Growing Pains: Exploring the Concurrent and Prospective Effects of Peer Victimization on Physical Health across Adolescence and Young Adulthood

by

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B.A., McGill University, 2007
M.Sc., University of Victoria, 2010

A Dissertation Submitted in Partial Fulfillment of the
Requirements for the Degree of

DOCTORATE OF PHILOSOPHY

in the Department of Psychology

Supervisory Committee

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Abstract

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Extensive research documents the deleterious effects of being victimized by peers on adolescents' mental health. In contrast, the impact of peer victimization on physical health remains largely unexplored. Studies suggest that peer victimization is a salient interpersonal stressor for adolescents that interferes with discrete aspects of physical health. However, past studies typically collapse the various forms of victimization together (i.e., physical, relational); examine single health indicators; and fail to test the effects of victimization prospectively. A limited understanding of the nature and course of physical health across adolescence and young adulthood also hinders the existent research. The present study tests the structure, stability, and patterns of change in a multidimensional model of physical health among a large, representative sample of young people across a six-year period and four waves of data. It then examines the concurrent and prospective associations between physical and relational victimization and physical health outcomes (physical symptoms, subjective well-being, health-risk behaviours, and health-promoting behaviours) across adolescence and young adulthood. Data from the Healthy Youth Survey (HYS) were collected four times between 2003 and 2009. Participants were 662 young people (aged 12 to 18 years at Time [T] 1; 342 girls).

By T4, participants were 18 to 25 (n = 459). Age at T1 and SES were covariates, and models compared effects for males and females. Latent growth curve modeling was performed. Confirmatory Factor Analysis supported the structure of five distinct health outcomes that were invariant over time and by sex. Univariate latent growth curve modeling established linear patterns of change in each health outcome across time. Peer victimization was examined as a time-varying covariate of health, whereby the repeated victimization measures predicted concurrent and longitudinal health outcomes over and above the average growth trajectory of that outcome. Each time-varying covariate model fit the data well. As expected, physical and relational victimization were associated with poorer physical health both within and across time; however, effects varied by victimization type, by sex, and by health outcome. Relational and physical victimization were associated with more concurrent physical symptoms, but only relational victimization predicted more symptoms at subsequent time points. Relational and physical victimization predicted poorer subjective health and fitness within and across time. Physical victimization was associated with poorer nutrition for the whole sample. Findings suggest that peer victimization puts adolescents at risk of several immediate and long-term physical health difficulties. This study highlights the unique effects of physical and relational victimization and that males and females respond differently to victimization experiences.

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Acknowledgments

I would like to extend thanks to my supervisor, Dr. Bonnie Leadbeater, for her encouragement and wisdom throughout this process. I would also like to acknowledge my committee members for their valuable input and contributions to this project. Many thanks to my close friends and family for pushing me onwards and keeping me smiling. Finally, I express gratitude for each man and woman who participated in this study who had the courage to discuss personal and sensitive information that will advance scientific knowledge for the benefit of so many others.

Chapter 1: Introduction

Extensive research has documented the deleterious effects of peer victimization on adolescents' mental health (Hawker & Boulton, 2000). Yet, empirical research has only recently begun to document the physical health outcomes associated with this psychosocial stressor. These studies typically collapse the various forms of victimization together (i.e., physical, relational); examine single facets of the multidimensional health construct; and fail to test the effects of victimization prospectively. A limited understanding of the nature and course of physical health across adolescence and young adulthood also hinders the existent research. In the current cross-sequential study of young people who span the ages of 12 to 27, we first test the structure, stability, and patterns of change in a multidimensional model of physical health across a six-year period and four waves of data. The present study then examines the concurrent and prospective intra-individual relations between physical and relational victimization and physical health outcomes (physical symptoms, subjective well-being, health-risk behaviours, and health-promoting behaviours) across adolescence and young adulthood. To contextualize this research, a discussion of ways to operationalize and monitor young people's heath is provided. The literature on the nature and course of peer victimization is then reviewed. Finally, we examine associations between peer victimization and various physical health outcomes, and theoretical explanations for these associations by drawing on the broader interpersonal aggression literature. It was hypothesized that peer victimization would predict poorer physical health within time, as well as across adolescence and young adulthood. Given gaps in the current literature, specific

predictions pertaining to the effects of sex and socioeconomic status (SES) were not indicated.

Physical Health in Adolescence and Young Adulthood

Conceptualizing adolescents' physical health. Adolescent health remains a nebulous concept in the social sciences literature. With its distinct developmental opportunities and challenges, the health of adolescents (aged 12 to 17) is not adequately represented by either of the two prevailing models of health – those for children and adults. Over the past few decades, researchers have operationalized and measured aspects of adolescent health, such as mortality rates, substance use, and prevalence of disease and injury. Yet there have been few attempts to provide an integrated conceptualization of adolescent health along with a comprehensive set of health indicators. Adolescence is a critical period of transition characterized by enormous physical and behavioural changes, as well as increased independence and self-reflection. Definitions of adolescent health, therefore, must account for adolescents' normative engagement in health-risk behaviours, their unique environmental influences, their initiation of positive habits and competencies, and their changing perceptions of their own bodies and experiences (Call et al., 2002; National Research Council [NRC], 2009).

The World Health Organization (WHO) emphasizes this holistic perspective of health, defining it as: "…a state of complete physical, mental, and social well-being and not merely the absence of disease or infirmity" (1948). In their systematic review of definitions of young people's health, Pollard and Lee (2003) conclude that health is multidimensional construct consisting of physical, social, cognitive, and psychological dimensions that each spans a continuum from positive to negative. They also illustrate

that each of these dimensions are commonly divided into domains and specific indicators. For example, physical health itself is a multi-component construct consisting of positive and negative physical capacities and experiences, such as physical symptoms of illness and health-compromising and health-promoting behaviours.

Adolescents themselves have become important informants on their health experiences. Qualitative (e.g., Shucksmith & Hendry, 1998) and quantitative (e.g., Johnson & Wang, 2008) studies elucidate that young people, in fact, think about their health quite differently from their parents. For example, adolescents tend to view their health in subjective, concrete terms, assigning greater priority to perceived immediate social needs and pressures, whereas adults endorse activities that promote future health (Coleman, Hendry, & Kloep, 2007).

Adolescent health researchers (e.g., Bronfenbrenner, 1979, Schulenberg & Maggs, 2002) have begun to couch their conceptualizations of health within a lifespan developmental framework, which emphasizes the interactive and dynamic processes that shape a young person's health. The National Research Council (NRC), for example, describes adolescent health as the extent to which young people... "are able or enabled to (a) develop and realize their potential, (b) satisfy their needs, and (c) develop the capacities that allow them to interact successfully with their biological, physical, and social environments" (2004, p. 33). Adolescents are considered determinants of their health and well-being as they begin to make their own choices about health care and healthy living. However, the developing adolescent also exists within a unique interplay of contexts, or ecologies, that affect his or her health and health-related behaviours (Coleman et al., 2007). For example, a young person whose parents and friends smoke

cigarettes might be more inclined to take up smoking than an adolescent who has never been exposed to smoking in her primary social network. Furthermore, adolescent health is regarded as a dynamic concept, fluctuating between more negative and positive states over time. As Holmbeck (2002) states: "change is the defining feature of adolescence". The physical growth and development that occurs throughout adolescence coincides with new physical sensations, health complaints, and body awareness. For many, it is also a time for experimentation with alcohol and cigarettes, as well as increased autonomy over one's food choices and extra-curricular activities. As adolescents transition to young adulthood, they encounter even less parental monitoring, more peer influence, and new role demands, which can further affect health status and related behaviours (Arnett, 2000). Accordingly, health is considered to be a fluid experience across adolescence and into young adulthood, one that is marked by normative developmental fluctuations that may vary from person to person.

Overall, our current understanding of adolescent health has some distinct themes. Across prominent definitions, health is characterized by a number of dimensions, of which physical health is one, and which itself consists of several domains. For the purposes of this study, only the physical health component of adolescent health will be examined, and only those physical health domains commonly measured and monitored in social sciences research will be addressed. Health emerges within continually interacting and changing contexts, and so there may be great variability within individuals over time as well as variability between individuals' health experiences. Health perspectives consistently include notions of well-being, healthy lifestyles, and positive functioning over and above physical ailments and illness. Further, adolescent health spans current

experiences – both objective and subjective - as well as practices that influence their well-being as young adults.

Operationalizing adolescent physical health. In an attempt to measure and monitory young people's health, several research groups (Ben-Arieh & Frones, 2011; Mitic & Leadbeater, 2009) and national and international governmental agencies (NRC, 2004, Rigby, Kohler, Blair, & Metchler, 2003; United Nations Children's Fund [UNICEF], 2011) have proffered sets of health domains and indicators that are consistent with this overarching health framework. In 2011, UNICEF's State of the World's Children documented the health of adolescents from over 190 countries. Indicators primarily focused on survival and illness (e.g., underweight status, immunizations, Malaria, access to sanitation facilities, and HIV prevalence), reflecting the experiences and challenges faced by many adolescents world-wide. In contrast, health indicators in North America tend to include the leading factors contributing to illness and death within our region, including tobacco use, poor diet, inactivity, alcohol abuse, motor vehicle crashes, sexually-transmitted illnesses (STIs), and illicit drug use (NRC, 2009). In some cases, indicators also reflect more positive or subjective health dimensions.

The McCreary Centre Society (MCS)'s Adolescent Health Survey (Smith, Stewart, Peled, Poon, Saewyc, and MCS, 2009), for example, is the largest survey of its kind in Canada and has been tracking the health of adolescents in British Columbia since 1992. Indicators were selected by a committee of public health and government personnel for their consistency with other Canadian surveys and span several dimensions of mental and physical health. In particular, the survey asks adolescents to report on their health complaints (e.g., frequency of headaches, stomach-aches, etc.), their subjective

physical health (e.g., “rate your own health”, “rate your satisfaction with your body”), their positive health practices (e.g., frequency of eating fruits and vegetables), as well as their use of substances (e.g., cigarettes, alcohol, marijuana). Similar items are being utilized by Healthy People, the leading American health promotion and disease prevention consortium (National Center for Health Statistics, 2010). Harris, Gordon-Larson, Chantala, and Udry (2006) identify eight Healthy People items particularly relevant to young people’s health, which include self-rated health (e.g., “rate your health”), nutrition (e.g., frequency of breakfast and fast food), fitness (e.g., frequency of exercise), and substance use (in addition to obesity, STIs, and access to health care). Similar indicators have been utilized in other parts of the world where adolescents enjoy comparable standards of living (e.g., New Zealand’s Adolescent Health Research Group; Clark et al., 2013; and the WHO’s European Region’s European Strategy for Child and Adolescent Health and Development, 2005). In the current study, we establish a multidimensional model of physical health in adolescence based on the prominent sets of health domains and their indicators that have been published in Canada and internationally (see Figure 1). We note that there are other research groups currently monitoring other important adolescent health indicators that were beyond the scope of this study, including chronic health conditions (e.g., diabetes, asthma, allergies, obesity; NRC, 2009), suicide (Langlois & Morrison, 2002), and injury (Public Health Agency of Canada, 2008).

Monitoring adolescent physical health. These noteworthy projects, among others, provide valuable insights into the state of adolescent health at certain points in time. Today’s generation of adolescents appear healthier than ever before when

examining traditional medical measures of health. For instance, NRC (2009) found that less than 10% of American adolescents currently suffer from at least one chronic health condition compared to 10% to 30% of young people in the 1980s. Although the burden of disease among young people is low, over 30% of Canadians aged 12 to 19 rate their health as poor or fair (Labonte et al., 2010) and over 50% of adolescents report dissatisfaction with their bodies (Public Health Agency of Canada, 2008). Epidemiological studies show that between 5% and 30% of 8- to 16-year-olds report weekly aches and pain (Egger, Costello, Erkanli, & Angold, 1999), and an estimated 8% to 20% of school-aged youth experience physical symptoms severe enough to interfere with daily functioning (Perquin et al., 2003).

The majority of studies that monitor adolescent health examine cross-sectional differences between adolescents and other age cohorts (e.g., Mulye et al., 2009) or average changes over short periods of time (e.g., Dunn, Jordan, Manci, Drangsholt, & Resche, 2010). Currently, longitudinal research describing the continuities and fluctuations of health across life stages is limited. Understanding the progression of health problems across the lifespan is important to the timing of interventions. If, for example, physical health difficulties are a relatively transitory phenomenon of which adolescents naturally outgrow, prevention efforts in early adolescence and supportive interventions in mid- to late-adolescence would be necessary. Conversely, if health continues to decline across adolescence and into young adulthood, ongoing intervention activities will be necessary across this developmental transition to combat increasing risk for lifelong and severe health conditions. New statistical developments in longitudinal analysis (e.g., latent growth curve modeling) have begun to facilitate the study of how

and why health changes across the lifespan. Latent growth curve modeling, in particular, allows researchers to examine intra-individual patterns of change over time (that is, within-person growth or stability across the lifespan), and also study inter-individual variability in these patterns (i.e., how people differ from one another in their health trajectories).

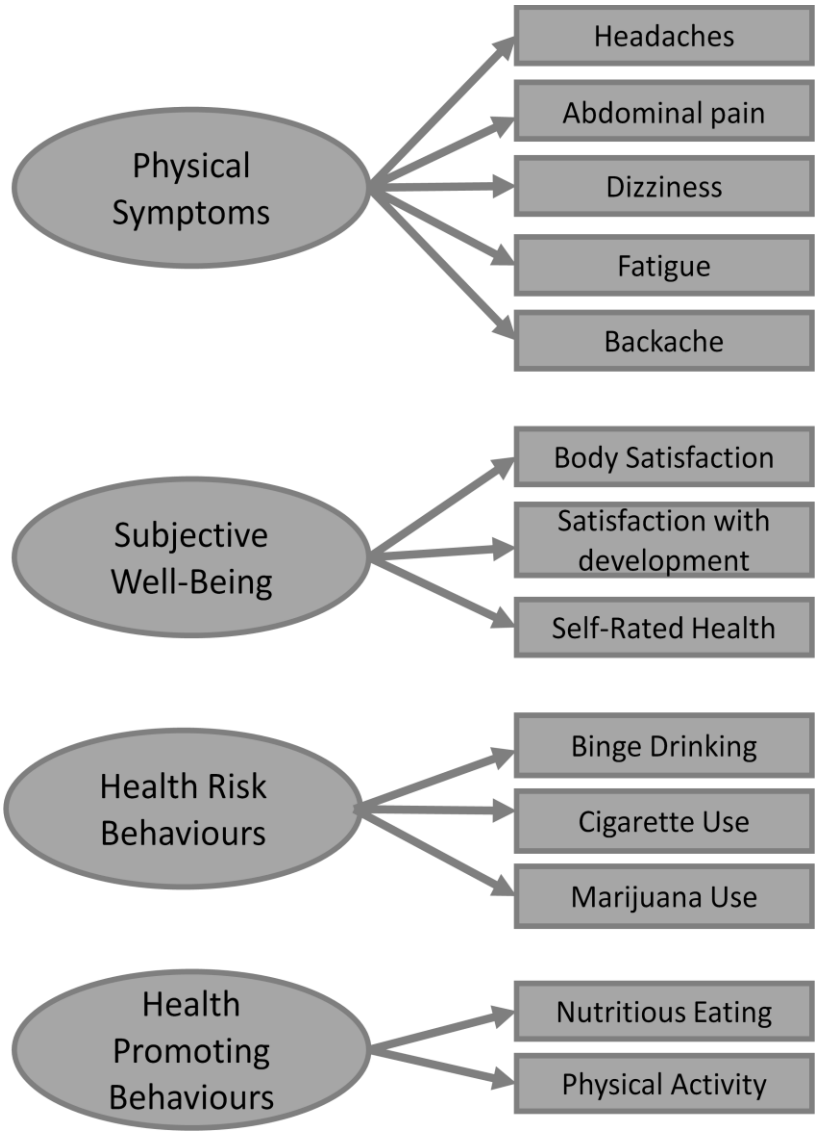

Figure 1. Multi-dimensional model of physical health in adolescence comprised of four health domains and their respective indicators.

Bongers, Koot, van der Ende and Verhulst (2003), for example, used growth curve analyses with a population-based sample of Dutch children aged 4 to 18 who were followed over ten years. They discovered that physical health complaints increased significantly with age for the entire sample, but increased over time much more for girls than for boys. Latent growth curve analyses are scarce in the domain of subjective health and well-being. However, a few population-based longitudinal studies report moderate stability in self-rated health across adolescence (Boardman, 2006; Breidablik, Meland, & Lydersen, 2009) and between adolescence and young adulthood (Fosse & Haas, 2009). Eisenberg, Neumark-Sztainer, and Paxton (2006) found that, on average, body satisfaction decreases between young-adolescence and old-adolescence, but remained higher for boys than girls. Body dissatisfaction was also found to level off or improve as individuals transitioned to young adulthood.

The bulk of longitudinal research on adolescent health has been in the domain of health-related behaviours. Mounting research confirms a normative pattern of alcohol use among young people, involving an increase in use across adolescence with a levelling-off or decline in young adulthood (Schulenberg & Maggs, 2002). In one of the only studies of its kind, Harris and colleagues (2006) tracked patterns of change in several health-related behaviours across adolescence and young adulthood. They identified linear increases over time in each health problem, including poor nutrition, inactivity, obesity, binge drinking, cigarette smoking, and risky sexual activity for men and women across levels of SES. A similar pattern was identified by Duncan, Duncan, Strycker, and Chaumeton (2007) who found a significant decline in physical activity across ages 12 to 17, with lower initial levels of physical activity among girls.

