KINGSTON ADOLESCENTS’ KNOWLEDGE ABOUT THE SOCIAL DETERMINANTS OF HEALTH: ASSESSING AND ADDRESSING THE GAP

by

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Abstract

Upstream social determinants of health (SDH) have become widely acknowledged as lying at the root of poor health outcomes in Canada and globally. Conditions of social disadvantage restrict access to both social and physical resources, limiting the opportunity to actively pursue a healthy lifestyle. The Commission on the Social Determinants of Health maintains that educating the public about the SDH is a key step towards population health equity. Educating adolescents may be the most efficient and effective route of SDH knowledge dissemination, as youth are in a stage of peak learning, and are also easily reached through health education curriculum delivered in secondary school. However, health curriculum in Ontario is lacking in SDH content, placing a much greater emphasis on individual, lifestyle behaviors, such as diet, physical activity, and sexuality practices. Identifying a gap in SDH knowledge within this population, and evaluating the benefits of SDH education, is required to advocate for health curriculum revision to include SDH material. This project is designed as both a research study and SDH educational intervention. Concept mapping exercises were used to determine students’ knowledge of the determinants of health and the SDH. The impact of short term SDH education on student retention of SDH material was also evaluated. Student concept maps indicated that students attributed their health primarily to physical determinants versus social determinants; 44% of maps contained no SDH content. Statistical analyses prior to delivering the SDH lessons indicated that students’ SDH knowledge varied by their relative socioeconomic status (SES). Post-lesson analyses indicated however that student SDH knowledge increased significantly, and final levels of SDH knowledge following the SDH lessons was unaffected by socio-demographic
variables. Findings suggest that 1) there is an SDH knowledge gap in the adolescent population, 2) an inequity in adolescent SDH knowledge exists across socio-economic factors, and 3) that SDH education can potentially eliminate the inequity in SDH knowledge. Current Ontario health curriculum requires revision to include SDH material. Designing curricula to have an optimal influence on both student learning and adolescent health requires greater communication and collaboration from both educational institutions and health agencies in Canada.
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and analysis, Dr. Spencer Moore held a New Investigator Award from the Canadian Institutes of Health Research - Institute of Aging.
Contributions

SM and KK designed the research and contributed to the conceptualization of the study. KK collected the primary data, delivered the educational sessions, conducted data analysis and drafted the initial version of the manuscript. KK composed the introduction, literature review, and discussion sections. SM was the investigator of the Early Researcher Award of the Ontario Ministry of Research and Innovation, gave advice and input on the sessions, data analyses, and edited the manuscript for intellectual content and clarity. Both authors assume responsibility for the final content and approve the manuscript for submission. There are no conflicts of interest to report.
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Chapter 1

Introduction

The Social Determinants of Health (SDH), also referred to as the Fundamental Determinants of Population Health, represent critical socio-economic and political factors that influence a person’s health status throughout their life (Cardarelli, 2005; Marmot, 1999). Social determinants include income and educational status, employment opportunities, housing conditions, social exclusion, and social constructs, such as race and disability. Evidence of the effects of such factors on health occurs at multiple levels of influence and through a multitude of pathways (Mikkonen & Raphael, 2010).

Knowledge of the SDH is important because it enables and empowers individuals to take control over their own health and the health of their community. The enablement and empowerment of individuals as a route to better health is an emergent subject in health research and education dubbed critical health literacy (Pleasant & Kuruvilla, 2008; Freedman et al, 2009).

The SDH lie at the foundation of health promotion theory in Canada; Canada’s reputation as a leader in health promotion advocacy and practice that takes into account the SDH has been recognized for decades. Publications such as the LaLonde report in the 1970s and the Ottawa Charter of Health Promotion in the 1980s established a direction for health promotion, arguing that policy should acknowledge the impact of the social and economic environment on health, alongside lifestyle behaviours and choices.
However, what Canadians are actually taught in the educational system about health and the SDH may not accurately reflect the rich history of health promotion theory and advocacy in Canada (Canadian Public Health Initiative, 2005)

By understanding the SDH and the different pathways and mechanisms by which they influence health, the ability to intervene upon the SDH and impact health at the individual and population levels might better be realized (Marmot 1999). With greater public knowledge of the SDH, the development and implementation of health policies that intervene on the SDH has a greater chance of success.

The health-related values, attitudes, and behaviours which individuals maintain throughout their lives are often acquired during adolescence (Holmbeck, Williams, & Greenley, 2002). The existing curriculum for secondary school health education is heavily weighted towards the endorsement of individual-level behavior change, and fails to provide any discussion on the SDH in its mandatory curriculum (Ontario Ministry of Education, 1999, 2000). Through the development of a health education curriculum that informs students about the SDH and how they influence health, health promotion practitioners can help provide students with critical health literacy skills. With an emphasis on translating knowledge into action, critical health literacy improves the capacity of individuals and groups to make appropriate, informed choices that will benefit their health now and later in their lives (Nutbeam, 2000). Appropriately designed health education can thus contribute to population health. However, the education and
health sectors need to collaborate to revise health curriculum so as to produce optimal influence on health.

Understanding how adolescents perceive health, and what they believe to be the determinants of health, is a critical component of curriculum development. According to the assimilation theory of learning, prior knowledge of a topic is the most important constituent of successful learning (Ausubel, Novak & Henesian, 1978). When educators are fully aware of current levels of subject understanding, they can effectively organize their teaching for optimal knowledge transfer and uptake (Centre for Teaching and Learning, 2011). Assessing student level of SDH knowledge is the first step towards health curriculum revision.

Effective learning occurs when there is an amalgamation of prior knowledge with new knowledge (Ausubel, Novak & Hanesian, 1978). Both the evaluation of prior knowledge and the identification of learning improvements through comparative analysis can be accomplished through concept mapping. Concept maps are a cognitive teaching and learning tools that originated from the assimilation theory. Constructed using concept nodes, connective arrows, and linking words, concept maps allow individuals to extract, organize, and critically examine both existing and/or newly developed knowledge (De Simone, 2007). Concept mapping is a relatively new technique in research studies, but is used frequently in education to extract prior knowledge and to assess learning over time (Daley, Shaw, Balistrier, Glasenapp & Piacentine., 1999). Analyzing concept maps for desired content is a valid evaluation tool to assess an individual’s original knowledge
base about a particular subject, as well as any improvements in learning that occur (Wallace & Mintzes, 1990).

Funding for the study was received through the Early Researcher Award program of the Ontario Ministry of Research and Innovation. Dr. Moore, whose overall study was titled "Investigating the social environmental and behavioural pathways linking socioeconomic status to cardiovascular disease risk across the life course," received the award in April 2010. Youth outreach activities with local high school students were a critical component of the study. The following work was therefore designed as both a (1) research study to assess local high school student knowledge about the SDH and (2) an educational intervention to develop their knowledge about the SDH. The data collected from the assessment was examined using quantitative methods. The concept maps were analyzed for content by categorizing map concepts into groups of similar reference (i.e. Physical Activity, Diet, Environment, etc), and using traditional counting methods to evaluate the map frequency of each category. The outcomes for categories of map content as well as SDH knowledge were in the form of count data.

Manuscript one assessed student perceptions of the determinants of health and their prior knowledge of the SDH. Poisson regression analysis was used to assess the association of student socio-demographic characteristics and levels of SDH knowledge found on pre-intervention maps. Manuscript two assessed how SDH knowledge may have changed as a result of the educational intervention sessions. Paired t-tests were used to evaluate significant increases or decreases in the frequency of map categories, as well
as for SDH content. Poisson regression analyses were used to identify any significant associations between socio-demographic information and post-lesson SDH map content.

Approval for the project was granted from the Queen’s University General Ethics Review Board (GREB) and the Limestone District School Board (LDSB) prior to commencement. The information gathered from this research will be provided to the Kingston, Frontenac, Lennox & Addington (KFL&A) Public Health Unit and the LDSB to support any future health curriculum modifications.
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Chapter 2

Literature Review

2.1 The Social Determinants of Health

Upstream social determinants of health (SDH) have become widely acknowledged as lying at the root of poor health outcomes in Canada and elsewhere (CSDH, 2008). Conditions of social disadvantage restrict access to both social and physical resources, limiting the opportunity to actively pursue a healthy lifestyle (CSDH, 2008). The powerful influence of social and economic environments on health has been consistently supported through health research findings; in the most fundamental way, they are the preconditions to population health (CSDH, 2008; Health Canada, 1997). However, because health research has been traditionally rooted in behavioural models, there has been some resistance towards the shift from behavioural health theories towards more social constructionist approaches to health (Marmot & Wilkinson, 1999). Even today, most health interventions highlight the individual-level determinants of health, drawing on theories from cognitive and behavioral sciences. The focus on the relationship between individual lifestyle factors and health is one of the foundations of traditional epidemiological research, but this approach is often problematic and limited due to its neglect of contextual, sociological, and ecological influences (Ansari et al. 2003). Social, economic, and environmental factors have been downplayed, largely due
to their complexity and the challenges of designing and implementing interventions to address such factors (Nutbeam, 2000).

Health inequities within and between countries occur as the result of structural determinants and circumstances of day-to-day life that individuals, communities, and entire societies face (Marmot et al. 2008). The opportunity for individuals and groups to acquire and maintain good health is dependent on socioeconomic factors, products of the social and political systems within which we live (CSDH 2008). These are classified as the Social Determinants of Health (SDH), the pathways through which social and physical environments act upon an individual’s health. The Commission on the Social Determinants of Health (CSDH) refers to the SDH as the "causes of the causes,” reinforcing the social and economic disadvantages which deny individuals the opportunity for good health (CSDH, 2007, p.1153). As Michael Marmot, chair of the World Health Organization’s Commission on Social Determinants of Health (CSDH), wrote, “The unequal distribution of health-damaging experiences is not in any sense a ‘natural’ phenomenon but is the result of a toxic combination of poor social policies and programs, unfair economic arrangements, and bad politics” (CSDH, 2008, p.1). These political and economic influences are reflected in physical and social environmental features at neighborhood-, community-, and individual-levels, creating inequities in exposure to factors that negatively influence morbidity and the mortality of populations (Cardarelli, Moor, Low & Low, 2005).
2.2 Milestones in Canadian Health Promotion

The World Health Organization (WHO) briefly defines health promotion as “the process of enabling people to increase control over, and to improve their health” (WHO, 1998). Canada has a long history of health promotion advocacy. Canada's international leadership in health promotion began in the early 1970s with the creation of *A New Perspective on the Health of Canadians* by Marc Lalonde, known more famously as *The Lalonde Report* (Health Canada, 1997). The report suggested that the primary prevention of illness through *health promotion* should be an approach for improving health. Poor health should be, first and foremost, prevented by encouraging healthy lifestyles and environments. This was the first public acknowledgement by a national government that health was influenced by much more than the medical system alone: biological, environmental, and lifestyle factors were also seen to play a part (Health Canada, 1997).

In response to the Lalonde report, health promotion infrastructure began to develop at both federal and provincial governmental levels, thereby providing a foundation from which health promotion initiatives could develop. For example, in 1978 the Canadian government established the federal Health Promotion Directorate, which brought the country national and international attention through the support of the development and testing of new models of health practice that diverged from biomedical theory (Health Canada, 1997). The Lalonde report laid the foundation for the changes that were to happen in the following decades, specifically, the creation of the Ottawa Charter for Health Promotion.
Despite the attention given to health promotion in the 1970s, the health impact of the social determinants was not yet a priority for research. As a result, public health investments and legislation in Canada prior to the late 1980s did not acknowledge social influences. In 1986, Ottawa hosted the International Conference of Health Promotion. From this conference arose the Ottawa Charter for Health Promotion – the “guidepost for health promotion around the world” (Health Canada, 1997, p.3). The Ottawa Charter of Health Promotion continues to be the seminal publication in public health, encouraging an ecological approach to health that is now the underpinnings of successful population health promotion (McQueen and De Salazar, 2011; Sallis, 2006). At the time of its creation, the Charter addressed the shortcomings of previous behavioural and biomedical models. It simultaneously built upon the principles introduced in the Lalonde report to promote new ways of thinking about health, sparking debates surrounding attribution of effect; It was acknowledged and accepted that socio-cultural and economic factors were associated with epidemiological evidence that predicted health outcomes (McQueen and De Salazar, 2011). Borrowing visions from both Canadian and international documents, such as the WHO Constitution and the Alma Ata Declaration, the Ottawa Charter defined health as a lifelong commitment - a “project to pursue” (Potvin & Jones, 2011, 244). The Charter framed health as a positive endeavor and not just as the avoidance of illness or disease, and offered Canadians an alternative definition of health that went beyond the isolated medical setting where discussions of health were thought to belong (Potvin & Jones, 2011). Individuals were encouraged to view health as a “product of daily life,” one
focused on preventative action and exercised outside the healthcare environment (Potvin & Jones, 2011, p.244). In support of this perspective, the Ottawa Charter’s strategies are to “advocate, mediate, and enable” by “building healthy public policy, creating supportive environments, strengthening community actions, developing personal skills, and reorienting health services” (WHO, 1896). As a result, health promotion was able to establish itself as a unique discipline in Canada in the 1980s and 1990s. The government developed new federal, provincial, and territorial health programs, initiatives, infrastructure, and research agendas (Health Canada, 1997).

The Charter states,

Health promotion supports personal and social development through providing information, education for health, and enhancing life skills. By so doing, it increases the options available to people to exercise more control over their own health and over their environments, and to make choices conducive to health… Action is required through educational, professional, commercial and voluntary bodies, and within the institutions themselves (WHO, 1986).

The Lalonde Report and the Ottawa Charter publicly recognized that creating supportive environments was essential for population health and gave prominence to the SDH (WHO, 1986; Health Canada, 1997). According to the Ottawa Charter, the reciprocal relationship between individuals and their social and physical environments is unquestionable; individuals act upon, as well as are acted upon by, the social determinants of health (Ottawa Charter, 1986). The recognition and incorporation of the SDH into an understanding of health is inherent in the message that the Ottawa Charter
endorses. Effectively promoting and improving health is achieved only by educating and intervening on the SDH at multiple levels of influence. This includes targeting governing bodies and policy makers, researchers, and the lay public to reduce the gap between what we know about, and how we act upon, the SDH (Bacchi, 2008). Despite the nearly 40 years of health promotion advocacy in Canada that emphasize the SDH, there remains a lack of education on the SDH. Symbolic of the collective frustration of health promotion advocates worldwide, Wanless (2004) wrote that, “what is striking, is that there has been much written often covering similar ground…but rigorous implementation of identified solutions has often been sadly lacking” (3). The translation of knowledge about the SDH remains relatively static by critical players in research, communication, policy formation and public education.

