snowball method was used to expand the search by generating new search strings using key words from selected articles.

To answer the third objective, *to assess factors of the built environment influencing adolescent MMA consumption*, the above strategies were used, with the exception of key words, which in this case included [adolescen* OR youth OR “young adult*” OR “high school”] AND [“healthy eating” OR “snack food” OR “food choice” OR nutrition] AND [“built environment” OR school OR home]. The search was limited to Canadian research to ensure relevant policy environments.

To answer the fourth objective, *to assess methodological approaches used to research adolescent dietary behaviour*, descriptive search terms including [adolescen* OR youth OR “young adult*”] AND [“dietary behaviour” OR “eating behaviour” OR “food choice”] were used. The document type was initially limited to reviews, and only review articles that were published between 2015 to 2020 were retrieved to obtain a broad sense of the methodologies used. Articles were removed if the sample population had pre-existing disease conditions because the researcher was taking a population health approach. Articles were also excluded if the sample population did not consist of high school-aged adolescents, as this was particularly important in answering the fourth objective. Searches were not restricted by country/territory in this section as this was not perceived to affect relevance. Both quantitative and qualitative research was selected for this analysis, and research that reported on credibility was more highly regarded. Later, the document type was not restricted to reviews, and primary research articles were selected to obtain a more in-depth understanding of the key theories and methodologies used in this area.

2.3 DIETARY GUIDELINES IN CANADA

Federal messages on dietary MMA for human health have changed substantially over the past decade in Canada, and today's adolescents may have conflicted views regarding the importance or non-importance of milk in their diet. In brief, since 2007, Canada advocated milk and alternatives as one of the 4 major food groups but in 2019 removed dairy products from the visual plate model used in the revised guidelines and incorporated examples of low-fat milk products in the list of protein-rich foods (Health Canada, 2020). The revised guidelines also encourage Canadians to consume plant-based proteins more often than animal sources, a key change from the 2011 version (Health Canada, 2020). These revisions may have significant implications for the Canadian public, if they are indeed using the guidelines to make food decisions. Most Canadians (>80% of a nationally representative sample) are aware that this resource exists, but only 8.7% report using information from the guide in the last six months (Slater & Mudryj, 2018). Women are more familiar with the guide, as well as younger respondents, white respondents, and respondents with higher annual income (Vanderlee et al, 2015). Despite being familiar with the guide, university students did not have accurate perceptions of the 2007 version's age- and sex- specific recommendations (Matthews et al, 2016). In light of the dramatic changes from 2011 to 2019, research is needed to understand how the 2019 guidelines and visual plate model is impacting Canadians' MMA consumption. In comparison to these voluntary federal guidelines, mandated provincial policies will be examined next.

2.4 SCHOOL NUTRITION POLICY IN ONTARIO

In Ontario, the main policy currently influencing adolescent nutrition is called the *School Food and Beverage Policy* (Policy/Program Memorandum No. 150). Implemented by the Ontario Ministry of Education in 2011, this policy sets nutrition standards for food and beverages sold in publicly funded elementary and secondary schools in Ontario (Ontario Ministry of Education, 2020). As such, foods are classified into “sell most ($\geq 80\%$)”, “sell less ($\leq 20\%$)” and “not permitted for sale” categories. Despite being mandatory, schools are not always compliant with this policy (Vine et al., 2017). According to Vine and colleagues, school-level compliance for vending machines selling drinks decreased by 25% over 3 years in Ontario following the implementation of this policy (2017). As a result, an increased proportion of competing beverages, high in sugar and low in essential nutrients, were available for students to purchase in their school food environment. Ontario public schools were, however, less likely to serve sugar-sweetened beverages in their vending machines compared to schools with voluntary (i.e., Alberta schools) or without policies (i.e., Ontario private schools) (Godin et al., 2018). The reduced availability and accessibility corresponded with a reduction in students’ consumption of sugar-sweetened beverages, implying that this mandatory provincial policy is affecting students’ beverage consumption (Godin et al., 2019).

2.5 FACTORS INFLUENCING DIETARY BEHAVIOUR

2.5.1 PERSONAL FACTORS

Personal factors are factors at the individual level which may impact MMA consumption, such as an individual’s demographic characteristics, knowledge, attitudes, and practices. Current knowledge in this area is based on research with young adults attending university; little research

has been done to understand adolescents in this regard. The literature suggests that gender is an important factor with regards to Canadians' MMA consumption. Young men tend to consume more calcium and MMA compared to young women according to cross-sectional studies using various methods: validated calcium questionnaires, nutrient analysis of 3-day food records, and 24-hour recalls conducted at the population-level (Rose et al, 2018; Marcinow et al, 2019; Auclair et al, 2019). The differences observed may be due to differing attitudes towards MMA between genders. Women may be more hesitant to consume MMA due to greater uncertainty and concern for milk product adulteration. For example, more women than men (46% vs 23%, $p = 0.05$) would increase their intake of milk products if they were confident those milk products did not contain antibiotics or unnatural hormones (Marcinow et al, 2019). In the same research, women also expressed greater concern for animal welfare, indicating they would increase their intake of milk products if they were confident cows were treated humanely (54% vs 20%, $p < 0.01$) (Marcinow et al, 2019). This theme will be explored in greater detail in a following section. In addition, women tended to have greater concerns for lactose intolerance and milk allergies according to Rose and colleagues (2018). Whereas, men reported liking milk more than women did on a 5-point Likert scale (Rose et al, 2018). However, men were less motivated to increase milk product intake to maintain strong bones compared to women (72% vs 55%, $p=0.02$) (Marcinow et al, 2019). This suggests that men may have differing views towards their susceptibility for bone diseases such as osteoporosis. For these reasons, literature has detected gender differences in attitudes towards MMA, which could attribute to lower intakes of MMA and calcium among women compared to men in Canada (Auclair et al, 2019).

In addition to gender, there is some literature to suggest that adolescents' beliefs about healthy eating impact their dietary decisions (Fielding-Singh, 2019; Caswell & Hanning, 2018;

Rose et al, 2018). For example, viewing milk as healthy was positively associated with calcium intake (Rose et al, 2018). In addition, some qualitative research suggests that adolescents believe healthy eating to be morally superior and associate healthy eating with financial privilege (Fielding-Singh, 2019; Caswell & Hanning, 2018). In these research programs, adolescents labelled some foods as good and others as bad. Fielding-Singh drew out this finding, reporting that adolescents of high socio-economic status classified themselves as healthy eaters and morally superior, whereas those of low socio-economic status did not consider themselves morally good (2019).

From the literature, we also see commonalities in young peoples' attitudes towards MMA production practices (Marcinow et al, 2017; Marcinow et al, 2019; Charlebois & Haratifar, 2015). Marcinow and colleagues have made important contributions to what is known about motivators and barriers to MMA and calcium consumption among this population in Canada. Across studies, they found that a notable barrier to MMA consumption was the perceived negative production practices of dairy farmers (Marcinow et al, 2017; 2019). This discovery was made through focus group discussions and a milk product health belief questionnaire. Findings from Charlebois & Haratifar (2015) support this; they found that young consumers had low levels of trust with the Canadian dairy industry. These findings suggest that some young Canadians care about sustainability and responsible practices within the food system, and hold positive attitudes towards ethically produced products (Marcinow et al, 2017; 2019). As previously mentioned, this concern may be associated with gender (Marcinow et al, 2019). However, it is not clear whether their intentions to support ethical production coincide with their behaviour. For example, it is unclear whether Canadians are willing to pay more for increased transparency in the dairy industry, as limited research has examined this (Charlebois & Haratifar,

2015). Overall, some young Canadians are concerned about ethical production in the dairy industry (Marcinow et al, 2017; Marcinow et al, 2019; Charlebois & Haratifar, 2015).

Literature suggests that the sources adolescents obtain their nutrition information from may impact their food decisions (Haidar et al, 2017; Charlebois & Haratifar, 2015; Truman & Elliott, 2020). A systematic review of research from Canada (24%) and the United States (76%) reveals that school-based, peer-led nutrition education programs are effective in improving healthy eating knowledge and dietary measures among youth (Yip et al, 2016). To illustrate this finding, a recent school-based intervention that included label-reading was effective in improving analytical skills among youth (Truman & Elliott, 2020). In addition to school-based education programs, nutrition labels are an important source for obtaining information, and literature shows that adolescents who read nutrition labels had higher healthy eating scores than those who did not ($p < 0.001$) (Haidar et al, 2017). Charlebois & Haratifar (2015) support and extend this finding, reporting that those who read labels were influenced by what is written on the label, and this was correlated with purchasing milk and dairy products ($p < 0.05$). From the literature, we see that food labels are important sources of nutrition information for adolescents, and that the school setting is important for building knowledge in this area (Haidar et al, 2017; Charlebois & Haratifar, 2015; Truman & Elliott, 2020, Marcinow et al, 2017; Yip et al, 2016).

Other biological factors such as milk allergy and lactose intolerance contribute to MMA avoidance. Milk is considered a priority allergen by Health Canada because it is one of the foods most frequently associated with food allergies (2018). Currently there is no cure for food allergy, so individuals who have experienced an adverse allergic reaction are required to avoid foods containing the allergen (Food Allergy Canada, 2020). As such, milk allergy and milk intolerance are negatively associated with milk consumption (Charlebois & Haratifar, 2015). Furthermore,

European research suggests potential long-term effects of avoiding cow's milk products if and when allergies are outgrown (Maslin et al, 2015). This topic has not been examined in the Canadian context, however.

In terms of personal factors, evidence has shown that gender, health beliefs, attitudes towards production, sources of information, and milk allergy and intolerance may influence MMA consumption. While there is much evidence among young adults, relatively few studies provide evidence to illuminate these factors among Canadian *adolescents*.

2.5.2 SOCIAL FACTORS

Adolescents are hypersensitive to social stimuli (Foulkes & Blakemore, 2016). This can manifest in multiple ways such as peer pressure, compliance, social roles, obedience, and conformity. Family food environments, for example, may include social interactions in which youth feel that they must take direction from elders. Comparatively, peer influences may be subtler, for example a teenager adopting a particular eating pattern to reap a social reward. The former is explicit and likely intentional while the latter is implicit and likely unintentional; these differences may impact how effective the social influence is on adolescent behaviour. The theme of 'obedience versus conformity' becomes clear through analysis of the recent literature on this topic, and further discussion will build on this theme.

Obedience is a type of social influence in which "a person yields to explicit instructions or orders from an authority figure" (Colman, 2009). In the Canadian context, parents are important authority figures that assert control over their children's behaviour. North American research shows that parents can positively influence the dietary behaviour of their adolescent children by setting expectations and rules (Banna et al., 2018; Ferris et al., 2017; J. Wang &

Fielding-Singh, 2018). Banna and colleagues (2018) sought to understand the home food environment and its influence on adolescents' dietary behaviours, and found a significant positive relationship between parental rules regarding beverage consumption and children's calcium intake. In addition, parents to non-Hispanic white adolescents who made rules had a much greater influence on their children's calcium intake, suggesting that culture may play a role (Banna et al., 2018). In addition to culture, there is some evidence that parental influence on adolescents' dietary behaviour differs across socio-economic groups (Fielding-Singh & Wang, 2017). For example, mothers of high socio-economic status tend to believe they have more control over their adolescents' diets compared to mothers of low socio-economic status, who tend to have greater acceptance of adolescents' autonomy in food choices which are "low in the hierarchy of worries" (Fielding-Singh & Wang, 2017). Thus, there is some evidence that parents, and particularly mothers, explicitly influence their adolescent children's dietary intake through rule-making, and that the effect may vary by culture and socio-economic status.

Parents are also role models to their adolescent children, who tend to adopt the eating behaviours displayed by their parents (Banna et al., 2018; Jung et al., 2015; Lilo et al., 2018). Parents' calcium intake was associated with children's calcium intake (Banna et al., 2018; Cluskey et al., 2015). In addition, role modelling was important for achieving compliance; parents who struggled to eat fruits and vegetables themselves described the process of getting their children to eat fruits and vegetables as a "battle", "struggle", or "impossible" (Lilo et al., 2018). Role modeling, by drinking milk in front of children, was also a common theme in focus group discussions asking Canadian adults to discuss strategies for increasing their milk product consumption (Jung et al., 2015).

On the contrary, conformity is a type of social influence where individuals voluntarily change their behaviour to imitate the behaviour of others (Holloway, 2009). This voluntary behaviour change is usually to fit in with peers or social groups (Holloway, 2009). For instance, the behaviour of others within the social environment has been associated with food choice within the cafeteria setting (Mollen et al, 2013). Mollen and colleagues found that peer observation of healthy food choices was associated with greater odds of salad consumption ($p < 0.05$) compared with a control condition (2013). As such, the types of foods consumed in peer environments may be important in understanding the food choices of adolescents. To date, little research has been carried out to understand the influence of peer observation on MMA consumption. Current research looking at the social influences on milk intake focuses on parental influence, and this may be due the nature of social peer environments that adolescents commonly occupy. In the school environment students consume lunch and snacks with peers, but some adolescents perceive bringing dairy products to school to be “too much work”, posing a barrier to MMA consumption in the school environment (Racey et al, 2017). As such, it may be less common for students to observe their peers consuming MMA products. For some adolescents, these foods may be more commonly consumed in home environments, largely in the absence of peers (Racey et al, 2017).

While there is minimal research to suggest peer influences on adolescent milk intake, there is a body of both observational and experimental research to suggest that peers play a role in influencing foods more commonly eaten together as adolescents - snack foods. Friends' high calorie snack food intake was associated with adolescents' snack food intake in a large cross-sectional study ($n = 2540$) that sought to identify individual and environmental influences on snack food consumption (Larson et al., 2017). Similarly, a small positive association resulted

from a model investigating the effects of social interaction on adolescents' fast food consumption (Fortin & Yazbeck, 2015). As such, high school students increased the frequency of their weekly visits to fast food restaurants by 0.21 visits as a result of an additional fast food restaurant visit by friends (Fortin & Yazbeck, 2015). While there seems to be a relationship between peer influences on snack foods and fast food, it is uncertain whether peer influences are as prominent with regards to milk. Thus, peer influences on adolescents' dietary intake largely depend on the type of food in question.