In summary, few attempts have been made to describe the changes in physical health across adolescence and into young adulthood. Initial findings suggest that across physical health domains, health appears to decline across adolescence for boys and girls. In some cases, there is evidence that health continues to decline across the transition to young adulthood, and other studies document a levelling off of health difficulties as young people get older. Research also suggests that boys and girls may have similar patterns of change in health problems over time, but may experience health difficulties at different levels of severity. Further research on the intra-individual patterns of change in adolescent health is necessary for two primary reasons: (1) to gain an understanding of the normative fluctuations in health experiences and practices across adolescence into young adulthood; and (2) to better examine the psychosocial predictors of the variability in these patterns, such as peer relationships.

Characterizing Peer Victimization in Adolescence

The experience of being aggressively targeted by peers is variously described as being bullied (Olweus, 1993) or being victimized (Crick & Grotpeter, 1996), but it invariably involves a power differential between bullies and their victims that is manifest through physical or non-physical efforts to harm the other. Physical victimization refers to direct physical attacks by peers with the intention to hurt, harm, or injure (e.g., kicking, pushing, hitting, threatening to attack; Hawker & Boulton, 2000). The forms of non-physical victimization (variously named indirect, covert, relational, or social) are distinct, but denote a range of harmful behaviours that are directed toward peers' social relationships (Archer & Coyne, 2005). Indirect victimization, in particular, is identified as covert aggression enacted through a third party, such as going behind someone's back

(Björkqvist, 1994). Relational victimization involves actual or threatened damage to peer relationships using overt or covert methods (e.g., social exclusion, ignoring, rumour spreading, gossiping; Crick, Casas, & Ku, 1999). Social aggression is defined as overt or covert acts that aim to manipulate group acceptance or damage a peer's social standing (Galen & Underwood, 1997). Physical and relational victimization will the focus of the current study.

Peer victimization among adolescents is increasingly being recognized as a public health concern (Craig & McCuaig Edge, 2011). Among industrialized countries, approximately 11% of adolescents report being bullied on a regular basis (Nansel et al., 2004). Present estimates for Canadians indicate that one in four students (aged 11-15) is victimized, and an additional 40% of adolescents report both bullying others and being victimized. Across grades 6-10, between 10% and 19% of adolescents report being victimized once or twice, and between 3% and 8% of students reported being victimized once a week or more (Craig & McCuaig Edge, 2011).

Longitudinal studies show that physical and relational victimization, on average, decline for boys and girls across childhood and adolescence (Giesbrecht, Leadbeater, & MacDonald, 2011; Kochenderfer-Ladd & Wardrop, 2001). However, a small, but significant, proportion of young people remain the targets of victimization across childhood and adolescence, and a similar number report increasing levels of victimization over time (Boivin, Petitclerc, Feng, & Barker, 2010; Pepler, Jiang, Craig & Connolly, 2008). Research indicates that physical victimization tends to emerge and peak early in life, and is gradually replaced by more subtle and sophisticated forms of verbal victimization (Crick et al., 2001; Leadbeater, Hoglund, & Woods, 2003). To our

knowledge, only one study using the current sample has examined the course of victimization across late adolescence and young adulthood (Leadbeater, Thompson, & Sukhawathanakul, 2014). Findings indicate that physical victimization remains low and stable across this developmental period while relational victimization increased for young men after high school. In most studies, boys and girls report comparable rates of victimization (Card, Stucky, Sawalani, & Little, 2008), but may perceive their victimization experiences quite differently. For example, girls rate relational victimization as significantly more hurtful than do boys, and describe relational and physical victimization as equally hurtful, while boys rate physical victimization as more hurtful than relational victimization (Galen & Underwood, 1997).

A wealth of research confirms that young people who experience peer victimization suffer from poorer mental health (e.g., anxiety, depression, low self-esteem), both concurrently and over time, compared to their non-victimized peers (see review by Hawker & Boulton, 2000). In general, such outcomes occur among victims of both sexes, in all age groups, and for each form of victimization. There is evidence that the severity, timing, and duration of peer victimization play a role in the magnitude and stability of adolescents' adjustment difficulties. More severe peer victimization experiences are correlated with greater symptomatology (e.g., depression, anxiety; Boivin, Hymel, & Bukowski, 1995; Leadbeater, Boone, Sangster, & Mathieson, 2006), and chronically victimized young people report the most severe difficulties compared to their peers (Goldbaum, Craig, Pepler, & Connolly, 2003). While some findings suggest that chronic victimization predicts increases in maladjustment over time (Kochenderfer, & Ladd, 1996), others indicate that initial levels of maladjustment remain stable (and

high) among persistently victimized adolescents (Goldbaum et al., 2003; Kochenderfer-Ladd & Wardrop, 2001). Past findings indicate that even adolescents who endure late-onset bullying are at risk of experiencing levels of maladjustment equal to their chronically victimized peers (Goldbaum et al., 2003). Cessation of victimization has been associated with improved adjustment over time for some individuals (Goldbaum et al., 2003); however, there is substantial evidence that victims of adolescent aggression are more likely to report mental health symptoms, and meet criteria for psychiatric disorders, in adulthood (Cicchetti & Toth, 2005; Kochenderfer-Ladd & Wardrop, 2001; Sourander et al., 2007), suggesting that some effects of victimization linger across the lifespan.

Explanations for the link between peer victimization and mental health difficulties are rooted in broader theories of stress and coping, which posit that the stress of negative interpersonal interactions interferes with one's ability to maintain wellness (Dohrenwend & Dohrenwend, 1981; Lin & Ensel, 1989). Peer victimization can be distressing, hurtful, and embarrassing for a young person trying to fit in among peers. The stress of severe or chronic victimization can erode self-esteem, prompt social withdrawal, and alter physiological stress responses, which can each put an individual at risk for mental illness (Ford, 2004; Lopez & DuBois, 2005). Notably, these stress-related reactions can also interfere with the body's physical functioning (Cohen, Janicki-Deverts, & Miller, 2007). Yet, there is a dearth of research examining links between peer victimization and physical health and how they may be associated.

Linking Interpersonal Aggression and Physical Health

Several large-scale population-based studies emphasize the physical health benefits of positive social relationships (see review by Uchino, 2006). Conversely, loneliness, social isolation, and limited social support are associated with a wide range of health problems, including poorer adjustment to and recovery from chronic illness, substance abuse, impaired immune function, elevated blood pressure, poor sleep, and higher rates of chronic disease and mortality (e.g., Cohen, 2004; Hawkley, Masi, Berry, & Cacioppo, 2006). A distinct, and much smaller, line of work has evolved from this literature to examine the physical health effects of extreme negative social interactions, such as abuse, assault, and interpersonal violence. Studies demonstrate that child sexual, physical, and emotional abuse, as well as adolescent and adult assault and violence predict increased physical health problems across the lifespan for men and women, including greater physical symptoms (e.g., nausea, pain, fatigue), higher rates of chronic illness (e.g., asthma, heart disease, cancer), increased health-threatening behaviours (e.g., substance use, unsafe sexual practices), and more functional limitations (Eadie, Runtz, & Spencer-Rodgers, 2008; Felitti et al., 1998; Green & Kimerling, 2004; Hager & Runtz, 2012; Runtz, 2002). Maltreatment survivors also report more health care utilization, incur greater health care costs, and endorse poorer perceptions of their overall health compared to non-victimized individuals (Walker et al., 1999). Associations between various forms of interpersonal aggression and physical health problems often strengthen with greater abuse severity, and effects remain after controlling for age, demographic variables, stressful life events, and psychiatric illnesses. Several studies report an

additive effect of abuse experiences on the severity of health problems (Arnow, Hart, Hayward, Dea, & Taylor, 2000).

Despite the mounting evidence for harmful health effects associated with negative social interactions, there have been few attempts to elucidate the impact of peer victimization on young people's health. If interpersonal aggression contributes to or perpetuates health difficulties across adolescence, victims are going to be at a disadvantage compared to their peers in terms of functional abilities, educational and vocational outcomes, financial stability, relationship quality, and overall wellness. Given the concerning prevalence rates of peer victimization, as well as the cumulative risks associated with poor health, it is imperative that we explore this topic at this time.

Exploring the Association between Peer Victimization and Physical Health

The literature examining links between peer victimization and various physical health outcomes is relatively undeveloped compared to the research regarding other forms of victimization. However, emerging findings across the domains of physical symptoms, subjective well-being, health-risk behaviours, and health-promoting behaviours are largely consistent with those reported in other lines of research.

Physical symptoms. Most of the research in the area of peer victimization and health examines physical symptoms as an outcome and supports this relation. Gini and Pozzoli (2009) conducted a meta-analysis of 11 methodologically-sound studies investigating the cross-sectional association between school bullying and physical symptoms (e.g., headaches, nausea) in young people. In combination, the studies assessed a total of 152,186 children and younger adolescents (aged 7 to 15) from several countries, and most data was nationally representative. Victims of peer aggression were

two times more likely than their non-victimized peers to report physical health complaints. Alfven, Ostberg, and Hjern (2008) and Carlerby, Viitasara, Knutsson, and Gadin (2013) similarly found that peer victimization was associated with increased frequency of physical symptoms among adolescents aged 10 to 18 years and 11 to 15 years, respectively. Effects were more pronounced in girls in the former study and in boys in the latter study, after controlling for SES and ethnicity. Baldry (2004) conducted the only cross-sectional study to date examining the unique influences of relational and physical victimization on physical symptoms among 11 to 15 year-old Italian youth. After controlling for age, sex, and SES, both forms of victimization were uniquely related to poorer health.

Only a few studies have prospectively examined the influences of peer victimization on physical symptoms among young people. Fekkes, Pijpers, Fredriks, Vogels, and Verloove-Vanhorick (2006) examined the incidence of new victimization experiences and physical symptoms over time among a nationally representative sample of Dutch children aged 9 to 11. Boys and girls who reported a history of bullying at baseline had a significantly higher risk of developing physical symptoms by the end of the school year. Notably, physical symptoms at Time 1 did not put children at higher risk of being bullied by Time 2, suggesting a unidirectional relationship between victimization and health problems. Nishina, Juvonen, and Witkow (2005) found similar effects for peer victimization in the Fall on physical symptoms in the Spring among male and female sixth graders. Rigby (1999) conducted a two-part study demonstrating a cross-sectional association between peer victimization and physical symptoms among junior but not senior high school students for both boys and girls. Three years later, male

students (but not female students) who were victimized in their junior year continued to report increased physical health complaints. In another study with high school students, Brengen and Vitaro (2008) found that peer victimization predicted an increase in physical symptoms two years later, but only for girls who were emotionally reactive (e.g., anxious, irritable) and not for boys or less reactive girls. Nixon, Linkie, Coleman, and Fitch (2011) conducted the only study to date examining the unique effects of physical and relational victimization over time. They found that both types of victimization predicted physical complaints four months later in a sample of young American boys and girls across SES. After controlling for other victimization experiences and health problems at Time 1, relational victimization more strongly predicted poor health compared to physical victimization.

Subjective well-being.

Self-rated health. Across nationally-representative samples from different countries, the experience of peer victimization has been linked with poorer self-rated physical health both cross-sectionally and longitudinally. In a large sample of Greenlandic young adolescents (aged 11 to 15), those who perpetrated and experienced victimization (i.e., "bully-victims"), but not victims or bullies, had lower self-rated health compared to adolescents uninvolved in bullying (Schnohr & Niclasen, 2006). However, Gobina, Zaborskis, Pudule, Kalnins, and Villerusa (2008) found that victims and bully-victims were more likely to report fair or poor health in their same-aged sample of Latvian and Lithuanian boys and girls. Frisen and Bjarnelind (2010) reported similar findings in their population-based sample of Swedish older adolescents (aged 15 to 18). They also found that those reporting victimization experiences in middle and secondary

school (Grades 7 to 10) reported poorer health than those who were victimized in elementary school (Grades 1 to 6). Allison, Roeger, and Reinfeld-Kirkman (2009) conducted the only study to date to examine the effects of adolescent peer victimization on adult self-reported health. They found that adults endorsing past bullying experiences were more likely to rate their current health as poor compared to those with no victimization history. To elucidate the cumulative impact of social stressors, Boynton-Jarrett, Ryan, Berkman, and Wright (2008) investigated the effects of frequently co-occurring forms of violence exposure (witnessed violence, threat of violence, repeated bullying, perceived school safety, and criminal victimization) on physical health ratings over time in a sample of American adolescents. The odds of experiencing poor self-rated health increased by 60% to 80% for each type of violence exposure, and the impact of cumulative exposure was also evident. This relation was partially mediated by depression, health risk behaviours, and household conflict.

To our knowledge, only one longitudinal study has examined the effects of peer victimization on self-rated health. Findings revealed that severity of physical or verbal victimization at school or on the school bus significantly predicted negative perceived health two years later among Canadian adolescents (Abada, Hou, & Ram, 2008). Effects remained after controlling for previous health conditions, sex, and SES.

Body Satisfaction. Negative evaluations about one's body, especially among adolescents, are intimately tied to peer influence, and appearance-related teasing has become one of the most supported risks for body dissatisfaction (Thompson, Heinberg, Altabe, & Tantleff-Dunn, 1999). A recent meta-analysis of primarily cross-sectional studies revealed moderate effect sizes for the relation between weight-related teasing and

appearance-related teasing on body dissatisfaction in childhood and adolescence (r = .39 and .32, respectively; Menzel et al., 2010). A few studies have also examined the effects of peer victimization more broadly on attitudes towards one's body. Compian, Gowen, and Hayward (2009) found significant associations between physical and relational victimization and weight concerns among young adolescent girls, and this effect was stronger among girls with advanced pubertal status. Lunde, Frisén, and Hwang (2007) prospectively tested the effects of physical and relational peer victimization on perceptions of one's own body, beliefs about others' attitudes towards one's body, and satisfaction with one's weight among pre-adolescents (aged 10). Peer victimization was significantly associated with weight dissatisfaction three years later for girls, but did not predict any type of dissatisfaction for boys. Using the same sample, Frisén et al. (2009) found that peer victimization was associated with negative body perceptions (i.e., I'm too fat, I'm too tall) among boys and girls, and that victimization was more strongly associated with perceptions of one's body compared to actual body composition. Some studies suggest that the impact of victimization may be most salient for those already at risk of adjustment difficulties (e.g., current obesity or clinical eating disorders; Wolke & Sapouna, 2008).

Health-risk behaviours. Findings concerning peer victimization and the use of substances are inconsistent. Some cross-sectional studies indicate that substance use is more common among victims than non-victims (Bontempo & D'Augelli, 2002; Brady, Tschann, Pasch, Flores, & Ozer, 2008; Luk, Wang, & Simons-Morton, 2010; Sullivan, Farrell, & Kliewer, 2006; Turagabeci, Nakamura, & Takano, 2008), while others document a lower occurrence of substance use among victims (Desousa, Murphy,

Roberts, & Anderson, 2008; Hazemba, Siziya, Muula, & Rudatsikira, 2008; Liang, Flisher, & Lombard, 2007). Comparable levels of substance use between victims and non-victims have also been reported (Alikasifoglu, Erginoz, Ercan, Uysal, & Albayrak-Kaymak, 2007; Liang et al., 2007; Morris, Zhang, & Bondy, 2006; Nansel et al., 2004). Using a Nationally representative survey of American adolescents in Grades 6 through10, Nansel et al. (2001) found that victimization was associated with lower rates of substance use while bully-victims reported higher rates. They also found that effects varied by age. For example, bully-victims were more likely to smoke cigarettes if they were in middle school rather than high school, but more likely to drink alcohol if they were in high school.

Findings from longitudinal studies have been similarly mixed. For example, among various nationally representative samples, alcohol use is identified as a predictor of peer victimization (Tschann, Flores, Pasch, & Marin, 2005), lower among victims (Kaltiala-Heino, Rimpela, Rantanen, & Rimpela, 2000), and unrelated to peer victimization (Brady et al., 2008; Niemelä et al., 2010; Topper, Castellanos-Ryan, Mackie, & Conrod, 2011). The experience of any form of peer victimization is associated with increased use of tobacco and marijuana later in life in several studies (Brady et al., 2008; Kaltiala-Heino et al., 2000; Niemelä et al., 2010), but also predicts a lower occurrence of other illicit drugs (Niemelä et al., 2010). Looking specifically for sex differences, Tharp-Taylor, Haviland, and D'Amico (2009) examined peer victimization and the frequency of alcohol, tobacco, marijuana, and inhalant use one year later among a representative sample of American young adolescents (Grades 6 to 8). With the exception of cigarette use (which was equally high among victimized boys and

girls), physical victimization predicted increased use of substances for girls only. Relational victimization was equally associated with elevated use for both sexes.

Health promoting behaviours.

Physical activity. While excessive efforts to lose weight and change one's shape are considered to be health threatening, regular physical activity is critical for maintaining and promoting well-being. Few studies have examined the impact of victimization on participation in sport and physical activity, and most samples involve children, rather than adolescents. In their sample of 50 Australian children, Ziviani et al. (2006) found that teasing was significantly associated with lower levels of physical activity. Faith, Leone, Ayers, Heo, and Pietrobelli (2002) found that weight criticism during physical activity, in particular, was linked to reduced sport enjoyment and lower rates of mild-intensity physical activity in a sample of American adolescents aged 10 to 14. These effects were attenuated among adolescents who engaged in more problem-focused coping (i.e., were better able to manage weight criticism). A number of studies using clinical or convenience samples of overweight youth report negative associations between peer victimization and physical activity levels (e.g., Storch et al., 2007). Using the WHO Global School-Based Student Health Survey data, researchers found that regular physical activity was associated with decreased risk of being frequently bullied for girls, but not boys, and effects did not hold after controlling for SES or country of origin (Turagabeci et al., 2008). Through focus groups, qualitative studies have revealed that adolescents identify teasing, criticism, and bullying by peers as primary barriers to physical activity (Bauer, Yang, & Austin, 2004).

To date, only one study has examined the prospective effects of peer victimization on physical activity among adolescents. Rancourt and Prinstein (2010) found that peer victimization as reported by peers did not predict any weight-related behaviours, including dieting to manage shape or weight or exercising to gain muscle or weight. They did find that that popularity was associated with higher levels of muscle-gaining behaviour for boys, but not girls. It is possible that this study's measure of physical activity was not sensitive enough to detect an association between victimization and general fitness in adolescence.