2.3 The SDH and Critical Health Literacy

Literacy has been traditionally associated with individual skills, signifying the ability to read and write at a certain defined level of competency (Encarta Dictionary, 2007). Yet, being a literate individual extends beyond reading and writing skills. Literacy is more practically classified in term of what it allows us to do; literacy makes understanding possible (Nutbeam, 2000). Individuals require literacy in a variety of contexts, including that of health.

If aligned with the goals of health promotion, health education should inspire and enable action on the physical (e.g. diet, activity, etc) and social (e.g. social status and networks, access to resources) determinants of health. When health curriculum is
designed to include SDH content, and delivered strategically to ensure optimal understanding, curriculum may provide knowledge and skills that can empower individuals to take control of their health through action on the determinants of health, including broad social issues (Mogford, Gould & Devought, 2010). New definitions of health literacy which emphasize abilities and skills to attain or maintain health have redefined traditional understandings of what constitutes “health literate” individuals.

Health literacy has traditionally focused on effective communication strategies and education in the field of health (Freedman et al, 2009). Health literacy emerged as a discipline within the field of literacy studies in the 1990s in an attempt to understand the complex and often illogical relationship between knowledge and health behaviors (i.e., we do not always practice healthy behaviours despite knowledge of their benefits) (Pleasant & Kuruvilla, 2008). With the relative shift within the field of health promotion from the biomedical model of health to a more holistic perspective that included quality of life issues and the SDH, the definitions of health and health literacy have also been subject to change and debate. Traditionally, the definition of health literacy reflected the biomedical paradigm of thought, which views health in opposition to illness or disease (Blaxter, 2004). As such, health literacy referred to the ability to make informed medical judgments, i.e., the extent to which health information and medical services can reach an individual effectively and be used to make appropriate health-related choices (IOM, 2004 In Freedman et al. 2009). The American Medical Association (AMA) uses a similar description, but further restricts the definition, stating that health literacy is applicable to
healthcare settings alone (Pleasant & Kuruvilla, 2008). Such definitions focus on the relationship between a patient and his or her healthcare provider, and the ability of patients to understand and follow medical instructions and properly read prescriptions, medication labels, and appointment cards (Nutbeam, 2000). This understanding is reiterative of a much narrower view of health, one that ignores the root, social and environmental causes of health illiteracy found in the every-day environments we live within (Freedman, 2009). Others suggest that an inclusive definition of health literacy should reflect current health research findings, which support the link between societal-level factors and population health (Freedman, 2009). From this perspective, health literacy should focus on ensuring that individuals understand how to take preventative steps to avoid poor health in all aspects of their daily lives, as opposed to understanding how to simply comply with medical instructions following an adverse event.

The concept of health literacy has evolved to incorporate the SDH. Critical health literacy, which has also been referred to as public health literacy (Nutbeam, 2000), extends the traditional definition of health literacy to acknowledge the impact of the broader social environment on health without negating the importance of individual-level health literacy (Freedman et al., 2009). Freedman et al. (2009) define health literacy as the degree to which information can be attained, understood, internalized and acted upon by a person or group of people so as to contribute positively to the health of their community. In this context, knowledge is an integral component, meant to empower individuals and groups, providing them with the opportunity and capability to exert some
sort of control over their health (Pleasant & Kuruvilla, 2008). Briefly, public health literacy is the ability to act so as to promote health, acquired through the knowledge of how to do so competently. This knowledge encompasses all possible determinants of health, not just those which apply to biomedical models (Abel, 2007).

A broader understanding of health literacy has important implications for health communication and education strategies. If health literacy is a deliberate goal of the health educational system, effective teaching should target both an understanding of the material, and also the application of new information and skills. Comprehensive health education requires awareness of contextual factors influencing health, as well as an emphasis on the role of collective action as a means of intervention to create favourable health environments (Nutbeam, 2000, 264). In the context of social disadvantage, powerlessness often results from a combination of social risk factors associated with low socioeconomic circumstances, such as material deprivation and low community cohesion (Wallerstein, 1992). Empowerment and action can occur through building critical health literacy by teaching and encouraging acts of individual advocacy (e.g., donating money to a charity, volunteering in a community service), or acts of collective activism, which are meant to encourage the “development of strategies to reduce or eliminate problems at a structural level” (e.g., improving access to services, advocating for the alleviation of poverty, etc) (Mogford, Gould & Devoght, 2010, 9) By incorporating health literacy skills into school
health curriculum, empowerment can be used as a health-enhancing strategy that will be an asset to improving and maintaining population health in years to come (Wallerstein, 1992; Gray et al. 2005, p. 243).

2.4 The Role of Knowledge Transfer to Enable Health Literacy

Enhancing education and public awareness of the SDH is a step towards action in reducing health inequalities (CSDH 2008). The CSDH (2008) recommends that greater knowledge of the SDH should be encouraged outside the medical and health research community. Educational and related institutions have the potential to play an important role in promoting knowledge on the SDH since they act as an interface for dialogue between the academic world and the general public. Promoting the SDH at through channels that are available to the public will allow those beyond the community of health professionals and researchers to access critical information that will enable the development of health literacy skills (CSDH 2008).

As we continue to expand our understanding of the SDH through new research in multiple disciplines, the gap between what we know about the SDH and what we do also continues to grow (Bacchi, 2008). Closing this gap requires more effective knowledge transfer, ensuring that information is disseminated to and understood by those with the capacity to make optimal use of it. Better use of research evidence to inform policy requires appropriate translation of information to policy-makers and government bodies (Bacchi, 2008). Although policy is informed in part by research, it can also be influenced by what the public sees as important for the health and safety of their community. Public
priorities are paramount to creating new policy and/or making appropriate changes to existing policy (Murphy & Fanfard, 2012). Spreading knowledge about the SDH has the potential to create social change by making interventions on the SDH a public priority. Future changes in the SDH may be possible if they are presented and interpreted as manageable problems with feasible solutions.

Unfortunately, the barriers to building political will and public advocacy about the SDH in Canada are entrenched in the paradigms of both politics and health. A lack of political will of those with institutional and governmental authority to enforce policy change, as possible ideological disagreements may exist (Bacchi, 2008, 165). Because health is a highly politicized subject, political institutions tend to adopt different models of health which may have conflicting attitudes and beliefs on the relative significance of the social and/or physical determinants of health (Raphael & Bryant, 2006). For example, the dominant public health strategies in Canada tend to be individualistic and behaviorally based, largely due to long-standing neoliberal government principles (Raphael, 2006). By their nature, the SDH should reflect a structural approach to health and conflict with traditional behavioural models (Raphael, 2006). Research that is meant to inform policy change needs to be presented in a way that is consistent with the dominant political approach for efforts to modify policy to be taken seriously (Raphael, 2006). For successful knowledge transfer, health messages about or framed by the social determinants need to be targeted effectively so that their audiences will consider them relevant or meaningful (Frewer, Howard, Hedderley, & Shepherd, 1996). In this context,
knowledge translation to the public about the SDH needs to emphasize the downstream effects that upstream determinants will influence, illustrating the cultural and societal factors that predispose individual health disparities.

Additionally, different political beliefs and attitudes of the public may pose another barrier to policy implementation since they affect the support of and receptivity to efforts of health education programs (Bell, Schermer and Vernon 2009). It may be important to take into account the beliefs, attitudes and values of the target audience in order to communicate SDH information in a way that effectively translates information and facilitates the development of critical health literacy. The successful movement of information among researchers, political bodies, and the general public all need to be considered to narrow the gap between the knowledge we have about the SDH and our ability to act upon them (Bacchi, 2008).

2.5 The Importance of Educating Adolescents about the SDH

The knowledge that many health researchers and professionals possess requires translation to the public to be used as a resource for achieving and maintaining population health. The exposure to health information may be most beneficial in youth since adolescents have high learning capabilities, as well as great potential to use health information to their advantage now and as they age (Toga, Thompson & Sowell, 2006; Miller, Freedman & Wallis, 2002). Positive health values, attitudes, and behaviours that are formed at young ages are likely to continue to be encouraged and built upon as youth
transition into adulthood (Holmbeck, Williams, & Greenley, 2002). Additionally, public secondary schooling during adolescence may be the last opportunity for many individuals to learn about health within the educational system free of cost (Wharf Higgins, Begoray & MacDonald, 2009).

Comprehensive health education in secondary school is essential to promote and produce optimal health outcomes throughout the life course. Following a preventative framework, education should begin at an early age to achieve and maintain good health, as well as to minimize the risk of poor health experiences in the future. A comprehensive health education should include critical health literacy by emphasizing (1) an appreciation of the full scope of the determinants of health, (2) an understanding of how those determinants act upon individuals to influence their health, and (3) capacity building to put skills and understanding into action, thereby allowing adolescents to experience a greater sense of control over their own health as they mature (Nutbeam, 2000). Supporting critical health literacy in adolescence is important in building the foundations for a future generation of adults that better understand the complex ways in which social and environmental factors can influence their health behaviors and conditions.

2.6 The Ontario Provincial Health Curriculum

The dissonance between dominant behavioural models and underlying SDH theory is an obstacle for SDH education initiatives (Raphael, 2006). Traditional models emphasize the relationship between health risk behaviours and health outcomes, and tend
to overlook the social conditions which necessitate said health risk behaviours. Although social science is slowly shedding the reputation of being the “softer” discipline (“In Praise of Soft Science”, 2005), policy changes have yet to reflect this ongoing shift. The biomedical model of health is the contemporary foundation of health and health education in North America (Blaxter, 2004). Conventionality is one of the most powerful influences on curriculum development, as decisions regarding what topics are and are not taught are largely determined by established social values regarding what is important or true (Tones, 2005). As a consequence, the secondary school health curriculum in Canada is still rooted in the biomedical model of health in that it focuses primarily on teaching adolescents about health behaviours.

In Canada, school curriculum is influenced by federal policy frameworks, but developed at the provincial level (See Figure 1). Secondary schools in Ontario currently operate under curriculum standards developed in 1999 (Junior grades 9 and 10) and 2000

![Figure 1. Curriculum Contributors](image)
The only health and physical education course which is a mandatory prerequisite to complete secondary school is Grade 9 *Healthy Active Living Education*, which focuses on personal lifestyle factors including physical activity, sexual education, social skills and conflict resolution, and injury prevention (Ontario Ministry of Education 1999). Nowhere in the mandatory health curricula is there a discussion of the SDH, despite strong recommendations globally for the integration of SDH learning resources into the standard curriculum (CSDH, 2008).

Grade 10 *Healthy Active Living Education* has similar content and is an extension of the skills and knowledge learned at the Grade 9 level. Senior classes are focused on “singular needs and challenges”, incorporating “skills and knowledge relating to healthy growth and sexuality, mental health, personal safety and injury prevention; lifelong participation in physical activities, and greater responsibility for personal learning, behaviour, physical fitness, and health” (Ontario Ministry of Education, 2000, 3). Course options include Grades 11 & 12 *Healthy Active Living Education*, Grade 11 *Health for Life*, Grade 12 *Exercise Science*, and Grade 12 *Recreation and Fitness*. Only two of 13 course units outlined in senior health courses state that students will discuss the personal and social factors that enhance and influence health on the individual level, as well as how community health can be influenced by environmental factors (Ontario Ministry of Education, 2000). An overwhelming majority of course content at the senior level is directed toward promoting the value and maintenance of physical activity and active
lifestyles (11/12 *Health Active Living Education*), understanding physical movement of
the body (*Exercise Science*), and building leadership skills through physical activity
endeavors (*Recreation and Fitness*) (Ontario Ministry of Education, 2000). There is
limited attention to the SDH in the current health education curriculum standards at both
the junior and senior levels.

At the local level, school boards are encouraged to adopt models or frameworks
that create positive learning environments for students through an emphasis on healthy
school practices and policies. However, even these frameworks, which advocate for a
holistic approach to health through action at the school level, tend to be heavily one-
sided, placing a greater importance on individual health influences and behaviours, such
as nutrition, physical activity, and sexual health education. The *Healthy Schools
Recognition Program*, introduced in 2006 by the Ontario Ministries of Education (ME)
and Health Promotion (MHP), is one of multiple programs offered to publicly-funded
elementary and secondary schools in the province (Ontario Ministry of Education, 2011).
The program’s *Foundations for a Healthy School* framework, proposes four core
components of a healthy school: (1) high quality instruction and programs, (2) a healthy
physical environment, (3) a supportive social environment, and (4) community
These elements, which are promoted at a provincial level, are echoed in Canada’s
National *Healthy Schools* program, which identifies said components as “interrelated
pillars” of “comprehensive school health” (Lambert & MacDougall, 2009; Ontario
Ministry of Education, 2009). The Ministries have also outlined implementation initiatives for each component, some of which include ensuring daily physical activity for students, and implementing MHP funded programs, such as Smoke Free Ontario, Active and Safe Routes to School, the Eat Smart Cafeteria Program, and the Swim to Survive Program (Ontario Ministry of Education, 2009). The initiatives are predominantly targeted towards implementing or promoting activities that address individual, behavioural determinants of health.

The Ontario Public Health Standards (OPHS) dictates that local public health units (PHUs) are required to work in partnership with secondary schools to educate students on topics related to tobacco enforcement, food safety, immunization, and oral health (Lambert & MacDougall, 2009). Similarly, the OPHS require PHUs to collaborate with Ontario schools to ensure the following programs are in place: (1) Chronic Disease Prevention (healthy eating, healthy weights, physical activity, tobacco control, alcohol use, and exposure to ultraviolet rays), (2) Child Health (oral health surveillance and screening), and (3) Vaccine Preventable Diseases. PHUs are also encouraged to deliver programs concerning substance use and injury prevention, reproductive health, child health, sexual health, infectious disease prevention and control, health hazard prevention, and emergency preparedness (Lambert & MacDougall, 2009). The connection that PHUs have to educational institutions through their health education responsibilities could be an effective way to integrate SDH material into the secondary school system. PHUs can be pivotal players towards engaging school boards more actively about the SDH, and
ensuring more adequate representation of the SDH within the health curriculum. Unfortunately, current health education provided by PHUs concentrates almost entirely on health behaviours.