2.5.3 GEOGRAPHIC REGION

Some evidence suggests that MMA consumption varies with geography (Downs et al., 2012; Minaker et al., 2006; Zello et al., 2015; Gates et al, 2013; Butler et al, 2020b). Specifically, there may be differences in diet quality between rural and urban youth (Downs et al, 2012; Minaker et al, 2006; Zello et al, 2015; Butler et al, 2020b). However, the nature of this relationship is unclear; some research suggests rural students have poorer diet quality compared to their urban counterparts (Downs et al, 2012), while other research suggests rural youth are better at meeting dietary guidelines for MMA and calcium (Minaker et al, 2006; Butler et al, 2020b). The relationship between geographic locale and milk and calcium intake has been observed among both the general population (Minaker et al, 2006; Butler et al, 2020b) and First Nations youth (Gates et al, 2013) in Ontario. New research is necessary to confirm this association within the Canadian context.

2.5.4 SCHOOL BUILT ENVIRONMENT

Increasing research and policy attention is being paid to the impact of the built environment of the school, home, and surrounding areas on dietary intake. In characterizing the built environment, researchers have been interested in determining whether availability and accessibility to food influences dietary intake. Availability and accessibility to high-sugar, -fat, and -sodium foods are moderated by nutrition policies in Ontario public schools (ex. the School Food and Beverage Policy). Thus, research has examined whether the environment surrounding schools, specifically the number and proximity of fast food locations, influences students' dietary intake (Cutumisu et al, 2017; Sadler et al, 2016; Shearer et al, 2015). While some supported a positive association between exposure to fast food outlets and junk food intake (Cutumisu et al, 2017; Sadler et al, 2016), others did not (Shearer et al, 2015). Relatively, the impact of school and community factors may be less important compared to the impact of personal factors (Butler et al, 2020b). In terms of MMA, Butler and colleagues (2020b) found that school and community factors had a weaker association with adolescents' MMA consumption compared to personal factors. Similarly, Acton and colleagues (2018) did not find a significant association between schools with mandatory compared to voluntary school nutrition policies and students' healthful and non-healthful eating behaviours in a representative sample of Canadian high school students (n=12,110). Overall, it is clear that the relationship between the school built environment and adolescents' dietary intake is complex and more research is needed to further evaluate this relation.

A key factor influencing availability and accessibility to MMA in Ontario schools is the presence of school milk programs and meal/snack programs that incorporate MMA. The Elementary School Milk Program, established in 1986, operates in 70% of Ontario schools

(Dairy Farmers of Ontario, 2019). Availability of flavoured milk provided by these programs may impact adolescents' milk consumption, as evidenced by Henry and colleagues (2015). Total milk intake decreased by 12.3% when chocolate milk was removed in their mixed methods cross over design (Henry et al, 2015). In addition, price may impact MMA consumption. In Saskatchewan, four times as many students drank milk in schools where it was provided for free compared to schools that required payment (Henry et al, 2015). Overall, relatively little research has recently evaluated the impact of milk programs on Canadian adolescents.

2.6 THEORETICAL CONTEXT

2.6.1 THEORY OF REASONED ACTION

The Theory of Reasoned Action (TRA) was developed by Fishbein and Ajzen in 1975 and is a widely used means for understanding behaviour, predominantly in social psychology. It assumes that behaviour is a direct result of behavioural intentions (Fishbein, 1967). These intentions are determined by a) an individual's attitude toward the behaviour, and b) subjective norms (Fishbein & Ajzen, 1975). The first construct, attitudes, pertains to the way people feel towards a particular behaviour (Ajzen & Albarracin, 2007). The second construct, subjective norms, refers to the pressure that people perceive from others to perform, or not perform, a behaviour (Rivis & Sheeran, 2003). Briefly, there are two components to subjective norms; the first is *descriptive norms* which refer to an individual's perceptions of what their peers are doing (Zou & Savani, 2019) and the second is *motivation to comply* which refers to how important an individual feels it is to adhere to social pressures (Montaño & Kasprzyk 2015).

The TRA shares an assumption common to other attitude and behaviour theories, that people do not behave thoughtlessly. Rather, humans systematically process and use information

and thereby self-regulate their behaviour. Among other behaviour theories, the TRA has received criticism for oversimplifying the process of behaviour. For example, it does not incorporate constructs such as self-efficacy and moral obligation, and there is evidence that these constructs strongly influence behavioural intention (Bandura et al, 1980). As a result of this criticism, the TRA was later expanded to incorporate the construct of perceived behavioural control, and the Theory of Planned Behaviour was later created (Ajzen, 1991).

The TRA is most commonly applied to research in the social sciences, business, medicine, and psychology. Health behaviour, such as condom use, and consumer behaviour, such as brand loyalty, are commonly examined using the TRA. For example, Martin Fishbein continues to use the TRA to develop interventions related to substance abuse (Sayeed et al, 2009) and condom use (Rhodes et al, 2007). While much of the literature utilizing the TRA focuses on explaining risky and deviant behaviour, there is some literature to support its use in explaining other volitional behaviours such as eating behaviour (Bagozzi et al, 2000; Rivera et al, 2010; Hosseini et al, 2015). Moreover, the theory has been effectively applied to researching food consumption decisions by one of the theory's founder's (Ajzen, 2015).

The TRA was selected as an appropriate theory to guide the data collection, analysis, and resulting conclusions of this research. The TRA incorporates the constructs of attitudes and subjective norms, which, according to this review of the literature, are important determinants of adolescents' behaviour in the context of MMA consumption. In addition, previous research shows that these constructs explained most of the variance in intention to purchase sustainably-sourced foods (Dowd & Burke, 2013). Application of this theory will allow researchers to better understand the behavioural intent of consumers, leading to the development of strategies for increasing consumption behaviour.

2.7 CHAPTER SUMMARY

This chapter discussed the compositional factors of the individual, and contextual factors of the individual's physical, social, and political environments potentially influencing the consumption of MMA among adolescents in Ontario, Canada. Recently published literature highlights the importance of individual- and interpersonal- level factors in understanding adolescents' MMA consumption, however environmental- and policy- level factors have also been identified which are relevant. To improve our understanding of adolescents' MMA consumption behaviour, it is especially important to examine their attitudes and prevailing social norms, according to the literature. As such, theoretically-informed research that draws out these constructs would improve understanding in this area. Between 2015 and 2020, mostly quantitative research designs (e.g., cross-sectional surveys), and relatively few interpretive research protocols (e.g., focus groups or individual interviews) have been carried out to examine reasons for consumption in specific contexts. Further context-specific qualitative investigations in Canada would improve the overall body of knowledge. Prior research in this area has focused on college students, and adolescents remain under-researched, despite being an important demographic to understand. This literature review draws on North American research as few studies have examined compositional and contextual factors influencing dietary consumption in the Canadian context. While there is Canadian research that has examined general dietary behaviour, little research has focused on MMA consumption following the release of the 2019 Food Guide.

CHAPTER THREE: RESEARCH DESIGN AND METHODOLOGY

3.1 INTRODUCTION

This chapter focuses on the epistemological and methodological foundations of this research. It describes in detail how and why methods were selected, and analytical techniques used. It also reports on the reliability and validity of this research.

3.2 RATIONALE

This research is guided by a social constructivist approach. As such, the intent is to understand human behaviour, while acknowledging that there are different lived experiences that human beings have, also known as ‘lifeworlds’ (Husserl, 1970). Under this approach, it is assumed that different people have different experiences of MMA, so there are likely to be multiple realities. These realities are considered equally valid. This perspective does not see people as passive recipients of knowledge about health, but actively engaged in the construction of knowledge (Gatrell & Elliott, 2015). From this standpoint, it is also important to understand the social and spatial processes involved in shaping health-related behaviours and outcomes (Gatrell & Elliott, 2015). As such, qualitative semi-structured interviews were conducted with participants to explore their perceptions of MMA and experiences. Interviews were organized in a semi-structured format to allow for a guided discussion with the opportunity to explore themes of interest in greater detail (Britten, 1995). In addition, theory helped to form the questions asked; constructs in the interview guide and coding decisions were rooted in the Theory of Reasoned Action. All aspects of the research design, data collection, and data analysis were based in the social constructivist approach.

Moreover, findings from the literature review indicate there is a gap in the scholarly peer-reviewed literature in terms of methodological approaches to understanding adolescent dietary

behaviour. Specifically, few researchers have sought to understand how and why adolescents make decisions about food. In contrast, quantitative dietary assessment methods such as Food Frequency Questionnaires and 24-hour recalls are commonly used in large cross-sectional research involving adolescents. While these methods have been validated for measuring usual intake, they do not help to explain *how* or *why* people make food decisions. Qualitative research is useful for understanding these dynamics.

3.3 PHOTO ELICITATION METHOD

Photo elicitation is a qualitative research method that originated in the mid-1950s to “connect core definitions of the self to society, culture, and history” through the rich information provided in photographs, but is seldom used (Harper, 2002). Application of this method to public health research is relatively new (Najib Balbale et al., 2014). While most photo elicitation involves photographs, other formats such as paintings, cartoons, public displays such as graffiti, and even film can be used (Harper, 2002). Participant-driven photo elicitation, where participants produce the photos themselves, has been used to capture nuances and context of food consumption (Thompson et al., 2016), activity tracking (Gorm & Shklovski, 2017; Hanson et al., 2016), and livelihoods (Hackshaw-McGeagh et al., 2018; Najib Balbale et al., 2014). As such, it may be useful for revealing behaviours that occur within specific contexts. Other researchers argue that photo elicitation refers to studies where researchers provide the photos for participants to examine and the photos themselves are not used as data, but as a tool for eliciting discussion (Ensaff et al., 2015; Joy et al., 2014). For instance, Ensaff and colleagues (2015) showed participants photographs of four pairs of comparable shopping baskets, one of each pair more heavily emphasizing plant-based foods, and asked them to select their preferred basket as a

means to introduce the topic and generate discussion. Similarly, research participants were provided with pictures of a university environment (i.e., staff lunch room, fitness center, food available in the cafeteria, community garden) to explore perceptions of effective workplaces (Joy et al., 2014). Both forms of photo elicitation give the participants autonomy in either selecting scenes for photography, or selecting the aspects of the photo for discussion, and as such this is a form of community-based participatory research.

3.4 RECRUITMENT

The research protocol received ethics clearance from the University of Waterloo's Office of Research Ethics. Following ethics clearance, potential participants were recruited via digital and paper posters, email mailing lists, and snowball sampling. Posters advertised the research via www.kijiji.ca for the areas of Hamilton, Halton, Wellington, Kitchener-Waterloo, Guelph, and London, Ontario. In addition, posters were put on Reddit via the following subreddits: r/Waterloo, r/Ontario, r/Kitchener, r/Guelph, r/Hamilton, r/BurlingtonON, r/oakville, r/haltonhills, r/Milton, r/samplesize, and r/GenZ. Additionally, permission was received to post paper posters on various community boards throughout the Hamilton, Halton, Wellington, and Kitchener-Waterloo areas. For example, posters were placed in community centres, YMCAs, libraries, grocery stores, restaurants, bookstores, convenience stores, and small shopping centres. Members of the research team also extended the recruitment poster to their networks, including recreational sport coaches' student-athlete email lists. If they were interested, potential participants reached out to the student investigator; students were eligible for participation if they were currently enrolled in high school.

Eligible students were then emailed the Letter of Information (Appendix B), and asked to send the email of a parent/guardian if they were interested in participating. Parents/guardians were then emailed the Consent Form (Appendix C), which was signed and returned before an interview time was scheduled. Research participants received 2 volunteer hours in remuneration for their time.

3.5 SAMPLE

Semi-structured interviews were conducted with a sample of 28 adolescents: women (n=12) and men (n=16) attending secondary school in Ontario. Four groups of interest were identified based on the quantitative survey analysis and participants were selected to represent each of the groups: young women in grades 9 and 10 (n=7), young women in grades 11 and 12 (n=5), young men in grades 9 and 10 (n=12), and young men in grades 11 and 12 (n=4) (Butler et al, 2020a). Adolescents were from 6 census divisions in Ontario: the Regional Municipality of Waterloo (29%), the City of Hamilton (25%), the Regional Municipality of Halton (21%), Wellington County (11%), Middlesex County (11%), and other (4%). Additional sample characteristics are shown in Table 3.1. Sample Characteristics.

Table 3.1. Sample characteristics

Sociodemographic Factors		Number of Participants (%)
Census Division	Regional Municipality of Waterloo	8 (29)
	City of Hamilton	7 (25)
	Regional Municipality of Halton	6 (21)
	Wellington County	3 (11)
	Middlesex County	3 (11)
	Other	1 (4)
Education Level	Grade 9-10	19 (68)
	Grade 11-12	9 (32)
Gender	Men	16 (57)
	Women	12 (43)
School Board	English Public	20 (71)
	English Catholic	4 (14)
	Homeschooled or alternative	2 (7)
	Private	2 (7)
Travel time from home to school	5-10 minutes	13 (46)
	15-20 minutes	6 (21)
	25-30 minutes	3 (11)
	40-45 minutes	5 (18)
	Homeschooled	1 (4)
Primary mode of transportation to and from school	School bus	14 (42)
	Drive	8 (24)
	Walk	7 (21)
	Public Transportation	3 (9)
	Bike	1 (3)
Frequency of involvement in extracurricular activities	Once per week	5 (18)
	2 times per week	6 (21)
	3 times per week	2 (7)
	4 or more times per week	5 (18)
	Monthly or seasonally and inconsistent	5 (18)
	Never or rarely	5 (18)
Type of extracurricular involvement	Sports	14 (45)
	Art	6 (19)
	Academic	5 (16)
	Community Service	4 (13)
	Other	2 (6)
Part time job	No	22 (79)
	Yes	6 (21)
Total		28 (100)

A pragmatic approach was taken in determining the sample size. This approach was illustrated by Guest and colleagues (2006) when they decided to stop data collection when the analysis produced little or no change to the coding scheme. As such, data collection consisted of identifying relevant subsamples (i.e., grade 9/10 women; grade 11/12 women; grade 9/10 men; grade 11/12 men), and aiming to recruit equally from each group. However, in the process of trying to recruit young men and women in grades 11/12, younger (i.e., grade 9/10) men volunteered to participate, and were not turned down. One of these younger men included a student who went to school in Brampton, which was outside the selected region, but he was interviewed and included in the sample as he was not seen to be an outlier.