Nutrition. A sizeable literature has documented the effects of peer victimization on disordered eating (e.g., food restriction, binge eating; Neumark-Sztainer et al., 2002). However, only one study to date has examined the impact of bullying on healthful, normalized eating practices. Using the WHO Global School-Based Student Health Survey data, Turagabeci et al. (2008) examined the relative risk of being bullied in a sample of over 32,000 adolescents aged 13 to 15 from nine developing countries. Findings indicated that nutrition (e.g., consumption of recommended daily diet of fruits and vegetables) was associated with lower relative risk of being frequently bullied among boys but not girls.

Summary. This review reveals that peer victimization is associated with a wide array of health indicators among adolescents. Research on victimization and *physical health symptoms* indicates that peer victimization is associated with physical complaints for children and young adolescents, and in some cases, older adolescents, both cross-sectionally and up to three years later. There is some evidence that relational victimization has a stronger impact on physical symptoms than physical victimization.

Findings pertaining to sex differences are inconclusive at this time. In the domain of *subjective well-being*, research suggests that peer victimization is associated with concurrent and subsequent poor self-rated health. Stronger effects have been found among older adolescents. Both physical and relational victimization predict body dissatisfaction among adolescent girls, and some studies substantiate this association among boys.

Health-risk behaviours among adolescents have been investigated more extensively, and findings are inconsistent. Peer victimization in adolescence predicts increased *and* decreased use of alcohol, tobacco, and illicit drugs concurrently and at subsequent time points, and effects seem to vary by sex. There is also evidence for reciprocal links between peer victimization and substance use. Some studies highlight complex interactions between victim status, sex, and age, which may help explain the discrepancies in this literature. Research in the area of *health-promoting behaviours* is relatively new, and initial research suggests that children and adolescents who experience either physical or relational victimization report less concurrent exercise than their non-victimized peers. Peer victimization has not been found to predict physical activity over time. Cross-sectional links between peer victimization and poor nutrition have been documented among young adolescents for boys but not girls.

Overall, there is support for concurrent and prospective associations between peer victimization and several physical health indicators in adolescence. Some studies have found that effects differ for physical and relational victimization, while many do not distinguish between the two. Age effects have been noted, but are inconsistent. Victimized boys and girls have been shown to report different health outcomes, though

sex effects tend to vary from study to study and by health domain.

Explaining this association. Despite the emerging evidence for concurrent and prospective effects of peer victimization on physical health, the literature still lacks an integrated theoretical model to explain these patterns. Explanations for a direct link between interpersonal aggression and health problems focus on assault-related injuries and sexually transmitted infections contracted during the incident (Resnick, Acierno, & Kilpatrick, 1997). Given that most survivors do not incur long-term injury or illness, researchers tend to regard survivors' reactions to their victimization experiences as essential precipitants of change in physical health (Repetti, Taylor, & Seeman, 2002; Schnurr & Green, 2004; Spaccarelli, 1994). Stress and coping theory (e.g., Lazarus & Folkman, 1984) suggests that an individual's psychological response to a stressor (i.e., distress) is a necessary pathway through which stress impacts physical health. It is the individual's specific distress response and attempts to cope with this distress, rather than the stressful experience itself, that instigate changes in physical health (Cohen et al., 2007; Schnurr & Green, 2004; Spaccarelli, 1994). The stress and coping framework has been used to explicate the impact of other forms of interpersonal aggression, such as childhood maltreatment and adult sexual assault, and may provide insight into why peer victimization relates to poor health.

Attachment theorists and evolutionary psychologists alike have long argued that we are hard-wired with a social need to belong in order to thrive as an interdependent species (Baumeister & Leary, 1995; Bowlby, 1973). Ruptures to social bonds, therefore, can be experienced as basic and severe threats to one's survival. To adolescents, being rejected, ridiculed, or harmed by peers can be a particularly salient stressor because they

are increasingly reliant on peers for emotional support, self-esteem, and identity development across this developmental period (Brendgen & Vitaro, 2008; Sullivan et al., 2006). The stressful nature of peer victimization has been documented in several studies, with young people describing these experiences as embarrassing, fearful, lonely, upsetting, angering, and hopeless (Kliewer & Sullivan, 2008; Ortega, Elipe, Mora-Merchan, Calmaestra, & Vega, 2009).

Researchers have begun to explore the various mechanisms through which distress impacts physical health, emphasizing biological, emotional, cognitive, behavioural, and social changes that independently, or in combination, influence health. Schnurr and Green (2004) highlight these mechanisms in a comprehensive model to explain the impact of extreme stressors (e.g., victimization or natural or human-made disasters) on physical health via the stress response of posttraumatic stress disorder (PTSD). Repetti et al. (2002) provide a similar integrative model to explicate the health effects of early family conflict, aggression, and neglect. Kendall-Tackett (2002) discusses four of these mechanisms in relation to childhood abuse, while Cohen et al. (2004) review the health effects of social isolation via similar pathways. These mechanisms will be reviewed below in the context of peer victimization.

Biological mechanisms. Considerable research documents the dyresgulation of the body's stress response systems in reaction to extreme or prolonged stress, such as child maltreatment (Shea, Walsh, MacMillan, & Steiner, 2005), rape (Resnick, Yehuda, Pitman, & Foy, 1995), and war (Yehuda, Yang, Buchsbaum, & Golier, 1995), which in turn affects several health processes (Friedman & McEwen, 2004). Over-activation of the hypothalamic-pituitary-adrenocortical (HPA) axis, for instance, results in abnormal

levels of cortisol and glucocorticoid receptors (Dougall & Baum, 2004). These alterations can have widespread impact on immune functioning, resulting in greater susceptibility to inflammatory conditions (e.g., asthma, eczema, migraines), infectious diseases (e.g., chronic coughs), and autoimmune disorders (e.g., arthritis, diabetes), delayed healing from injury, and exacerbation of dormant conditions (Friedman & McEwen, 2004). A number of recent studies verify that peer victimization is associated with abnormal cortisol responses similar to other forms of interpersonal aggression and trauma (Vaillancourt et al., 2008). These dysregulated stress responses have also been shown to persist into young adulthood (Hamilton, Newman, Delville & Delville, 2008) and to account for at least some of the physical health problems reported by peer victimization survivors (Knack, Jensen-Campbell, & Baum, 2011).

Other biological changes that may relate psychosocial stress to physical health include elevated catecholamine levels and adrenergic reactivity resulting from over-activation of the sympathetic-adrenal-medullary (SAM) system. Disruptions of the SAM axis put individuals at increased risk of cardiovascular, pulmonary, and musculoskeletal conditions (Friedman & McEwen, 2004). Stress reactions also interfere with opioid functioning, responsible for pain detection and regulation, and may therefore lead to increased pain perception and risk for chronic pain conditions (Friedman & McEwen, 2004). At this time, little is known about the SAM and opioid functioning of those victimized by their peers.

Emotional mechanisms. Peer victimization experiences are a significant factor in the development of affective disorders, such as anxiety and depression (e.g., Hawker & Boulton, 2000), which themselves are associated with poor physical health outcomes

(Ford, 2004; Green & Kimerling, 2004). Affective disorders can interfere with the regulation of the HPA and SAM axes, thus putting individuals at risk of immunological, cardiovascular, pulmonary, and musculoskeletal conditions (Ford, 2004). Depression and anxiety are also characterized by dysfunctions of the serotonergic and noradrenergic pathways, which may account for some of the somatic symptoms endorsed by those with mental illness, including fatigue, muscle tension, pain, and nausea (Stahl & Briley, 2004). Furthermore, emotional problems can interfere with cognitions about oneself, self-care, and interpersonal functioning (Salovey, Rothman, & Steward, 2000), pathways that are reviewed below. Although there is substantial research to support the role of mental health difficulties in the pathway between interpersonal aggression and physical health (e.g., Eadie et al., 2008), few studies have tested this mechanism in relation to peer victimization. There is some evidence that depression helps to explain the associations between peer victimization and self-rated health (Boynton-Jarrett et al., 2008) and physical inactivity (Storch et al., 2007). Furthermore, those who experience peer victimization and report high negative affect are more likely to report physical health symptoms compared to those with less negative affect (Brendgen & Vitaro, 2008).

Cognitive mechanisms. A third pathway delineates physical health problems as a consequence of attentional biases that may result from victimization experiences, or associated mental health difficulties. Briere and Elliot (1994) discuss the tendency for abuse survivors to make sense of their circumstances by adopting negative self-perceptions including self-blame, low self-worth, and poor self-esteem. Peer victimization is also associated with these "depressive self-schemas", which can result in negative appraisals of one's character and abilities, as well as one's body, appearance,

and overall health (Cole et al., 2014). Attentional bias may take the form of heightened vigilance to one's surroundings, as well as to one's internal experiences, which can increase preoccupation with or sensitivity to somatosensory input. Similar to those with panic disorder, the increased awareness of physical sensations can trigger arousal, which in turn can exacerbate physical symptoms (e.g., heart rate, shortness of breath, dizziness), as well as negative health perceptions, and health care utilization (Engel, 2004; Kirmayer, Groleau, Looper, & Dominicé, 2004). Although peer victimization has been associated with hyperarousal and hypervigilance (Idsoe, Dyregrov, Cosmovici Idsoe, 2012), these experiences have not yet been examined in relation to physical health.

Behavioural mechanisms. Survivors' behavioural responses to the stress of victimization can affect their physical health through two primary pathways – reliance on harmful coping strategies and reductions in health-promoting activities (Schnurr & Green, 2004). Given the often uncontrollable nature of victimization, maltreatment survivors tend to adopt passive forms of coping, like avoidance, denial, and rumination (Coffey, Leitenberg, Henning, Turner, & Bennett, 1996; Leitenberg, Gibson, & Novy, 2004), and to use fewer problem-focused coping strategies, such as social support-seeking and active problem-solving (Gipple, Lee, & Puig, 2006). There is some evidence that peer victimization is associated with similar patterns of coping (Brady, Tschann, Pasch, Flores, & Ozer, 2009). On the one hand, passive coping strategies can take the form of engagement in health-risk behaviours, such as smoking, drinking, and drug use. These behaviours can exacerbate emotional distress over time and contribute to poorer physical functioning and higher risk of mortality in later life (Aldwin & Yancura, 2004). Alternatively, survivors may be less inclined to engage in health promotion, such as

maintaining a healthy diet, exercising, practicing safe sex, adopting good sleep hygiene, and regularly utilizing health care services (Rheingold, Acierno, & Resnick, 2004). Research shows that avoidance coping (i.e., distracting oneself, wishing the situation would end) partially explains the association between peer victimization and psychological adjustment among adolescents (Lodge & Feldman, 2007). It is unclear at this time how coping strategies influence the link between peer victimization and physical health.

Social mechanisms. The ability to establish and maintain positive, reciprocal, and supportive social connections are essential to our overall well-being (Kendall-Tackett, 2002). Victimization experiences are associated with impaired social competence (i.e., passivity, social withdrawal, mistrust, hostile attributions), which can lead to social isolation and loneliness, and in turn, increase risk of mental and physical health complications over time (Hawkley & Cacioppo, 2003). Those with limited or weak social support are also more vulnerable to the effects of stress on health across their lifetime, likely because they lack an important emotional resource for coping with negative life events (e.g., subsequent victimization, developmental transitions; Schmidt & Bagwell, 2007). Rejection from normative peer groups also predicts affiliation with deviant peers, which can increase exposure to health risks, such as weapon use, intimate partner violence, substance use, injury, and the ongoing stress of belonging to a marginalized peer culture (Brendgen, Vitaro, Tremblay, & Wanner, 2002).

Interactive and developmental mechanisms. As discussed by Schnurr and Green (2004) and Repetti et al. (2002), the mechanisms linking victimization and physical health are thought to interact and accumulate over time, a process best captured by the

concept of "allostatic load". Allostatic load refers to the "the strain on the body produced by repeated up and downs of physiologic response, as well as the elevated activity of physiologic systems under challenge... and wear and tear on a number of organs and tissues" (McEwen & Stellar, 1993, pp. 2094). According to this model, a single peer victimization experience may not be sufficient for the development of physical health problems. However, repeated or severe victimization experiences may sensitize the body's stress response system and put an individual at risk of negative thoughts and feelings, and possibly mental illness. Depression or anxiety can lead to social isolation, which tax one's abilities to cope effectively with stress and further strain the body. Harmful coping strategies may be employed in adolescence which become major contributors to morbidity and mortality in adulthood (e.g., hypertension, cardiovascular disease, diabetes, and cancer). At this time, research is necessary to substantiate the association between peer victimization and physical health problems across adolescence and adulthood, as well as the proposed explanatory mechanisms.

Limitations to the Current Literature

Still early in its development, the literature examining links between peer victimization and physical health is characterized by a number of methodological limitations. Much of the research is limited to child samples rather than examining effects across the entire developmental period in which peer victimization typically occurs. Many studies fail to account for sex differences even though boys and girls tend to report different health experiences (e.g., Needham & Hill, 2010) and to exhibit different patterns of adjustment following victimization (e.g., Pimlott-Kubiak & Cortina, 2003). Findings have been further limited by the tendency to collapse all forms of peer

victimization into a single variable. Though moderately correlated, physical and non-physical forms of victimization differentially relate to adjustment (Crick et al., 1999; Storch, Masia-Warner, Crisp, & Klein, 2005) and may also affect physical health in unique ways. Moreover, the variability in measurement of peer victimization between studies makes comparisons difficult; while some utilize single-item reports of any history of bullying, others rely on questionnaires assessing frequency and severity. More restrictive measures (e.g., Aimé, Craig, Pepler, Jiang, & Connolly, 2008) may conceal the strength of the relation between variables of interest.

The measurement of physical health and well-being in the psychosocial literature also has shortcomings. As discussed above, health is a multidimensional construct, denoted by objective and subjective, positive and negative, immediate and long-term components. Given the discrepancy in the literature regarding definitions and measurement of physical health in adolescence, comparing results across studies is challenging. Moreover, the effects of victimization across physical health domains (e.g., symptoms, subjective health, health behaviours) remain unexplored. While the large, nationally-representative samples frequently used in this area of research is a strength, many of these samples are recruited from schools within a particular region rather than from communities. School-based samples are less likely to include students with poor school attendance, as in those who are bullied or who experience extensive health problems, and thus may not be representative of the adolescent population.

Perhaps most importantly, the majority of research in this area is cross-sectional (e.g., Gini & Pozzoli, 2009) or examines effects across two points of measurement (e.g., Rigby, 1999). The dearth of longitudinal research precludes our understanding of the

enduring effects of victimization. While some studies reveal persistent, or even increasing, mental health problems over time (Goldbaum et al., 2003; Kochenderfer-Ladd & Wardrop, 2001), it is unknown whether peer victimization continues to impact young people across adolescence and into young adulthood. Physical health concerns and risk behaviours that persist across this developmental transition increase the risk of morbidity and mortality later in life (Grant et al., 2006), as well as poorer economic, employment, and relationship outcomes (Arnett, 2000). Accordingly, it is imperative that research examines the effects of peer victimization across this entire period of the lifespan. Research has also begun to illustrate that the effects of victimization depend on the timing of aggression in one's development (e.g., Leadbeater et al., 2014). For example, young adolescents (aged 14) report more concurrent and prospective physical symptoms compared to those victimized later in adolescence (aged 17; Rigby, 1999), and those bullied in high school report poorer self-rated health compared to those bullied in elementary or middle school (Frisen & Bjarnelind, 2010). Without sufficient data points, however, past research has been unable to test for the unique effects of victimization at different points across adolescence. Knowing the impact of time-specific peer victimization experiences is essential for the development of timely and effective intervention programs.

Current Study

The current project used four waves of data from the Victoria Healthy Youth Survey (HYS), a multi-cohort, community-based study that began in 2003 (Albrecht, Galambos, & Jansson, 2007). A preliminary aim of this project was to develop a multidimensional model of physical health for adolescents and to establish the normative

levels and patterns of change in five health domains over time (physical symptoms, subjective well-being, health-risk behaviours, physical activity, and nutrition). The primary goal of this study was to examine the associations between peer victimization and physical health at the time victimization occurs (i.e., concurrently), as well as across the transition to young adulthood (i.e., prospectively). Weaknesses of the current literature are addressed by examining the unique effects of physical and relational victimization on five health domains over six years (four time points) and by examining sex differences in these associations. SES was examined as a covariate of these associations given its well-documented impact on physical health outcomes (Marmot, McEwen, & Adler, 1999). Age heterogeneity was also examined as a covariate to account for cohort effects.

Specific hypotheses include:

1. Physical symptoms, subjective well-being, health-risk behaviours, physical activity, and nutrition will each be characterized by intra-individual patterns of change over time.
2. Males and females are expected to exhibit different patterns of health problems over time.
3. More frequent victimization experiences will be associated with concurrent elevations in physical health problems (i.e., more physical symptoms, poorer subjective well-being, greater health-risk behaviours, less physical activity, and poorer nutrition) over and above the expected health problems at that time.

4. More frequent victimization experiences will predict elevations in health problems at each subsequent time point above the expected patterns of health over time.
5. It is expected that relational victimization will have a stronger association with each physical health outcome compared to physical victimization given the higher prevalence in relational victimization across the developmental periods assessed.

Chapter 2: Method

Participants

Data from the Victoria Healthy Youth Survey (HYS) were collected, biennially, four times between 2003 and 2009 in a medium-sized Canadian city (population 300,000). In 2003, a random sample of 9,500 private telephone listings yielded an eligible sample of 1,036 households with adolescents aged 12 to 18 years (M = 15.5; SD = 1.9). Of eligible households, 185 (18%) parents or guardians refused permission, 187 (18%) adolescents refused to participate, and two adolescents did not meet the age criteria, leaving a total participation rate for eligible adolescents at 64%. At Time 1 (T1), the sample consisted of 662 adolescents (342 girls). Response rates were 87% (n = 578; 306 girls) at Time 2 (T2), 81% (n = 539; 294 girls) at Time 3 (T3), and 69% (n = 459; 255 girls) at Time 4 (T4). The sample's distribution by age and sex across time points is described in Table 1.