In short, education about the SDH in Canada is not included in provincial secondary school health curricula, federal healthy school frameworks, or local PHU programs. A lack of knowledge and understanding about the SDH in the Canadian adolescent population is plausible, as well as likely. Teaching on the subject is clearly limited, which suggests that educators and administrative professionals themselves may not have adequate understanding of SDH material to recognize its importance or feel comfortable teaching or advocating more for SDH material within the health education curriculum.

Based on the guidelines for secondary school health curriculum content, adolescents are well-educated about behavioral and lifestyle risk factors, such as physical activity, nutrition, substance use, and safe sexual practices (Ministry of Education, 1999). Educating adolescents about the SDH has been said to result in the attainment of critical health literacy skills, and ultimate action on the SDH through political awareness and advocacy (Mogford, Gould & Devoght, 2010). This suggests that health interventions targeted at youth result in both an increase in knowledge about a certain concept, and the transformation of that information into a behavioural response. A variety of programs have been implemented and evaluated that target behaviours such as physical activity, diet, safe sexual practices, substance use, and others health topics that have had positive
behavioral outcomes (Fahlman, Dake, McCaughtry & Martin, 2008; Monty, Handu, & Chmel 2008; Tsorbatzoudis, 2005). Review of different school-based health interventions suggest that although findings are mixed, programs which use multiple methods to translate information and build skills are most effective in changing behaviour in child and adolescent populations (Jackson, Geddes, Haw & Frank, 2011; Neville, O’Hara & Milat, 2009; Roberts, Ashbusy, Rootman & Sahay, 2006; Walcott, 2007). Knowledge about the SDH also has the potential translate into behavioural change if taught effectively and if supplemented with hands-on, interactive skill building activities and exercises (Mogford, Gould & Devoght, 2010).

2.8 Concept Mapping as a Health Education Tool

Identifying knowledge gaps about the SDH in adolescent populations can inform potential secondary school health education curriculum amendment. Assessing the prior knowledge that adolescents have about the SDH is the first step towards creating and advocating for greater curriculum content on the SDH. Policy-makers require evidence of knowledge gaps to adjust educational legislation to address discrepancies. Concept mapping is one way in which student levels of knowledge and understanding can be extracted, documented, and evaluated.

Novak (1998) defined a concept as a word or label that represents an event or object. Concept mapping is a creative and interactive method for visually organizing thoughts, and is commonly used in teaching, learning and assessment in educational
settings (Hay, Kinchin & Lygo-Baker, 2008; Williams, 2004; Hill 2005). Concept mapping helps encourage meaningful and critical thinking in students, enabling them to identify, appraise, restructure, and build upon existing knowledge systems (Hill, 2005). Concept maps are simple enough to create since they consist of different concept nodes connected to one another by arrows, which represent the existence or direction of the relationship between the concepts (Kwok, 2010).

Concept maps arose from the assimilation theory of learning, which argues that effective learning requires an amalgamation of prior knowledge with new knowledge (Ausubel, Novak & Hanesian, 1978). According to the assimilation theory of learning, meaningful learning occurs when new information is integrated into the existing foundation of knowledge (i.e., prior knowledge). This integration requires three main elements: (1) prior knowledge of a topic, (2) meaningful material, and (3) the learners’ intent and ability to integrate the new material into their prior knowledge (Mayer, 1979). Prior knowledge however is the most important in this process. Once prior knowledge is assessed, educators can effectively plan their teaching for optimal meaningful learning – an important educational goal (Mayer, 2002).

In constructing an individualized map of a particular topic, individuals must consider how different, but related, concepts are linked. In doing so, they are forced to think about the underlying mechanisms that form the relationships they have identified. This not only reveals to educators and evaluators their prior knowledge levels, but also
reinforces a mapper’s own personal understanding of the topic by exploring the knowledge base that they may already possess but rarely activate. (De Simone, 2007).

Concept maps can perform several roles as educational tools. They can be used strategically for learning and instructional purposes, planning curriculum, and evaluating students’ understanding of concepts (McClure, Sonak & Suen, 1999). As an evaluation tool, students can construct a concept map based upon the material taught in single lesson or entire course load (Moreira, 1985). Observing and recording the changes in the content of the map or changes in the relationships among concepts that are identified allows evaluators to track learning progress (Pilcher, 2011).

Research on the use of concept maps as evaluation tools has shown considerable variation across studies in how concept maps are evaluated, particularly in assessing knowledge and learning (Cline, Brewster & Fell, 2010). Computer technology has been developed for concept mapping. However, in classroom settings physical maps are commonly drawn by students using a pencil and paper (McClure, Sonak & Suen, 1999). Common methods of assessing paper-made concept maps are 1) structural, 2) relational and 3) holistic (McClure, Sonak & Suen, 1999). Developed by Novak & Gowin (1984), structural scoring is the most technical method, assessing the quality of the concepts and propositions (linking words), and the hierarchical positioning of concepts in the map (McClure, Sonak & Suen, 1999). Relational scoring, created by McClure & Bell (1990), focuses more predominantly on identifying meaningful relationships illustrated in the map by assessing the quality of the prepositions between concepts. Lastly, the holistic
scoring technique assesses understanding by approaching the concept map as a whole, placing less importance on the individual components and more on the quality of the overall finished product (McClure, Sonak & Suen, 1999).

Concept mapping enables learners to extract existing and newly developed knowledge, and to arrange old and new knowledge in such a way that is logical to those individuals. The instrumental achievements of concept mapping align with the philosophy and goals of critical public health literacy – concept mapping allows for the optimal understanding and more effective use of knowledge. The nature of the activity itself requires mappers to make connections between concepts where they see fit. Visual linkages imply knowledge about the pathway(s) through which concepts are connected (De Simone, 2007). Recognizing these connections is particularly important in understanding how the social determinants of health exert their influence since the effects are often indirect (Baum, Begin, Houweling & Taylor, 2009). A causal chain of events that leads to poor health outcomes does not begin with superficial lifestyle factors; unhealthy behaviors are manifestations of prior interactions between components of social disadvantage (Marmot et al, 2008).

2.9 Research Design

The following study was designed as both a pilot research investigation and an educational intervention. Funding for the study was received through the Early Researcher Award program of the Ontario Ministry of Research and Innovation. Dr.
Moore, whose overall study was titled "Investigating the social environmental and behavioural pathways linking socioeconomic status to cardiovascular disease risk across the life course," received the award in April 2010. Youth outreach activities with local high school students were a critical component of the study. The following work was therefore designed as both a (1) research study to assess local high school student knowledge about the SDH and (2) an educational intervention to develop their knowledge about the SDH. As a research study, the project examined the association of a range of individual factors with a student's knowledge of the SDH. As an intervention, the project targeted adolescent knowledge of the SDH in the effort to increase their knowledge of the SDH. The intervention's primary goal was to educate students about the Social Determinants of Health (SDH), a concept that is not formally taught within the Ontario classroom setting. SDH health lessons were given at seven senior-level health classes located in three secondary schools in the Kingston and surrounding areas. The lessons took place over two class periods, each period ranging from 60 to 75 minutes in length.

The first period included an introduction to concepts of health promotion theory, (including the upstream versus downstream determinants of health, behavioural versus social health models, the social-ecological model of health, etc), followed by three core SDH topics. These were (1) socioeconomic status, (2) social networks and/or social capital, and (3) the local neighbourhood environment. We administered a pre-educational session questionnaire to assess what students already know about the SDH and gather socio-demographic and –economic information about participants. We also held a pre
and post-intervention concept-mapping exercise to assess prior knowledge and identify any potential changes in the students’ knowledge of the SDH following the intervention. The second period was primarily activity based, meant to engage the students and allow them to see examples of the SDH in real-life situations by using *The Last Straw* board game. *The Last Straw* is an interactive teaching tool designed explicitly for education and critical thinking about the SDH (Rossiter & Reeve, 2008). By creating demographically and economically different character narratives and following them from childhood to old age, students were meant to develop an understanding of the differential vulnerability, exposure, and ultimately differential health outcomes that the SDH may create within and between populations. The ultimate goal was to show students realistic examples of how the SDH shape the health of individuals, and to encourage critical thinking towards the accumulating effect that positive and negative experiences have on overall health over a lifetime (Rossiter & Reeve, 2008).

Manuscripts 1 and 2 have different sample sizes due to methodological design changes that occurred after implementation of the lessons had already began. The decision to evaluate the impact of the intervention by having the students create a second concept map following the lesson delivery was made after two classes had already received the lessons. Paired data were not available for the first 17 students who participated because they did not complete post-lesson concept maps, resulting in a smaller sample size in Manuscript 2 than in Manuscript 1.
Manuscript one used the baseline data on 62 students to examine their perceptions of the determinants of health and, more specifically, their knowledge of the social determinants. Our aim was to evaluate student’s perceptions of the determinants which influence their health. That is, the extent to which students attributed health to physical determinants (diet, physical activity, etc) compared to the social determinants of health. Additionally, we examined whether there were any socio-demographic or -economic patterns to be found in students' knowledge of the SDH. Findings are discussed in light of the burgeoning literature on educating and increasing public awareness of the SDH.

Manuscript two used the pre- and post-intervention data to evaluate the success of the educational intervention through a comparison of their SDH knowledge before and after the lessons. Our goal was to increase the SDH content found in student post-lesson maps by increasing their understanding of SDH topics. Similar socio-demographic and -economic factors are examined in the second manuscript, but the focus is on educational policies and health promotion policies within Ontario. Curriculum revision is framed as a route to promote health equity amongst adolescents by counteracting the affects of relative social disadvantage on health-related knowledge, understanding, and action.

The results of this type of research can be applied to both the fields of health promotion and education. In the case of the former, identifying and addressing knowledge gaps concerning important health information can be utilized as a health promotion strategy to build critical health literacy and empower the adolescent population to influence their health through action on the SDH. In terms of the latter,
determining student receptivity to SDH educational material and assessing improvements in learning outcomes can be used to advocate for health curriculum modification, with the goal of reducing inequities in adolescent health knowledge and understanding.

2.10 Conclusion

Justification for educational interventions needs to extend beyond that of just educating individuals; educational policies and curriculum can be a powerful tool for creating changes in population health. However, institutional support and collaboration is required for the success and sustainability of policy change. Collaboration among relevant provincial ministries, and also between municipal PHUs and school boards is necessary when designing and implementing interventions centered on health and/or education.

Curriculum amendment is a powerful and effective way to combine health and education, with a potential to create large-scale positive change. Curriculum guidelines dictate what is taught, and also decides what falls through the cracks of the education system. Content needs to be updated to reflect new debates in public health concerning the social determinants; new research and knowledge requires translation to the public in order for it to be seen and used as resource for improving the health of populations. My research contributes to this by demonstrating the SDH knowledge gap that exists within the adolescent population. However, it also presents a solution to the problem, illustrating the positive effects that SDH curriculum has on both student learning outcomes and reducing inequity in adolescent health knowledge.
2.11 Research Questions

The following research questions guide the proposed studies and analyses

1. What determinants (social, behavioural, and physical) do Ontario high school students associate with health?

2. To what degree do Ontario high school students know about the SDH and their influence on health?

3. What is the short-term learning impact of an SDH educational intervention on student perceptions of the social determinants of health

4. Are there any socio-demographic or economic patterns in students' baseline and post-intervention knowledge of the SDH?
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Chapter 3

Kingston, ON Adolescents’ Perceptions and Knowledge about the Social Determinants of Health

3.1 Introduction

Upstream social determinants of health (SDH) play an integral role in health promotion research and practice. The SDH fundamentally influence health through their effects on morbidity and mortality (Raphael, 2006). Despite a rich history of health promotion in Canada, there has been very little research examining the Canadian public’s perceptions of the SDH (CPHI, 2005). When conducted, studies usually focus on adults rather than adolescents. Research investigating adolescent health knowledge has tended to focus on adolescent knowledge about risky health behaviours (e.g. tobacco and alcohol use, sedentary activity, poor nutrition, safe sexual practices, etc) and not about their understandings of the SDH. Less is known about the behavioural factors that adolescents perceive significant to their health, and whether they even recognize the role of social determinants on health (SDH). In short, as expressed by Woodgate and Leach (2010), the focus has been on what youth do, not what they think and feel (Woodgate & Leach, 2010, 1174). Health-related values, attitudes and behaviours formed in adolescence have been shown to predict significant health risks in adulthood, including issues of social and economic disadvantage (Holmbeck, Williams, & Greenley, 2002; Woodgate & Leach, 2010). Knowing what youth perceive as critical health determinants can help to identify
gaps in health and educational curriculum and contribute to the design of programs that will foster the broader understanding of health enshrined in the Ottawa Charter.

Preventative health action first and foremost requires individuals and groups to value the determinants of health. When asked to identify the most important factors that contribute to good health, Canadian adults tend to attribute greater influence to personal health behaviours, such as physical activity and diet than to social and economic conditions (CPHI, 2005). Only one in three Canadian adults believed that social, economic, and environmental conditions had an impact on health (CPHI, 2005). The CPHI findings are limited however to those older than 18 years (CIHI, 2005). The research that has explored Canadian adolescents' perceptions of health has tended to show similar results as those found in Canadian adults. Youth had broad understandings of health, attributing health to a variety of distinct domains including physical, mental, social and environmental health. However, personal behaviors and practices, specifically exercise and diet, were seen as the main determinants of health (Woodgate & Leach, 2010). Youth descriptions of the connections between the SDH and health outcomes have been described as vague and disjointed, suggesting a noticeable lack of understanding (Woodgate & Leach, 2010). The lack of relevant literature on how Canadian adolescents perceive the determinants of health has created a noticeable gap in health education and promotion research.