3.6 ANONYMITY & CONFIDENTIALITY

To maintain and preserve participants' anonymity and confidentiality, several measures were taken. First, audio recordings were collected on a digital recording device (not a cell phone) that was only used for research purposes. The device was stored in a locked room, only accessible to the student investigator. Photographs used for the photo elicitation method did not include people. Any information that could identify a participant was removed from interview transcripts at the earliest possible time. All electronic files, including signed consent forms, were stored on a computer where the storage was encrypted, as well as an encrypted external hard drive. As a result, measures were taken to protect participants' anonymity and confidentiality to the best of the researcher's ability.

3.7 DATA COLLECTION

Individual interviews were selected to generate data for the qualitative investigation. The interviews were semi-structured to allow for both the interviewer to guide the topics for discussion, but also for the interviewee's responses to determine the types of information produced on those topics (Green & Thorogood, 2018). This method was coupled with the photo elicitation method, where the interviewee was asked to discuss pictures of COMPASS school vending machines and products for sale in the school- and surrounding- environments (e.g. "which product would you choose to purchase, and why?"). This allowed for the interviewee to lead the discussion, choosing certain aspects of the photos for discussion. Qualitative methods using photos have been effective in promoting expression, communication, and focus during interviews with young research participants, who tend to be a difficult demographic to build rapport with (Drew et al, 2010).

The interview guide and photo elicitation method were pilot tested on 30 undergraduate students enrolled in the GEOG 325: Geographies of Health class at the University of Waterloo in the winter 2020 term. This was beneficial for eliciting feedback on the validity, reliability, feasibility, and timing needed to carry out these methods. Furthermore, pilot testing helped to refine probes used in the interview guide. Ultimately the pilot test allowed the student researcher to test the research methods on a group of young adults who provided useful feedback to improve the quality of data collection.

Data collection took place between February and July of 2019. All interviews were held online through GoToMeeting Software, or over the phone, and audio was recorded with permission. For students to participate in an interview, informed, written consent was obtained from their parent/guardian first. In two cases, oral consent was obtained prior to the interview as

those students' parents/guardians had not checked all of the boxes on the consent form, but had signed the form. Interview questions were open-ended, and related to adolescents' knowledge, attitudes, practices, and social norms with regard to MMA consumption, with probing used to expand the discussion. Questions in the interview guide were developed based on core constructs in the Theory of Reasoned Action (See Appendix D for interview questions). The interview lengths were between 30 and 65 minutes (average was 40-45 minutes). Immediately following each interview, field notes were taken, and included information such as the overall attitude of the interviewee, the interviewer's insights about what was observed, relevant information about the physical environment, the nature of communication, and thoughts regarding future observations.

**Note that the student researcher conducted all interviews.*

3.8 DATA ANALYSIS

Interviews were transcribed verbatim and analyzed using NVivo 12 qualitative data analysis software (QSR International, 2020). In order to address the research questions and develop some explanations for the trends in MMA consumption between groups, a thematic content analysis was carried out. A pragmatic hybrid approach, combining both deductive and inductive forms of analysis, was considered most appropriate with regard to the purpose of the research. This approach draws on both participants' own explanations of their world as well as more theoretical explanations (Green & Thorogood, 2018). As such, a coding scheme was developed before the main analysis was carried out, incorporating constructs from the Theory of Reasoned Action, and additional themes emerged from the data. These inductive themes were developed using Ryan and Bernard's (2003) strategies, including looking for repetition, 'in-vivo'

categories, and similarities and differences. Once new themes were identified, they were incorporated into the coding scheme, which was re-organized and consolidated before codes were applied to interview transcripts. The final coding scheme consisted of three levels of coding; the first level was more abstract and rooted in the Theory of Reasoned Action, and the second and third levels were more concrete and iterative.

After codes were applied to all transcripts, coding queries and matrix queries were conducted to explore associations between groups of interest and knowledge, attitudes, practices, and social norms. To do so, it was necessary to create a case for each participant, including sociodemographic attributes such as gender, education level, and census division. This allowed for any differences to be revealed as a result of differing participant attributes. In addition, word frequency queries were conducted to identify (a) the most frequently occurring words used among participants, and (b) words used in relation to concepts.

3.9 RESEARCH CREDIBILITY

After an initial coding scheme was developed, both the student investigator and a second coder applied the scheme to 10% of the data. The second coder was an advanced undergraduate student who had prior coding experience. The investigators then compared findings, and settled disagreements that arose from the naming of codes (e.g., ‘environmentally-friendly’ and ‘natural’ were combined under ‘natural’), and came to consensus on the names and descriptions for codes. Redundant codes were eliminated, and codes that were considered too broad were expanded (e.g., ‘factors influencing product selection’ was broken down to ‘motivators for MMA selection’ and ‘deterrents for MMA selection’). Inter- and intra- rater reliability scores were calculated to measure the level of agreement between coders, and between different points in

time for the same coder, respectively. Reliability was calculated according to Miles and Huberman's (1984, 1994) formula: $(\# \text{ of agreements}) / (\# \text{ of agreements} + \# \text{ of disagreements})$. Inter-rater reliability was 84% and intra-rater reliability was 84%. Subsequently, the remaining 90% of the data were coded with the finalized coding scheme by the student investigator.

3.10 CHAPTER SUMMARY

This chapter described the epistemological and methodological foundations for the research carried out. Furthermore, it highlighted recruitment strategies and characteristics of the sample. It ended with an explanation of the types of analysis conducted to answer the research question, and reported on the credibility of the research.

CHAPTER 4: RESULTS

4.1 INTRODUCTION

This chapter presents key findings from the semi-structured interviews with twenty-eight adolescents. The interviews were conducted to answer the three research objectives: *(i) from where do young people attain health information; (ii) what are their perceptions of MMA products?; and (iii) how would they interpret the patterns in the quantitative data collected from their peers in the COMPASS study.* As such, students' knowledge, attitudes, and behaviours related to MMA consumption are explored in the following sections. Compositional and contextual factors will be presented through the lens of the Theory of Reasoned Action. The quantitative analysis of survey data revealed two key compositional factors related to MMA consumption, gender and age. As such, associations related to gender and age will be presented subsequently.

4.2 KNOWLEDGE

To introduce the topic of MMA, students were asked to discuss the sources they usually obtained health information from (Table 4.1.). According to respondents, health class was an important setting to learn about nutrition facts and label reading, portion sizes, and balanced meals. Many recalled learning about nutrition, and how to understand and use the nutrition facts table through class assignments:

I took this nutrition class last semester- so just reading the labels, and I was kind of reading how much sugar [is] in each bottle [...] and we had little assignments to calculate how much sugar like in percentage [is] in one of those bottles to our daily nutrition needs. (Gr 11/12, male, Middlesex County)

Moreover, many discussed Canada's Food Guide as a key resource used in health class:

In health we usually talk about healthy eating and Canada’s Food Guide, and what to eat, what not to eat in proportions. (Gr 9/10, female, Municipality of Waterloo)

Their comments revealed that both mandatory health classes and elective food and nutrition classes were significant sources of health information. Responses typically included more than one source, with many students commenting on health class and parents as their main sources for health information.

Table 4.1. Sources of health information

Sources of health information	Number of respondents mentioning (n=28) (%)	Number of mentions (%)
Health class	23 (82)	30 (35)
Parents	11 (39)	15 (18)
Other	10 (36)	10 (12)
Health professionals	8 (29)	10 (12)
Social media, peers	7 (25)	7 (8)
Government, university websites	6 (21)	9 (11)
Product label	4 (14)	4 (5)
Total		85 (101)*

Next, participants were shown pictures of a variety of MMA products and other beverages and asked “What do you know about the products pictured here?” (Appendix E). Most commonly, students discussed the nutritional value and role the pictured beverages played in their diet (Table 4.2.). For example, one student noted that:

Milk has a lot of calcium, and healthy vitamins and minerals for you, while on the other hand Gatorade is very processed, high in sugar, not very healthy for you. Same with the chocolate milk and then especially the pops, those are crammed full of sugar. (Gr 9/10, male, Municipality of Waterloo)

Another topic elicited was the natural environment. “I... usually just think about either good snacks that I would like to eat or plastic water bottles and how it annoys me” was the way one person brought up the topic (Gr 11/12, female, City of Hamilton). Students were quick to comment on the negative environmental impacts of plastic bottles, exclaiming that “it’s really

unhealthy for the environment”, “killing our Earth”, and “damaging” (Gr 9/10, female, Municipality of Waterloo; Gr 11/12, male, Middlesex County). Other topics elicited were animal husbandry and fair trade. While human nutrition was a prominent topic of discussion, the majority of adolescent participants had limited knowledge of where their food, specifically MMA, came from.

Table 4.2. Areas of knowledge elicited from photo 2

Areas of knowledge elicited from photo 2	Number of respondents (% of the total)	Number of mentions (% of the total)
Human nutrition	14 (48)	14 (44)
Natural environment	8 (28)	8 (25)
Animal husbandry	5 (17)	6 (19)
Fair trade	2 (7)	4 (12)
Total	29 (100)	32 (100)

This question was followed by asking students “What do you know about the way these items were produced?” in reference to a variety of MMA products and other beverages. Knowledge of MMA production practices was determined by asking students what their perceived level of knowledge in this area was, and by asking them to describe aspects of production they were familiar with. Knowledge of agricultural production practices was classified as either limited, moderate, or extensive. Participants’ responses were classified as limited when their answers were poorly composed and demonstrated little understanding of MMA production (e.g. “milk comes from a cow, that’s all I know”). Participants’ responses were classified as moderate when their answers demonstrated some knowledge and understanding of processes and stakeholders involved in MMA production. Responses were classified as extensive when their answers demonstrated full knowledge of various processes and stakeholders involved in MMA production, and awareness of issues within the industry. By and large, students had

limited knowledge of MMA production practices. Most respondents hesitated to answer, and gave short and simple replies such as “no, not really” (Gr 9/10, female, Middlesex County).

When probed as to whether this knowledge was important to him, one student replied, “I mean it probably is, cause if I’m drinking them, then the way they’re produced should be kind of important. But I don’t really pay attention to it” (Gr 9/10, male, Municipality of Halton). This attitude was common among respondents. Of those who had more to say, some respondents mentioned the process of adding “a lot of chemicals to cow’s milk” (Gr 9/10, male, Municipality of Halton):

I don’t really know about the whole process, I just know that they have like- a lot of different things that are injected to make the milk better for you, like quote unquote better, but people complain that they’re really not what’s right, and move towards like almond and soy milk. (Gr 11/12, male, City of Hamilton)

Others compared products produced in factories to those produced on farms, and viewed the latter as more nutritious.

Conversely, few adolescents exhibited moderate to extensive knowledge of MMA production practices. Often those that had more knowledge on the subject relayed firsthand experience or had seen videos to understand how products are made. They discussed family-versus factory- farming, living conditions for cows, and practices inside the milk industry. For example, one respondent had a higher regard for family farms due to his knowledge of farming practices:

I mean the factory farms are sometimes necessary because you know a lot of people need that stuff, but the family farms do it a lot more humanely I guess, so I personally respect that a lot more. And it’s nice to hear that when they treat their animals respectfully. (Gr 9/10, male, Brampton)

In other cases, knowledge of cows’ living conditions influenced behaviour:

there's not always the best care of the cows and the animals, so sometimes I don't really like to think of that and I'd rather just drink more plant-based milks or almond milk. (Gr 11/12, female, Middlesex County)

Even so, most adolescent research participants had limited knowledge of MMA production practices.

Table 4.3. Knowledge of milk production practices

Knowledge of milk production practices	Number of respondents (% of the total)	Number of mentions (% of the total)
Limited	21 (75)	21 (72)
Moderate	5 (18)	6 (21)
Extensive	2 (7)	2 (7)
Total	28 (100)	29 (100)

4.2.1 GENDERED PERSPECTIVES

In discussions brought on by the photo elicitation method, young women mentioned fair trade more often than young men, who did not make any mentions. Some young women regarded brands differently based on observed corporate social responsibility, stating they “wouldn’t really want to support [unsafe or unfair conditions]”, and felt that corporations had a responsibility to pay their workers fairly (Gr 9/10, female, Wellington County).

With regard to sources of health information obtained, young men said government and university websites and parents more often, whereas women talked more about documentaries and health professionals as sources of health information. On the whole, there were few differences between genders in terms of knowledge.

4.2.2 AGE-BASED PERSPECTIVES

Few differences were found between younger (grades 9-10) and older (grades 11-12) students in discussions pertaining to knowledge. Younger students tended to focus the

conversation on the relative healthiness of the beverages pictured. This is illustrated by one participant who comments on how age has impacted his food decisions:

I wouldn't use vending machines because – I'm not a picky eater but I also try and make sure I eat more healthy food sometimes. In the past I would just eat equally everything but as I have grown up, I have wanted to eat a bit more healthy. (Gr 9/10, male, Municipality of Halton)

Ultimately, the adolescent participants cared about their own nutrition and learned about this in health class, but interviews suggest they do not know how some of the food they consume is produced. Connections between students' knowledge and attitudes will be made in the next section.

4.3 ATTITUDES

Students were then showed several images of COMPASS school vending machines, and asked “If you could choose one product to buy, which would you choose to purchase and why?” (Appendix E). Products pictured reflected those that students could typically find in an Ontario public school environment, as products for sale abided by the P/PM 150 policy. Students overwhelmingly chose 1% chocolate milk when the selection was between various milk products (Table 4.4.), however it was the least popular choice when the selection was among juices, water, and chocolate milk (Table 4.5.). Instead, students selected 100% orange juice and bottled water most of the time. When diet pops were introduced to the selection pool, 100% juice, bottled water, and vitamin water continued to be the most popular among high school students (Tables 4.6. & 4.7.). To understand students' attitudes towards various products, reasons for and against MMA selection were explored.