The ethnicity and socioeconomic status (SES) reported by participating adolescents were almost identical to that of the population from which the sample was drawn (Albrecht et al., 2007). Adolescents were 85% Caucasian, 4% Asian, 4% mixed/bi-racial, and 3% Aboriginal. The remaining 4% belonged to other ethnic groups (e.g., Black, Hispanic, or other). Mother's education (indicating SES) ranged from not completing high school to completing university or college, with 48% of mothers receiving at least some university or college education. At T4, approximately 27% of the sample reported one chronic physical health condition (e.g., asthma, arthritis, diabetes, migraines, irritable bowel syndrome), and 9% endorsed more than one persistent problem. A total of 26% of T4 participants reported that their physical health interferes

with their daily activities at least sometimes. Nineteen percent of those participating at T4 had not received health care in the past year. The most common reasons provided for not utilizing the health care system included being too busy (54%), not getting around to it (50%), cost (33%), and services not being available at the appropriate time (24%).

Table 1

Distribution of Sample (N) by Age and Sex across Time Points

	T1		T2		T3		T4	
Age	M	F	M	F	M	F	M	F
12	44	39						
13	36	54	1					
14	57	47	32	31				
15	41	57	30	48				
16	62	42	53	41	33	31		
17	54	58	31	53	29	48		
18	26	45	52	37	48	38	6	4
19			41	56	31	49	25	34
20			27	39	43	41	39	37
21			5	1	34	50	29	40
22					22	36	23	39
23					5	1	38	41
24							37	34
25							17	25
26							0	1
Subtotal	320	342	272	306	245	294	204	255
Total	662		578		539		459	

Selective attrition was assessed by testing for differences at T1 (or T2 if unavailable) on demographic and key study variables between people who remained in the longitudinal study (n = 459) and those who dropped out by T4 (n = 203). Males were

more likely to drop out of the study than females (116 vs. 87, $X^2 = 9.09$, $p = .00$). Participants who dropped out of the study reported significantly more physical symptoms ($M = 7.43$ vs. 6.42; $t[660] = -3.25$, $p = .00$). Further, SES was significantly lower for participants who dropped out of the study ($M = 2.58$ vs. 3.02; $t[321] = -3.56$, $p = .00$). This means that the highest level of mother's education, on average, for both groups was "some university or college". Median SES for those who dropped out equated to "some university or college", while the median for those who remained in the study was "completed university or college". Attrition from T1 to T4 was not related to age, ethnicity, victimization, or any other health variable of interest.

Procedure

The HYS was administered to adolescents by trained interviewers in their homes or an alternate location that provided privacy (e.g., at the university). Informed consent was obtained from parents or guardians and from the adolescent. The HYS included multiple items on socio-demographics, family, peers, and school environments, and mental and physical health in a 3-part questionnaire. In part one, the interviewer read questions to the participants and recorded their responses; part-two responses were recorded by the participants to enhance privacy. In part three, participants filled out questionnaires themselves and then placed them in a sealed envelope to maximize privacy and confidentiality for potentially sensitive issues, such as use of illegal substances and sexual behaviour. Interviews took two hours, on average. Respondents received a $35 honorarium at each interview. The same procedure was employed at each follow-up.

Measures

Peer Victimization. Self-reported experiences of physical and relational peer victimization were measured using the Social Experiences Questionnaire (SEQ; Crick & Grotpeter, 1996). Participants rated how often they experienced *physical* victimization (five items; e.g., "How often do you get pushed or shoved by your peers?") and *relational* victimization (five items; e.g., "How often do your peers tell lies about you to make others not like you anymore?") on a three-point scale (0 = never, 1 = sometimes, 2 = almost all the time). Reliability of this measure was determined with polychoric ordinal alphas because they more accurately estimate reliability than Cronbach's alphas for ordinal response scales (Zumbo, Gadermann, & Zeisser, 2007). Alphas at T1 to T4 ranged from .42 to .88 for physical victimization and from .33 to .89 for relational victimization. The lower internal consistency for overt victimization at T4 reflects the decline in physical aggression with age as well as a reduction in the number of items from five to three to drop age-inappropriate items (e.g., kicks and pulls hair). Measurement invariance was conducted to ensure the stability of the victimization scales across waves of data (see Table 2). Metric invariance (e.g., stability of factor loadings) was found for relational victimization, for all five physical victimization items from T1-T3, as well as for the three physical victimization items measured at all four time points. Accordingly, the relational and physical victimization measures in this study consistently assess the same constructs over time.

Physical symptoms. Adolescents' physical symptoms were assessed between T1 and T3 using the five physical health items from the Health Behaviour in School-aged Children scale (Aarø ,Wold, Kannas, & Rimpelä, 1986). Participants rated the frequency

with which they experienced headaches, abdominal pain, backaches, dizziness, and sleeping difficulties in the past six months on a 6-point scale (0 = never, 1 = rarely, 2 = about every month, 3 = about every week, 4 = more than once a week, 5 = about every day). Total scores were used in the analyses.

Table 2

Tests of Measurement Invariance across Time for Peer Victimization

	Compared Model	χ^2	*df*	CFI	Δ*CFI*	RMSEA	Δ*RMSEA*
			Relational				
Configural	--	339.31**	134	.93	--	.04	--
Metric	Configural	370.20**	146	.92	.01	.05	.01
Scalar	Metric	465.39**	158	.89	.03	.05	.00
Strict	Scalar	733.42**	173	.81	.08	.07	.02
			Physical – T1-T3 (5 items)				
Configural	--	398.52**	72	.85	--	.08	--
Metric	Configural	453.91**	80	.83	.02	.08	.00
Scalar	Metric	489.13**	88	.82	.01	.08	.00
Strict	Scalar	594.04**	98	.77	.05	.09	.01
			Physical – T1-T4 (3 items)				
Configural	--	54.54**	30	.98	--	.04	--
Metric	Configural	87.15**	36	.95	.03	.05	.01
Scalar	Metric	131.19**	42	.91	.04	.06	.01
Strict	Scalar	333.64**	51	.72	.19	.09	.03

**$p < .01$.

Subjective well-being.

Self-rated health. Participants rated their own health with a single item from the Attributional Style Questionnaire (Peterson et al., 1982). At each time point, participants

were asked: “How often do you notice that you are physically healthy?” based on a 3-point scale (0 = never, 1 = sometimes, 2 = often).

Body satisfaction. Three items were used from the Body Areas Satisfaction Scale (Cash, 1994) to assess dissatisfaction with body features (e.g., weight, muscles, face). The items were rated on a five-point scale (“very dissatisfied” to “very satisfied”) and were rescaled to a three-point scale to be consistent with the remaining well-being indicators. Chronbach’s alpha for this scale was .60 at T2, .63 at T3, and .55 at T4.

Satisfaction with development. Nine items from the McCreary Centre Society’s (MCS) Adolescent Health Survey (Tonkin, Murphy, Lee, Saeqyc, & MCS, 2005) were used to assess satisfaction with one’s physical self and body development (e.g., “I feel ugly or unattractive”, “I am uncomfortable with my body development”, “I am proud of my body”). Responses were rated as either false (0) or true (1) but were rescaled as 0 or 2 to reflect the three-point span mentioned above. Negative items (e.g., “I wish I was in better physical condition”) were reverse-scored so that higher scores reflected greater satisfaction. Data was only available from T2 to T4, and so only those three waves of data were used to analyze changes in subjective well-being. Chronbach’s alpha for this scale was .73 at T2, .76 at T3, and .76 at T4.

Health-risk behaviours.

Alcohol use. At each time point, participants were asked to rate how often they consumed five or more alcoholic drinks in one sitting (e.g., binge drink) during the past year along a five-point scale (never, a few times a year, a few times a month, once a week, more than once a week).

Marijuana use. Along the same five-point scale, participants rated their frequency of marijuana use.

Tobacco use. Participants were also asked to estimate how many cigarettes they smoked in the past week. Responses ranged from 0 to 200 and were recoded on a five-point scale for consistency with other risk behaviour measures (e.g., none, one per week, less than half a pack [2-9], less than a full pack [10-19], a full pack or more [20+]).

Health-promoting behaviours.

Physical activity. Fitness was assessed with the remaining three items from the Adolescent Lifestyle Questionnaire (Gillis, 1997) at each time point. Items included "I participate in a regular program of sports at school" and "I exercise vigorously". Internal reliabilities for fitness ranged from .74. to .83 across the four time points.

Nutrition. Nutrition was assessed with the Adolescent Lifestyle Questionnaire (Gillis, 1997) at each time point. The scale includes five items about nutrition habits (e.g., "I usually limit my intake of junk food", "I eat fruits and vegetables") that are rated on a three-point scale ("never" to "often"). Internal consistency for nutritious eating ranged from .72 to .80.

Planned Analyses

The study's hypotheses were tested in three stages. As a first step, confirmatory factor analysis (CFA) was used to test physical health's structural organization and measurement stability across time and sex. Once the five dimensions of health were established (e.g., physical symptoms, health-risk behaviours, subjective well-being, physical activity, nutrition), univariate latent growth curve models were run to assess patterns of change in each health domain over time. Building on these univariate models,

peer victimization was then examined as a predictor of concurrent and prospective health in a time-varying covariate model.

All models were fit to the data using Mplus Version 6.12 (Muthén & Muthén, 1998-2010). Maximum likelihood estimation with robust standard errors (MLR) was used because it is optimal for modeling non-normal data (i.e., responses were positively skewed in this community sample; Brown, 2006). MLR also reduces bias related to incomplete data (missing values and attrition) by using all available data to identify parameter estimates for a particular data set. Unbiased population estimates are provided under the assumption that data are "missing at random" (Little & Rubin, 1989).

Modeling five dimensions of health. CFA was used to establish five domains and indicators of physical health in this sample. Conventionally, a nonsignificant ($p > .05$) chi-square value indicates good model fit; however, this test statistic tends to be significant for large samples even if a model approximates the data well. Accordingly, acceptable models were also determined by comparative fit index (CFI) values $\geq .90$ and root mean square error of approximation (RMSEA) values $\leq .08$ (Byrne, 2010; Hu & Bentler, 1999).

Measurement invariance testing was used to assess whether structural components of the health models were equivalent across time and sex (Brown, 2006). This process compares the fit of four increasingly restrictive models: (1) an unconstrained model (i.e., configural invariance); (2) a model that constrains the magnitude of factor loadings to be equal across time and sex (i.e., metric invariance); (3) a model with additional constraints on the indicator intercepts (i.e., scalar invariance); and (4) a model with further equality constraints on the residual variances (i.e., strict invariance; Widaman, Ferrer, & Conger,

2010). Multi-group longitudinal models were run for each health domain to test for invariance across time and sex simultaneously. Invariance is supported when the changes in model fit (e.g., ΔCFI and ΔRMSEA) between sequentially nested models is ≤ .01 because it indicates that the more restrictive model fits as well as the less constrained model (Cheung & Rensvold, 2002).

Examining changes in health over time. Univariate latent growth curve models were used to assess patterns of change in health across three or four time points (based on available data). Two latent factors were defined for each health domain, including an intercept, representing the average level of health at baseline, and a slope, which reflects the average of individual differences in change across time. These latent growth factors also both have a variance parameter, illustrating inter-individual variability in baseline levels of health (i.e., intercept) and in change trajectories across time (i.e., slope). A residual variance was also estimated for each repeated health measure, which represents systematic fluctuation of individual scores around the measure not accounted for by the average trajectory (Duncan, Duncan, & Strycker, 2006).

In order to provide the best model fit, both linear and quadratic forms of change were tested for each health domain. Intercepts and slopes were modeled as a function of sex, age at T1, and SES to account for sex differences, age heterogeneity, and the potential effects of economic stress, respectively. Participants' age was centered at 12 years so that growth factors could reflect the age of the youngest participant at T1 and each unit change could easily be interpreted in one-year increments. Intercepts indicated the first measurement occasion for each individual, and average years in study defined the slopes' metric (e.g., 0 at T1, 2.07 at T2, 4.04 at T3, and 6.84 at T4). For parsimony,

the residual variances for each health domain were constrained to be equal across time in all models (Wolfinger, 1996).

Assessing the effects of peer victimization on health domains. Univariate health models were extended to include peer physical and relational victimization as concurrent and prospective predictors of each health domain. Given that peer victimization is a repeated measure in the data that has variability over time, it can best be modeled as a *time-varying covariate* (PV-TVC) of health (Bryk & Raudenbush, 1992; Curran & Hussong, 2002; Preacher, Wichman, MacCallum & Briggs, 2008). The PV-TVC model essentially tests the time-specific influences of peer victimization on health (above and beyond the influence of the average growth trajectory of that outcome). In other words, we can estimate the ability of a covariate to predict deviations away from the estimated average trajectory in health outcomes within and across time (Curran & Hussong, 2002). For example, it is hypothesized that an individual experiencing peer victimization at T1 will also report higher levels of physical symptoms than is expected at that time point and at subsequent time points. Figure 1 shows the full PV-TVC model that was tested for each health domain. One strength of this approach is that it can account for changes in both health and peer victimization across time, as well as the variability in the relationship between peer victimization and health over time (Preacher et al., 2008). Additionally, this approach has the ability to show both cross-sectional and prospective effects between the covariate and the outcome of interest (Curran, Muthén, & Harford, 1998).

Separate PV-TVC models were run for each health domain, simultaneously testing the effects of physical and relational victimization. The PV-TVC models

preserved the univariate growth model parameters and also estimated the time-specific effects of victimization on the repeated health measures. Accordingly, physical health at three or four measurement occasions (depending on available data) is explained simultaneously by growth curve factors (i.e., intercept and slope) and physical and relational victimization at that time point and all previous time points. For example, pathways were estimated between symptoms at T3 and victimization at T1, T2, and T3, but not T4 (see Figure 2 for the hypothesized model). This parameterization allows for the cross-sectional, and longitudinal, prediction of health (Curran et al., 1998). Age at T1 and SES were examined as "invariant covariates" (measured only once) by allowing them to covary with both peer victimization scores and with the health intercepts and slopes.

Because sex differences were hypothesized and found in the univariate health models, each PV-TVC model was run as a multi-group model to analyze sex differences in the association between peer victimization and health. An unconstrained model was compared to a model with cross-group equality constraints on all parameters. This provides a test of the null hypothesis that effects are comparable for males and females. A scaled chi-square test (e.g., Satorra-Bentler) is used for comparing nested models when conducting analyses with MLR (Muthén & Muthén, 1998-2010). Sex differences are indicated by: $\Delta\chi^2 < .05$.

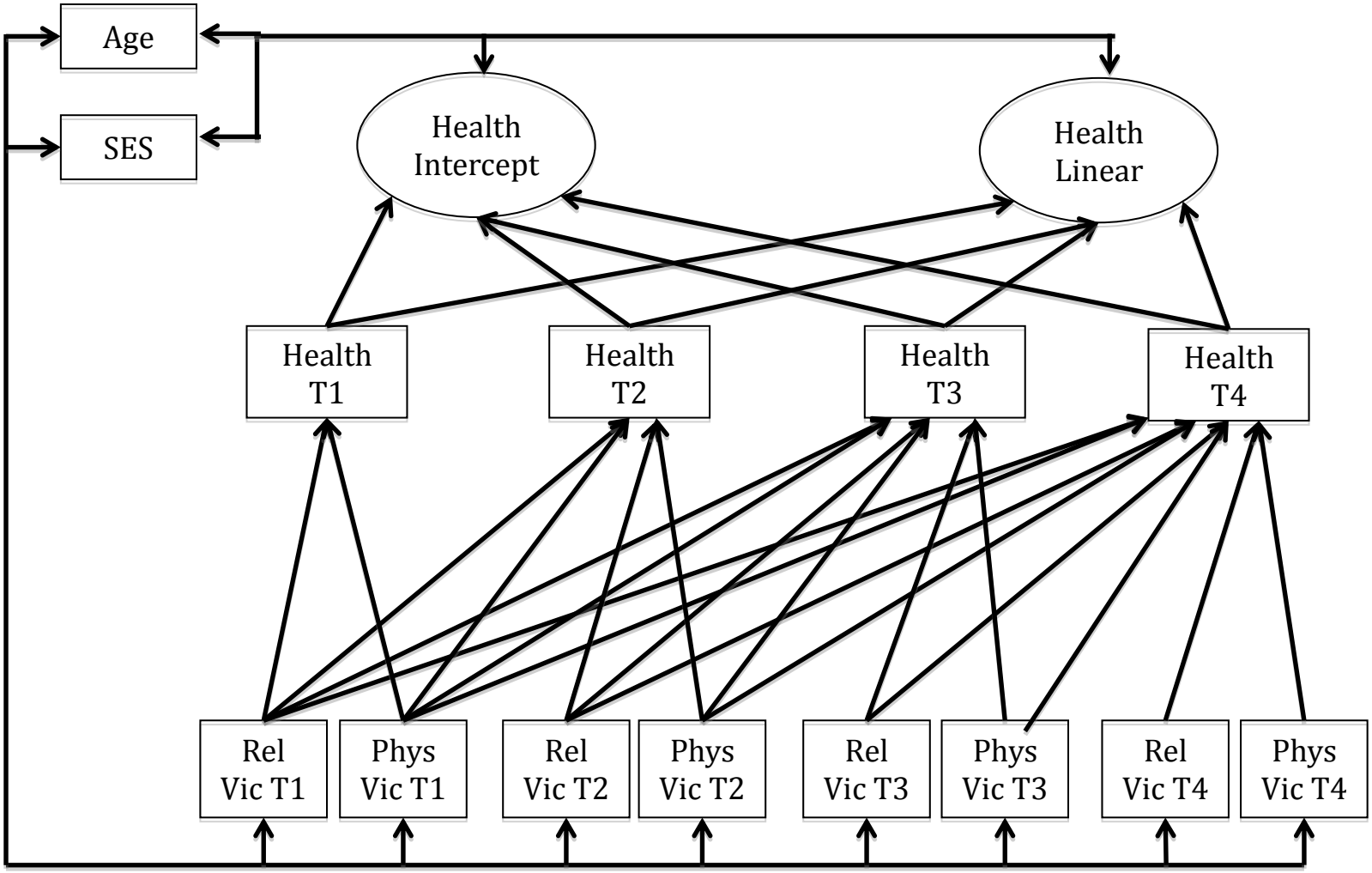

Figure 2. Hypothesized PV-TVC model of health including effects of relational and physical victimization as time-varying covariates and age and SES as time-invariant covariates.