Enhancing education and public awareness of the SDH is a step towards action in reducing health inequalities (CSDH 2008). The CSDH (2008) recommends that greater
knowledge of the SDH should be encouraged outside the medical and health research community. The exposure to health information may be most beneficial in youth, as adolescents have high learning capabilities, as well as great potential to use health information to their advantage now and as they age (Toga, Thompson & Sowell, 2006; Miller, Freedman & Wallis, 2002). Positive health values, attitudes, and behaviours that are formed at young ages are likely to continue to be encouraged and built upon as youth transition into adulthood (Holmbeck, Williams, & Greenley, 2002). Youth report that their exposure to health information is heavily weighted towards lifestyle behaviours (Woodgate & Leach, 2010). The majority of health information is delivered to adolescents through the health education curriculum within schools; educational policies are thus in a powerful position to influence adolescent knowledge and understanding of health and the SDH (Marks, 2009). Review of Ontario guidelines for secondary school education reveals that health curriculum weighs heavily towards lifestyle behaviours (Ontario Ministry of Education, 2000, 3). Current health education is relatively void of SDH theory and content, and reinforces the biomedical model of health within secondary school health programs. Our research on adolescent perceptions of health is a step towards determining a potential knowledge gap in Ontario youth concerning the SDH. Conclusions drawn will inform suggestions for future Ontario health curriculum modification to better educate students about the SDH alongside mainstream physical determinants.
3.2 Research Questions

Three questions guide the proposed study and analyses:

5. What determinants (social, behavioural, and physical) do Ontario high school students associate with health?

6. To what degree do Ontario high school students know about the SDH and their influence on health?

7. Are there any socio-demographic or -economic patterns in students' knowledge of the SDH?

3.3 Data & Methods

3.3.1 Sample and participants

The Limestone District School Board (LDSB) comprises eleven secondary schools located in Kingston and the surrounding areas. Two of the schools are remote (approximately 75km and 111km away from the LDSB main offices) and were excluded from the study due to travel constraints. Initial contact was made with eligible schools in December 2010; by February 2011, three schools showed interest in participating. The study focused on the health and physical education classes within each school. In total, six health and physical education classes took part in the lessons. At the time of the project, a total of 133 students were registered in the six classes. Approval to conduct research in the Kingston secondary school system was granted from the LDSB and the Queen’s University General Research Ethics Board (GREB) in August of 2010. Students
could take part in the educational session without consent but were required to have a signed consent from their parents to participate in the research component.

3.3.2 Measures

3.3.2.1 Instruments

The students completed a self-administered questionnaire consisting of six items used to assess participants' socio-demographic background (Appendix II). Following completion of the questionnaire, students were instructed on how to create a simple concept map to demonstrate their individual understandings of the determinants of health. Students were encouraged to think about how the health concepts that they identified were related to one another, and to illustrate connections where relationships were thought to exist. Each map began with the word “health” as the focal point; students were given 10-15 minutes to build their maps. Knowledge of health and of the SDH was evaluated by the enumeration of different types of concepts present in student maps (Passmore, 2004; Besterfield-Sacre et al, 2004).

3.3.2.2 Socio-demographic Variables

Socio-demographic and -economic variables included participants’ high school of attendance, grade level, and maternal educational attainment. Students self-reported their grade level. Socioeconomic status (SES) was based on students' reports of maternal educational attainment as being (1) less than high school, (2) high school or equivalent, (3) college degree (4) university degree, or (5) advanced university degree (MA, MSc,
PhD, MD). Responses were later dichotomized into either having attained a university education or not. Maternal education was chosen to estimate SES because it has been shown to be a stronger predictor of childhood health than paternal education (Zhong-Cheng, Wilkins & Kramer, 2006; Cochrane, Leslie & O’Hara, 1982).

3.3.2.3 Map Measures

To evaluate the SDH knowledge of students and the determinants they most frequently associated with health, three distinct measures from the concept maps were developed: (1) diversity, (2) frequency, and (3) knowledge about the SDH. To assess diversity, the concepts found in each map were sorted into 12 different conceptual categories (Appendix III). Diversity reflects the number of different conceptual categories that a student included in their map, and was categorized into low (<4 categories), medium (4-7 categories), and high (8+) levels. Frequency reflects the number of concepts within each category drawn on a map. Knowledge about the SDH was determined by counting SDH-related content within each map (Appendix III).

A primary coder classified the different concepts found within each of the 62 maps into one of the 13 categories and determined whether any of the concepts were related to the SDH. Face validity and content validity was determined for each concept category by defining each using definitions established by sources such as the Merriam-Webster Dictionary, the World Health Organization (WHO), the Canadian Society of Exercise Physiology, and relevant peer-reviewed sources. To assess the reliability of the classification method, a second coder classified 20% of the concepts found within the
maps into separate health categories based on criteria developed by the primary coder. The Cohen’s kappa inter-coder reliability coefficient was 0.885. Discrepancy occurred primarily over the concept of “fit” and to whether "fit" related more to physical activity or personal appearance (2.7%), and to whether concepts such as “determination” and “self control” should be considered mental health or personality traits (2.7%).

3.3.3 Analysis

Bivariate and multivariate Poisson regression analyses were conducted to estimate the association between socio-demographic and –economic variables and SDH map content. Poisson regression was chosen since the outcome variable was in the form of count data, i.e., the number of SDH concepts in student maps. Analyses were performed using Stata version12.

3.4 Results

3.4.1 Survey Content

3.4.1.1 Sample characteristics

Consent return rates were 46.6% for a final sample size of 62 students from three secondary schools in the LSBD in Kingston, Ontario. There was a greater percentage of female (53.2%) than male (46.8%) participants. The majority of the students were in grade 11 (75.8%), followed by grade 12/13 (16.1%) and grade 10 (8.1%). Over 96% of the sample had resided in Kingston since the beginning of their secondary schooling. In terms of maternal education, nearly 53% of the participants’ mothers had a university degree (Table 1).
Table 1. *Sample Socio-demographic and -Economic Characteristics (n=62)*

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>No. (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sex</td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>29 (46.8)</td>
</tr>
<tr>
<td>Female</td>
<td>33 (53.2)</td>
</tr>
<tr>
<td>High School</td>
<td></td>
</tr>
<tr>
<td>KCVI</td>
<td>28 (45.2)</td>
</tr>
<tr>
<td>LSS</td>
<td>18 (29.0)</td>
</tr>
<tr>
<td>NDSS</td>
<td>16 (25.8)</td>
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<tr>
<td>Grade</td>
<td></td>
</tr>
<tr>
<td>Grade 10</td>
<td>5 (8.1)</td>
</tr>
<tr>
<td>Grade 11</td>
<td>47 (75.8)</td>
</tr>
<tr>
<td>Grade 12</td>
<td>8 (12.9)</td>
</tr>
<tr>
<td>Grade 13 (Returning)</td>
<td>2 (3.2)</td>
</tr>
<tr>
<td>Mother’s Educational Attainment</td>
<td></td>
</tr>
<tr>
<td>&lt; University</td>
<td>29 (46.8)</td>
</tr>
<tr>
<td>Undergraduate/Advanced University Degree</td>
<td>33 (53.2)</td>
</tr>
</tbody>
</table>

3.4.2 Map Content

3.4.2.1 Diversity and Frequency of the Determinants of Health

Maps contained an average of 12 concepts (SD=5.65) with the range from 2-31 concepts. Maps had an average diversity of 5.4 (SD=1.8) different categories of health. The most comprehensive map contained 10 different categories of health. The most commonly occurring categories of concepts were physical activity, diet/nutrition, and mental health (Table 2).
Table 2. Summary Statistics for Frequency of Map Concepts in Categories 1-12 
\((n = 62)\)

<table>
<thead>
<tr>
<th>Category</th>
<th>Mean Frequency</th>
<th>Std Dev</th>
<th>Minimum</th>
<th>Maximum</th>
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</thead>
<tbody>
<tr>
<td>Physical Activity</td>
<td>2.42</td>
<td>1.53</td>
<td>0</td>
<td>7</td>
</tr>
<tr>
<td>Diet/Nutrition</td>
<td>2.37</td>
<td>2.04</td>
<td>0</td>
<td>12</td>
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<tr>
<td>Mental</td>
<td>1.92</td>
<td>1.86</td>
<td>0</td>
<td>8</td>
</tr>
<tr>
<td>Social</td>
<td>1.26</td>
<td>1.93</td>
<td>0</td>
<td>8</td>
</tr>
<tr>
<td>Genetic</td>
<td>0.5</td>
<td>1.05</td>
<td>0</td>
<td>6</td>
</tr>
<tr>
<td>SES</td>
<td>0.65</td>
<td>1.23</td>
<td>0</td>
<td>5</td>
</tr>
<tr>
<td>Appearance</td>
<td>0.48</td>
<td>1.05</td>
<td>0</td>
<td>6</td>
</tr>
<tr>
<td>Environmental</td>
<td>0.73</td>
<td>1.07</td>
<td>0</td>
<td>5</td>
</tr>
<tr>
<td>Substance use</td>
<td>0.23</td>
<td>0.66</td>
<td>0</td>
<td>3</td>
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<tr>
<td>Daily Life</td>
<td>0.29</td>
<td>0.55</td>
<td>0</td>
<td>2</td>
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<td>Sexual</td>
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<td>Medical</td>
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<td>1.34</td>
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<td>SDH</td>
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<td>3.0</td>
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<td>15</td>
</tr>
</tbody>
</table>

3.4.2.2 Social Determinants of Health Knowledge

The map with the highest level of SDH knowledge contained 15 SDH concepts. However, students who included many SDH concepts were somewhat repetitive with their use, resulting in larger maps with little variation (e.g., students may have “income”, “money” and “finances” listed as separate concepts, when they represented a common idea). The mean number of SDH concepts on a map was 2.21 (SD=3.0). The median number of SDH concepts was 0; approximately, 43% of the students had no SDH drawn on their maps.
Bivariate and multivariate poisson regression results indicated that students’ SDH knowledge varied by high school, grade-level, and socioeconomic status (See Tables 3 & 4). SDH content was more likely to occur in student concept maps from KCVI than those from LSS (IRR = .53, 95% CI = .31 - .88) or NDSS (IRR = .51, 95% CI = .31 - .87). Students in grade 11 and grade 12/13 were more likely to have SDH concepts in their maps than those in grade 10, respectively (IRR = 4.8, 95% CI = 1.50 – 15.82; IRR = 7.66, 95% CI = 2.38 – 24.60). Students with relatively higher socioeconomic status (estimated by maternal educational attainment of a undergraduate/advanced university degree) were more likely to have SDH concepts in their maps than students with lower socioeconomic status (IRR = 1.61, 95% CI = 1.11 – 2.32).

**Table 3. Bivariate poisson regression of SDH content and High School of Attendance, SDH Content and Grade Level, and SDH content and Maternal Education (n = 61)**

<table>
<thead>
<tr>
<th>Variable</th>
<th>IRR</th>
<th>95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>High School of Attendance</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>KCVI (reference)</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>LSS</td>
<td>.45**</td>
<td>.28 - .71</td>
</tr>
<tr>
<td>NDSS</td>
<td>.46**</td>
<td>.29 - .72</td>
</tr>
<tr>
<td><strong>Grade</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10 (reference)</td>
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</tr>
<tr>
<td>11</td>
<td>3.04</td>
<td>.96 – 9.6</td>
</tr>
<tr>
<td>12/13</td>
<td>8.0**</td>
<td>2.49 – 25.68</td>
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<tr>
<td><strong>Maternal Educational Attainment</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt; University (reference)</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>Undergrad./Advanced Univ. Deg.</td>
<td>1.87**</td>
<td>1.3 – 2.67</td>
</tr>
</tbody>
</table>

* *p < 0.05, **p < 0.01*
Table 4. Multivariate Poisson Regression of SDH Content by High School, Grade, and Maternal Educational Attainment, (n = 62)

<table>
<thead>
<tr>
<th>Variable</th>
<th>IRR.</th>
<th>95% CI</th>
</tr>
</thead>
<tbody>
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<td></td>
<td></td>
</tr>
<tr>
<td>KCVI</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>LSS</td>
<td>.53*</td>
<td>.31 - .88</td>
</tr>
<tr>
<td>NDSS</td>
<td>.51*</td>
<td>.31 - .87</td>
</tr>
<tr>
<td><strong>Grade Level</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>11</td>
<td>4.88**</td>
<td>1.50 – 15.82</td>
</tr>
<tr>
<td>12/13</td>
<td>7.66**</td>
<td>2.38 – 24.60</td>
</tr>
<tr>
<td><strong>Maternal Educational Attainment</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt; University</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>Undergrad./Advanced Univ. Deg.</td>
<td>1.61*</td>
<td>1.11 – 2.32</td>
</tr>
</tbody>
</table>

*p < 0.05, ** p < 0.01

3.5 Discussion

Health promotion and a focus on the SDH have a rich tradition in Canada. Nevertheless, little is known about adolescent awareness of the SDH or how they are reflected in educational policies targeted at youth. Canadian educational policies appear incongruous with the emphasis that Canadian health promotion puts on the role of the SDH in achieving good health (WHO, 1986). Health-related values and behaviours developed in adolescence endure through adulthood (Holmbeck, Williams & Greenley, 2002). Adolescents are and will continue to be key contributors to community health as
they grow and take on greater roles in society. Understanding adolescent perceptions of health is necessary to address potential gaps in health curriculum, specifically, in regards to the SDH. The concept map exercise indicated that our sample of adolescents have a fairly broad perception of health, and recognize that a variety of different components contribute to one’s health. Yet, the heavy emphasis placed on the physical determinants of health and lifestyle practices, and the general lack of SDH map content tend to confirm previous findings regarding both adolescent and adult perceptions of health (Woodgate & Leach, 2010; CPHI, 2005). Our study compliments prior qualitative, interview-based research in this area involving Manitoban youth (Woodgate & Leach, 2010) by providing a quantitative perspective and extending the focus to include a similar sample of Ontario youth.

The lack of SDH content on the concept maps could reflect the general absence of SDH education within the Ontario secondary school system. The Commission on the Social Determinants of Health (CSDH) maintains that addressing the knowledge gap in the SDH is an essential step in improving population health (CSDH, 2008). There is disconnect between what we know about the SDH and how we act, and addressing that gap should be a priority for educators and policy makers alike (Bacchi, 2010). Our analysis indicated that students with lower socioeconomic backgrounds tend to know less about the SDH in comparison to their classmates. This further supports intervention during public school, as it provides students equal opportunity to learn regardless of their socioeconomic background.
Education on the SDH is essential in order to develop more effective policy and programs to intervene upon them (Marmot et al, 2008). There is a need to evaluate what youth view as the determinants of health to address potential knowledge gaps through educational and health policies. Recognition that current widespread health issues are the end result of deep-rooted social inequalities has created a shift in public health research, but public educational curriculum guidelines have been slow to reflect those recognitions. Substantial, compelling evidence to guide appropriate and effective action on the SDH already exists (CSDH, 2008). Expanding mandatory health education to incorporate SDH content is a sound, powerful route to action on the SDH in adolescent populations.

There are a number of limitations to the study. First, data come from a convenience sample of Ontario secondary students taking Health and Physical Education classes and conclusions may not therefore be generalizable to other school districts in Ontario or Canada. Without further research, however, it is difficult to state whether the results over- or underestimate the amount of knowledge that Ontario adolescents have about the SDH. Second, the concept mapping exercise was simplified for study purposes: only a small amount of time was available for concept mapping instruction. Compared to other studies using concept mapping, the maps created by our participants were less evolved, and few contained prepositions, or “linking words” characteristic of other concept maps (McClure, Sonak & Suen, 1999).