Table 4.4. Slide 4 product selection

Slide 4 product selection	Number of respondents (% of the total)	Number of mentions (% of the total)
1% chocolate milk	17 (55)	18 (56)
2% white milk	6 (19)	6 (19)
Flavoured milk	4 (13)	4 (12)
Milkshake	4 (13)	4 (12)
Total	31 (100)	32 (99)*

Table 4.5. Slide 5 product selection

Slide 5 product selection	Number of respondents (% of the total)	Number of mentions (% of the total)
100% orange juice	11 (35)	11 (34)
Bottled water	10 (32)	11 (34)
Juice cocktail	6 (19)	6 (19)
1% chocolate milk	4 (13)	4 (12)
Total	31 (99)*	32 (99)*

Table 4.6. Slide 6 product selection

Slide 6 product selection	Number of respondents (% of the total)	Number of mentions (% of the total)
100% apple juice	11 (38)	11 (38)
Bottled water	9 (31)	9 (31)
Diet pop- gingerale	5 (17)	5 (17)
Diet pop- Pepsi	4 (14)	4 (14)
Total	29 (100)	29 (100)

Table 4.7. Slide 7 product selection

Slide 7 product selection	Number of respondents (% of the total)	Number of mentions (% of the total)
Vitamin water	10 (33)	10 (33)
100% apple juice	8 (27)	8 (27)
100% orange juice	7 (23)	7 (23)
Carbonated lemonade	5 (17)	5 (17)
Total	30 (100)	30 (100)

Motivators for MMA selection were revealed through the interview process, although students were not directly asked about these factors. By and large students discussed taste, followed by nutritional value as motivators for MMA selection. For most, taste was “the first

thing” they looked at, and was often mentioned as the only reason for their selection (Gr 9/10, male, Municipality of Halton). Corresponding to the previous findings, it was not surprising that students spoke about the relative nutritional value of MMA motivating them to select those products. Nutrients in MMA such as calcium and protein were highly regarded, as expressed by one participant: “after you do a sport or something, you wanna eat protein, and stuff like milk, that has good benefits to you so you can get stronger” (Gr 9/10, male, Municipality of Waterloo). In addition, most viewed low-fat, -sugar, and -calorie options more highly. For example, a student discussed his decision to switch from regular cow’s milk to almond milk due to these factors: “-because I’m a little bit health conscious, so [almond milk] just has like less calories, it has zero sugar. Cause I get the unsweetened” (Gr 9/10, male, City of Hamilton). However, some of these factors were also discussed with regard to cow’s milk, which was selected due to its “reduced fat” which “would be healthier” (Gr 11/12, male, Middlesex County). With regard to cow’s milk, it was common for students to talk about the milk fat percentage: “it says 1% too, and people go for, like, 1% usually with milk” (Gr 9/10, female, Municipality of Waterloo). While students discussed the nutritional value as being a motivator for their choices, they had different points of view in terms of which MMA products were healthier. Some regarded milk alternatives as healthier choices, while others viewed 2% cow’s milk as the healthiest choice, and still others viewed the 1% chocolate milk as the healthiest choice. Besides taste and nutritional value, other motivators included parents, packaging, circumstance (e.g., after a sport), knowledge of the product, friends, and accessibility.

Table 4.8. Motivators for MMA selection

Motivators for MMA selection	Number of respondents (% of the total)	Number of mentions (% of the total)
Taste	15 (23)	20 (25)
Nutritional value	13 (20)	18 (23)
Parents	8 (12)	9 (11)
Packaging	6 (9)	6 (8)
Other	5 (8)	7 (9)
Circumstance	5 (8)	6 (8)
Knowledge of the product	5 (8)	5 (6)
Friends	4 (6)	4 (5)
Accessibility	4 (6)	4 (5)
Total	65 (100)	79 (100)

Conversely, several factors were mentioned that deterred students from selecting MMA products (Table 4.9.). According to respondents, packaging was a significant deterrent. Some were deterred by cartons and commented that unlike the plastic bottle, which can easily be opened and closed, it's difficult to save milk for later and often becomes “messy”, “the mouthpiece tends to start tearing”, and gets “soggy” (Gr 9/10, female, Municipality of Waterloo; Gr 9/10, male, Municipality of Waterloo; Gr 9/10, male, Municipality of Halton). Others found the design and marketing of other MMA products unattractive. Some commented that the plastic packaging of Milk2Go and milkshakes made the products look “heavily processed” and “not appealing” (Gr 9/10 female, Wellington County; Gr 9/10, female, Middlesex County). Another participant referenced the same packages saying it “doesn’t look like it would benefit anyone’s health” (Gr 9/10, male, Municipality of Halton). However, they also recognized deceptive marketing techniques, commenting that the rice-, almond- and coconut-milk packages looked “green-washed” (Gr 9/10, female, Wellington County). Overall, there were a variety of reasons why students did not like the packaging of milk products, ranging from the material to the

marketing. While some disliked cartons in favour of plastic, others disliked plastic in favour of cartons. Attitudes towards MMA packaging are explored in greater detail next.

Table 4.9. Deterrents of MMA consumption

Deterrents for MMA consumption	Number of respondents (% of the total)	Number of mentions (% of the total)
Packaging	8 (24)	12 (24)
Other	7 (21)	11 (22)
Taste	6 (18)	10 (20)
Less Healthy	5 (15)	6 (12)
Price	4 (12)	6 (12)
Uneasy feeling	3 (9)	4 (8)
Total	33 (99)*	49 (98) *

Interestingly, the majority of adolescents researched made moral judgements about packaging, although they were not explicitly asked to do so (Table 4.10.). This suggests that students’ knowledge of environmental impacts and sustainability may play a significant role in the decisions adolescents make around MMA. Participants often used words such as “better” and “good” to describe cartons and sometimes cans, whereas plastic packaging was described with words like “worse” and “bad” (Gr 11/12, female, City of Hamilton; Gr 9/10, female, Wellington County; Gr 9/10, male, Municipality of Halton; Gr 9/10, female, Wellington County). There was a clear moral hierarchy of food packaging with plastic at the bottom and cartons at the top: “Some of them have better packaging than others; some of them are very plastic packaging, some of them are more cardboard which I think is good” (Gr 9/10, female, Wellington County). Adolescents were quite knowledgeable about the negative impact of single-use plastics on the environment:

[sigh] Okay, mostly it's the packaging. I don't mind the cost if that becomes a thing [...] and if it's public then I'm not the one paying for it. But the packaging itself is the problem because we all know how plastic, especially plastic water bottles are being dumped into the ocean every year and I think if it continues by 2040, something like that, there will be more water bottles than fish in the ocean. Which is horrible and I would like to stay away from that. (Gr 9/10, male, Municipality of Halton).

Products with packaging that was “easier to recycle and less damaging for the environment” or “easy to decompose” were preferred as they were “more green for the Earth” (Gr 11/12, male, Middlesex County; Gr 9/10, female, Municipality of Waterloo). However, this knowledge did not always translate to behaviour as students tended to consider packaging among other factors when making decisions. One participant described her decision-making process:

I... would probably choose something in cardboard over plastic just because I know plastic's bad, but [...] if it was in the vending machine [...] I don't think it would really influence what I was... choosing, other than like if it specifically showed the same drink in cardboard and plastic, I'd probably choose like the cardboard. (Gr 9/10, female, Wellington County)

In other words, participants had an overwhelmingly negative attitude towards single-use plastic containers, as they were difficult to recycle and not biodegradable. On the other hand, participants had a more favourable attitude towards cartons, and mixed attitudes towards cans.

Table 4.10. Moral value ascribed to food packaging

Moral value ascribed to food packaging	Number of respondents (% of the total)	Number of mentions (% of the total)
Lower standard to plastic	11 (44)	16 (52)
Higher standard to cartons	8 (32)	9 (29)
Higher standard to cans	3 (12)	3 (10)
Lower standard to cans	3 (12)	3 (10)
Total	25 (100)	31 (101)*

Throughout the interviews, students often attributed emotions to food (Table 4.11.). Joy and nostalgia were commonly attributed to regular milk, chocolate milk, and pizza. Some

students discussed milk being their “favourite beverage growing up” (Gr 11/12, female, City of Hamilton), and many recalled school milk programs with nostalgia:

It’s a classic [...] I’ve always loved it and it’s from my childhood and stuff, like I’d always be drinking chocolate milk and they’d hand it out like at lunches and stuff to the kids and it’s always just been a favourite drink of mine, I guess.
(Gr 11/12, male, Municipality of Halton)

They also associated joy with sharing MMA with family and friends: “if your friends were all going to a pizza place [...] you’d want to enjoy it with them” (Gr 9/10, female, Municipality of Waterloo). The emotion of disgust was commonly associated with MMA containing high amounts of sugar such as fruity milks and milkshakes which were considered “over the top”, “off-putting”, and “disgusting” (Gr 9/10, male, Municipality of Halton; Gr 11/12, male, Wellington County; Gr 9/10, female, Wellington County).

Table 4.11. Emotional value ascribed to food

Emotional value ascribed to food	Number of respondents (% of the total)	Number of mentions (% of the total)
Joy	11 (44)	15 (47)
Nostalgia	5 (20)	5 (16)
Disgust	5 (20)	6 (19)
Desire	2 (8)	3 (9)
Sadness	2 (8)	3 (9)
Total	25 (100)	32 (100)

4. 3.1 GENDERED PERSPECTIVES

Young men and women involved in the research shared similar attitudes with regard to MMA (Table 4.12.). Young men tended to discuss taste more often as a primary motivator for MMA selection. In addition, high school men tended to discuss consuming MMA due to nutritional value and circumstance more often than women.

With regard to emotions, men tended to ascribe disgust more often, while women tended to ascribe joy and sadness more often.

Table 4.12. Gender differences in attitudes

	A : Person:Gender = Woman	B : Person:Gender = Man
Deterrent: less healthy	4	3
Deterrent: other	13	4
Deterrent: packaging	7	13
Deterrent: price	5	7
Deterrent: taste	9	5
Deterrent: uneasy feeling	4	5
Desire	2	13
Disgust	1	12
Joy	13	6
Nostalgia	9	3
Sadness	7	0
Higher standard to cans	2	3
Higher standard to cartons	9	11
Lower standard to cans	2	4
Lower standard to plastic	16	12
Motivator: accessibility	5	1
Motivator: circumstance	2	10
Motivator: friends	7	4
Motivator: knowledge of the product	4	6
Motivator: nutritional value	14	21
Motivator: other	5	12
Motivator: packaging	3	6
Motivator: parents	7	3
Motivator: taste	8	38

4.3.2 AGE-BASED PERSPECTIVES

Despite age, students involved in the research tended to share similar attitudes towards MMA. Key differences between younger and older students were that taste was expressed more often as a motivator for MMA selection among younger students. For example, one student mentioned that he was a “picky eater”, but liking the taste of chocolate milk, so consumed that product often (Gr 9/10, male, Municipality of Halton). According to young respondents, flavoured milks and yoghurts tasted good, and taste was a key motivator for MMA selection. This suggests that with age taste buds develop and older adolescents may begin consuming a greater variety of foods, while at the same time they stop relying on MMA as primary sources of energy. Additional differences between younger and older adolescents were that younger students cited packaging as a deterrent more often than older adolescents. Again, this was for a variety of reasons, such as it being “not appealing”, “seems like it’s not real milk”, or is “wasteful” (Gr 9/10, female, Middlesex County; Gr 9/10, female, Wellington County; Gr 9/10, female, Municipality of Waterloo).

4.4 BEHAVIOUR

In this section, participants were asked to interpret findings from the analysis of COMPASS survey data. The first question was, “According to this research, women in high school tend to consume fewer servings of MMA compared to men. How would you explain this?” Respondents said that this was largely because MMA was associated with building muscle, and men in high school are more interested in building muscle compared to high school women. One respondent explained the contrast this way:

You have girls who are very very... in touch with- they really do care about how they look [...] So they're very conscious of what they're eating, and honestly I find that to be a little bit toxic because if you're, you know, counting the calories you're putting in your body, or [...] you need to be healthy, you need to make good choices, but if you take it too far and start, like, again counting your calories and becoming obsessive over it, that's when it leads to problems like eating disorders, because you're so focused on your nutrition that it's no longer about, 'what's the best choice for my body nutritionally' it's more 'how can I eat minimally so I can look this way.' You know? So I feel like there's a lot of body image issues there. Whereas you have guys who really wanna get buff and fit, and so they're online looking up, you know, protein-based diets on how to gain the most muscle. (Gr 11/12, female, City of Hamilton)

Many participants echoed these thoughts: “girls tend to want to be skinny and be fit, when guys try to build up muscle, so they try to gain weight? And then turn it into muscle afterward” (Gr 9/10, female, Municipality of Waterloo). In addition, working out and drinking protein shakes were closely tied together, and the association was strong and automatic: “once you get into high school and get into junior, senior year I think a lot of guys are into being more muscular, or more athletic, so they're into protein shakes” (Gr 9/10, female, Municipality of Waterloo). Moreover, one participant described his friend, a young woman who works out and drinks protein shakes, as an exception, explaining that “girls in my high school don't tend to do that” (Gr 9/10, male, Brampton). On the whole, most respondents explained the gender differences by associating MMA with gaining muscle and weight. This was considered ideal for body image among young men, but not among young women.

While many participants quickly made the association between MMA and building muscle, others were hesitant to answer and did not have personal experience to contextualize the trend. Just as many participants responded that they did not know why the trend existed. Other explanations for the differences in MMA consumption between genders included perceived differences in requirements, greater variety in food intake among women, and association of MMA with acne.

Table 4.13. MMA consumption gender

MMA consumption gender	Number of respondents (% of the total)	Number of mentions (% of the total)
Association of MMA and building muscle	9 (21)	13 (24)
Don't know	9 (21)	11 (20)
Fat or calorie content	7 (16)	9 (17)
Different requirements	7 (16)	8 (15)
Variety	4 (9)	5 (9)
Other	4 (9)	5 (9)
Association of MMA with acne	3 (7)	3 (6)
Total	43 (99)	54 (100)

Next, participants were asked to interpret the COMPASS finding that “grade twelves tend to consume fewer servings of MMA each day compared to grade nines”. For the most part, respondents explained that this was due to greater independence that came with age, and also competing drinks and foods (Table 4.14.). “When you’re in grade nine your mom’s kinda telling you to eat your veggies or drink your milk” was the way one person phrased it (Gr 9/10, female, Municipality of Waterloo). Whereas a grade twelve stated that “around my age, kids are definitely more responsible for what they’re putting into their bodies and shouldn’t be relying on their parents as much” (Gr 11/12, female, City of Hamilton). Respondents associated this “[ability] to make more decisions” with choosing a greater variety of foods, eating out more, and choosing less healthy options more often: “since the grade twelves are kind of more independent and on their own- well, not all of them, but maybe a good amount are... not eating as well as they used to” (Gr 11/12, female, City of Hamilton; Gr 9/10, male, City of Hamilton). In addition to relying on parents when in grade nine, students also mentioned relying on Canada’s Food Guide:

Definitely when I was younger, I relied on [Canada’s Food Guide] quite heavily [...] I think I developed more independent eating habits from that, but I definitely – that was definitely a big influencer for quite a while. (Gr 11/12, male, Wellington County)

In other words, greater independence experienced in grade twelve meant that students had more freedom to choose foods other than MMA.