Chapter 3: Results

Preliminary Analyses

The proportion of male and female participants reporting "never", "sometimes", and "often" experiencing physical and relational victimization is presented in Table 3. Means, standard deviations, medians, and skewness for peer victimization are presented in Table 4. Means and standard deviations for each health domain for males and females are presented in Table 5. Sex differences were significant for both forms of victimization and each health domain at at least one time point. Within-time correlations among victimization variables and health domains are presented in Table 6. Physical and relational victimization were positively correlated with physical symptoms at each time point (*r's* ranging from .10 to .33) and positively correlated with health-risk behaviours at almost each time point (significant *r's* ranging from .09 to.27). Peer victimization was negatively correlated with well-being, nutrition, and fitness at at least one time point (significant *r*'s> .09). Concurrent correlations among health domains are presented in Table 7. Each health domain was significantly related to the others at most time points, with the exception of physical symptoms and nutrition, which were not correlated. Bivariate correlations among physical and relational victimization are presented in Table 8. Across-time correlations for each form of victimization were all significant (*r*'s ranging from .28 to.43 for relational and from .26 to .44 for physical). Further, relational victimization was significantly correlated with physical victimization at each time point with the exception of relational victimization at T2 and physical victimization at T4 (significant *r*'s ranging from .17 to .48).

Table 3
Frequency of Peer Victimization Reported by Males and Females

	Time 1 n (%)	Time 2 n (%)	Time 3 n (%)	Time 4 n (%)
Relational Victimization				
Males				
Never (0)	184 (58%)	181 (57%)	146 (60%)	66 (33%)
Sometime (0-1)	130 (41%)	90 (28%)	97 (40%)	134 (67%)
Always (>1)	6 (2%)	1 (.4%)	1 (.4%)	1 (.5%)
Any (>0)	136 (43%)	91 (28.4%)	98 (40.4%)	135 (67.5%)
Females				
Never (0)	178 (52%)	190 (62%)	154 (52%)	114 (45%)
Sometime (0-1)	156 (46%)	113 (37%)	138 (47%)	138 (54%)
Always (>1)	8 (2.3%)	3 (1%)	2 (1%)	2 (1%)
Any (>0)	164 (48.3%)	116 (38%)	140 (48%)	140 (55%)
Physical Victimization				
Males				
Never (0)	159 (50%)	181 (67%)	120 (49%)	98 (49%)
Sometime (0-1)	158 (49%)	90 (33%)	121 (50%)	103 (51%)
Always (>1)	3 (1%)	1 (.4%)	3 (1%)	1 (.5%)
Any (>0)	161 (50%)	91 (33.4%)	124 (51%)	104 (51.5%)
Female				
Never (0)	242 (71%)	244 (80%)	186 (63%)	156 (61%)
Sometime (0-1)	97 (28%)	60 (20%)	103 (35%)	98 (39%)
Always (>1)	3 (1%)	2 (1%)	5 (2%)	0
Any (>0)	100 (29%)	62 (21%)	108 (37%)	98 (39%)

Table 4
Means, Standard Deviations, Medians, and Skewness for Peer Victimization

		M *(SE)*	Median	Skew *(SE)*
		Physical Victimization		
T1	M	.95 (1.24)	1.00	1.53 (.14)
	F	.52 (1.11)**	.00	3.78 (.13)
T2	M	.53 (.96)	.00	2.75 (.15)
	F	.34 (.92)*	.00	4.90 (.14)
T3	M	.95 (1.26)	1.00	1.88 (.16)
	F	.63 (1.18)**	.00	3.33 (.14)
T4	M	1.39 (1.63)	1.00	1.01 (.17)
	F	.77 (1.09)**	.00	1.46 (.15)
		Relational Victimization		
T1	M	.87 (1.41)	.00	2.51 (.14)
	F	1.11 (1.60)*	.00	1.91 (.13)
T2	M	.62 (1.13)	.00	3.16 (.15)
	F	.81 (1.36)	.00	2.33 (.14)
T3	M	.77 (1.21)	.00	2.04 (.16)
	F	1.04 (1.44)*	.00	1.60 (.14)
T4	M	1.38 (1.38)	1.00	.93 (.17)
	F	1.22 (1.45)	1.00	1.11 (.15)

Note. Male participants are the reference group. $^{**}p < .01$, $^{*}p < .05$.

Table 5
Sex Differences in Means and Standard Errors for Each Health Domain

		T1	T2	T3	T4
Variable	Range	*M (SE)*	*M (SE)*	*M (SE)*	*M (SE)*
Physical symptoms	0-25				
Males		6.46 (3.48)	6.98 (3.48)	7.29 (3.74)	--
Females		7.74 (3.86)**	8.60 (4.01)**	9.02 (4.01)**	--
Subjective Well-Being	0-26				
Males		--	20.12 (4.08)	19.60 (4.72)	19.28 (4.67)
Females		--	17.60 (5.41)**	17.64 (5.41)**	17.47 (5.39)**
Health Risk Behaviours	0-12				
Males		1.88 (2.68)	3.22 (3.28)	4.20 (3.55)	4.85 (3.62)
Females		1.45 (2.64)*	2.57 (3.10)*	3.44 (3.27)**	3.28 (3.05)**
Physical Activity	0-6				
Males		4.24 (1.78)	3.59 (1.92)	3.57 (2.11)	3.24 (1.91)
Females		3.91 (1.96)*	3.33 (2.02)	3.26 (2.14)	3.09 (1.98)
Nutrition	0-10				
Males		4.63 (2.34)	4.88 (2.50)	5.13 (2.39)	5.76 (2.47)
Females		5.62 (2.22)**	5.72 (2.41)**	6.26 (2.45)**	6.76 (2.24)**

Note. Male participants are the reference group. $^{**}p < .01$, $^{*}p < .05$.

Table 6

Bivariate Correlations Among Victimization and Health Domains Within and Across Time

		Physical Victimization				Relational Victimization			
Health Domain	T	T1	T2	T3	T4	T1	T2	T3	T4
Physical Symptoms	T1	.16**				.22**			
	T2	.10*	.15**			.23**	.27**		
	T3	.17**	.20**	.13**		.26**	.28**	.33**	
	T4	--	--	--	--	--	--	--	--
Subjective Well-Being	T1	--				--			
	T2	-.05	-.18**			-.23**	-2.6**		
	T3	-.09*	-.13**	-.22**		-.23**	-.20**	-.21**	
	T4	-.14**	-.09	-.20**	-.11*	-.26**	-.17**	-.17**	-.18**
Risk Behaviours	T1	-.01				-.01			
	T2	.04	.09*			.02	.01		
	T3	.10*	.14**	.16**		.07	.07	.12**	
	T4	.10*	.13**	.14**	.27**	.04	-.02	.04	.17**
Physical Activity	T1	-.01				-.14**			
	T2	.03	.02			-.10*	-.01		
	T3	-.04	-.05	-.06		-.10*	-.06	-.07	
	T4	-.13**	-.08	-.11*	-.05	-.14**	-.06	-.04	-.08
Nutrition	T1	-.15**				-.03			
	T2	-.09*	-.11**			-.03	-.01		
	T3	-.14**	-.14**	-.13**		-.07	-.05	-.01	
	T4	-.08	-.17**	-.15**	-.25**	-.01	-.01	.02	-.09*

Note. T = time point; $^{**}p < .01$, $^{*}p < .05$

Table 7
Bivariate Correlations Among Health Domains Within Time

Health Domain	T	Physical Symptoms	Well-Being	Risk Behaviours	Physical Activity	Nutrition
Physical Symptoms	T1	--	--	.26**	-.18**	-.32
	T2	--	-.41**	.21**	-.21**	-.04
	T3	--	-.46**	.17**	-.20**	-.04
	T4	--	--	--	--	--
Well-Being	T1		--	--	--	--
	T2		--	-.09*	.31**	.02
	T3		--	-.02	.27**	.09*
	T4		--	-.04	.32**	.17**
Risk Behaviours	T1			--	-.16**	-.14**
	T2			--	-.23**	-.11*
	T3			--	-.16**	-.14**
	T4			--	-.12*	-.19**
Physical Activity	T1				--	.20**
	T2				--	.32**
	T3				--	.32**
	T4				--	.31**

Note. T = time point; ** $p < .01$, * $p < .05$.

Table 8
Bivariate Correlations Between Relational and Physical Victimization Within and Across Time

		Relational				Physical			
Victimization	T	T1	T2	T3	T4	T1	T2	T3	T4
Relational	T1	--	.43**	.30**	.28**	.48**	.27**	.27**	.18**
	T2		--	.39**	.29**	.30**	.45**	.28**	.08
	T3			--	.39**	.17**	.18**	.33**	.19**
	T4				--	.25**	.25**	.31**	.42**
Physical	T1					--	.39**	.37**	.35**
	T2						--	.44**	.26**
	T3							--	.41**
	T4								--

Note. T = time point; **$p < .01$.

Modeling Physical Health

CFA supported the structure of five health domains at each time of assessment: *physical symptoms* (indicated by five symptom items); *subjective well-being* (indicated by three body satisfaction items, nine development satisfaction items, and one self-rated health item); *health-risk behaviours* (indicated by cigarette use, binge drinking, and marijuana use); *physical activity* (indicated by three physical activity items), and *nutrition* (indicated by five nutrition items). Factor loadings were all statistically significant ($p <$ .01) and were adequate to good (β's ranging from .38 to .93). Models for each health domain fit the data well (see Tables 9 and 10 for factor loadings and model fits).

For each health domain, configural, metric, and in some cases, scalar factorial invariance was established across time and sex (see Table 11). Accordingly, sex differences in this study are not due to measurement error, and observed changes in health over time are functions of true change, rather than changing measures (Bollen & Curran, 2006). Given these findings, and to facilitate interpretability of growth models, total scores for each health domain (sums of items) were used in all subsequent analyses instead of latent construct scores (Brown, 2006).

Examining Changes in Health over Time

Table 12 provides the coefficients and standard errors for each health domain, controlling for sex, SES, and baseline age. Figure 3 depicts the trajectories of each health domain over time by sex and by cohort. Quadratic growth factor estimates were not significant and so all models were run using linear functions. Although trajectories were estimated based on time in study, they are graphed based on age to provide a more interpretable metric.

Table 9
Standardized CFA Coefficients for Health Indicators by Health Domain

Factor Indicators	Latent Construct	T1	T2	T3	T4
Headache	Physical Symptoms	.55 (.06)	.50 (.05)	.56 (.04)	
Stomach Pain	Physical Symptoms	.60 (.05)	.58 (.05)	.60 (.04)	
Backache	Physical Symptoms	.51 (.06)	.45 (.05)	.51 (.04)	
Dizziness	Physical Symptoms	.56 (.05)	.52 (.05)	.60 (.04)	
Sleep Difficulty	Physical Symptoms	.67 (.07)	.47 (.05)	.44 (.05)	
Satisfied with Face	Subjective Well-Being		.39 (.04)	.40 (.04)	.38 (.04)
Satisfied with Muscles	Subjective Well-Being		.62 (.03)	.61 (.04)	.62 (.04)
Satisfied with Weight	Subjective Well-Being		.62 (.03)	.65 (.03)	.56 (.04)
Happy with Look	Subjective Well-Being		.86 (.03)	.87 (.04)	.86 (.04)
Not Worried about Health	Subjective Well-Being		.53 (.05)	.52 (.05)	.54 (.06)
Like my Physical Condition	Subjective Well-Being		.57 (.05)	.69 (.05)	.68 (.05)
Comfortable with Development	Subjective Well-Being		.70 (.04)	.76 (.04)	.71 (.05)
Proud of Body	Subjective Well-Being		.81 (.03)	.78 (.03)	.78 (.04)
Feel Attractive	Subjective Well-Being		.75 (.04)	.81 (.04)	.80 (.04)
Others Like my Development	Subjective Well-Being		.66 (.08)	.74 (.06)	.71 (.07)
Body Develops Normally	Subjective Well-Being		.44 (.06)	.40 (.06)	.44 (.06)
Feel Strong/Healthy	Subjective Well-Being		.80 (.04)	.82 (.04)	.82 (.04)
Satisfied with Health	Subjective Well-Being		.47 (.04)	.54 (.04)	.56 (.04)
Smoke Cigarettes	Risk Behaviours	.57 (.03)	.56 (.04)	.54 (.04)	.65 (.05)
Binge Drink	Risk Behaviours	.71 (.03)	.70 (.04)	.70 (.04)	.59 (.05)
Use Marijuana	Risk Behaviours	.92 (.03)	.83 (.04)	.77 (.04)	.61 (.06)
Exercise vigorously	Fitness	.87 (.03)	.83 (.03)	.93 (.02)	.87 (.03)
Participate in sports	Fitness	.53 (.03)	.51 (.04)	.61 (.03)	.49 (.04)
Exercise regularly	Fitness	.76 (.03)	.84 (.03)	.86 (.02)	.88 (.03)
Read Food Labels	Nutrition	.41 (.04)	.52 (.04)	.52 (.04)	.49 (.04)
Limit Junk Food	Nutrition	.73 (.03)	.68 (.03)	.70 (.03)	.69 (.03)
Eat Healthy Diet	Nutrition	.54 (.04)	.64 (.03)	.67 (.03)	.69 (.03)
Limit Fat	Nutrition	.67 (.03)	.76 (.03)	.77 (.03)	.70 (.03)
Eat Produce	Nutrition	.60 (.03)	.73 (.03)	.62 (.03)	.68 (.03)

Table 10
CFA Model Fit Indices for Health Domains

Health Domains	T1	T2	T3	T4
Physical Symptoms				
χ^2	4.31	12.11*	9.01	
df	5	5	5	
CFI	1.00	.97	.99	
RMSEA	.00	.05	.04	
(CI_{90})	(.00-.05)	(.01 - .09)	(.00 - .08)	
Subjective Well-Being				
χ^2		217.01**	203.04**	168.34**
df		65	65	65
CFI		.92	.93	.94
RMSEA		.06	.06	.06
(CI_{90})		(.05 – .07)	(.05 - .07)	(.05- .07)
Health-Risk Behaviours[J]				
χ^2	.00	.00	.00	.00
df	0	0	0	0
CFI	1.00	1.00	1.00	1.00
RMSEA	.00	.00	.00	.00
(CI_{90})	(.00 - .00)	(.00 - .00)	(.00 - .00)	(.00 - .00)
Physical Activity[J]				
χ^2	.00	.00	.00	.00
df	0	0	0	0
CFI	1.00	1.00	1.00	1.00
RMSEA	.00	.00	.00	.00
(CI_{90})	(.00 - .00)	(.00 - .00)	(.00 - .00)	(.00 - .00)
Nutrition				
χ^2	11.41*	13.00*	12.32*	8.85
df	5	5	5	5
CFI	.99	.99	.99	.99
RMSEA	.04	.05	.05	.04
(CI_{90})	(.01 - .08)	(.02 - .09)	(.02 - .09)	(.00 - .08)

Note. Results are based on the full sample. * $p < .05$, ** $p < .01$; [J] just-identified model.

Table 11
Tests of Measurement Invariance across Time and Sex by Health Domain

	Comparative Model	χ^2	*df*	CFI	Δ*CFI*	RMSEA (CI)	Δ*RMSEA*
Physical Symptoms							
Configural	--	218.94**	144	.97	--	.04 (.03-.05)	--
Metric	Configural	247.27**	164	.96	.01	.04 (.03-.05)	.00
Scalar	Metric	372.27**	184	.91	.05	.06 (.05-.06)	.02
Strict	Scalar	420.45**	209	.90	.01	.06 (.05-.06)	.00
Subjective Well-Being							
Configural	--	40.64	30	.99	--	.03 (.00-.06)	--
Metric	Configural	52.23	40	.99	.00	.03 (.00-.05)	.00
Scalar	Metric	73.90*	50	.99	.00	.04 (.02-.06)	.01
Strict	Scalar	109.21**	65	.98	.01	.05 (.03-.06)	.01
Health-Risk Behaviours							
Configural	--	188.76**	61	.96	--	.08 (.07-.09)	--
Metric	Configural	225.19**	75	.96	.00	.08 (.07-.09)	.00
Scalar	Metric	325.81**	89	.93	.03	.09 (.08-.10)	.01
Strict	Scalar	668.33**	110	.84	.09	.12 (.12-.13)	.03
Physical Activity							
Configural	--	102.73**	60	.99	--	.05 (.03-.06)	--
Metric	Configural	116.51**	74	.99	.00	.04 (.03-.06)	.01
Scalar	Metric	238.42**	88	.95	.04	.07 (.06-.08)	.03
Strict	Scalar	326.19**	109	.93	.02	.08 (.07-.09)	.01
Nutrition							
Configural	--	279.65	268	1.0	--	.01 (.00-.03)	--
Metric	Configural	312.17	296	1.0	.00	.01 (.00-.03)	.00
Scalar	Metric	471.93**	324	.96	.04	.04 (.03-.04)	.03
Strict	Scalar	558.18**	359	.95	.01	.04 (.03-.05)	.00

Note. $^{**}p < .01$, $^{*}p < .05$.