Despite such limitations, the results of our research are useful in advancing a health educational curriculum within Ontario schools that more accurately reflects and
aligns with Canadian health promotion ideals and positions. At the local school board level, administrators need to enforce SDH education within schools, and provide support for educators who are potentially learning and teaching less familiar material. At the provincial level as well, there is a need for greater cross-institutional conversations and planning on the health curriculum within schools. Ensuring that Canadian youth have a comprehensive understanding of health and the upstream social determinants of health is critical in advancing public policy that aims to intervene on the SDH.
Author's Contributions

SM and KK designed the research and contributed to the conceptualization of the study. KK collected the primary data, delivered the educational sessions, conducted data analysis and drafted the initial version of the manuscript. SM was the investigator of the Early Researcher Award of the Ontario Ministry of Research and Innovation, gave advice and input on the sessions, data analyses, and edited the manuscript for intellectual content and clarity. Both authors assume responsibility for the final content and approve the manuscript for submission. There are no conflicts of interest to report.

Acknowledgements

This study and youth outreach initiative was funded by Early Researcher Award program of the Ontario Ministry of Research and Innovation. The overall study was titled "Investigating the social environmental and behavioural pathways linking socioeconomic status to cardiovascular disease risk across the life course. At the time of the research and analysis, SM held a New Investigator Award from the Canadian Institutes of Health Research - Institute of Aging.
REFERENCES


Chapter 4  
An Educational Intervention on the Social Determinants of Health in Ontario Secondary Schools

4.1 Introduction

Upstream social determinants of health (SDH) are an integral part of health promotion research and practice. The SDH play a fundamental role in achieving health through their influence on morbidity and mortality (Raphael, 2006). Despite a rich history of health promotion in Canada, there has been little research examining the Canadian public’s perceptions of health and the SDH (CPHI, 2005). Adolescents have received less attention than adults in this area. Research investigating adolescent health knowledge has tended to focus on evaluating health risk behaviours. Less is known about what factors adolescents perceive significant to their health, and whether they even recognize the role of social determinants on health (SDH): “The focus has been on what youth do and less about what they think and feel” (Woodgate & Leach, 2010, 1174). Health-related values, attitudes and behaviours are formed in adolescence. (Holmbeck, Williams, & Greenley, 2002; Woodgate & Leach, 2010). It is critical to understand adolescent perceptions of health, as they will contribute to collective population health outcomes if maintained throughout adulthood.

Traditionally, health behaviors have been examined within the context of the biomedical model of health and disease (Ioannu, 2005). As a result, interventions on adolescent health predominantly target risky health behaviours (Brown et al, 2005; Bindler et al, 2012; Chan, Prendergast Gronhoj & Bech-Larsen, 2009; Zullig, Ubbes,
Behavioural approaches to health interventions persist as the dominant paradigm by which to “promote health”, despite the recognized importance of social factors in determining health outcomes.

Adults and adolescents in Canada have limited knowledge of the social determinants of health (SDH), and tend to attribute their current and future health status to personal responsibility and lifestyle behaviours (CPHI, 2005, Woodgate & Leach, 2010). Research has indicated that adolescents in particular have an unclear understanding of what the SDH are and how the broader social context influences health (Woodgate & Leach, 2010). Yet, adolescence is a critical period for learning (Miller, Freedman & Wallis, 2002). Values and attitudes developed during adolescence are encouraged and built upon as youth transition into adulthood, including those pertaining to health (Holmbeck, Williams, & Greenley, 2002). Youth may benefit more than any other demographic group from education on the SDH. To disseminate current knowledge on the SDH to the broader public and adolescents in particular, there is the need for interventions that educate youth about the influence of the social environment on health.

4.1.1 School-based SDH Interventions

By prioritizing behavioural approaches to health promotion in the current school curriculum, educators reinforce the traditional model of health education, which emphasizes individual choice and behaviour and neglects the structural and environmental influences on health (Ioannu, Kouta & Charalambous, 2011). Advocacy
towards environmental rather than behavioural change has led to school-based initiatives that implement “structural interventions”. These interventions target environmental changes beyond the individual, such as changes in cafeteria policy, school design elements that incorporate green space, etc (Bloom & Cohen, 2007). One well-known example of these "structural" school-based initiatives is Health-Promoting Schools, an internationally accepted program for school-based health education. Taking a holistic approach, the project targets multiple levels of the educational system, from healthy school policies that promote health and well-being, the physical and social environments of the school to individual health skills (St. Leger, 2005). Despite the efforts of programs like Health Promoting Schools, school health courses have yet to educate students through explicit curriculum content about why and how the social environment influences health (Ontario Ministry of Education, 1999; Ontario Ministry of Education, 2001). In fact, there is no discussion of the SDH in the mandatory health curriculum, despite recommendations for the increased integration of SDH content and learning resources into the standard educational curriculum (CSDH, 2008). Findings from our preliminary research in Manuscript 1 suggest that there is inequity in student knowledge and understanding of the SDH across socioeconomic indicators (Kenney, 2012). Interventions that target SDH education in public school systems is a logical approach to reducing equity. Publicly funded education provides all students the opportunity to learn about the SDH, regardless of their socio-demographic and/or –economic backgrounds.
Recently, steps have been taken to educate students on the SDH in the United States. Since 2004, *Just Health Action (JHA)* has been working to develop a health curriculum that educates students about the SDH. JHA has successfully delivered lessons about different SDH topics in a variety of settings, including secondary schools (Just Health Action, 2012). Educators have reported success in teaching SDH within the secondary school system, and have supported and advocated for the inclusion of explicit SDH content in health courses (Mogford & Gould, 2010). The JHA has made progress within the United States, but similar SDH educational initiatives have yet to surface in Canada. The purpose of this study is twofold: (1) educate secondary school students about the SDH and (2) evaluate the short-term learning impact of teaching SDH content to secondary school students.

### 4.1.2 Concept Maps as Evaluation Tools

Concept mapping is a creative and interactive way to visually organize thoughts, and is commonly used in teaching, learning and assessment in educational settings. (Hay, Kinchin & Lygo-Baker, 2008; Williams, 2004; Hill 2005). Concept maps are simple enough to create since they consist of different concept nodes connected to one another by arrows. These arrows represent the existence or direction of the relationship between the concepts (Kwok, 2010).

Concept maps arose from the “assimilation theory of learning,” which argues that to learn affectively, there must be an amalgamation of prior knowledge with new knowledge (Ausubel, Novak & Hanesian, 1978). According to the theory, “meaningful
learning” occurs when new information is integrated into the existing foundation of knowledge (i.e., prior knowledge). This integration requires three elements: prior knowledge, meaningful material, and the learners’ intent and ability to integrate the new material into their prior knowledge (Mayer, 1979). However, research suggests that pertinent prior knowledge is commonly unused, and the identification of connections between related thoughts and ideas is often difficult for learners. Individuals are often unaware of what they already know, which acts as an impediment to making connections and extensions to other relevant information.

Concept mapping is an ideal solution to these issues. In constructing a personal map, individuals must consider how different, but potentially related, concepts are linked. This requires the student to reflect on the underlying mechanisms that form the relationships that they have identified, thereby reinforcing their understanding. (De Simone, 2007). Comparing concept maps constructed at different times during an educational intervention is an innovative and effective strategy to evaluate the incorporation of new information into a learner’s prior knowledge base. It allows researchers and educators to see potential improvements in knowledge and understanding through the growth in size and quality of student maps over a period of supposed learning.

4.2 Research Questions

The study's design has two goals: 1) to identify the range and variety of factors—physiological, behavioural, social, and environmental - that Kingston students identify as
important health determinants and 2) to assess the short-term learning impact of an SDH educational intervention on student perceptions of the social determinants of health.

4.3 Data & Methods

4.3.1 Sample and participants

Approval to conduct research on adolescents in the Kingston secondary school system was granted from the Limestone District School Board (LDSB) and the Queen’s University General Research Ethics Board (GREB) in August of 2010. The LDSB comprises eleven secondary schools located in Kingston and the surrounding areas. Two of the schools are remote (approximately 75km and 111km away from the research facility) and were excluded from the study due to travel constraints. Initial contact was made with eligible schools in December 2010; by February 2011, three schools showed interest in participating. The educational intervention session was designed to fit within the health curriculum guidelines developed by the Ontario Ministry of Education. Hence, health and physical education classes within the schools were deemed the appropriate forum for the session. Within the three schools, a total of five different health/physical education classes took part in the lessons. At the time of the project, a total of 116 students were registered in the five classes. Since most students were younger than 18, they were required to have their parents sign a consent form to participate. Students without signed consent forms were allowed to take part in the educational session but any information provided by those without consent were destroyed prior to any analyses. Of the 116 students who participated in the educational sessions, a total of 45 students...
returned signed consent forms for a study rate of 38.8%. The voluntary aspect of the project both at school, classroom, and student levels thus resulted in a multistage convenience cluster sample consisting of three schools, five classrooms, and 45 high school students.

4.3.2 Lesson Content

For each class, the SDH lessons were divided into two classes. Each class was 75 minutes in length, with the exception of LSS where classes ran 60 minutes.

4.3.2.1 Lesson 1

The first class began with a concept mapping exercise to introduce the concept of health prior to any introduction of SDH. Students were given instruction on how to construct a concept map. They were encouraged to think about how health concepts related to one another, and to illustrate connections where relationships were thought to exist. Each map began with the word “health” as the focal point. Students were then asked to provide examples of the concepts they had in their maps, and prompted by the instructor to explain why and how they influenced health. This activity encouraged students to assess critically their knowledge of health and of the pathways through which the determinants of health operate. To bring attention to the complex nature of health, an extensive “expert” map created by the instructor was shown to the students (Figure 2). Important theories and concepts were highlighted in the expert map, including the social-ecological model, the biomedical versus the holistic model of health, and downstream versus upstream determinants of health, were then introduced to the students.
Once students understood the introductory concepts, three core topics in the SDH were taught: 1) socioeconomic status, 2) social networks and/or social capital, and 3) the local neighbourhood environment. Multiple teaching methods were used to appeal to different learning styles, and to maintain active participation. Microsoft Powerpoint® and interactive chalkboard were used to deliver important illustrations and ideas (e.g., the
social-ecological model, the social gradient of health, etc). Student participation in discussion was facilitated through brainstorming activities and questions that encouraged them to consider how the SDH influence health outcomes (e.g., “In what ways do you think education can influence your health?”, “How is health affected by social support?”).

After the lesson material was covered, students created a second health concept map meant to reflect any changes in their perceptions of what determinants influence health which may have been due to their participation in the session. Each individual’s pair of concept maps was later evaluated for learning improvements by comparing map content prior to and following exposure to SDH lesson material.

**4.3.2.2 Lesson 2**

The second part of the education session was primarily activity based and was meant to engage the students in scenarios where they might better understand the importance of the SDH in real-life situations. The period began with a brief recap of the SDH topics presented the previous day, followed by an introduction to the class activity, *The Last Straw* board game. The students were split into 4-5 different groups and began playing the game, learning about the relevance of the SDH in everyday life.

*The Last Straw* is an interactive teaching tool designed explicitly for education and critical thinking about the SDH (Rossiter & Reeve, 2008). By creating character narratives, students are able to follow different personalities having different socioeconomic backgrounds, genders, and ethnicities from childhood to old age. Each roll of the dice determines events and experiences each character will encounter, and
illustrates how the SDH cause differential vulnerability, differential exposure, and ultimately differential health outcomes within populations that each character may represent. The ultimate goal of *The Last Straw* is to show students real-life examples of how the SDH shape the health of individuals, and encourage critical thinking towards the accumulating effect that positive and negative experiences have on overall health over a lifetime (Rossiter & Reeve, 2008). The design and dynamics of the game demonstrate how health status results from a combination of (1) the circumstances in which we were born, (2) our chance encounters and experiences, and (3) the choices that we make during our life.

Following the completion of *The Last Straw*, 10-15 minutes of class time were dedicated to a debriefing period. This included a discussion of the different pathways that each character took through life, identifying the major events in their lives that influenced each character’s final health outcome. Students were also encouraged to relate those events back to the SDH concepts taught in the first period.

### 4.3.3 Measures

#### 4.3.3.1 Instruments

The students completed a self-administered questionnaire consisting of six items assessing participants' socio-demographic and economic background (Appendix II). The pre- and post-lesson concept maps created by the students were used to measure baseline understandings of the determinants of health and any changes in their perceptions of health that occurred after their exposure to lesson materials.
4.3.3.2 Socio-demographic Variables

Socio-demographic and -economic variables included participants’ sex, grade level, and maternal/guardian level of educational attainment. Sex was self-reported by students. Students reported length of residency in years but answers were occasionally given in qualitative terms, (e.g. “my whole life”). When required, age respective to a student's grade level was used to approximate their length of residency. For example, a student in the 11th grade was given a value of 16 for their length of residency in Kingston. Socioeconomic status (SES) was based on the students' reports of maternal educational attainment as belonging to either one of the two following categories: (1) less than a university education or (2) an undergraduate or advanced university degree (MA, MSc, PhD, MD). Research has shown maternal education has been shown to be a stronger predictor of childhood health than paternal education (Zhong-Cheng, Wilkins & Kramer, 2006; Cochrane, Leslie & O’Hara, 1982).

4.3.3.3 Map Measures

Measures developed from the concept maps to evaluate student perceptions of the determinants of health included: 1) concept diversity, 2) concept frequency, and 3) knowledge about the SDH. Concept diversity reflects the number of different conceptual categories that a student included in their map. To assess concept diversity, the concepts found in each map were sorted into 13 different conceptual categories (Appendix III). This variable was categorized into low (<4 categories), medium (4-7 categories), and high (8+) levels of diversity. Concept frequency reflects the number of concepts within
each category drawn on a map. For example, if a student has written “exercise”, “gym” and “running” in their map, the frequency of the “physical activity” for their map would be 3. A student’s familiarity/knowledge about the SDH was determined by counting the number of SDH-related content within each map. SDH content was defined as general terms or specific examples related to the social determinants of health (Appendix III).