The concepts of independence, competitive foods, and mobility were often intertwined in discussing age and MMA consumption. Competitive foods are defined as foods that are sold or available in schools outside of federally reimbursable school meal programs (Centres for Disease Control and Prevention, 2012). One person illustrates how both independence and competing foods could lead to older students consuming fewer servings of MMA daily:

Now that they're older they can make their own choices, and if they wanted pop or something else instead of milk- whereas as a child, maybe there's less exposure to like fancy drinks like that, and it's normally just milk or water or juice rather than pop. (Gr 11/12, female, Middlesex County).

In addition, older students often have greater mobility, expanding the number of food options available to them: “your ability to have your license kind of effects what’s available to you at lunch” (Gr 11/12, female, Waterloo Municipality). Overall, greater independence and mobility was associated with consuming fewer servings of MMA daily. In addition, a few older students shared their own experiences of switching from milk to coffee: “I noticed in grade nine I used to drink a cup of milk every day but then as I got older I just changed and started drinking coffee in the morning” (Gr 11/12, male, City of Hamilton). Or “a lot of people just drink water, or there’s Tim Hortons™ near my school, so some people will go and get coffee or iced caps” (Gr 11/12, female, City of Hamilton). Respondents had several other explanations for the decline in MMA consumption with age, notably: competing priorities, different requirements, knowledge, and the association of MMA with kids (Table 4.14.).

Table 4.14. MMA consumption age

MMA consumption age	Number of respondents (% of the total)	Number of mentions (% of the total)
Independence	15 (28)	18 (27)
Competing drinks and foods	11 (20)	13 (20)
Other	7 (13)	8 (12)
Competing priorities	6 (11)	8 (12)
Different requirements	5 (9)	6 (9)
Knowledge	4 (7)	5 (8)
Association of MMA with kids	3 (6)	5 (8)
Don't know	3 (6)	3 (4)
Total	54 (100)	66 (100)

Following this question, students were asked to explain the COMPASS finding that “students with more spending money tend to consume more servings of MMA”. According to respondents, this was because those with more spending money can “just go out and get whatever they feel like [...] grab whatever they really want” (Gr 9/10, male, City of Hamilton). Thus, disposable income was thought to play a significant factor (Table 4.15.). Many suggested that those with more spending money spent it at coffee shops or pizza places, both which sell products high in MMA. For example, one student discussed going to Tim Horton’s™ daily when she had a part time job at a grocery store, but when she stopped working, she also stopped going to Tim Horton’s™ for drinks:

-after I did leave my job, I did stop- [...] I wasn't at Tim Horton's a lot anymore [chuckles] like I would get Tim Horton's™ like once a month. Or maybe less.
(Gr 11/12, female, City of Hamilton)

Another person echoed this “if they don’t have as much money they would wanna save it and not waste it too much on eating out and food” (Gr 9/10, female, Municipality of Waterloo). Whereas “if you have more money you’re more free to spend it how you want” (Gr 9/10, male, City of Hamilton). When asked, respondents answered that students with extra spending money had part time jobs, as this was the case within their friend groups.

In addition, respondents mentioned that the relative cost of MMA may play a role in students with less spending money consuming less MMA. They discussed milk having a “higher price than other drinks”, and those with less pocket money opting for drinks with lower price tags (Gr 9/10, female, Municipality of Waterloo). One student suggested this was due to MMA’s shelf life, because

It doesn’t stay good for as long as some other drinks. So... if you were struggling financially, you’d probably want to prioritize and buy something that wouldn’t spoil quickly. (Gr 11/12, female, Municipality of Waterloo)

Students with less spending money brought food from home to school, and many commented that the products brought from home contained less MMA compared to what would be purchased:

Usually when people don’t have spending money we kind of just bring apples and things to school, and eat stuff from your house, but when you do [have spending money] we go out and purchase stuff that has like milk and all these alternatives in it. (Gr 11/12, female, City of Hamilton)

Table 4.15. MMA consumption – spending money

MMA consumption – spending money	Number of respondents (% of the total)	Number of mentions (% of the total)
Disposable income	16 (38)	19 (42)
Relative cost of MMA	13 (31)	13 (29)
Foods brought from home contain less MMA than those purchased during school day	7 (17)	7 (16)
Don’t know	4 (9)	4 (9)
Other	2 (5)	2 (4)
Total	42 (100)	45 (100)

To conclude the behaviour section, students were asked to interpret the COMPASS finding that “students who are more likely to consume MMA products are also the students who tend to meet nutrition recommendations and have a healthy body weight”. Respondents

discussed healthy role models playing a role in this outcome, particularly parents. “If you’re raised in a family that teaches you the value of good nutrition, you’re more likely to carry that your whole life” was the way one person phrased it (Gr 11/12, female, City of Hamilton). They also commented that:

Parents are the ones who do the grocery shopping and provide the food and the milk options and the dairy options, and give them that option, whereas maybe some parents don’t- like they just personally don’t drink milk so then those kids don’t have exposure to that. (Gr 11/12, female, Middlesex County)

In addition to parents, but of lesser importance was gym teachers, coaches, and social media influencers that were discussed as role models.

Another explanation for the above finding was that some people are just more health conscious than others. According to respondents, people that participate in sports and fitness care about what they fuel their bodies with: “most people who I’m friends with who do sports care a bit more about what they put into their bodies” (Gr 9/10, female, Wellington County). One person described it as a general interest that some people have:

Some people are just more interested in taking fitness classes [...] A lot of people have interest in sports while others are more interested in the robotics thing [...] some people wanna look at all the workout things, or like healthy... body things on social media, while others would rather just look at memes and things like that. (Gr 11/12, female, City of Hamilton)

Student-athletes said that they “understand the importance of having milk and milk alternatives daily. We understand that it is important to stay healthy” (Gr 9/10, male, Municipality of Halton). In summary, healthy role models, having an interest in fitness, and being health conscious were the main factors in participants’ explanations.

Table 4.16. MMA consumption – BMI, physical activity level

MMA consumption – BMI, physical activity level	Number of respondents (% of the total)	Number of respondents (% of the total)
Healthy role models	15 (34)	17 (35)
Health conscious	12 (27)	13 (27)
Other	7 (16)	7 (15)
Improve strength and performance	5 (11)	5 (10)
MMA has a reputation of being healthy	3 (7)	4 (8)
Don't know	2 (4)	2 (4)
Total	44 (99)*	48 (99)*

4.4.1 GENDERED PERSPECTIVES

On the whole, young women and men shared similar perspectives and types of experience in discussions of behaviour. In discussing the question on gender differences in MMA consumption, women tended to say it was due to the association of MMA with muscle, acne, and high calorie and fat content more often. Young women perceived themselves to be more conscious about what they eat compared to young men:

I feel like being conscious about what they're eating by, like, [young women will] try to eat more healthy, or less of something, or go on a diet, if it's good for their skin. Or just, they don't want too much of that if they're gonna exercise. (Gr 9/10, female, Municipality of Waterloo)

Women discussed the “huge difference” MMA made on “your weight, your skin”, claiming that “more women would think about that kind of stuff, more than men, cause they might not care as much” (Gr 9/10, female, Municipality of Waterloo; Gr 9/10, female, Middlesex County). In contrast, men often could not explain the gender differences in MMA consumption. This supports the claim young women made that they are “more conscious” (Gr 11/12, female, City of Hamilton).

4.4.2 AGE-BASED PERSPECTIVES

Overall, students had similar explanations for the behavioural differences in MMA consumption despite their education level. There were however, nuances in the way older students explained the question on age differences in MMA consumption. Older students tended to discuss competitive drinks and foods more often and shared experiences of having greater mobility in grades 11/12 compared to 9/10. In addition, older students shared their experiences of changing their morning routine from drinking a cup of milk to drinking a cup of coffee more often.

4.5 SOCIAL NORMS

Students were not explicitly asked about perceived norms, but these concepts emerged from analysis of the interview transcripts. One third of respondents perceived their peers to buy foods and drinks at restaurants often (Table 4.17.):

For me I'd say the simple answer would be if they have more spending money, they'd go out for lunch more and personally at my school, when anyone goes out, it's for pizza most of the time, like I know me and my friends do it, I see- it's packed there on most days, so- and since they have more spending money, they'll probably do that since why wouldn't you? You get to hang out with your friends and have pizza for lunch! (Gr 9/10, male, Brampton)

This corresponds to the previous finding that disposable income played a significant role in students' MMA consumption. Another participant discussed options within her school food environment:

From my experience in high school a lot of people would rather eat out and go out to other fast food places or just other food places rather than eating in the school cafeteria or vending machines. It's just not- I feel like it just doesn't have as many options and it's not as good of quality of food. (Gr 11/12, female, Middlesex County)

Students often referred to restaurants such as Starbucks™, Tim Hortons™, pizza places, and Subway™ when sharing their experiences and views of their peers' behaviour. Buying foods and drinks at restaurants was coupled with going off school property on break. Students frequently discussed their peers leaving school property on lunch break:

I find at [school name] it's mostly off of school property cause there's a pizza place and a whole bunch of places to eat right across the street from it.
(Gr 9/10, female, Municipality of Waterloo)

In addition to these descriptive norms, respondents also perceived their peers to bring re-usable water bottles from home. Fewer respondents discussed the norm to bring lunch and snacks from home.

Table 4.17. Descriptive norms

Descriptive norms	Number of respondents (% of the total)	Number of mentions (% of the total)
Buy foods and drink at restaurant	11 (35)	13 (39)
Go off school property on break	9 (29)	9 (27)
Bring re-usable water bottle	8 (26)	8 (24)
Bring lunch and snacks from home	3 (10)	3 (9)
Total	31 (100)	33 (99)*

Another aspect of subjective norms is the motivation to comply with others. Again, interviewees were not directly asked about their motivation to comply with others, but this emerged from the analysis of interview transcripts. More students felt a strong motivation to comply with their peers compared to a weak motivation to comply, but overall only a few respondents referred to this (Table 4.18.). For example, one respondent commented on a social norm and how he felt he had to adhere in order to fit in:

Socially it is, like, a little awkward to drink... those milk cartons, and even the juice boxes, because... in high school everyone drinks pops, Coca Colas and stuff, and it's kind of looked at as childish I guess?
(Gr 9/10, male, Municipality of Halton)

Table 4.18. Motivation to comply with others

Motivation to comply with others	Number of respondents (% of the total)	Number of mentions (% of the total)
Strong	4 (66)	4 (66)
Weak	2 (33)	2 (33)
Total	6 (99)*	6 (99)*

Furthermore, social norms were explored as inductive codes. A few students discussed healthy norms - the expectation that people will eat foods that are healthy (Table 4.19.). For example, one respondent discussed a healthy social norm within his sports team:

basically as athletes, coaches tell you to eat healthy before games, they tell you to make right choices because you perform better

(Gr 11/12, male, City of Hamilton)

Whereas another respondent discussed unhealthy norms within his friend group, noting that he would make a different beverage selection if he was with friends. As such, students may make decisions which vary depending on prevailing social norms in any given environment.

Table 4.19. Social norms

Social norms	Number of respondents (% of the total)	Number of mentions (% of the total)
Healthy norm	3 (50)	6 (60)
Unhealthy norm	3 (50)	4 (40)
Total	6 (100)	10 (100)

4.5.1 GENDERED & AGE-BASED PERSPECTIVES

Inferences could not be made regarding gender- or age-based perspectives from discussions that revealed prevailing descriptive norms, motivation to comply, and social norms.

4.6 CHAPTER SUMMARY

This chapter reviewed the results of qualitative semi-structured interviews with high school students. Individual-level factors were examined through the lens of the Theory of Reasoned Action to help explain trends in behaviour regarding MMA consumption. Specifically, the key constructs researched here included attitudes and subjective norms. Moreover, gender- and age-based perspectives were considered.

Overall, the student participants held favourable attitudes towards MMA, and were most motivated to consume these products because of taste and nutritional value. Students were interested in discussing foods in terms of their impact on health, and commonly associated MMA with protein and building muscle. This was more highly regarded among young men compared to young women. However, students were deterred from consuming MMA products by various aspects of packaging. It was evident that students held a lower standard to plastic packaging, especially single-use plastics. Knowledge was another construct that was examined as it was thought to contribute to students' attitudes. The majority of students had limited knowledge of MMA production practices, and largely obtained health information from health class.

Information about subjective norms was also gleaned from the interviews. Adolescent participants perceived eating out to be common among their peer groups. This was associated with greater independence, disposable income, and age. In addition, findings suggest that adolescents may feel a stronger motivation to comply with their peers.

These results reveal attitudes and subjective norms which contribute to MMA consumption behaviour among high school students in Ontario. The next chapter will contextualize these findings within recent literature.

CHAPTER 5: DISCUSSION & CONCLUSIONS

5.1 INTRODUCTION

This research examined adolescents' knowledge, attitudes, and behaviours related to MMA consumption, and the subjective norms prevailing in their school and home environments. Qualitative interviews were conducted with 28 high school students in five urban census tracts in Southern Ontario to address the following objectives: *(i) from where do young people attain health information; (ii) what are their perceptions of MMA products?; and (iii) how would they interpret the patterns in the quantitative data collected from their peers in the COMPASS study.* In this section, comparisons will be made between relevant existing literature and the findings of this investigation. Beginning with an overview of the key findings, this chapter will discuss contributions, limitations, and future research directions. The relationship between the results, theory, and existing literature will be examined.