Table 12
Univariate Latent Growth Curve Model Parameter Estimates (Est.) and Standard Errors (SE) for Each Health Domain

	Symptoms	Risk Behaviours	Well-Being	Nutrition	Activity
Parameters	Est. (SE)	Est. (SE)	Est. (SE)	Est. (SE)	Est. (SE)
Fixed effects					
Intercept	5.24 (.41)**	-0.37 (.25)	20.47 (.7)**	4.28 (.28)**	5.02 (.20)**
Age	0.43 (.07)**	0.71 (.05)**	-0.08 (.10)	-0.02 (.05)	-0.32 (.04)**
Sex	1.24 (.27)**	-0.43 (.19)*	-2.37 (.38)**	0.91 (.18)**	-0.36 (.14)*
SES	-0.07 (.10)	-0.08 (.07)	-0.06 (.14)	0.15 (.07)*	0.09 (.05)
Rate of change					
Slope (Linear)	0.56 (.13)**	1.17 (.13)**	-0.59 (.17)**	0.05 (.05)	-0.34 (.04)**
Age	-0.11 (.02)**	-0.14 (.02)**	0.03 (.03)	0.02 (.01)*	0.05 (.01)**
Sex	0.09 (.08)	-0.15 (.06)*	0.14 (.09)	0.00 (.03)	0.02 (.03)
SES	0.01 (.03)	0.02 (.02)	0.10 (.04)*	0.01 (.01)	0.01 (.01)
Variance					
Intercept	7.02 (.76)**	3.61 (.49)**	14.38 (1.6)**	3.31 (.26)**	1.42 (.17)**
Slope (Linear)	0.23 (.08)**	0.24 (.05)**	0.14 (.10)	0.05 (.26)**	0.02 (.01)*
Residual	5.55 (.44)**	2.54 (.17)**	9.44 (.74)**	2.25 (.17)**	2.11 (.10)**
Correlation					
Intercept w Linear	-0.06 (.20)	0.18 (.09)	-0.01 (.29)	-0.13 (.04)**	-0.01 (.03)

Note. **$p < 0.01$, * $p < 0.05$

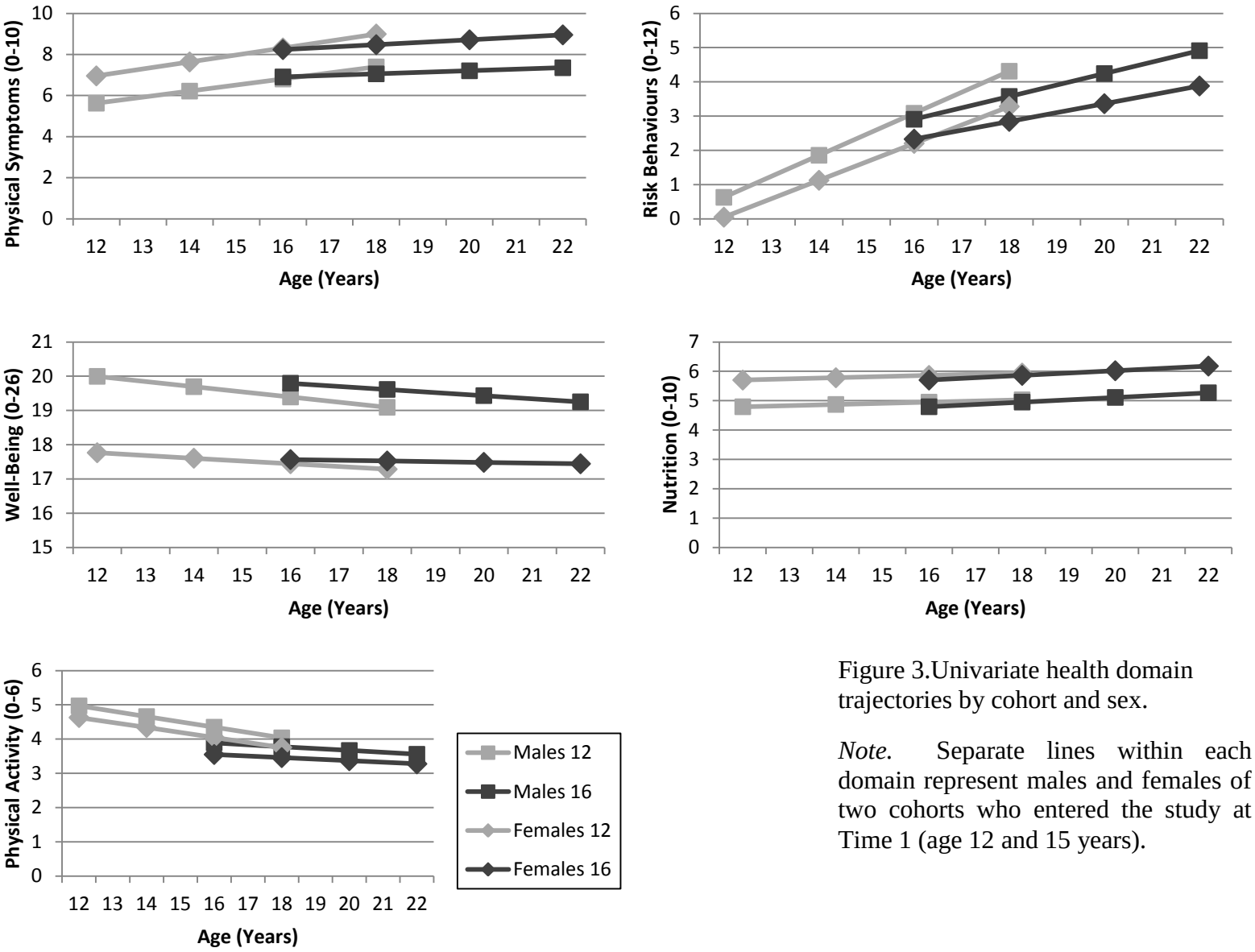

Figure 3.Univariate health domain trajectories by cohort and sex.

Note. Separate lines within each domain represent males and females of two cohorts who entered the study at Time 1 (age 12 and 15 years).

Physical symptoms. A linear physical symptoms model fit the data extremely well: χ^2 (6) = 11.69, *p* = .07, CFI = .99, RMSEA = .04. The average initial level of physical symptoms in this sample was 5.24 units. Between-person differences in age at baseline and sex predicted initial levels of physical symptoms, with older individuals and females reporting more baseline symptoms (β's = .43 and 1.24, respectively). For example, for every 1-year increment in age, the initial level of symptoms increased by .43 units. The average slope increased significantly over time (β =.56, *p* = .00). Younger individuals showed steeper increases in physical symptoms over time than older participants (β = -.11, *p* = .00). Sex was not significantly associated with changes in physical symptoms (β = .09, *p* = .26), and SES was not significantly associated with either the intercept or slope (β's = -.07 and .01, respectively). Significant variance in the initial level of physical symptoms, and in the slope, indicates systematic between-person differences in the trajectory of symptoms (β's = 7.02 and .23, respectively). This domain's residual variance was also significant, indicating within-person variation in the symptom trajectory over time (β = 5.55, *p* = .00).

Subjective well-being. The linear model had excellent fit to the data: χ^2 (6) = 4.97, *p* = .55, CFI = 1.00, RMSEA = .00. The baseline level of well-being was 20.47 and was higher for males than females (β = -2.37, *p* = .00), but was not associated with age or SES (β's = -.08 and -.06, respectively). On average, subjective well-being declined significantly by .59 units per time point (*p* = .00), but this drop was attenuated by higher SES (β = .10, *p* = .01). Age and sex were not associated with changes in well-being (β's = .03 and .10, respectively). Significant variability was evident in baseline levels of well-

being (β = 14.38, *p* = .00) and across the repeated measure (β = 9.44, *p* = .00), but not in rate of change (β = .14, *p* = .17).

Health-risk behaviours. In order to identify the health-risk behaviour model, slope factor loadings at T1 and T2 were fixed, while loadings at T3 and T4 were allowed to be free. The resulting model fit the data well, χ^2 (12) = 93.37, *p* = .00, CFI = .93, RMSEA = .10. The intercept for health-risk behaviours approximated 0 but was higher for older participants and for males (β's = .71 and -.43, respectively). The significant slope effect (β = 1.17, *p* = .00) suggests that there is a substantial increase in risk behaviours over the four time points. Older individuals and males displayed smaller rates of change (β's = -.14 and -.15, respectively). SES was not significantly associated with either the intercept or slope of health-risk behaviours (β's = -.08 and -.02, respectively). Significant within- and between-person variability in levels and changes of health-risk behaviours was found.

Physical activity. A linear model for fitness fit the data well, χ^2 (14) = 52.72, *p* = .00, CFI = .92, RMSEA = .07. Baseline levels of fitness were 5.02 units and were significantly higher for younger participants and for males (β's = -.32 and -.36, respectively). There was a significant linear decrease in fitness levels across the four time points of the study (β = -.34, *p* = .00), and this decline was steeper for younger individuals (β = .05, *p* = .00). Sex was not significantly associated with changes in fitness (β = .02, *p* = .48), and SES was not associated with either the intercept or the slope (β's = .09 and .01, respectively). Variance estimates suggest that there were reliable intra- and inter-individual differences in fitness levels and trajectories.

Nutrition. The overall model fit the data very well, χ^2 (14) = 53.14, p = .00, CFI = .95, RMSEA = .07. The intercept for nutrition in the sample was 4.28 units, and was significantly higher for females and for those with higher SES (β's = .91 and .15, respectively). On average, levels of nutrition did not change over time (β = .05, p = .36). Age was not significantly associated with levels or changes in nutrition (β's = -.02 and .02, respectively). There was significant individual variability in the initial level and in the rate of change of nutrition. A significant negative correlation between intercept and slope (β = -.13, p = .00), indicates that participants reporting higher initial levels of nutrition changed at slower rates than those reporting lower initial levels.

Effects of Peer Victimization on Health Domains

The extent to which peer physical and relational victimization account for time-specific increases or decreases in health across adolescence and young adulthood was examined through a time-varying covariate (PV-TVC) model for each health domain.

Physical symptoms. The PV-TVC model for physical symptoms (shown in Figure 4) fit the data well: χ^2 (38) = 85.75, p = .00, CFI = .92, RMSEA = .06. Multi-group comparison, to assess sex differences, revealed that the constrained model fit the data more poorly than a model with no constraints on male and female parameters, ΔX^2 (27) = 208.28, p < .001, indicating that the effects of peer victimization on physical symptoms differs for males and females. Concurrent associations between victimization and physical symptoms were significant for boys in all instances with the exception of physical victimization at T2 and relational victimization at T3 (significant β's ranging from .11 to .16). For females, all concurrent associations were significant (although the effects of physical victimization at T2 was a trend, p = .07; significant β's ranging from

.11 to .26). Prospective effects were only significant for relational victimization. For boys, relational victimization at T1 predicted increased physical symptoms at T3 (β = .18, p = .05). For girls, relational victimization at T1 and T2 predicted more symptoms at the subsequent time point (T2β = .18, p = .01; T3β = .16, p = .03).

Subjective well-being. A model estimating the TVC effects of peer victimization on subjective well-being fit the data very well, χ^2 (46) = 83.29, p = .00, CFI = .92, RMSEA = .05 (see Figure 5). Multi-group comparison, to assess sex differences, revealed that the constrained model fit the data more poorly than a model with no constraints on male and female parameters, ΔX^2 (37) = 74.10, $p < .001$, supporting sex differences. Effects of victimization on subjective well-being varied across time and by sex. For males, concurrent associations were only significant for relational victimization at T2 (β = -.14, p = .02). For females, concurrent associations were significant for both forms of victimization at T2 and for physical victimization at T3 (β's ranging from -.15 to -.26). Prospectively, males experiencing relational victimization at T1 reported less well-being at T2 and T3; and females experiencing relational victimization at T1 reported less well-being at T2 and T4 (β's ranging from -.15 to -.30). Unexpectedly, for females, physical victimization at T1 predicted more well-being at T2 (β = .20, p = .02), but physical victimization at T3 predicted less well-being at T4 (β = -.13, p = .04).

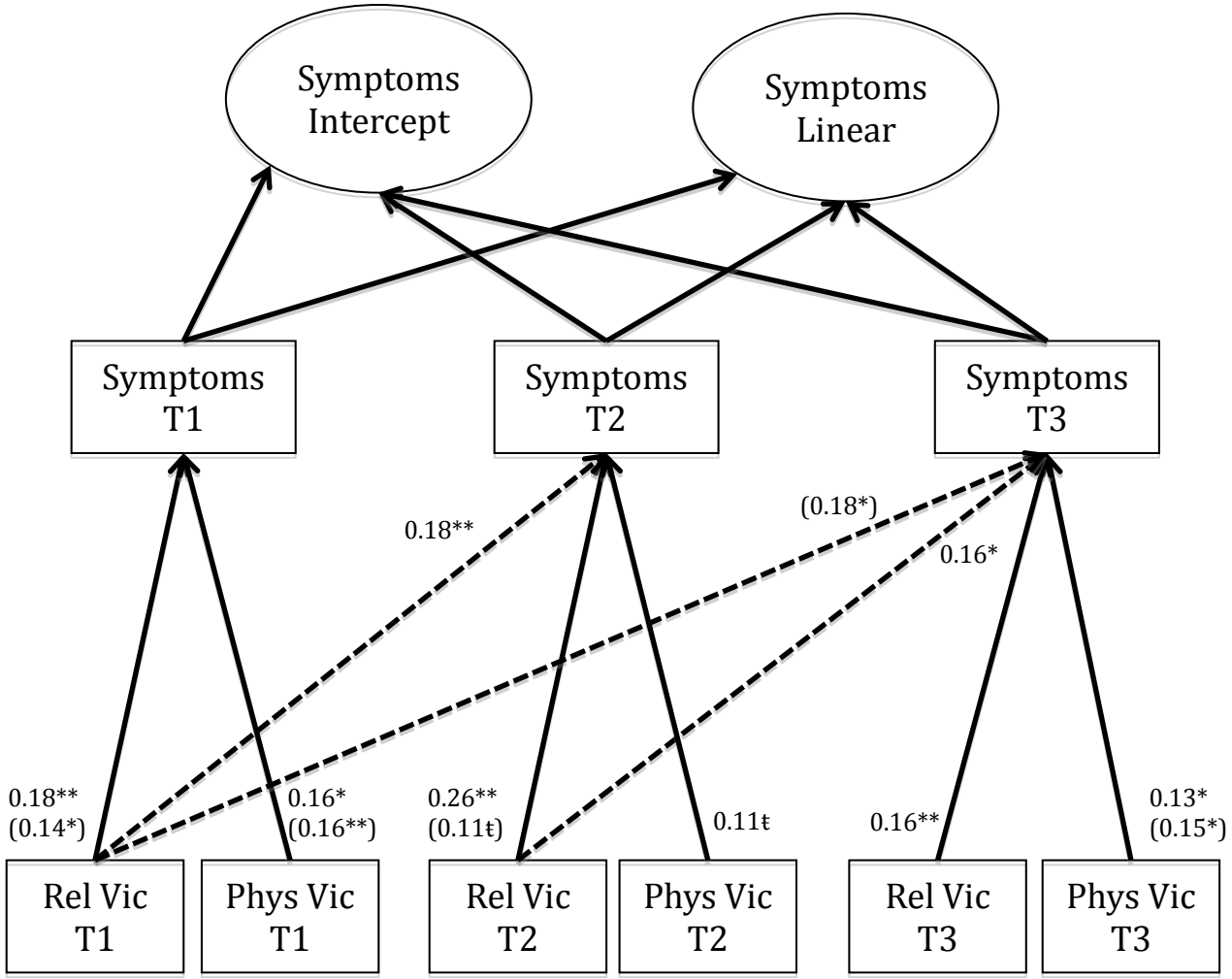

Figure 4. TVC model for peer victimization and physical symptoms controlling for age at T1 and SES.
All paths between TVCs and repeated measures of health were estimated but only significant paths are displayed. Solid lines indicate within-time effects and dotted lines denote across-time effects. Path values are standardized regression coefficients. Males' estimates are presented in parentheses. $^{**}p < .01$, $^{*}p < .05$, ŧ $p < .07$.