A primary coder classified the different concepts found within each of the 62 maps into one of the 13 categories and determined whether any of the concepts were related to the SDH. Content validity was determined for each concept category by defining each using criteria established by sources such as the Merriam-Webster Dictionary, the World Health Organization (WHO), the Canadian Society of Exercise Physiology, and relevant peer-reviewed sources. To assess the reliability of the classification method, a second coder classified 25% of the concepts found within the maps into the categories based on criteria developed by the primary coder. The Cohen’s kappa inter-coder reliability coefficient was 0.885. Discrepancy occurred primarily over the concept of “fit” and to whether "fit" related more to physical activity or personal appearance (2.7%), and to whether concepts such as “determination” and “self control” should be considered mental health or personality traits (2.7%).

4.3.4 Analysis

The number of map concept categories and the frequency of each category were calculated for each student’s set of maps. The frequency of SDH concepts was calculated to determine the level of SDH knowledge. Average frequency values were also calculated
for the sample as a whole. This type of map assessment is a traditional map evaluation method (Passmore, 2004; Besterfield-Sacre et al, 2004). Bivariate and multivariate poisson regression analyses were used to identify any significant associations between socio-demographic information and baseline SDH knowledge. Identical regression analyses were applied using post-intervention SDH knowledge. Poisson regression analysis was chosen because the outcome variable of SDH knowledge was collected in the form of count data.

To evaluate the results of the SDH lessons on map content, paired t-tests were used to compare the post-lesson frequencies of concept categories to the baseline values. This allowed us to determine significant increases or decreases in category frequencies following students’ exposure to SDH material.

4.4 Results

4.4.1 Sample characteristics

The final sample consisted of 45 students from three secondary schools in the LSBD in Kingston, Ontario. There was a higher number of female participants (68.9%) than male participants (31.1%). Of the sample, 35.6% attended Kingston Collegiate Vocational College (KCVI) located in Kingston’s downtown core, 31.3% attended LaSalle Secondary School (LSS) located east of the city, and 33.3% attended Napanee District Secondary School (NDSS), located west of the city. The majority of the students were in grade 11 (84.4%). Over 93% of the students have resided in Kingston since the beginning of their secondary schooling. In terms of the students' socioeconomic
background, nearly 47% of the students’ mothers had an undergraduate or advanced university degree. ANOVA testing indicated that there was no significant difference in maternal education levels between schools (See Table 5 for sample socio-demographic and economic characteristics).

### Table 5. Sample Socio-demographic and Economic Characteristics (n=45)

<table>
<thead>
<tr>
<th>Characteristic</th>
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</tr>
</thead>
<tbody>
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<td>Sex</td>
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</tr>
<tr>
<td>Male</td>
<td>14 (31.1)</td>
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<tr>
<td>Female</td>
<td>31 (68.9)</td>
</tr>
<tr>
<td>High School</td>
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<tr>
<td>KCVI</td>
<td>16 (35.6)</td>
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<td>LSS</td>
<td>14 (31.1)</td>
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<tr>
<td>NDSS</td>
<td>15 (33.3)</td>
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<tr>
<td>Grade</td>
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</tr>
<tr>
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<td>3 (6.7)</td>
</tr>
<tr>
<td>Grade 11</td>
<td>38 (84.4)</td>
</tr>
<tr>
<td>Grade 12/13 (Returning)</td>
<td>4 (8.9)</td>
</tr>
<tr>
<td>Maternal Educational Attainment</td>
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<tr>
<td>Less than a university Degree</td>
<td>24 (53.3)</td>
</tr>
<tr>
<td>Undergraduate/Advanced University Degree</td>
<td>21 (46.7)</td>
</tr>
</tbody>
</table>

#### 4.4.2 Pre-Lesson Map Content

Prior to lesson delivery, student concept maps contained an average of 12.2 concepts (standard deviation (SD) = 5.8). The smallest map contained only 2 concepts, while the largest contained 31. Overall, student maps were moderately diverse in their content with an average of 5.2 separate conceptual categories (SD = 1.6). The most
comprehensive map consisted of determinants of health from 8 separate categories. The least comprehensive map included only 2 categories. In terms of the separate conceptual categories, the most frequent concepts in the pre-lesson maps were physical activity, mental health, and diet/nutrition. The map with the highest SDH content contained 15 SDH concepts. However, many who included SDH material in their maps were repetitive with the use of similar SDH concepts. For example, the concepts, “occupation”, “job”, and “work” may have occurred in a student’s map, but all three concepts represent one common social determinant. In some instances this resulted in larger maps with little content variety. Approximately 44% of the students created maps without any SDH-related content.

Bivariate and multivariate poisson regression results indicated that students’ baseline SDH knowledge varied by high school, grade-level, length of residency in Kingston, and socioeconomic status (See Tables 6 & 7). Multivariate poisson regression results revealed that KCVI students were more likely to have SDH content in their map compared to those from LSS (IRR = .46, 95% CI = .25 - .83) and NDSS (IRR = .40, 95% CI = .22 - .73). Students in grade 11 and grades 12/13 were 3.38 and 3.77 times more likely to have SDH concepts in their maps than those in grade 10, respectively (95% CI = 1.01 – 11.27, 95% CI = 1.10 – 12.93). Students with relatively higher socioeconomic status (estimated by maternal educational attainment) were also more likely to have maps containing SDH content than students with lower socioeconomic status (IRR = 1.68, 95% CI = 1.07 – 2.63). Lastly, SDH concepts were more likely found
Table 6. Bivariate poisson regression of SDH content and High School of Attendance, Gender, Grade, Length of Residency in Kingston, Number of Siblings, and Maternal Educational Attainment, (n = 45)

<table>
<thead>
<tr>
<th>Variable</th>
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<th>95% CI</th>
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<tr>
<td>KCVI (reference)</td>
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</tr>
<tr>
<td>LSS</td>
<td>.46**</td>
<td>.28 - .78</td>
</tr>
<tr>
<td>NDSS</td>
<td>.48**</td>
<td>.29 - .79</td>
</tr>
<tr>
<td>Grade</td>
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<td></td>
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<tr>
<td>Grade 10 (reference)</td>
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<td>Grade 11</td>
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</tr>
<tr>
<td>Grade 12/13</td>
<td>5.00**</td>
<td>1.48 – 16.82</td>
</tr>
<tr>
<td>Length of Residency in Kingston</td>
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<td></td>
</tr>
<tr>
<td>Years of Residency</td>
<td>1.11**</td>
<td>1.03 – 1.20</td>
</tr>
<tr>
<td>Maternal Educational Attainment</td>
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</tr>
<tr>
<td>&lt; University (reference)</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>Undergrad./Advanced Univ. Deg.</td>
<td>2.01**</td>
<td>1.31 – 3.07</td>
</tr>
</tbody>
</table>

* p < 0.05, ** p < 0.01

in maps created by students who have lived in Kingston the longest, an increase of 14% in likelihood per year increase in residency (IRR = 1.14, 95% CI = 1.05 – 1.24).

4.4.3 Post-Lesson Map Content

Paired t-tests of pre- and post-intervention maps showed a clear growth in map size, i.e., the number of concepts reported: post-intervention maps held an average of 15.2 concepts, an increase of 3.6 concepts (p < 0.05). Map diversity also grew from an
Table 7. Baseline Multivariate Poisson Regression of SDH Content on High School, Grade, Maternal Educational Attainment, and Length of Residency in Kingston (n=45)

<table>
<thead>
<tr>
<th>Variable</th>
<th>Odds Ratio</th>
<th>95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>High School of Attendance</td>
<td></td>
<td></td>
</tr>
<tr>
<td>KCVI</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>LSS</td>
<td>.46*</td>
<td>.25 - .83</td>
</tr>
<tr>
<td>NDSS</td>
<td>.40**</td>
<td>.22 - .73</td>
</tr>
<tr>
<td>Grade Level</td>
<td></td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>11</td>
<td>3.38*</td>
<td>1.01 – 11.27</td>
</tr>
<tr>
<td>12/13</td>
<td>3.77*</td>
<td>1.10 – 12.93</td>
</tr>
<tr>
<td>Maternal Educational Attainment</td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt; University</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>Undergrad./Advanced Univ. Deg.</td>
<td>1.68*</td>
<td>1.07 – 2.63</td>
</tr>
<tr>
<td>Years of residency in Kingston</td>
<td>1.14**</td>
<td>1.05 – 1.24</td>
</tr>
</tbody>
</table>

*p < 0.05, ** p < 0.01

average of 5.2 to an average of 6.8 categories (p < 0.05). Concepts associated with
socioeconomic status became the most prevalent concepts illustrated in student maps
following the educational session, with a significant increase of 2.8 concepts from
baseline measures (p < 0.01). Environment-related concepts significantly increased as
well (p < 0.01). Other statistically significant changes included a decrease in the
proportion of physical activity- and diet-related concepts (p <0.01). There were slight
changes in the remaining categories, but none that were statistically significant (See Table 8 for relative changes between pre- and post-lesson map content). Unlike baseline results, regression analyses indicated that the extent of post-intervention SDH map content was not significantly associated with any socio-demographic or economic variables (Table 9).

Table 8. Comparison of Mean Pre- and Post- Lesson Map Category Content (n=45)

<table>
<thead>
<tr>
<th>Category</th>
<th>Map 1</th>
<th></th>
<th></th>
<th></th>
<th>Map 2</th>
<th></th>
<th></th>
<th></th>
<th>Diff</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Freq.</td>
<td>S.d</td>
<td>Min</td>
<td>Max</td>
<td>Freq.</td>
<td>S.d</td>
<td>Min</td>
<td>Max</td>
<td></td>
</tr>
<tr>
<td>Physical Activity</td>
<td>2.68</td>
<td>1.57</td>
<td>0</td>
<td>7</td>
<td>1.73</td>
<td>1.54</td>
<td>0</td>
<td>9</td>
<td>-.95**</td>
</tr>
<tr>
<td>Diet/ Nutrition</td>
<td>2.00</td>
<td>1.43</td>
<td>0</td>
<td>7</td>
<td>1.22</td>
<td>.93</td>
<td>0</td>
<td>4</td>
<td>-.77**</td>
</tr>
<tr>
<td>Mental</td>
<td>2.13</td>
<td>1.83</td>
<td>0</td>
<td>8</td>
<td>2.27</td>
<td>1.67</td>
<td>0</td>
<td>6</td>
<td>-.13</td>
</tr>
<tr>
<td>Social</td>
<td>1.33</td>
<td>2.12</td>
<td>0</td>
<td>8</td>
<td>2.44</td>
<td>1.66</td>
<td>0</td>
<td>7</td>
<td>1.11**</td>
</tr>
<tr>
<td>Genetic</td>
<td>.51</td>
<td>.87</td>
<td>0</td>
<td>3</td>
<td>.56</td>
<td>.87</td>
<td>0</td>
<td>3</td>
<td>.04</td>
</tr>
<tr>
<td>SES</td>
<td>.62</td>
<td>1.27</td>
<td>0</td>
<td>5</td>
<td>3.4</td>
<td>1.74</td>
<td>1</td>
<td>7</td>
<td>2.78**</td>
</tr>
<tr>
<td>Appearance</td>
<td>.58</td>
<td>1.18</td>
<td>0</td>
<td>6</td>
<td>.27</td>
<td>.54</td>
<td>0</td>
<td>2</td>
<td>-.31</td>
</tr>
<tr>
<td>Environmental</td>
<td>.56</td>
<td>.87</td>
<td>0</td>
<td>3</td>
<td>2.76</td>
<td>2.43</td>
<td>0</td>
<td>12</td>
<td>2.2**</td>
</tr>
<tr>
<td>Substance use</td>
<td>.16</td>
<td>.47</td>
<td>0</td>
<td>2</td>
<td>.67</td>
<td>.25</td>
<td>0</td>
<td>1</td>
<td>-.09</td>
</tr>
<tr>
<td>Quality of Life/DLS</td>
<td>.29</td>
<td>.51</td>
<td>0</td>
<td>2</td>
<td>.18</td>
<td>.49</td>
<td>0</td>
<td>2</td>
<td>-.11</td>
</tr>
<tr>
<td>Sexual</td>
<td>.27</td>
<td>.78</td>
<td>0</td>
<td>4</td>
<td>.13</td>
<td>.46</td>
<td>0</td>
<td>2</td>
<td>-.13</td>
</tr>
<tr>
<td>Medical</td>
<td>.96</td>
<td>1.41</td>
<td>0</td>
<td>6</td>
<td>.82</td>
<td>1.07</td>
<td>0</td>
<td>4</td>
<td>-.13</td>
</tr>
<tr>
<td>SDH</td>
<td>2.02</td>
<td>3.09</td>
<td>0</td>
<td>15</td>
<td>8.33</td>
<td>3.97</td>
<td>2</td>
<td>18</td>
<td>6.31**</td>
</tr>
</tbody>
</table>

*p<0.01*, *p<0.001**
Table 9. Post-Intervention Multivariate Poisson Regression of SDH Content on High School, Grade, Maternal Educational Attainment, and Length of Residency in Kingston (n=45)

<table>
<thead>
<tr>
<th>Variable</th>
<th>Odds Ratio</th>
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<tr>
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<td>---</td>
<td>---</td>
</tr>
<tr>
<td>LSS</td>
<td>.98</td>
<td>.73 – 1.31</td>
</tr>
<tr>
<td>NDSS</td>
<td>.96</td>
<td>.71 – 1.28</td>
</tr>
<tr>
<td>Grade Level</td>
<td></td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>11</td>
<td>1.17</td>
<td>.72 – 1.90</td>
</tr>
<tr>
<td>12/13</td>
<td>1.35</td>
<td>.79 – 2.29</td>
</tr>
<tr>
<td>Maternal Educational Attainment</td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt; University</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>Undergrad./Advanced Univ. Deg.</td>
<td>1.02</td>
<td>.83 – 1.26</td>
</tr>
<tr>
<td>Years of residency in Kingston</td>
<td>1.01</td>
<td>.99 – 1.04</td>
</tr>
</tbody>
</table>

*p < 0.05, ** p < 0.01

4.5 Discussion

The initial concept map analyses indicated that, in general, adolescents have a fairly broad perception of health, and recognize that there are a variety of factors that contribute to one’s health. However, similar to previous research in this field, the maps also showed that students prioritized the physical determinants and lifestyle practices related to health, such as physical activity, healthy eating, and coping with stress (mental
health). In fact, 7% of students indicated in their concept map that diet and activity were the only determinants of health.

At baseline, students’ knowledge or least the recognition of the importance of the social determinants of health was lacking; SDH concepts were weakly represented in the majority of the concept maps. The limited level of SDH content might reflect the general absence of a SDH module within the current Ontario secondary health education curriculum.