5.2 SUMMARY OF KEY FINDINGS

5.2.1 SOURCES OF HEALTH INFORMATION

Interviews revealed that health class in school is an important source of health information for adolescents. According to this analysis, 82% of respondents indicated they would obtain health information from health class at school (Table 4.1.), and this finding was true across gender and age subgroups. Indeed, the Ontario secondary school curriculum aims to provide students with health literacy that is necessary to make good decisions for health (Ontario Ministry of Education, 2015). Students may have discussed health class as a source of health information because the curriculum encompasses all aspects of accessing, understanding, and evaluating information to promote health. Interviews also revealed that most students do not

obtain health information from social media websites. These findings are consistent with previous Canadian research with young adults, showing that this demographic considers school a reliable source of health information, whereas social media is considered unreliable (Marcinow et al, 2017). It is also consistent with findings that school-based nutrition education programs are effective at improving healthy eating and dietary measures among youth (Yip et al, 2016). These findings differ from an American study reporting on the popularity of the Internet in health information seeking behaviour among college students, but reaffirm their findings regarding skepticism around social media use (Basch et al, 2018). In addition, this research found that adolescents sought information from multiple sources, often listing their parents as a secondary source of information to health class; this reaffirmed findings from another Canadian study (Gagné et al, 2018).

5.2.2 PERCEPTIONS OF MMA PRODUCTS

Overall, participants interviewed held favourable attitudes towards MMA products. Quantitative findings from COMPASS survey data suggested that gender- and age- related differences in perceptions towards MMA may exist, however this investigation found that favourable attitudes towards MMA products were consistent between gender and age groups. Most participants discussed a variety of both egoistic and altruistic factors. Egoistic factors like taste and nutritional value were most frequently discussed as motivators for MMA selection. Taste appeared to be a larger motivator among younger adolescents (grades 9-10), and among men. Nutritional value also appeared to be a larger motivator among young men compared to young women. Altruistic factors like environmental impacts and animal welfare were also discussed, mostly with regard to deterrents of MMA consumption. For example, participants

made moral judgements about food packaging; they perceived a hierarchy with plastic packaging at the bottom and cartons at the top. These findings suggest that a combination of egoistic and altruistic attitudes both motivate and deter adolescents when making food choices including MMA. The complexity of these factors in food choices was also demonstrated in research looking at attitudes towards organic, genetically-modified, and conventional foods (Wunderlich & Gatto, 2016). The findings reported on here suggest that the tension between egoistic factors motivating-, and altruistic factors deterring adolescents to- or not to consume MMA may contribute to cognitive dissonance. Cognitive dissonance occurs when an individual holds two or more beliefs that contradict each other, or when an individual's beliefs and actions do not align, and this may be at play in adolescents' food decisions regarding MMA. Future research to investigate the link between cognitive dissonance and MMA consumption among adolescents would help to clarify these findings.

Themes that emerged from other Canadian research were true for this research as well; factors influencing MMA or calcium consumption included health (Marcinow et al 2017; 2019; Henry et al, 2015), taste (Henry et al, 2015), the environment (Henry et al, 2015), parents (Henry et al, 2015; Rose et al, 2018; Banna et al, 2018), and other role models (Henry et al, 2015; Banna et al, 2018). However, our findings did not support findings of other Canadian research reporting on the importance of cost (Marcinow et al, 2017; Henry et al, 2015), availability (Rose et al, 2018; Banna et al, 2018; Henry et al, 2015), and perceived immediate benefits (e.g., strong nails) (Marcinow et al, 2017). Observed differences between studies may be due to the age of participants, as some were youth (grades 5-8) (Henry et al, 2015; Banna et al, 2018), while others were college students (Marcinow et al, 2017; 2019; Rose et al, 2018), and no research included in this analysis specifically assessed high school students.

5.2.3 INTERPRETATION OF QUANTITATIVE FINDINGS

Participants expressed that the gender difference in MMA consumption is likely due to the association of MMA with building muscle, or the association of MMA with fat and calories. Together these findings point to gender differences in body image ideals which are driving these patterns in MMA consumption. When asked to explain the gender difference in MMA consumption, 21% of respondents said this was due to the association of MMA with building muscle, while 16% of respondents said it was due to the fat or calorie content of MMA (Table 4.13.). It is well known that adolescents are highly conscious of body image, and the recent literature supports this (Voelker et al, 2015). In addition, high school is an important time for building autonomy, and many adolescents begin to make food decisions for themselves instead of relying on parents to make these decisions. Furthermore, adolescents feel pressure to conform to gender ideals (Klaczynski et al, 2020). Adolescent men in North America are looking to achieve the muscular body ideal (Smolak & Stein, 2006), and the findings reported on here support this. In turn, gendered body image ideals are driving adolescent food choices with regard to MMA consumption. Previous literature shows that adolescent men want to gain muscle to fit the ideal body image, so they eat high protein foods (Eisenberg et al, 2012). Alternatively, adolescent women in Canada are looking to be thin, therefore they restrain eating (Flament et al, 2012). The upswing in social media use over the past decade could be partially responsible for the gendered changes observed in MMA consumption because social media can affect adolescents' self-view, and many adolescents are heavy users of social media (Abi-Jaoude et al, 2020). Another 21% of respondents said that they did not know why the gender difference in MMA consumption existed, and this may be due in part because people come into adolescence at different times, and those that are later at coming into adolescence may not interact with the

other gender enough to understand behavioural differences. The findings reported on here differed from research with college students which suggest this gender difference may be due to men liking milk more, and associate it with specific foods (e.g. breakfast cereal), and women having greater concern for milk allergies (Rose et al, 2018). This may be due to the relative importance of body image between ages.

Participants also expressed that the age difference in MMA consumption (i.e., MMA consumption declines from grade 9 to 12) was likely due to the greater independence adolescents gain as they progress through high school. According to these findings, 28% of respondents indicated that greater independence was reason for this trend, while 20% of respondents suggested this was due to competitive foods and drinks (Table 4.14.). This explanation makes logical sense, as adolescents gain independence with age. Manzoni (2016), for example, suggests a strong connection exists between age and level of independence, with older youth being less dependent and more independent compared to younger youth. Individuals also come into adolescence at different times, and develop independence in multiple domains (Manzoni, 2016). Age and independence are also associated with enhanced mobility (Janssen et al, 2016). For example, survey responses show that older youth had more freedom to move around their neighbourhood without parental supervision (Janssen et al, 2016). Greater mobility may lead to greater food availability and accessibility, and greater exposure to unhealthy food outlets has been associated with changes in food choice (Sadler et al, 2016). This could mean that as students progress through high school, they consume less MMA as a result of enhanced mobility and greater food selection. Age and independence are also associated with greater autonomy in making food decisions (St-Onge & Keller, 2012). Greater autonomy in making food decisions may lead to adolescents making different food choices (Engler-Stringer et al, 2016). Adolescents

may choose to consume fewer MMA products as a result of this greater autonomy, potentially because they are forming their own thoughts on animal welfare, sustainability, and practices within the dairy industry. Or, they may ignore or refuse their parents' advice to consume MMA as a result of the process of becoming independent (Bassett et al, 2008). This is supported by previous research showing that when adolescents are given more control over their food choices, they tend to be less healthy (Engler-Stringer et al, 2016).

Participants were also asked to interpret the finding that adolescents with more spending money tended to consume more servings of MMA, and 38% of respondents said this was likely due to differences in disposable income (Table 4.15.). This may be because students with more spending money spend it more freely on items that are readily available to them which they perceive to improve their wellbeing. This aligns with work by Aknin and colleagues (2018), who found that small and seemingly insignificant spending choices may provide greater wellbeing. In addition, 31% of respondents said the discrepancy in MMA consumption was due to the relative high cost of MMA (Table 4.15). Previous Canadian literature has reported that cost is a crucial barrier to college students' calcium consumption and children's MMA consumption (Marcinow et al, 2017; Henry et al, 2015). The importance of cost suggests that subsidizing MMA costs in schools may be an effective way to increase MMA consumption among those with less disposable income.

Finally, participants were asked to interpret the COMPASS finding that "students who are more likely to consume MMA products are also the students who tend to meet nutrition recommendations and have a healthy body weight". Many participants (34%) expressed that role models likely mediate this relationship (Table 4.16.). This finding is consistent with previous literature reporting on the importance of role models in promoting health during adolescence

(Banna et al, 2018; Henry et al, 2015). As such, nutrition programs that aim to improve MMA consumption or calcium status of adolescents should incorporate role models to achieve the desired behaviour outcomes. In addition, 27% of respondents explained this relationship was likely due to a portion of adolescents being health conscious, and motivated to make good food choices (Table 4.16.). Together these findings align with previous literature which shows that peer-led, school-based interventions are effective at promoting healthy eating knowledge and dietary measures among youth (Yip et al, 2016). As such, nutrition programs that aim to increase Canadian adolescents' MMA consumption should incorporate healthy peer role models.

5.2.4 ADDITIONAL FINDINGS

Interestingly, some unexpected findings emerged from the interviews. First, the results indicate that high school students were quite knowledgeable about the environmental implications of their food decisions. Participants compared characteristics of recyclability and biodegradability, and discussed ramifications of single-use plastics, mostly without prompts. This corresponds to the recent commitment of the Ontario government to improve environmental education following the 2007 report called *Shaping Our Schools, Shaping Our Future*. Therefore, in efforts to increase MMA consumption among younger generations of Canadians, it is important to maintain and enhance practices which are environmentally-friendly throughout production. For example, promoting environmentally-friendly practices within the dairy supply chain, and enhancing packaging to make it more environmentally-friendly will likely attract more consumers.

Second, interviews revealed that most participants (75%) had little knowledge of MMA production practices (Table 4.3). Most participants self-reported that their knowledge in this area

was little to none, stating that their knowledge of production was limited to knowing that milk comes from a cow. Moreover, the disconnect between consumers and agricultural production has become increasingly salient in the Canadian literature (Sutherland et al, 2020). The lack of knowledge about MMA production may be due to lack of exposure, either through easily accessible and trustworthy resources in formal or informal education settings, or lived experience. Ventura and colleagues (2015) report that exposure to the dairy livestock industry in Canada alters citizens' perceptions and concerns. Perceptions, in turn, influence behaviour (Reibstein et al, 1980). As such, efforts to improve Canadian adolescents' MMA consumption should focus on increasing exposure to MMA production practices, in order to create awareness of issues and address consumer's concerns. This is not to say that increasing exposure should lead to widespread acceptance of agricultural practices, rather that more focus may be placed on addressing consumer's issues when there is greater transparency in the food system. Exposure may be improved by incorporating additional curricula (e.g., through home economics courses) to enhance students' knowledge and skills to make healthy and sustainable food choices.

5.2.5 REVISITING THE THEORY OF REASONED ACTION

Attitudes and subjective norms from the TRA were thought to predict behavioural intentions to- or not to- consume MMA. These findings suggest attitudes play an important role in predicting behavioural intentions, however the role of subjective norms was less clear. This is likely due to an imbalance in theory-based (i.e., deductive) questions used to assess attitudes versus subjective norms; this is a limitation of the research. Intention to purchase MMA was influenced by egoistic and altruistic attitudinal factors such as nutritional value, taste, and attitudes towards animal welfare. These findings revealed that normative beliefs, such as the

perception that peers eat out at restaurants often, may be associated with the intention to purchase MMA. This was mostly exemplified by students' perceptions of their peers buying pizza, and drinks from popular coffee shops (Table 4.17.). In addition, some students experienced cognitive dissonance as a result of conflicting attitudes such as when they want what is best for themselves, others, and the environment. As such, efforts to increase Canadian adolescents' MMA consumption should aim to reduce cognitive dissonance as this may increase intent to consume MMA. When egoistic and altruistic motives align, this may result in an increase in MMA consumption.

5.3 CONTRIBUTIONS

This thesis provides meaningful contributions that can be used for improving adolescent MMA consumption in Canada. To date, little research has sought to examine reasons for the recent decline in MMA consumption in Canada. Of the limited research that has been done in this area, most involves college students, and to our knowledge this is one of the first in a Canadian adolescent population. Adolescents are an important subset of the population to research, as they are at an age of transition, shifting from being reliant on parents to making decisions for themselves. As such, research with adolescents provides insight into the present and future patterns of MMA consumption among Canadians. Moreover, qualitative research investigating MMA consumption in Canada is limited, so this qualitative investigation contributes methodologically to the body of literature. In this way, it provides in-depth understanding of adolescent knowledge, attitudes, and practices regarding MMA consumption in the Canadian context. As such, this research contributes to our understanding of *how* and *why* the decline in MMA consumption exists.

This thesis also makes theoretical contributions. Using the Theory of Reasoned Action, salient determinants of adolescent MMA consumption behaviour were identified, adding to what is known about attitudes, subjective norms, behavioural beliefs, outcome evaluations, and descriptive norms in this context. In contrast, previous literature exploring reasons for MMA or calcium consumption is guided by Social Cognitive Theory, examining constructs such as self-efficacy, observational learning, outcome expectations, and behavioural capability (Jung et al, 2015; Marcinow et al, 2017). The present research therefore addresses gaps in the literature by: (i) illuminating factors presently influencing MMA consumption in Canada, (ii) advancing understanding of adolescent behaviour, and (iii) examining the associations between attitudes, subjective norms, and behavioural intentions with regard to MMA consumption.

5.4 LIMITATIONS

This research must be interpreted in light of its limitations. Overall research participants held a favourable attitude towards MMA, and this may be indicative of selection bias as those that were interested and enjoyed consuming MMA volunteered to participate. As such, this work may not have fully captured the knowledge, attitudes, and behaviours of adolescents who do not hold favourable views of MMA. In addition, this work is subject to social desirability bias, a common limitation to research involving human participants. This occurs when participants tend to respond in a socially desirable manner, and consequently the research may not be based on participants' true feelings. Future research measuring actual behaviour would improve accuracy in this regard. Moreover, while the researchers aimed to recruit an equal number of participants from each of the subgroups (i.e., grade 9-10 women, grade 9-10 men, grade 11-12 women, grade 11-12 men), fewer grade 11 and 12 students were included in the sample. This may be due to the

fact that remuneration was in the form of volunteer hours, which most students in the sample had collected in their first two years of high school. As such, older students may have been less interested in the remuneration. Researchers tried to mitigate this issue by targeting recruitment advertisements to grade 11 and 12 students only in the latter stages of recruitment, however younger students continued to show interest and researchers did not exclude volunteers on the basis of grade.

In addition to these limitations, study logistics prevented data collection in COMPASS schools. Furthermore, in-person data collection would not have been possible at the time it was collected due to the impacts of COVID-19. As such, interviews were held online using GoToMeeting software, which allowed for data collection to occur according to the researchers' timelines.