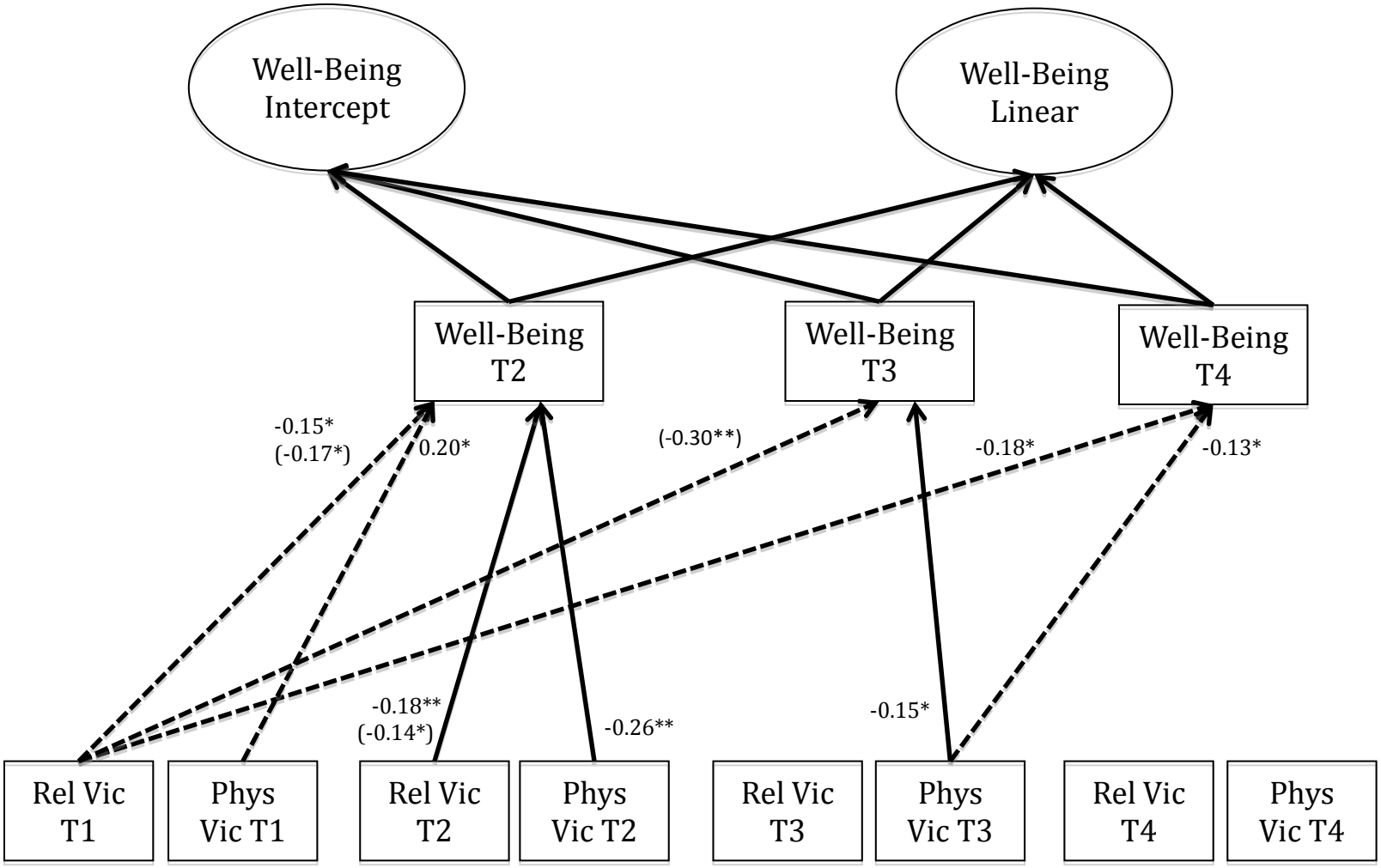

Figure 5. TVC model for peer victimization and subjective well-being controlling for age at T1 and SES.
All paths between TVCs and repeated measures of health were estimated but only significant paths are displayed. Solid lines indicate within-time effects and dotted lines denote across-time effects. Path values are standardized regression coefficients. Males' estimates are presented in parentheses. $^{**}p < .01$, $^{*}p < .05$.

Health-risk behaviours. Fit for this TVC model was fair: χ^2 (66) = 284.08, p = .00, CFI = .81, RMSEA = .10 (see Figure 6). Multi-group comparison, to assess sex differences, revealed that the constrained model fit the data more poorly than a model with no constraints on male and female parameters, ΔX^2 (40) = 70.13, $p < .01$, suggesting sex differences in the overall model. After controlling for age heterogeneity at T1 and SES, there was only one significant concurrent effect, and this was for females. Relational victimization at T4 significantly predicted more health-risk behaviours at that time point (β = .09, p = .04). Counter to the hypotheses, for males, relational victimization at T1 predicted a *reduction* in risk behaviours at T2 (β = -.13, p = .03). However, physical victimization at T2 predicted a significant increase in health-risk behaviours at T3 (β = .16, p = .00). For females, physical victimization at T3 predicted significantly fewer health-risk behaviours at T4 (β = -013, p = .01). All other prospective effects were non-significant.

Physical activity. The unconstrained model fit the data adequately, χ^2 (68) = 172.26, p = .00, CFI = .80, RMSEA = .07 (see Figure 7). Multi-group comparison, to assess sex differences, revealed that the constrained model fit the data more poorly than a model with no constraints on male and female parameters, ΔX^2 (40) = 62.70, $p < .05$. After controlling for age at T1, SES, and the average changes in fitness over time, only victimization at T1 was associated with time-specific levels of fitness. For males and females, relational victimization at T1 predicted worse fitness habits at T1 (β = -.16 and -.14, respectively, p = .01). No other concurrent or prospective pathways were significant for males. For females, relational victimization at T1 also predicted worse fitness at T2

and T3 (β = -.28, p = .00 and β = -.16, p = .02). Physical victimization at T1 predicted poorer fitness at T4 (β = -.16, p = .04).

Nutrition. The fully constrained model fit the data better than the model in which parameters were free to vary among males and females, ΔX^2 (33) = 17.79, $p > .05$, suggesting that the association between peer victimization and nutrition did not differ significantly by sex. For parsimony, the TVC model was accordingly re-run with the total sample (see Figure 8). Overall model fit was very good: χ^2 (34) = 87.33, p = .00, CFI = .93, RMSEA = .05. Estimates revealed that only physical (and not relational) victimization was associated with nutrition habits both within and across time. In particular, physical victimization at T1, T3, and T4 (but not T2) were associated with concurrent nutrition levels (significant β's ranging from -.07 to -.15). Prospectively, physical victimization at T1 was associated with poorer nutrition at T2 (β = -.10, p = .05), and victimization at T2 marginally predicted worse nutrition at T4 (β = -.10, p = .08) for both males and females after controlling for age at T1 and SES.

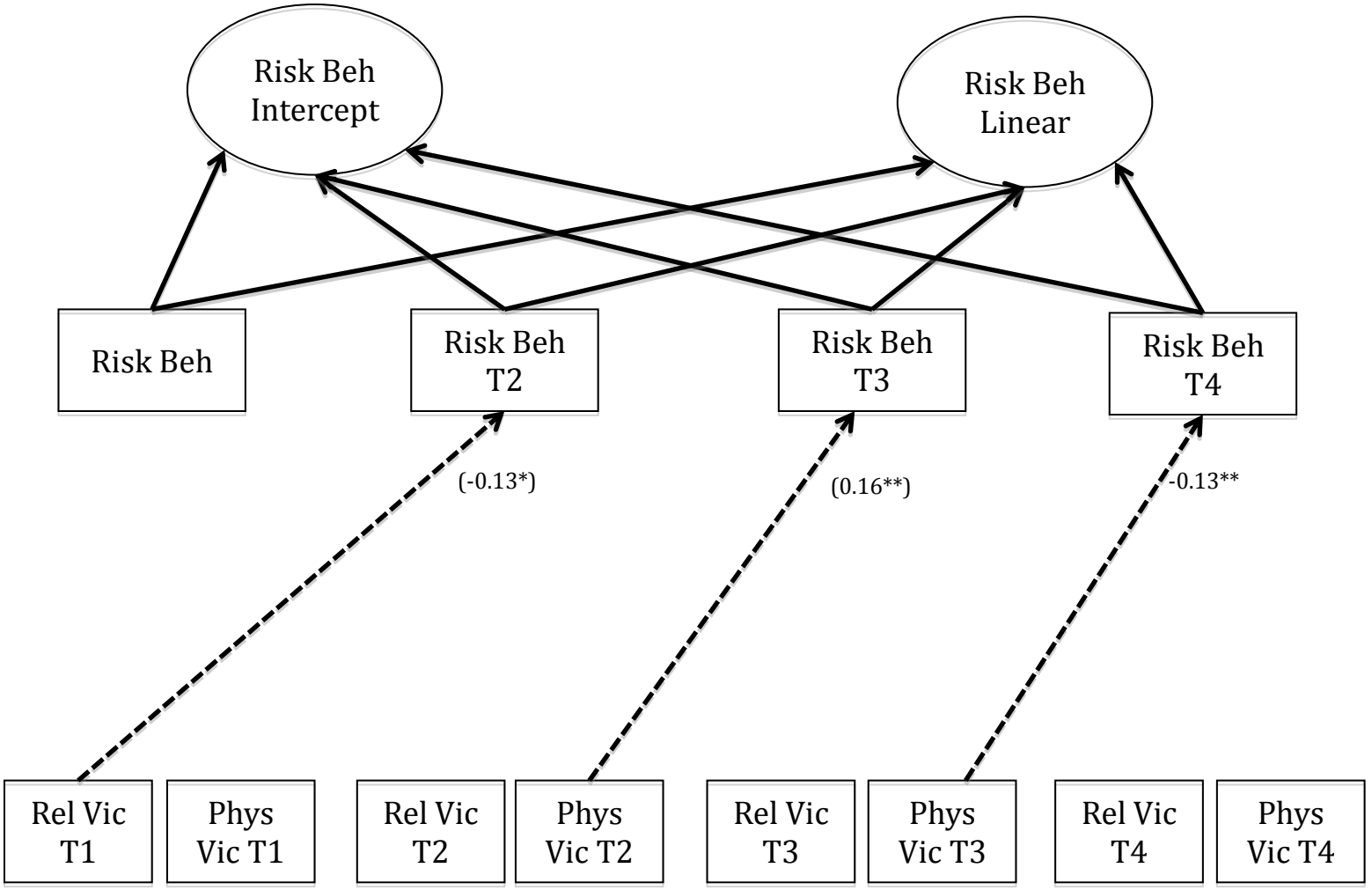

Figure 6. TVC model for peer victimization and health-risk behaviours controlling for age at T1 and SES.
All paths between TVCs and repeated measures of health were estimated but only significant paths are displayed. Solid lines indicate within-time effects and dotted lines denote across-time effects. Path values are standardized regression coefficients. Males' estimates are presented in parentheses. $^{**}p < .01$, $^{*}p < .05$.

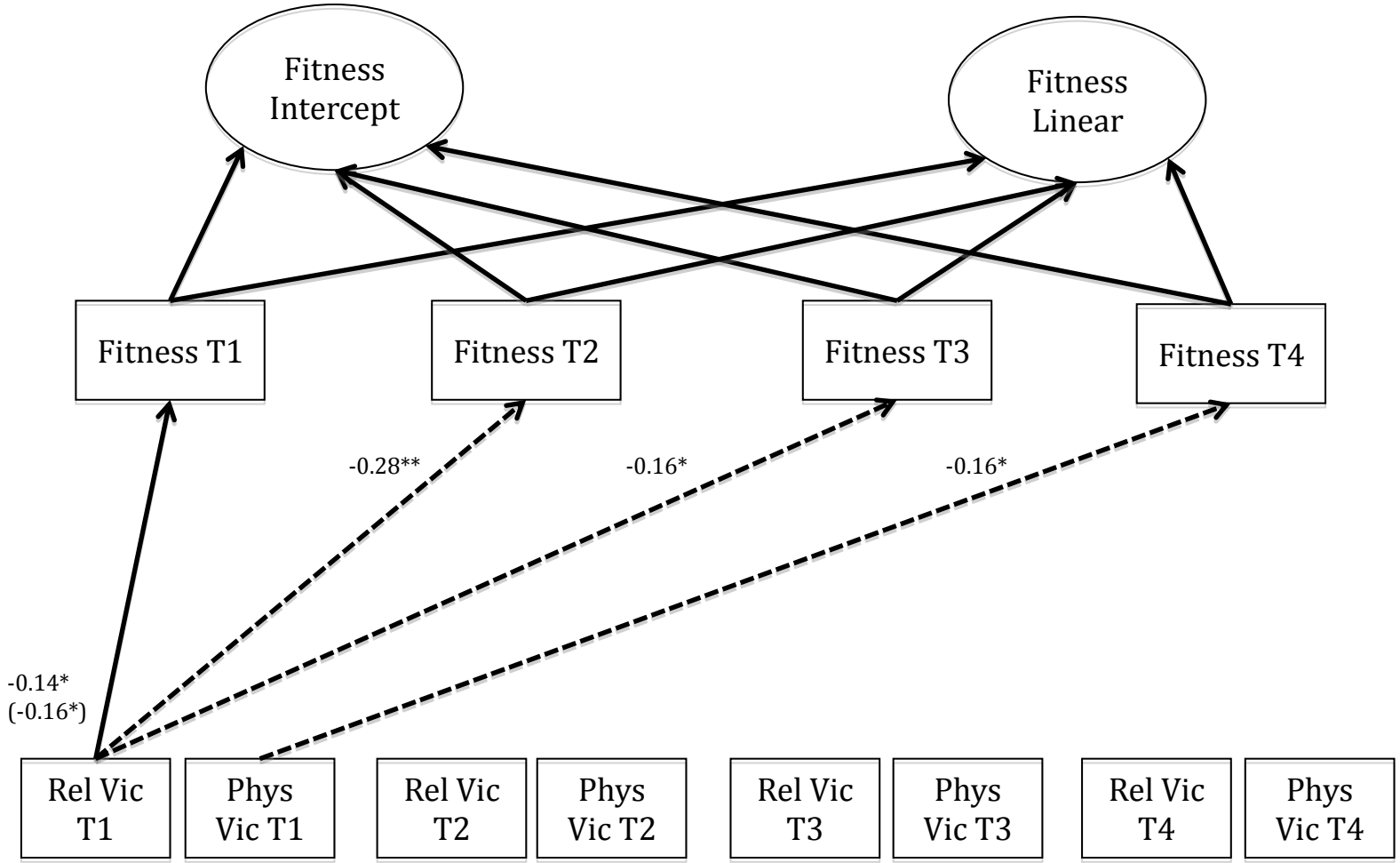

Figure 7. TVC model for peer victimization and physical activity controlling for age at T1 and SES.
All paths between TVCs and repeated measures of health were estimated but only significant paths are displayed. Solid lines indicate within-time effects and dotted lines denote across-time effects. Path values are standardized regression coefficients. Males' estimates are presented in parentheses. $^{**}p < .01$, $^{*}p < .05$.

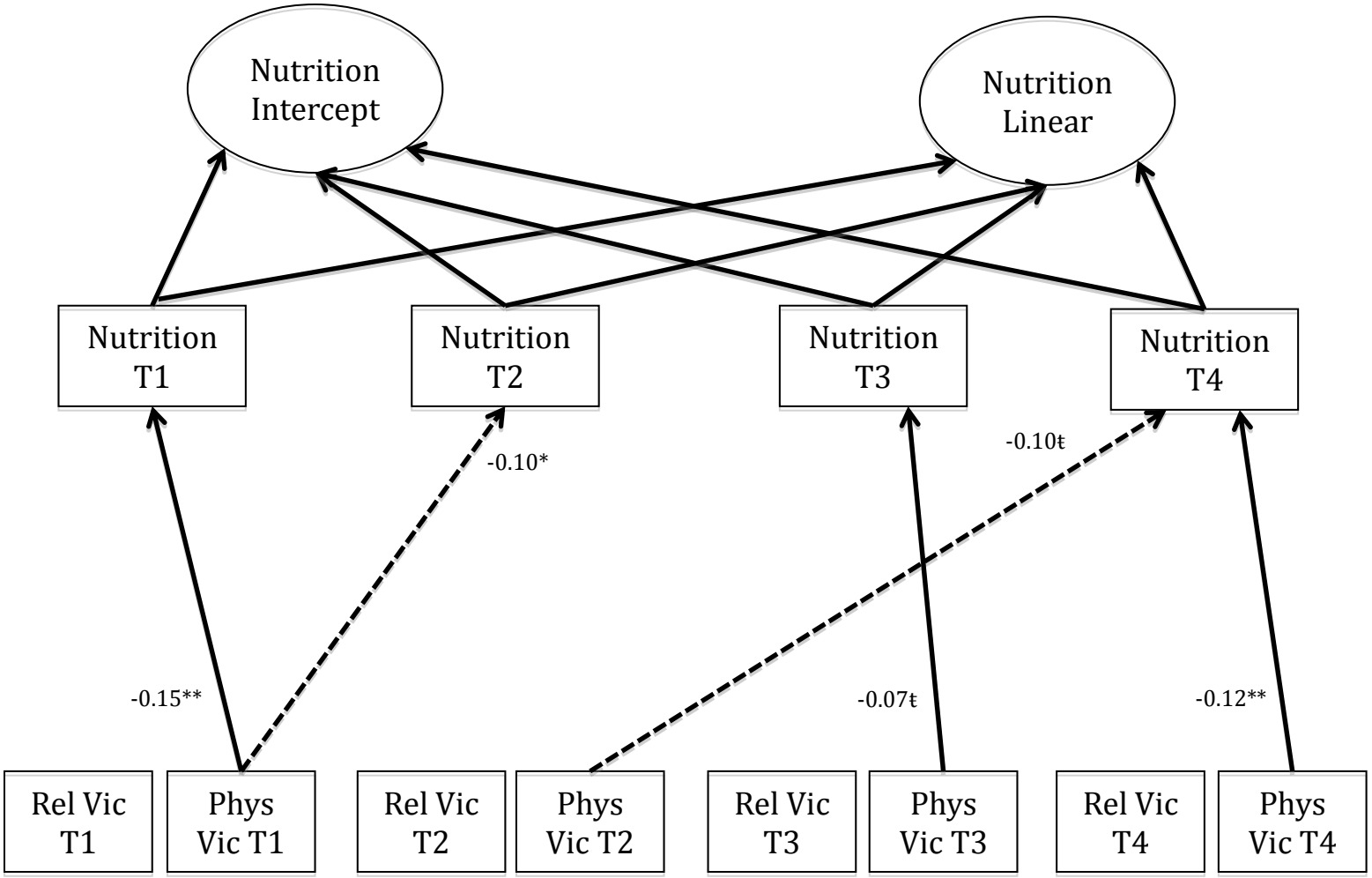

Figure 8. TVC model for peer victimization and nutrition controlling for age at T1 and SES.
All paths between TVCs and repeated measures of health were estimated but only significant paths are displayed. Solid lines indicate within-time effects and dotted lines denote across-time effects. Path values are standardized regression coefficients for the entire sample.
**p< .01, * p < .05, ŧ p < .08.