Results of the evaluation of the educational session on SDH suggest that even one session on the SDH can increase students' knowledge of the SDH in the short term. The fact that this increase was not associated with students' socioeconomic background suggests that such interventions may have an impact regardless of a student's own social background. Further research that might follow up with students after a year could enhance our knowledge of whether such educational sessions on the SDH stick with adolescents over time. Besides improving students' understanding of the SDH, it is essential for researchers and educators to assess what youth view as the constituents of health so as to address potential gaps in the health education curriculum. Recognition that current widespread health issues are the end result of deep rooted social inequalities has led to the increased importance of SDH on the national and global health agenda. Yet, Ontario curriculum guidelines have been slow to adapt and incorporate SDH content in the curriculum; this seems to be reflected in adolescents' knowledge of the SDH.
There are a number of limitations to this evaluation study of a SDH educational intervention. First, the study is based on a convenience sample of Ontario secondary students who attend specific schools in the LDSB and are enrolled in Health and Physical Education classes. As a result, study findings may not be generalizable to other provinces, school boards, or schools. However, the lesson format is easily reproduced, and our findings that the SDH intervention was successful regardless of student socioeconomic background suggests that similar success could well be found in other adolescent populations. Second, the simplicity of the concept maps that the students produced should also be considered. Only a small amount of time was available for concept mapping instruction and therefore there was little time for students to connect the different concepts through various lines and arrows. Although still valid as a research tool, the maps were basic and contained few linking words characteristic of other concept maps. This lack of complexity in the concept maps meant that more developed concept map analysis methods were unavailable for the study, e.g., analysis of the map structure, hierarchy, and/or prepositions in one form or another (McClure, Sonak & Suen, 1999). Third, the results of the intervention on SDH knowledge may be subject to bias. Our interpretation of post-lesson changes in SDH map content was an increase in students’ knowledge and understanding of the SDH. However it is impossible to know whether changes reflect a true integration of knowledge, or are a result of students’ desire to illustrate positive research outcomes (social desirability bias). Finally, long-term assessment of post-lesson integration of SDH content into student understandings of
health was not possible within the provided time frame. However, the positive results from a single exposure to SDH topics is promising, and also quite telling of the impact that frequent and concentrated SDH instruction could have.

The results of this type of research can be applied to both the field of health promotion and also the field of education. In the case of the latter, assessing the extent of students’ understanding and uptake of topics associated with the social determinants of health can provide evidence of a potential knowledge gap, and subsequently inform future health curriculum modification.

A revision of the current health curriculum is overdue; partnership on the design of health curriculum needs to be a priority for both educational institutions and health agencies. Integration of SDH content into health education can simultaneously work towards the goals and objectives of both the Ministry of Education and Health Promotion in Ontario if there is consistent and continual communication between the two. Working towards a healthier Canadian population requires a multidisciplinary effort, irrespective of the route. As one potential pathway, curriculum amendment requires greater affiliation between the education system, health organizations, and other relevant parties to optimize the potential influence on health.
Author's Contributions

SM and KK designed the research and contributed to the conceptualization of the study. KK collected the primary data, delivered the educational sessions, conducted data analysis and drafted the initial version of the manuscript. SM was the investigator of the Early Researcher Award of the Ontario Ministry of Research and Innovation, gave advice and input on the sessions, data analyses, and edited the manuscript for intellectual content and clarity. Both authors assume responsibility for the final content and approve the manuscript for submission. There are no conflicts of interest to report.

Acknowledgements

This study and youth outreach initiative was funded by Early Researcher Award program of the Ontario Ministry of Research and Innovation. The overall study was titled "Investigating the social environmental and behavioural pathways linking socioeconomic status to cardiovascular disease risk across the life course. At the time of the research and analysis, SM held a New Investigator Award from the Canadian Institutes of Health Research - Institute of Aging.
REFERENCES


Chapter 5

Discussion

Upstream social determinants of health (SDH) have become widely acknowledged as lying at the root of poor health outcomes in Canada and elsewhere (CSDH, 2008). Conditions of social disadvantage restrict access to both social and physical resources, limiting the opportunity to actively pursue a healthy lifestyle (CSDH, 2008). Research evidence has and continues to support the fundamental role of the SDH on health, yet policy is still lagging in terms of its acknowledgement of the SDH. Despite decades of evidence that has recommended revision, there has been a failure to incorporate the SDH into educational policy at an appropriate scale so as to make a true impact on population health. Hesitation to adopt a health framework that acknowledges social influence has resulted in many continuing to view social reform and health as two mutually exclusive phenomena, despite firm research that suggests otherwise (Hawe, 2009).

5.1 Key Findings

Our research indicates that youth in particular may not understand or value the SDH relative to other determinants of health taught in the health curriculum of Ontario secondary schools. Congruent to previous research on youth knowledge and attitudes about health (Woodgate & Leach, 2010), youth are more knowledgeable about behavioural determinants, namely physical activity and healthy eating, than social
determinants, such as community support and socioeconomic factors. A similar pattern has been reported in other adolescent and adult populations in Canada (Woodgate & Leach, 2010; CPHI, 2005).

Through our concept mapping exercise, we found that there was significant variability in student knowledge and understanding about the SDH across certain socio-demographic and –economic characteristics. Although overall levels were low across our sample, SDH knowledge differed by students’ grade level and socioeconomic status (SES). Firstly, higher levels of SDH knowledge were found at successive grade levels. This has been illustrated in research measuring other types of knowledge in student populations, including mathematics, science, social studies, and English (Flowers et al, 2001). Secondly, students coming from higher SES households (as measured by maternal educational attainment) knew more about the SDH at baseline. Research in the area of maternal education suggests that the connection between maternal education and learning potential of their children throughout the life course is based on more than the obvious childhood benefits of increased income and employment which come hand in hand with higher educational attainment; it is also strongly linked to the skills, abilities, and resources that are developed through educational experiences which help mothers to encourage and facilitate their child(ren)’s learning (Augustine & Crosnoe, 2010). Mothers and/or parents of low socioeconomic status may not be able to realize fully their role in guiding their children’s’ learning in early stages of life, potentially be due to the lack of educational resources they have access to (Levin & Aram, 2012). Many studies
link greater learner potential to parent-child joint activities in childhood, such as
storybook reading and general exposure to educational materials, which help develop a
foundation of basic literacy skills to build upon in a variety of ways as they grow (Levin
& Aram, 2012). In addition to household SES, students’ knowledge about the SDH also
differed by the high school in which students attended. The three schools in our study
sample are located within different neighborhood areas with varying levels of average
income (City of Kingston, 2006). Although some students may commute from other
neighbourhood areas, in general, those students attending high schools in neighborhoods
with higher average incomes had a greater knowledge of the SDH. This may also relate
back to the influence of household SES on learning capabilities throughout the life
course.

5.2 Strengths and Contributions to the Field of Health Promotion and Education

How might we address this gap in adolescent knowledge on the SDH?

Developing health curriculum that educates students about the SDH alongside
mainstream physical determinants can be seen as both an education- and health-related
intervention. Dissemination of SDH knowledge to youth can encourage the development
of critical health literacy, and in turn increase the potential for individual and collective
action towards securing and maintaining good health, such as acts of individual advocacy
(donating money to a cause, volunteering in community services, etc.) or collective
activism (e.g., public advocacy for alleviation of poverty, or increasing access to
resources. Our pilot classroom educational session/intervention targeted the SDH
knowledge gap through the integration of SDH material into the health curriculum of local Ontario high schools. By juxtaposing the physical determinants health (physical activity, diet) against the equally relevant, yet under-taught social determinants (socioeconomic status, the social and physical environment, etc), students were provided a broader understanding of the constituents of health. Public school health curriculum is an opportune route to deliver SDH material, as it provides educational equity – an equal opportunity for youth of varying social and economic backgrounds to receive a comprehensive health education (Irby, Brown & Yang, 2010). Our study showed that incorporating SDH material into secondary school health courses was not only feasible for teachers, but also increased students' short-term knowledge on the SDH. In the long term, however, curriculum modification may be the single most logical and tangible solution to disseminating knowledge on the SDH to adolescents. Public education that provides all students an ability to procure good health is one pathway through which curriculum content can influence future population health. This project demonstrated that there is 1) an SDH knowledge gap in adolescent populations, 2) there are inequities in SDH knowledge across socioeconomic factors, and 3) SDH educational interventions may eliminate inequities in SDH knowledge.

5.3 Limitations

There are a number of limitations to this evaluation study of a SDH educational intervention. First, the study is based on a convenience sample of Ontario secondary
students who attend specific schools in the LDSB and are enrolled in Health and Physical Education classes. As a result, study findings may not be generalizable to other provinces, school boards, or schools. However, the lesson format is easily reproduced, and our findings that the SDH intervention was successful regardless of student socioeconomic background suggests that similar success could well be found in other adolescent populations. Second, the simplicity of the concept maps that the students produced should also be considered. Only a small amount of time was available for concept mapping instruction and therefore there was little time for students to connect the different concepts through various lines and arrows. Although still valid as a research tool, the maps were basic and contained few linking words characteristic of other concept maps. This lack of complexity in the concept maps meant that more developed concept map analysis methods were unavailable for the study, e.g., analysis of the map structure, hierarchy, and/or prepositions in one form or another (McClure, Sonak & Suen, 1999). Third, the results of the intervention on SDH knowledge may be subject to bias. Our interpretation of post-lesson changes in SDH map content was an increase in students’ knowledge and understanding of the SDH. However it is impossible to know whether changes reflect a true integration of knowledge, or are a result of students’ desire to illustrate positive research outcomes (social desirability bias). Finally, long-term assessment of post-lesson integration of SDH content into student understandings of health was not possible within the provided time frame. However, the positive results
from a single exposure to SDH topics is promising, and also quite telling of the impact that frequent and concentrated SDH instruction could have.

5.4 Current Progress and Directions for Future Research

Based on successes in teaching the SDH in multiple school settings, steps have been made towards implementing SDH curriculum frameworks informed by both the Ottawa Charter for Health Promotion and the Commission on the Social Determinants of Health (CSDH) in the United States (Mogford, Gould & Devoght, 2010). Yet, despite our international acclaim as a leader in the field of health promotion (Health Canada), Canada appears to be lagging behind other countries in advocating for similar curriculum change. Federal and provincial strategies for school design and operation have been developed, including Canada’s Healthy Schools, and Ontario’s Healthy Schools Recognition Program initiatives (Ontario Ministry of Education, 2011). The nature of these strategies not only allows for, but also facilitates SDH education. However, the acknowledgement of the SDH within these frameworks tends to manifest in recommendations for the design and dynamics of school environments (Lee, 2009). Guidelines are targeted more towards policy to alter the school structure and environment (e.g., introducing green space, changing cafeteria policy, etc), and less towards curriculum change. Although the role of SDH theory in the development of new healthy school policy is evident, educating students about SDH principles in the classroom setting is absent from program objectives. Students are expected to operate within these “healthy school” environments
and play key roles in maintaining them, yet there is little effort for students to understand why. Attention to teaching Canadian students about the SDH has been largely neglected.

Secondary school is an opportunity to endorse positive health environments, but is also a chance to explain the theoretical underpinnings of why an environmental approach to health is valuable within and beyond an educational backdrop. Educating students about the SDH will not only further their understanding of the determinants of health, but also compliment and reinforce structural interventions that may have been implemented in their school. In their Guidance Document for Ontario School Health, Lambert & MacDougall (2009) state that the assessment, consideration, and implementation of action on the [social] determinants of health is an essential part of planning and implementing healthy schools. Placing children and adolescents in a positive health environment is an important step in addressing the SDH; yet, we cannot assume that the knowledge, skills, and tools to maintain or recreate that positive environment in other realms of life are present if they have not been taught. School is the most opportune route to translate information about the SDH to the adolescent population. If structured in line with health promotion principles, health education should be designed to inspire and enable action on the determinants of health, physical and social. Educators agree that knowledge of the SDH is the foundation upon which individuals become critically health literate (Mogford, Gould & DeVoght, 2010).

The absence of SDH material presents a significant gap in the health education students receive; curriculum amendment to ensure student exposure to SDH material may
be the most efficient and effective solution. The creation and amendment of educational policy begins with the research community; further evidence from both health and education studies is needed to provide the rationale to take on the restructuring of health curriculum in Canada. Curriculum alteration should aim to provide students with explicit instruction on the SDH alongside lifestyle determinants in secondary school settings.

This type of “concurrent” health education might lead to greater awareness and empowerment of students to take control of their own health through individual acts of advocacy but also through collective activism on the upstream social influences on health. As Hawe (2009) suggests, the solution to the relative neglect of the SDH is not for academia to criticize practitioners and educators for not directly addressing them. Rather, researchers should aim to facilitate a reformation of policy and practice to create stronger connections with the SDH within their work. Simultaneously, as we work to translate knowledge about the SDH to the public, ensuring that the SDH are presented as priorities for public health could increase political will to act by individuals, communities, organizations, and institutions at a structural level of influence, whether that be through individual deeds, implementing healthy workplace policies, revision of current housing standards, etc.

The results of this type of research can be applied to both the field of health promotion and also the field of education. In the case of the former, identifying and addressing knowledge gaps concerning important health information can be utilized as a health promotion strategy to build critical health literacy and empower the adolescent
population to influence their health through action on the SDH. In terms of the latter, determining student receptivity to SDH educational material and assessing improvements in learning outcomes can be used to advocate for health curriculum modification, with the goal of reducing inequities in adolescent health knowledge and understanding.

5.5 What I have Learned

Working within the department of Kinesiology and Health studies at Queen’s University as a graduate student has provided me with opportunities to develop research skills and has given me a new sense of confidence in my abilities as an academic, a student, and future employee. I have been involved in every step of my research, including preliminary planning and ethics approval, the design and use of both original and progressive data collection instruments, primary data collection in the field, and statistical analysis and interpretation. The process has allowed me to work with both health and educational institutions within the Kingston community, and to build working relationships with community representatives within those organizations. I have learned that building and maintaining relationships and communication with community members who are willing to help and participate is key. I have learned that evidence-based practice is important both within and outside the research community in order to gain support. I have planned and taught health lessons that have incorporated new knowledge into longstanding curriculum guidelines for secondary school health. This required extensive research into Ontario curriculum policy, much of which was made
possible through resources provided both Kingston Frontenac Lennox & Addington (KFL&A) Public Health and the Limestone District School Board (LDSB).