In terms of theoretical limitations, this research is limited in its analysis of subjective norms. Subjective norms are a central construct of the theory used for this analysis, yet subjective norms were not analyzed deductively. As such, participants were not directly asked questions to understand how subjective norms influenced their MMA consumption. However, subjective norms were analyzed inductively. Therefore, this work cannot say that attitudes and social norms predict behaviour. However, this research did highlight factors which influence MMA consumption behaviour among Canadian adolescents, according to the TRA. This approach allowed us to provide a detailed analysis in response to the stated research objectives.

5.5 RECOMMENDATIONS FOR FUTURE RESEARCH

Future research may help to address some of the aforementioned limitations and build on specific findings of this research. For example, a notable finding of this research program was the prevailing gender differences in MMA consumption, which carried through both the quantitative survey and qualitative interview analyses. Survey analysis revealed that more high school men meet MMA guidelines compared to high school women (42.2% vs 24.7%) (Butler et al, 2020b). Individual interviews with high school students revealed that participants interpreted the aforementioned finding by associating MMA with accumulating muscle, and also with fat and calories, and these associations appear to drive the gender difference in consumption. Given the gender differences in MMA consumption, future research is needed to understand how adolescent women make healthy food choices that focus on health benefits, rather than body image, to support health promotion strategies and address nutrition inequalities. A strengths-based approach, which focuses on positive capabilities of individuals and communities may be useful in this regard as previous research focuses on body dissatisfaction which leads to poor eating habits (Clarke et al, 2020).

Moreover, this research identified a potential knowledge gap in Canadian adolescents' awareness of MMA production practices. This suggests a new avenue to explore in future research that may be beneficial - to examine the impact of knowledge and awareness of food production practices in Canada on sustainable and healthy food choices, and food waste. To my knowledge, no recent Canadian research has examined this relationship, and it is unknown whether increased connections to local agriculture has positive implications for sustainability within the food system. Other authors, however, have recommended increasing agricultural education among Canadians as a result of a lack of basic knowledge in agricultural production

(Sutherland et al, 2020). Moreover, further investigation in this area may help to identify areas to improve health literacy among Canadians.

Furthermore, this investigation highlights the need for research to understand the role that cognitive dissonance plays in forming intentions to- or not to- consume MMA. To date, little research involving dietary decision-making has included cognitive dissonance as a primary construct, as evidenced by a review by Ong and colleagues (2017). Future work that is guided by theory will contribute to a greater understanding of the impact cognitive dissonance has on food choices.

Future research should consider the use of a time-lag design to carry out the quantitative and qualitative work discussed here again in the future to understand the impact of the revised food guide on dietary decision making in schools. The dietary guidelines implemented by Health Canada are an important contextual factor influencing Canadian adolescents' MMA consumption, and the present research does not capture the effects of the revision. Future research that measures the impact of the revised guidelines on MMA consumption would be useful in guiding future health promotion efforts. Additional contextual factors should be explored in greater depth, such as the impact of COVID-19 on adolescents' food decisions within the places and spaces they occupy. Likewise, future research should continue to examine the neighbourhood context within which food decisions are made. As previously stated, places matter with regard to health, and are central to the study of health geography (Moon, 1995).

5.6 CONCLUSIONS

Overall, the present research examined Canadian adolescents' knowledge, attitudes, and behaviours, as well as the prevailing subjective norms influencing MMA consumption. This thesis contributes to the limited knowledge that currently exists to explain the decline in MMA consumption in Canada. It made clear that while Canadian adolescents do not obtain health information from social media websites, these websites may still be highly influential in propagating gendered body ideals among Canadian youth. These ideals, in turn, appear to be driving the trends observed in MMA consumption. This provides an opportunity for health educators to share unbiased and truthful information about MMA in relation to body composition and health. Additionally, this research suggests that despite holding favourable attitudes towards MMA, Canadians may hold conflicting views of the Canadian dairy industry, and these views may be unfounded. Nutrition programs that aim to improve adolescents' MMA consumption should focus on incorporating healthy role models, subsidizing MMA costs, and be school-based.

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ARE YOU A HIGH SCHOOL STUDENT?

DO YOU HAVE 2 HOURS TO PARTICIPATE IN AN EXCITING RESEARCH PROJECT?

Would you like to earn 2 volunteer hours simply for answering a few questions about milk & milk alternatives consumption? Participants will be asked to take part in one interview or focus group.

INTERESTED?

Contact Carise: c29thompson@uwaterloo.ca

This study has received ethics clearance through a University of Waterloo Research Ethics Committee.



APPENDIX B – Letter of Information

February 12th, 2020



LETTER OF INFORMATION

Students, schools, and society: using a multi-level systems approach to understanding milk product consumption and reasons for under-consumption among Canadian high school students

Co-Investigator:

Name: Dr. Susan Elliott
Department: Geography and Environmental Management
University: University of Waterloo
City, Country: Waterloo, Canada
Phone: 519-888-4567, ext. 31107
Email: elliotts@uwaterloo.ca

Student Researcher:

Name: Carise Thompson
Department: Geography and Environmental Management
University: University of Waterloo
City, Country: Waterloo, Canada
Phone: (519) 888-4567 ext. 37035
Email: c29thompson@uwaterloo.ca

To: Parent/Guardian

Please read this letter of information before giving permission for your child/youth to participate in this research. This letter of information is to stay in the parent/guardian's possession.

Research Sponsor: Dairy Farmers of Canada

Purpose of the study:

Your child/youth is invited to take part in a focus group/interview discussing milk/milk alternatives consumption among high school students in Ontario, Canada. The purpose of this study is to understand the health behaviours of youth through gathering group opinions on student behaviour in the school environment. Specifically, researchers are interested in understanding how student, school, and environment interactions contribute to milk/milk alternatives consumption, or lack thereof. We are looking to hear your child's perspective. Please note that this research study is for a Master's thesis, and findings may be used long-term to determine trends in milk consumption over time.

What will happen during the study?

Your child will either take part in:

a) a focus group

During the focus group, your child will take part in a group discussion with approximately 6 student peers that will last 1 – 1.5 hours in duration;

OR

b) a one-on-one interview

During the interview, your child will take part in a one-on-one discussion with the researcher that will last 1 – 1.5 hours in duration.

In both cases, the student researcher will ask questions about their knowledge, beliefs, and practices related to milk/milk alternatives. Your child will be asked to share their experiences and perceptions of milk/milk alternatives and milk/milk alternatives consumption. The study will take place virtually, online via the GoToMeeting teleconferencing software.

Are there any risks to participating in this study?

The risks involved in participating in this study are minimal. Your child may feel uncomfortable answering certain questions or discussing their ideas and opinions. If your child *is* feeling overwhelmed or stressed as a result of their participation in this study, they can inform the facilitator; they do not need to answer any questions that they do not want to. The topic of discussion – eating behaviour- may lead to the disclosure of sensitive information (eg. the disclosure of an eating disorder), but the likelihood of this happening is low. If this is the case, the researcher will respect and keep the promise of confidentiality, within the scope of ethical principles. The University of Waterloo Research Ethics Committee will be consulted in cases of uncertainty. Again, the risk of this happening is low. The researcher will be prepared to provide research participants with a list of resources for organizations located in the community that are equipped to counsel participants with any distress they are feeling. There are also risks that students participating in the session may not keep what was said confidential. Although the researchers will ask that people keep what was said confidential, there is no guarantee that this will occur.

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 steps we are taking to protect your child's privacy are described below.

Are there any benefits to participating in this study?

All study participants have the option to receive a copy of the study results upon completion. The researchers will share findings from the COMPASS study (a large study of 61 high schools in Ontario and the students attending those schools) with focus group/interview participants, and your child will have the unique opportunity to help interpret findings from the COMPASS study. As a participant in this study, your child may not receive a direct personal benefit, but likely will help to influence future dietary guidance and recommendations for Canadian youth.

Will I receive anything for participating in this study?

Your child/youth will receive 2 volunteer hours for their participation in this research project.

Confidentiality: Who will know what my child said or did in the focus group?

Your child's participation in the focus group study is likely not confidential as other participants will know who is participating in the focus group, although they may not have met prior to the study. This does not apply to the one-on-one interviews. We will not use your child's name or any information that would allow your child to be identified in publications which result from this study. In addition, your child will be encouraged to use a pseudonym during the focus group discussion.

The focus group information will be ***digitally recorded*** and transcribed following the discussion. All notes and transcripts will be kept for a minimum of 7 years following the study. Only the members of the research team (including the principal investigator, co-investigators, and student investigator) will have access to research files which will be stored on a password protected computer in a locked room on the University of Waterloo campus.

What if my child changes their mind about participating in the focus group?

Your child's participation in this study is completely voluntary. If your child decides to be part of the study, they can withdraw at any time from the focus group for whatever reason, even after signing the consent form. They may also choose not to answer a question (or questions) if they do not want to answer. If this is the case, your child can inform the researcher right away that they do not want to continue or that they wish not to answer that question. If your child decides to withdraw, there will be no consequences to them or you.

Once the focus group/interview discussion is complete, your child's answers and discussion will be anonymized and will not be identifiable to them. This means that once they have completed the focus group/interview, their responses cannot be withdrawn from the study because we will not be able to identify which responses are theirs.

Has the study received ethics clearance?

This study has been reviewed and received ethics clearance through a University of Waterloo Research Ethics Committee (ORE #41175). 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.

Who should I contact if I have questions regarding my child's participation in the study?

If you have questions, need more information about the study, or have comments please contact the researchers at the contact information listed at the top of the page.

APPENDIX C – Letter of Consent**CONSENT FORM**

Students, schools, and society: using a multi-level systems approach to understanding milk product consumption and reasons for under-consumption among Canadian high school students**Co-Investigator:**

Name: Dr. Susan Elliott
Department: Geography & Environmental Management
University: University of Waterloo
City, Country: Waterloo, Canada
Phone: 519-888-4567, ext. 31107
Email: elliotts@uwaterloo.ca

Student Researcher:

Name: Carise Thompson
Department: Geography & Environmental Management
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Email: c29thompson@uwaterloo.ca

This study has been reviewed and received ethics clearance through a University of Waterloo Research Ethics Committee (ORE #41175). 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.

By giving your consent, you are not waiving your legal rights or releasing the investigators or involved insitutions from their legal and professional responsibilities.

CONSENT

- I have read the information presented in the information letter about a focus group/interview discussion being conducted by Dr. Shannon Majowicz, Dr. Susan Elliott, and Ms. Carise Thompson; School of Public Health and Health Systems/Department of Geography and Environmental Management of the University of Waterloo.
- I have had the opportunity to ask questions about my child's involvement in this focus group/interview discussion and have received satisfactory answers to my questions and any details I requested.
- I understand that if I consent and my child agrees to participate in this study, they may withdraw this consent at any time or up until approximately 3 months following the focus group, by informing the researcher.
- I agree to having my voice digitally recorded during the focus group/interview.
- I agree to the use of anonymous quotations in any thesis or publication that comes from this research.

I agree that my child can participate in this study.

Parent/Guardian's name: _____

Date: _____

Parent/Guardian's signature: _____

Date: _____

I agree to participating in this study.

Participant's name: _____ Initials: _____

Date: _____

Researcher's/Witness' signature: _____

Date: _____

Information about the Focus Group/Interview Summary:

A summary of the results will be sent to each participant personally, unless otherwise indicated:

- Yes, I would like to receive a summary of the study's results.

Please send them to me at this email address _____

Or to this mailing address: _____

- No, I do not want to receive a summary of the focus group/interview.

APPENDIX D – Interview Checklist

Concept	Question	Probes	Comments
Sociodemographics	<i>Welcome and thank you for joining me today for this interview. My name is Carise and I'm with Waterloo University, and this research is being done for my Master's thesis. Today we're going to be talking a little bit about MMA, and I'm excited to learn about your experiences. When I say MMA, I'm referring to fluid cow's and goat's milk, cheese, yoghurt, as well as soy milk and other plant-based milks that are nutritionally similar. I'm interested in hearing what high school students have to say about MMA, so I'm glad you're here for this interview.</i>		
	Where are you from?	- Hamilton, Kitchener, Waterloo, Cambridge, Guelph, London, Halton?	These questions will give us a sense of the spatial-temporal context within which these students spend their day. They will also serve as icebreakers.
	What school do you go to?	- Have you always gone to this high school or did you move here from somewhere else?	
	How long have you been going to this school?	- Long time/short time	
	What grade are you in?	- Gr 9, 10, 11 or 12?	
	How long does it take you to get to school in the morning?	- Long time/short time	
	How do you get there?	- School bus - City bus - Ride from parent/guardian	
	How do you get home?	- Walk - Bike - Other	
Do you often come to school early or stay late			

	<p>for extra curriculars?</p> <p>Do you have a part time job? Are you involved in other activities outside of school like sports teams, arts activities, etc?</p>		
Knowledge	<p>Tell me about food – what’s the first thing you think about when people start talking to you about food?</p> <p>Who talks to you about food?</p>	<ul style="list-style-type: none"> - What it tastes like? - If it’s good for you? - If it’s bad for you? <ul style="list-style-type: none"> - Parents? - Friends? - Media? 	(Ensaff et al., 2015; Freeman, Howse, Bauman, Hankey, & Allman-Farinelli, 2018)
<p><i>Thank you for answering those questions. Now I am going to flip my screen so that you see my screen. Let me know when you can see the Powerpoint opened on my screen.</i></p>			
	<p>Do these images look familiar to you?</p> <p>What is the first thing you think about when you see this photo?</p> <p>What do you know about the products pictured?</p> <p>What do you know about the way these items were produced?</p>	<ul style="list-style-type: none"> - Do you use this vending machine? <ul style="list-style-type: none"> - Where do these products come from? - How are they made? - What is in them? - Do they all cost the same amount? <ul style="list-style-type: none"> - Have you ever seen how these products are made in a video or in person? - Who makes them? - What have you heard about the process of making these products? 	<p>See Appendix B.</p> <p>These pictures are going to be of vending machines from select COMPASS schools.</p>