The nature of my research with adolescents required data collection within the Kingston Community. Working with youth and translating the knowledge I have gained throughout my education Queen’s was a lesson in both patience and flexibility as an instructor. Maintaining authority and feeling confident as a teacher, and adapting to the unpredictability of a classroom setting were skills that improved significantly over the course of data collection. My community work placed me in a social work environment where I could interact with people, a setting which where I feel my greatest strengths are showcased.

Data configuration and analysis has been the most challenging aspect of my graduate work. Using concept mapping as a data collection tool required me to rely on unconventional ways of translating my data into quantitative measures. I learned new techniques and approaches to evaluate both the questionnaire and concept map components of my research, and was able to translate both into an original data set. Through the trial and error, I not only gained confidence in my statistical skills and abilities, but also learned that patience and perseverance is fundamental to the research process, especially during data analysis.

The two years I have spent as a graduate student has given me confidence in myself to work independently, but also to ask for and accept advice and guidance when it is provided. It has shown me the value of a strong support system within my work
environment, but also that I have the capability to be self motivated. This experience has taught me that nothing is written in stone, and nothing is off the table for improvement, at every stage of the research process. I have learned to take constructive criticism as just that – constructive. I have learned that setbacks often lead to greater motivation to succeed, and that those who at times seemed to set me back have pushed me to become a better researcher and a better writer. This experience has been monumental in terms of my own personal growth, and has given me a direction towards a future career in health and health promotion.
REFERENCES


APPENDIX I: Ethics Materials

a. Letter of Information - Student

This letter contains information regarding an educational workshop entitled “Educating on the Social Determinants of Health”, being conducted by Kelly Kenney, a graduate student at Queen’s University supervised under Dr. Spencer Moore, aimed at educating high school students in the Kingston area about the social determinants of healthy aging and to evaluate their learning of this topic through the use of concept mapping. Your participation will require the completion of an individual questionnaire with approximately 10 questions, followed by taking part in a lesson that will take 45-60 minutes to complete.

The purpose of the workshop is to both educate students and gather information on the knowledge and attitudes of adolescents towards of the social determinants of healthy aging. Your answers to questions on these topics will assist in the development of a program plan that addresses the education of students about the role of social determinants of healthy aging. These program plans along with summary evaluation information will be given to the Limestone District School Board and Algonquin and Lakeshore Catholic District School Board.

There are no known risks, discomforts or inconveniences associated with participation. Your participation is voluntary which means that you can refuse to participate, you can withdraw at any time, and request that your answers to the evaluation be stricken from the record. If you choose not to participate, see your teacher to arrange for alternate activities.

The lessons will be audio recorded. Your name will remain confidential and your responses will not be linked to your name.

This study has been granted clearance according to the recommended principles of Canadian ethics guidelines, and Queen’s policies. Any questions about study participation may be directed to the Kelly Kenney at 6kk1@queensu.ca. Any ethical concerns about the study may be directed to the Chair of the General Research Ethics Board at chair.GREB@queensu.ca. Or 613-533-6081

Please retain your copy of the letter of information for future reference.
b. Consent Form - Student

Have you received and read a copy of the letter of information? Yes  No

You know that you are agreeing to participate in an educational workshop entitled “Educating on the Social Determinants of Health”, being conducted by Kelly Kenney, a graduate student at Queen’s University supervised under Dr. Spencer Moore, aimed at educating high school students in the Kingston area about the social determinants of healthy aging and to evaluate their learning through the use of concept mapping. You understand that your participation will require the completion of an individual questionnaire with approximately 10 questions, followed by taking part in a lesson that will take 45-60 minutes to complete.

You understand that the purpose of the workshop is to both educate students and gather information on the knowledge and attitudes of adolescents towards the determinants of healthy aging. Your answers to questions on these topics will assist in the development of a program plan that addresses the education of students about the role of social determinants of healthy aging. These program plans will be given to the Limestone District School Board and Algonquin and Lakeshore Catholic School Board.

You understand that there are no known risks, discomforts or inconveniences associated with participation. Your participation is voluntary which means that you may refuse to participate, you may withdraw at any time and may request that your responses be stricken from the record.

You understand that the lessons will be audio recorded. You understand that your name will remain confidential and your responses will not be linked to your name.

Any questions about study participation may be directed to the Kelly Kenney at 6kk1@queensu.ca. Any ethical concerns about the study may be directed to the Chair of the General Research Ethics Board at chair.GREB@queensu.ca. Or 613-533-6081

Do you give your consent to participate in the educational workshop?

YES  [ ]  I agree to participate.

NO  [ ]  I do not agree to participate.
______________________________ (Participant’s signature)

Please retain your copy of the letter of information for future reference.
c. Letter of Information - Parent

This letter contains information regarding an educational workshop entitled “Educating on the Social Determinants of Health”, being conducted by Kelly Kenney, a graduate student at Queen’s University supervised under Dr. Spencer Moore, aimed at educating high school students in the Kingston area about the social determinants of healthy aging and to evaluate their learning of this topic through the use of concept mapping. Your child’s participation will require the completion of an individual questionnaire with approximately 10 questions, followed by taking part in a lesson that will take 45-60 minutes to complete.

The purpose of the workshop is to both educate students and gather information on the knowledge and attitudes towards of adolescents towards the social determinants of healthy aging. Your child’s answers to questions on these topics will assist in the development of a program plan that addresses the education of students about the role of social determinants of healthy aging. These program plans along with summary evaluation information will be given to the Limestone District School Board and Algonquin and Lakeshore Catholic District School Board.

There are no known risks, discomforts or inconveniences associated with participation. The participation is voluntary which means that you may refuse your child’s participation, you may withdraw your child at any time and may request that you’re his/her answers to the evaluation be stricken from the record. If you refuse your son/daughter’s participation, the teacher will arrange for alternate activities. The lessons will be audio recorded. Your child’s name will remain confidential and his/her responses will not be linked to his/her name.

This study has been granted clearance according to the recommended principles of Canadian ethics guidelines, and Queen’s policies.

Any questions about study participation may be directed to the Kelly Kenney at 6kk1@queensu.ca. Any ethical concerns about the study may be directed to the Chair of the General Research Ethics Board at chair.GREB@queensu.ca. Or 613-533-6081

Please retain your copy of the letter of information for future reference.
d. Consent Form - Parents

Have you received and read a copy of the letter of information?  Yes  No

You know that you are agreeing to allow your child to participate in an educational workshop entitled “Educating on the Social Determinants of Health”, being conducted by Kelly Kenney, a graduate student at Queen’s University supervised under Dr. Spencer Moore, aimed at educating high school students in the Kingston area about the social determinants of healthy aging and to evaluate their learning through the use of concept mapping.

You understand that your child’s participation will require the completion of an individual questionnaire with approximately 10 questions, followed by taking part in a lesson that will take 45-60 minutes to complete.

You understand that the purpose of the workshop is to both educate students and gather information on the knowledge and attitudes of adolescents towards the determinants of healthy aging. Your child’s answers to questions on these topics will assist in the development of a program plan that addresses the education of students about the role of social determinants of healthy aging. These program plans will be given to the Limestone District School Board and Algonquin and Lakeshore Catholic School Board.

You understand that there are no known risks, discomforts or inconveniences associated with your child’s participation. Participation is voluntary which means that you may refuse to allow your child’s to participation, you may withdraw him/her at any time and may request that his/her responses be stricken from the record.
You understand that the lessons will be audio recorded. You understand that your child’s name will remain confidential and his/her responses will not be linked to his/her name. Any questions about study participation may be directed to the Kelly Kenney at 6kk1@queensu.ca. Any ethical concerns about the study may be directed to the Chair of the General Research Ethics Board at chair.GREB@queensu.ca. Or 613-533-6081

Do you give your consent for your child to participate in the educational workshop?

YES    [               ]  I allow my son/daughter to participate.

NO      [               ]  I do not allow my son/daughter to participate.
(Participant’s signature)

(Parent Signature)

Please retain your copy of the letter of information for future reference.
APPENDIX II: Student Questionnaire

NAME: __________________________

1. Are you male or female? ________________

2. Which primary school did you attend? __________________________

3. What is your postal code in Kingston, ON? ______________________

4. How long have you lived in Kingston, ON? _______________________

5. How many brothers and sisters do you have? ______________________

6. What level of education has your mother and/or father completed?

   Mother
   1. Less than High School
   2. High School or equivalent
   3. College Degree completed
   4. University Degree completed
   5. Advanced University Degree completed (MA, MSc, PhD, MD)

   Father
   1. Less than High School
   2. High School or equivalent
   3. College Degree completed
   4. University Degree completed
   5. Advanced University Degree completed (MA, MSc, PhD, MD)
APPENDIX III: Health Category Criteria

1) PHYSICAL ACTIVITY: Movement that increase heart rate or breathing; any bodily movement produced by skeletal muscles that requires energy expenditure (Canadian Society of Exercise Physiology, 2011). Physical activity concepts may include general terms or specific examples that are associated with being active or exercising (E.g., exercise, running, strength training, push-ups, etc.)

2) DIET/NUTRITION: food and drink regularly provided or consumed; habitual nourishment (Merriam-Webster Dictionary, 2007). Diet/nutrition-related concepts may include general terms or specific examples that refer to food, nutrients, and diet (E.g., food, nutrients, carbohydrates, vitamins, eating right, etc.)

3) MENTAL HEALTH: a state of well-being in which an individual realizes his or her own abilities, can cope with the normal stresses of life, can work productively and is able to make a contribution to his or her community (WHO, 2012); of or relating to the total emotional and intellectual response of an individual to external reality (Merriam-Webster Dictionary, 2007). Mental health Concepts may include general terms of specific examples of stress, anxiety (E.g., stress, coping, anxiety) or processes/situations which alleviate mental stress (E.g., relaxation, sleep, meditation, etc.); may refer to one’s self esteem, self-confidence, self-efficacy, and disposition/mood (E.g., confident, insecure, low/high self-esteem, happy, etc.)

4) SOCIAL HEALTH: of or relating to human society, the interaction of the individual and the group, or the welfare of human beings as members of society; the ability to form cooperative and interdependent relationships with others of one's kind. May include general terms or specific examples of social relationships (E.g., family, friends, peers), and social involvement or contribution (E.g., Extra-curricular activities, community involvement, etc.)

5) GENETICS/ PERSONALITY: the complex of characteristics that distinguishes an individual or a nation or group ; the totality of an individual's behavioral and emotional characteristics; a set of distinctive traits and characteristics (Merriam-Webster Dictionary, 2007). Genetic/personality concepts may include general terms or specific examples of characteristics innate to the individual (E.g., genes, personality traits, heredity etc.)
6) SOCIOECONOMICS: Of, relating to, or involving a combination of social and economic factors (Merriam-Webster Dictionary, 2007); AN individual’s or groups’ position within a hierarchal social structure (The American Heritage® New Dictionary of Cultural Literacy, 2005). Socioeconomic concepts may include general terms or specific examples related to education, occupation and income, conditions of education and occupational institutions, status and/or class (E.g., money, work, schooling, poverty, etc.)

7) APPEARANCE: External show, outward aspect; outward indication or impression (Merriam Webster Dictionary, 2007). Appearance related concepts may include general terms or specific examples related to physical appearance (obese, skinny, muscular, fit etc). May also refer to body image (good-looking, ugly, pretty, etc)

8) ENVIRONMENT: the circumstances, objects, or conditions by which one is surrounded; the complex of physical, chemical, and biotic factors (as climate, soil, and living things) that act upon an organism or an ecological community and ultimately determine its form and survival; the aggregate of social and cultural conditions that influence the life of an individual or community (Merriam Webster Dictionary, 2007). Environmental concepts may include general terms or specific examples related to the built environment (E.g., housing, city infrastructure), the natural environment (E.g., air, trees, soil, fresh water, etc.), and conditions of the natural environment (pollution, clean air, pesticide use, etc). Also refers to availability and accessibility of resources and services (proximity to..., availability of…, etc.).

9) SUBSTANCE USE/ABUSE: Something (as drugs or alcoholic beverages) deemed harmful and usu. subject to legal restriction (Merriam Webster Dictionary, 2007). Substance-related concepts may include general terms or specific examples related to using drugs, alcohol, tobacco, or to any illicit substance (E.g., smoking, drinking, marijuana, addiction, etc.)

10) DAILY LIFE: Personal management and skills that are necessary for adequate functioning on an independent basis. May include general terms or specific examples related to daily living skills, such as hygiene, cleanliness, mobility
issues that directly affect quality of life. May also include reference to daily routines/schedules (E.g., balance, routine, etc.)

11) SEXUAL HEALTH: a state of physical, mental and social well-being in relation to sexuality. It requires a positive and respectful approach to sexuality and sexual relationships, as well as the possibility of having pleasurable and safe sexual experiences, free of coercion, discrimination and violence (WHO, 2012). Sexual health concepts may include general terms or specific examples related to sex, safe sex practices, or sexual reproduction (E.g., safe sex, condoms, contraception, etc.)

12) BIOMEDICINE/ILLNESS: Of, relating to, or concerned with physicians or the practice of medicine; requiring or devoted to medical treatment (Merriam-Webster Dictionary, 2007). May include general terms or specific examples related to the medical system (E.g., hospitals, healthcare, medication, doctors, nurses, insurance, etc). Also may include reference to illness or disease (E.g., sickness, specific conditions, etc.).

13) SOCIAL DETERMINANTS OF HEALTH: circumstances are shaped by the distribution of money, power and resources at global, national and local levels. The social determinants of health are mostly responsible for health inequities (WHO, 2012). SDH concepts may include general terms or specific examples related to the SDH: Income and Income Distribution, Education, Unemployment and Job Security, Employment and Working Conditions, Early Childhood Development, Food Insecurity, Housing, Social Exclusion, Social Safety Networks, Health Services, Aboriginal Status, Gender, Race, and Disability (Mikkonen & Raphael, 2010).
APPENDIX IV: Examples of Student Concept Maps

a. Maps Demonstrating the Range of Student Knowledge

i. Few concepts, Low concept Diversity
ii. Many Concepts, Low Concept Diversity
iii. Moderate Number of Concepts, Medium Concept Diversity
iv. Many concepts, High Concept Diversity
b. Maps Demonstrating Changes Between Pre- and Post-Lesson Knowledge

i. Example 1

Pre-Lesson Content

Post-Lesson Content
ii. Example 2

Pre-Lesson Content

Post-Lesson Content
iii. Example 3

Pre-Lesson Content

Post-Lesson Content
iv. Example 4

Pre-Lesson Content

Post-Lesson Content