	<p>How do you know this?</p> <p>Where do you get health information from?</p>	<ul style="list-style-type: none"> - Do you have any personal connections to agriculture or food manufacturing? - Websites? - Books? - Class? - Who else do you learn about health from? 	<p>(Marcinow et al, 2017)</p> <p>(Tonkin, Coveney, Meyer, Wilson, & Webb, 2016)</p>
Attitudes	<p>If you could choose one product to buy, which would you choose? There is no right or wrong answer.</p> <p>How do you think each of these products influences health?</p> <p>What do you think about the way each of these items are packaged?</p>	<ul style="list-style-type: none"> - Why? - Why not other products? - Would you make a different choice if this was your fridge at home? - Are some of these products more healthy than others? - Why? - Do you care about the way they are packaged? - What do you like? - What don't you like? - Is there anything that confuses you? - Do you believe everything on the package? - Why/ why not? 	<p>(Ensaff et al., 2015; Fielding-Singh & Wang, 2017; Freeman et al., 2018; Marcinow et al., 2017; Prichard et al., 2016)</p> <p>(Marcinow et al., 2017)</p> <p>(Marcinow et al., 2017; Tonkin, Meyer, Coveney, Webb, & Wilson, 2016)</p>
Practices	<p><i>In this section, we are going to talk about survey data that has been collected from high schools in Ontario. This data is from the COMPASS study. There are four important trends in this data that I would like to discuss with you today.</i></p>		
	<p>According to this research, women tend to consume fewer servings of MMA compared</p>	<ul style="list-style-type: none"> - What do women say about milk? - What do men say about milk? 	<p>Participants are asked to discuss the findings of the COMPASS data as they relate to their</p>

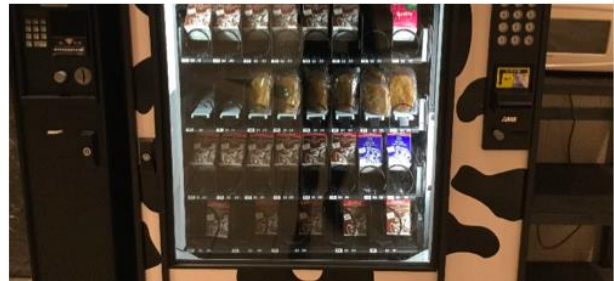
	<p>to men in high school. Why do you think this is?</p> <p>We also found that as students progress from grade 9 to grade 12, milk consumption declines. How would you explain this pattern?</p> <p>The students who are more likely to consume milk products are also the students who tend to meet nutrition recommendations and have a healthy body weight. Why do you think this is?</p> <p>Students who have more spending money tend to consume more milk products. Why do you think this is?</p>	<ul style="list-style-type: none"> - Why do you think students drink less milk in grade 12 than they did in grade 9? - What or who do you think influences students to have healthy habits? - Are these the students with part-time jobs? 	<p>own practices, and practices of students at large.</p> <p>-For the purpose of this study, participants were organized as women or men but I want to make this as inclusive as possible, so if you have any additional comments, please share!</p>
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	<p>Do they spend money on school property or off school property?</p> <p>What else can you interpret from this data?</p>	<ul style="list-style-type: none"> - Where do students tend to spend money during school time? - Are there any other patterns you see? 	
<p><i>Thank you so much for your feedback. I would like to move on to talking about your own MMA consumption now.</i></p>			
Milk consumption	<p>Within the milk and alternatives category, what products do you choose?</p> <p>Where are you when you choose to eat these products?</p> <p>Are there other ways you think about milk related to your health?</p> <p>Do you believe there is risk for you or for others if you were to consume any of these products in school?</p>	<ul style="list-style-type: none"> - Do you choose some milk products more often than others? - Milk, cheese, yoghurt, ice cream? - At school, at home, at a restaurant, at a friend's house? - Do you have any reason to avoid milk products? - How severe would the risk be? - Have you (or someone close to you) ever had a milk allergy? - Do you think food choices affect your popularity? 	(Tonkin, Coveney, et al., 2016)
Conclusion	<p>Is there anything else you would like to add?</p> <p>Do you have any questions for me?</p>		
<p><i>Thank you so much for your time. [brief discussion about volunteer hours]</i></p>			

APPENDIX E – Vending Machine Pictures

Slide 1. [Blank]

Slide 2.



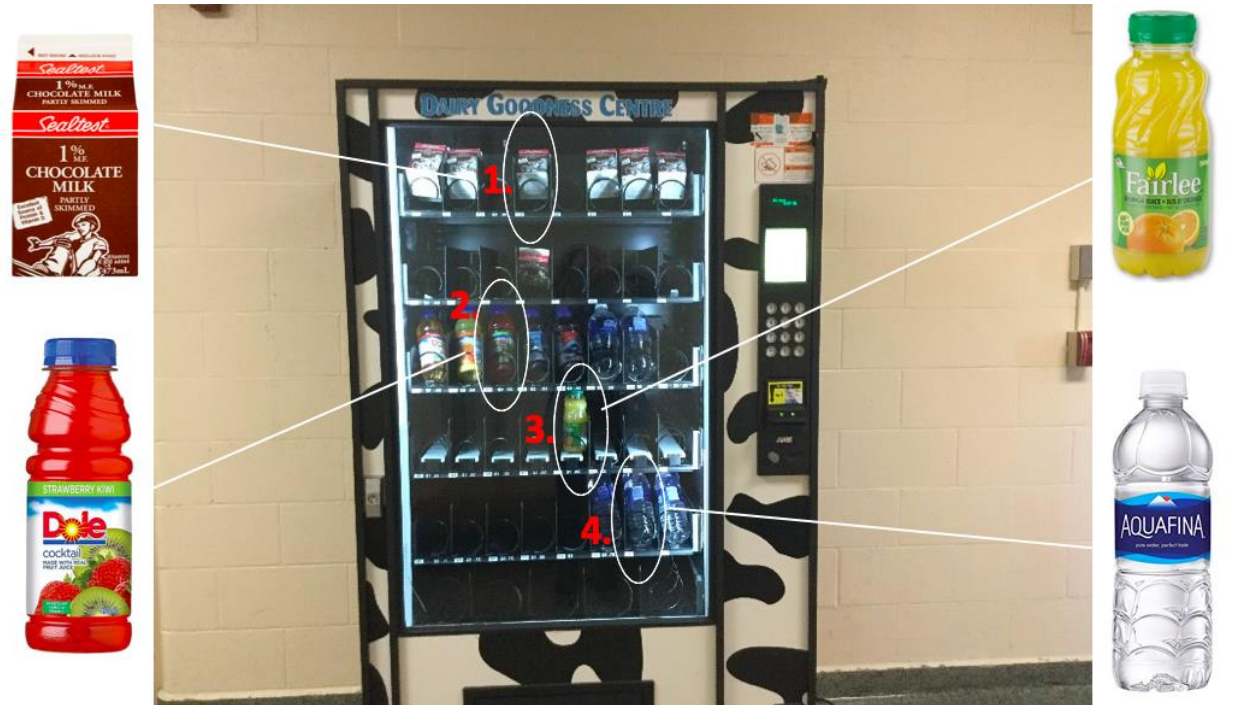
Slide 3.



Slide 4.



Slide 5.



Slide 6.



Slide 7.



APPENDIX F – Coding Manual

Deductive themes <i>Inductive themes</i>

Sociodemographics

- Census division
 - Regional Municipality of Waterloo (includes Kitchener, Waterloo, Cambridge)
 - Wellington County (includes Guelph)
 - City of Hamilton
 - Regional Municipality of Halton (includes Burlington, Oakville, Milton, Halton Hills)
 - Middlesex County (includes London)
 - Other (Region of Peel)

- Education level
 - Grade 9 - 10
 - Grade 11 - 12

- Gender
 - Man
 - Woman

- School board
 - English public
 - English Catholic
 - Private
 - Homeschooled or alternative

- *Cultural background*
 - Chinese
 - European
 - Indian
 - Middle East
 - Africa

- Travel time from home to school
 - No travel time – homeschooled
 - 5-10 minutes
 - 15-20 minutes
 - 25-30 minutes
 - 40-45 minutes
 - Greater than 45 minutes

- Primary mode of transportation to/from school
 - Walk
 - Bike
 - School bus
 - Public transportation (city bus, light rail train)
 - Drive (parent/guardian/self/carpool)

- Frequency of involvement in extracurricular activities
(If participant gives a range, code highest number in the range, ex. 2-3 times per week would be 3 times per week)
 - Never or rarely (ex. gives a specific instance that they stayed after school)
 - Monthly or seasonally and inconsistent (ex. every night for 3 weeks straight)
 - Once per week
 - 2 times per week
 - 3 times per week
 - 4 or more times per week

- Type of extracurricular involvement
 - Sports
 - Arts
 - Academic (ex. robotics)
 - Community service (ex. fundraising for school breakfast program)
 - Media (ex. communications club)
 - Fantasy (ex. Dungeons and Dragons club)

- Part time job
 - Yes
 - No

Knowledge

- Sources of health information
 - Health class
 - Health professionals (doctors, dietitians)
 - Government, university websites (ex. Health Canada)
 - Social media, peers (ex. Facebook, Twitter, YouTube, Instagram, blogs)
 - Parents
 - Product label
 - Other

- Areas of knowledge elicited from photo 2
 - Human nutrition
 - Natural environment
 - Animal husbandry
 - Fair trade

- Knowledge of milk production practices
 - Limited
 - Moderate
 - Extensive

Attitudes

- *Moral value ascribed to food packaging*
 - Lower standard to plastic
 - Higher standard to cartons
 - Higher standard to cans
 - Lower standard to cans
- *Symbolic value ascribed to food* (buying, preparing, or consuming a food that portrays something about their identity or attitudes)
 - Natural
 - Athleticism
 - Other
- *Emotional value ascribed to food*
 - Disgust
 - Joy
 - Sadness
 - Desire
 - Nostalgia
- Motivators for MMA selection
 - taste
 - circumstance (ex. time of day, before/after activity)
 - packaging
 - nutritional value
 - friends
 - knowledge of the product
 - parents
 - accessibility
 - Other
- Deterrents for MMA selection
 - Price
 - Taste
 - Packaging
 - Uneasy feeling
 - Less healthy
 - Other

- Slide 4 product selection (Participants are always asked in order although I will not explicitly reference slide numbers during the interview)
 - Milkshake
 - Flavoured milk (strawberry)
 - 2% milk
 - 1% chocolate milk
- Slide 5 product selection
 - 1% chocolate milk
 - 100% orange juice
 - Bottled water
 - Juice cocktail
- Slide 6 product selection
 - Bottled water
 - 100% apple juice
 - Diet pop- ginger ale
 - Diet pop- Pepsi
- Slide 7 product selection
 - Vitamin water
 - 100% orange juice
 - 100% apple juice
 - Carbonated lemonade

Subjective Norms

- *Descriptive norms* (real behaviours that others are undertaking)
 - Go off school property on break
 - Buy food/drinks at restaurant
 - Bring lunch/snacks from home
 - Bring re-usable water bottle
- *Social norms* (the perception of other people's opinions on how the individual should behave)
 - Healthy norm
 - Unhealthy norm
- *Motivation to comply with others*
 - Weak
 - Strong

- *Awareness of gender differences in milk/milk alternative (MMA) consumption*
 - Unaware
 - Low (difficulty or hesitancy answering the question)
 - High (does not hesitate to answer)

- MMA consumption - gender
 - Association of milk and building muscle/fitness
 - Different requirements (ex. men tend to consume more calories each day)
 - Fat/calorie content
 - Don't know
 - Variety (ex. women tend to consume greater variety of foods)
 - Association of MMA with acne
 - Other

- MMA consumption - age
 - Independence
 - Competing priorities (ex. focus on grades in grade 12)
 - Competing drinks and foods (ex. greater selection available, coffee replaces milk)
 - Different requirements (ex. grade 9-10s need more calories per day)
 - Association of milk with kids
 - Knowledge (tend to know more about foods with age)
 - Don't know
 - Other

- MMA consumption - spending money
 - Relative cost of MMA (ex. milk and milk alternatives are more expensive than other drinks and foods)
 - Foods brought from home contain less MMA compared to purchased foods(ex. Tim Horton's, Starbucks, pizza are commonly purchased and contain high amounts of MMA)
 - Disposable income (ex. those who have more spending money tend to spend money more freely, for example buying from vending machines which are generally overpriced)
 - Don't know
 - Other

- MMA consumption -BMIs, physical activity levels
 - Healthy role models
 - Health conscious (ex. those who are physically active tend to pay more attention to what they eat)
 - Improve strength/ sport performance
 - MMA has a reputation of being healthy
 - Don't know
 - Other

MMA consumption habits

- MMA products chosen most often
 - Cow's milk
 - Almond milk
 - Soy milk
 - Cheese
 - Yoghurt
 - Ice cream
 - Other
 - Don't tend to choose MMA

- Changes to eating habits since home in social isolation
 - Eating more
 - Eating less
 - Negative change
 - Positive change
 - No change

- Place where MMA would commonly be consumed
 - Home
 - School
 - Restaurant

- Other ways that MMA is associated with health
 - Bone health
 - Lactose intolerance
 - Mental health
 - Stronger hair/nails
 - Unhealthy

- Perceived risk associated with consuming MMA at school
 - None
 - Food safety
 - Other

- Reason to avoid MMA
 - Lactose intolerance
 - Eczema/ acne
 - Allergy
 - None
 - Vegan diet
 - Unnatural
 - Unethical
 - Other

APPENDIX G – Impacts of COVID-19

This research took place during the COVID-19 global pandemic. In light of these circumstances, interviews were held online using the platform GoToMeeting or over the phone, instead of in-person in order to prevent the spread of COVID-19. As such, it may have been more difficult for the researcher to build rapport with participants as non-verbal communication was often lost. The researcher adapted to the situation by listening for inflections in tone, changes in rhythm, and clarifying the researcher's understanding. In light of these drawbacks, the pandemic may have improved ease of scheduling, efficiency, and reduced costs.

Moreover, these circumstances likely posed several challenges to recruitment. For example, the Ontario Ministry of Education suspended the graduation requirement to complete 40 hours of community involvement over the 2020 school year. As remuneration for this study consisted of 2 volunteer hours, this was no longer an incentive for students to participate. Despite wide-ranging recruitment strategies, the researcher experienced waves of difficulty in recruiting participants that likely aligned with phases of the pandemic. For example, when the pandemic forced secondary school classes online there was a drop in interest as students were likely adjusting to their new learning environments. As students spent more time working from home, however, there was a resurgence in interest in participating in this research.