Chapter 4: Discussion

The current study expands our understanding of the nature of and patterns of change in physical health across adolescence and young adulthood. This study establishes a multi-dimensional model of physical health for young people and tracks the longitudinal course of primary health domains– physical symptoms, subjective well-being, health risk behaviours, nutrition, and fitness – while also examining how sex, age, and SES affect these patterns. In its second stage, this project investigated the concurrent and prospective effects of peer physical and relational victimization on each of the five health outcomes. To our knowledge, this is the first study to examine associations between peer victimization and physical health across this developmental transition. I first discuss the multi-dimensional model of health established in this study, including the levels and patterns of change found for each health domain and how they are affected by sex, age, and SES. Next, I review the patterns of peer victimization in the current sample over time. The current and prospective effects of peer victimization on each health domain are then explained. Finally, the limitations, future directions, and clinical implications of this project are discussed.

Physical Health across Adolescence and Young Adulthood

Five distinct health domains were modeled in the current study to represent the multi-dimensional health experiences and behaviours of adolescents and young adults. Physical symptoms (e.g., headaches, stomach aches, fatigue), subjective well-being (i.e., body and health satisfaction), health-risk behaviours (e.g., use of nicotine, alcohol, and marijuana), physical activity (i.e., regular exercise), and nutrition (i.e., eat fruits and vegetables) each had good model fits and exhibited invariance over time and across sex.

These findings indicate that this model of health is developmentally appropriate across adolescence and young adulthood for both males and females. In terms of sample descriptives at T1, health problems were typically low in the current sample. On average, participants reported "rarely" experiencing physical symptoms. Participants, on average, also reported "often" being satisfied with their bodies and health. Average baseline levels of health-risk behaviours reflected use "less than a few times per year". Participants, on average, reported "sometimes" making healthy food choices and "always" exercising regularly and vigorously. As hypothesized, the results of this study also provide evidence of significant changes in health across adolescence and young adulthood. We found significant variation in the average pattern of change for each health domain, suggesting that young people are not equally vulnerable to poor health or a decline in health over time. Patterns of change for each health domain varied by age cohort at T1 and sex. SES was not associated with levels of or changes in health in the current study, suggesting that the patterns of health are representative of the population across SES.

Physical symptoms. Physical symptoms increased in a linear fashion across four waves of data, suggesting that this domain of health declines for adolescents as they transition to young adulthood. Other studies also document an increase in physical symptoms across adolescence (e.g., Dunn et al., 2011) and from adolescence to young adulthood (e.g., Eaton, Kann, Okoror, & Collins, 2007). Given the cross-sequential nature of this study, we were able to examine whether levels and patterns of change in health varied by age cohort at T1. Older participants reported more physical symptoms compared to younger participants. Furthermore, over time, physical symptoms began to

level off for older participants. It has been suggested that the rapid physical changes and hormonal alterations that occur in adolescence may trigger physical symptoms and increased sensitivity to the body, which then stabilize in young adulthood (Rhee, 2005). Sex differences were found in initial levels of physical symptoms such that young women reported greater physical complaints compared to men. These findings are consistent with extensive research documenting sex differences in health (Mulye et al., 2009; Needham & Hill, 2010). In some studies, adolescent girls report more than twice as many physical symptoms as boys (Guidetti & Galli, 2001). Observed sex differences in health have been explained from a variety of orientations, including biology (Payne, 2005), psychology (Needham & Hill, 2010), and sociology (Torsheim et al., 2006). In the case of physical symptoms, increases in estrogen and progesterone associated with menarche can predispose women to greater aches and pains (Payne, 2006). In contrast, increases in male hormones (i.e., androgens) at puberty may have antagonistic functions related to physical symptoms (Rhee, 2005). Adolescent girls also tend to be more aware of and concerned with their physiological changes (Needham & Hill, 2010), which may increase their reporting of health complaints. MacLean, Sweeting, and Hunt (2010) discuss the societal expectations placed on boys to be less expressive about their feelings, and more "stoic" and "tough", thus less inclined to report physical health complaints. In contrast, girls may feel safer to report symptoms and seek help for illness because these behaviours are more consistent with the socially constructed notion of "femininity".

Subjective well-being. Subjective well-being decreased over time for the sample as a whole, irrespective of age at T1. In other words, subjective well-being continues to decline into adulthood. We also found that young women reported lower

subjective well-being compared to men. Puberty is associated with less socially desirable physical changes for females than it is for males (i.e., increases in body fat vs. muscle), which may explain the more negative health and body perceptions reported by females in this study and in past research (e.g., Coleman, 2004). Our findings suggest that perceptions of one's own health, body, and body development are particularly vulnerable during the transition to young adulthood. Poorer subjective health ratings correlate highly with chronic disease, physical symptoms, functional limitation, and health care use (Fosse & Haas, 2009), and may be stronger predictors of morbidity and mortality than objective health difficulties (Joyce, McGee, & O'Boyle, 1999). These results highlight the need for interventions that target subjective well-being in adolescence to promote more positive views of self across the lifespan, especially for females.

Health-risk behaviours. Health-risk behaviours increased in a linear fashion across the four waves of data. Other studies also document this pattern of change in substance use across adolescence and young adulthood (e.g., Frech, 2012). Older participants reported more health-risk behaviours compared to younger participants, and increased less over time. Our research confirms previous work that indicates an increase and then a levelling-off of substance use across adolescence and young adulthood. Experimentation with substances is considered normative during this developmental period, which then tends to stabilize or dissipate with the onset of roles and responsibilities in the late twenties (i.e., career, marriage, parenthood; Schulenberg & Maggs, 2002). Males reported greater use of alcohol, cigarettes, and marijuana and also had steeper increases in health-risk behaviours compared to females, suggesting that young men are at greater risk of developing higher-risk patterns of substance use.

Similar to our findings, past research documents sex differences in substance use that emerges in late adolescence (Wallace et al., 2003), a pattern that can be understood from a biopsychosocial perspective (Schulte, Ramo, & Brown, 2009). Research indicates that boys' and girl' initiation and continuation of substance use are influenced differentially by genetic factors and physiological sensitivity to substances (Schulte et al., 2009). Certain personality factors, such as sensation-seeking and impulsivity, have been found to put males more at risk of substance use problems than females (Schulte et al., 2009). Socialization processes provide pronounced influences on adolescents' attitudes towards and use of substances that seem to vary for males and females. For example, boys have been shown to be more susceptible to peer influences in regards to heavy consumption of substances. Adolescent males' increased alcohol consumption has also been linked to traditional attitudes towards gender roles (i.e., men as masculine and tough, women as virtuous and nurturing; Ricciardelli, Connor, Williams, & Young, 2001).

Physical activity. Similar to the patterns of health discussed above, physical activity involvement got worse for the sample as a whole over time. Older participants reported less physical activity compared to younger participants, and females reported less physical activity than males. Past studies indicate that adolescent girls are less active across numerous sports and forms of physical involvement (e.g., Guinn, Vincent, Semper, & Jorgensen, 2000). This discrepancy may result from social attitudes regarding gender roles. In our culture, men are socialized to value competition and sports achievement much more than women. Gender biases in the organization of clubs and programs often lead to better training for males (i.e., more qualified coaches, more opportunities for competition), which may boost involvement for males and decrease

motivation for females (Vilhjalmsson & Kristjansdottir, 2003). Engaging girls in physical activity that is rewarding and appealing to them will be imperative for the formation of healthy habits across the lifespan.

Nutrition. In contrast to previous research (Harris et al., 2006), nutrition remained stable across the duration of the current study for all age cohorts. This finding suggests that eating habits developed in adolescence persist into young adulthood. Early education regarding healthy food choices will be imperative for the formation of lifelong, nutritious eating. It is also possible that our measure of nutrition (e.g., intake of fruits and vegetables, limiting of fat) was not able to capture typical changes in nutrition during adolescence that have been reported in other studies, such as increases in fast food consumption and declines in eating breakfast. Males reported poorer nutrition compared to females. Our results replicate the numerous findings that men eat fewer fruits and vegetables, choose fewer high-fibre and low-fat foods, and consume more sugar than women (Liebman, Cameron, Carson, Brown, & Meyer, 2001). Men also tend to rate nutrition as less important than women, to report less nutrition knowledge, and to be less concerned with weight control (Wardle, Haase, Steptoe, Nillapun, & Jonwutiwes, 2004), which may help explain the sex differences in food choices found in the current study.

Prevalence of Peer Victimization Experiences

Peer victimization experiences were common in the current sample. Across the four waves of data, 33% to 51% of males and 20% to 39% of females experienced physical victimization at least sometimes, and 28% to 67% of males, and 37% to 54% of females experienced relational victimization at least sometimes. These rates are fairly consistent with others reported within Canada (e.g., Craig & McCuaig Edge, 2011).

Males consistently reported higher rates of physical victimization, and females reported higher rates of relational victimization at the first three waves. Rates of victimization appeared fairly stable across time, with a slight drop at T2 for both physical and relational victimization among males and females. There was an increase in relational victimization at T4 for males, but not females. Past studies have reported average declines in both relational and physical victimization across childhood and early adolescence (e.g., Giesbrech et al., 2011). This project expands on previous research by documenting rates of victimization into young adulthood. Our data suggest that a significant proportion of young people continue to experience peer victimization as they transition out of high school and into college, university, or the workforce. These findings highlight the need for ongoing prevention efforts throughout high school and university to reduce interpersonal aggression, possibly by improving social competencies, conflict resolution, and communication.

Effects of Peer Victimization on Health Domains

The findings of this study advance our understanding of the concurrent and prospective associations between peer victimization and health across adolescence and young adulthood. Although health worsened over time for the sample as a whole, time-varying covariate latent growth curve models revealed significant intra-individual differences in these patterns within and across time. Overall, individuals experiencing more frequent peer victimization reported poorer health than would be expected given the average pattern of health across adolescence and young adulthood. In other words, peer victimization predicted time-specific elevations in health problems, both concurrently and prospectively, for young men and women, after controlling for age heterogeneity and

SES. Notably, victimization was related to each health domain, and these associations varied by sex and the form and timing of victimization.

Physical symptoms. We found that relational and physical victimization were concurrently related to higher levels of physical symptoms at each wave for females and at two of three time points for males. Cross-time associations show that relational, but not physical, victimization at T1 was associated with increases in physical symptoms at T2 for females and T3 for males. These findings are consistent with the growing body of literature that illustrates that victims of bullying are more likely to report physical discomfort, such as aches and pains, at the time of their victimization experiences (e.g., Gini & Pozzoli, 2009) and that these health complaints linger over time. Augmenting Baldry's (2004) work with young adolescents, our findings illustrate that victims of both physical and relational bullying continue to experience higher rates of concurrent health complaints well into young adulthood. We also extend previous longitudinal work (e.g., Brengen & Vitaro, 2008; Rigby, 1999) by demonstrating that the effects of bullying in adolescence persist beyond high school.

Peer victimization is a salient interpersonal stressor for young people, and this intense and often chronic stress can lead to physical health complaints through biological and psychosocial processes. Distress associated with victimization may dysregulate the body's stress response systems (Vaillancourt et al., 2008), which can, in turn, interfere with immune, cardiovascular, pulmonary, and musculoskeletal functioning, and ultimately lead to increases in aches and pains, infection, and fatigue, among other health conditions (Knack et al., 2011). A new line of research indicates that "social pain", such as peer rejection, activates the same physiological responses in the brain as those elicited

by physical pain, which may help explain the increased physical discomfort reported by victims (McDonald & Leary, 2005). The association between peer victimization and physical symptoms may also be influenced by internalizing symptoms that are common in victims of bullying. Both depression and anxiety can initiate biologically-based disease processes because of their direct effects on the stress response systems (Ford, 2004). Furthermore, those with depression may have a propensity to report physical symptoms as a way of focusing away from their emotional distress (Pennebaker, 2000). Resnick and colleagues (1995) suggest that victims may develop hyperarousal in response to the threat of victimization (e.g., rapid heartbeat, sweating, difficulty breathing) and an increased sensitivity to these symptoms over time. Thus, victims may be more likely to interpret physical symptoms as dangerous or severe (Schnurr & Green, 2004).

Subjective well-being. In the current study, relational victimization was concurrently related to subjective well-being at T2 for males and females, and physical victimization was concurrently linked with well-being at T2 and T3 for females only. T1 levels of relational victimization predicted subsequent decreases in subjective well-being for males (T2 and T3) and females (T2 and T4). Our findings are largely consistent with the small body of research that documents the cross-sectional effects of peer victimization on self-rated health, body satisfaction, and body-related perceptions (Allison et al., 2009; Frisén et al., 2009). To date, there are only a few studies that examine these associations prospectively, and these are limited to two points of measurement in early- or mid-adolescence (e.g., Abada et al., 2008). In one national survey of Canadian adolescents, Adams and Bukowski (2008) demonstrated that peer

victimization at age 12 or 13 predicted more negative feelings about one's physical appearance at age 14 or 15 for both obese and non-obese youth. Our study augments this work by pointing to the lingering effects of peer victimization on subjective well-being across adolescence and into young adulthood. Cognitive, or attentional, processes may explain the current findings. Bullying victims may develop negative internal attributions for their victimization experiences (e.g., "The event happened because I am not a likeable person") that can influence adolescents' overall perceptions of their worth, abilities, and efficacy (Briere & Elliot, 1994). These beliefs can extend to perceptions of one's health, body, attractiveness, and development (Resnick, 2002), thus impacting adolescents' subjective health experiences.

Prospectively, only the path from physical victimization at T3 to female's well-being at T4 was significant. Physical victimization occurs infrequently for young adult females, and so these women may represent a particularly high-risk group. Physical victimization is associated with a range of mental health concerns and risky contexts, including internalizing and externalizing symptoms, delinquent peer groups, and relationship violence (Sullivan et al., 2006) that may also be negatively impacting subjective well-being over time. Unexpectedly, we found that physical victimization at T1 was associated with improved well-being for females at T2. This may indicate a suppressor effect of the data; however, it is possible that these girls represent a subset of victims who are also aggressors in their peer groups. Although the research is inconsistent, some studies suggest that bullies experience levels of self-esteem and self-satisfaction comparable to non-victimized young people (Seals & Young, 2003). These

effects may only be temporary as peer relationships continue to suffer and mental and physical health becomes strained over time.

Health-risk behaviours. The data did not support a clear relationship between peer victimization and health-risk behaviours. At one time point, peer victimization predicted decreased use of risk behaviours for males and females, and at a different time point it predicted increased use of risk behaviours for males. Past studies exploring the link between peer victimization and health-risk behaviours similarly report inconsistent findings (Kaltiala-Heino et al., 2000). It is possible that more consistent and pronounced effects would have been found with a higher risk sample, such as in the study by Sullivan et al. (2006). Some research suggests that health-risk behaviours are precipitated by particularly severe stress reactions to a victimization event, such as posttraumatic stress disorder (Rheingold et al., 2004), a mediator we did not test for in the current study. Alternatively, studies have shown that health-risk behaviours, and other externalizing behaviours (e.g., delinquency), may be more common among perpetrators, while internalizing symptoms (e.g., depression, anxiety, somatic complaints, low self-esteem) may be more characteristic of victims (e.g., Carlyle & Steinman, 2007).

Physical fitness. Relational, but not physical, victimization was concurrently related to physical activity at T1 for males and females. Relational victimization at T1 predicted decreases in physical activity at T2 and T3 for females only, and early physical victimization predicted decreased physical activity at T4 for females only. These findings replicate earlier cross-sectional studies that have found peer victimization to be associated with lower levels of physical activity for both boys and girls (e.g., Faith et al., 2002; Storch et al., 2007). To our knowledge, only one other study has examined this

relationship longitudinally, and researchers failed to find a prospective effect of peer victimization (Rancourt & Prinstein, 2010). Our composite measure of fitness may have been more sensitive and gender-neutral than the single fitness item used in the earlier study (e.g., exercising to gain muscle or weight).

According to stress and coping theory (e.g., Schnurr & Green, 2004), peer victimization may create a stressful environment where young people worry about not being selected to participate in gym class or on sports teams. This anxiety may prompt adolescents to avoid situations that involve physical activity. In addition to anxiety, depression has also been identified as a barrier to physical activity for victimized youth (Grey et al., 2008). This may be because depression is often characterized by fatigue, loss of energy, and reduced motivation, which may limit the desire to participate in physical activity or enjoyment from this participation. Some studies have found that female victims are at greater risk of developing internalizing symptoms compared to males (Yeung, Thompson & Leadbeater, 2013), which may help explain the sex differences found in the current study. An additional pathway through which peer victimization may affect physical activity is through a reduction in positive peer interactions (Kendall-Tackett, 2002). Adolescents are more likely to exercise in the presence of a friend (Salvy et al., 2009), and so victimized youth may have fewer opportunities and support for physical activity because of their strained peer networks. Internalizing symptoms may further reduce an adolescent's likeability and acceptance and subsequent participation in group fitness.

Nutrition. Physical, but not relational, victimization was concurrently related to nutrition at three of four time points for both males and females. Physical, and not

relational, victimization at T1 was also prospectively associated with poorer nutrition at T2 and T4 for the whole sample. Several studies report that peer victimization increases the risk of disordered eating among adolescents (e.g., food restriction, binge eating; Neumark-Sztainer et al., 2002). However, the current findings contribute to this literature by highlighting that victimization also affects more normative food choices (e.g., eating fruits and vegetables, limiting fats) among males and females.

Researchers suggest that survivors may choose to cope with their distress by self-soothing with higher fat and sugary foods (Heatherton & Baumeister, 1991), especially when feeling depressed and hopeless about the future (Kendall-Tackett (2002). Given the strong correlations between body mass index and nutrition at each time point in the current study (*r*'s > -.94), we suggest that weight status may be accounting for at least some of these effects. In other words, overweight adolescents with unhealthy eating habits may be at increased risk of being victimized, and more likely to continue eating poorly over time. These explanations are consistent with findings by Adams and Bukoswki (2008) who observed that peer victimization predicted increases in BMI over time among obese youth, and not in normal weight youth, and that these effects were partially mediated by poor self-concept. They conclude that obesity predicts victimization *and* that victimization will reinforce the negative self perceptions that an adolescent already has, thus leading to changes in eating behaviours and weight status. To our knowledge, no study has examined weight status as a moderator of the relationship between peer victimization and eating habits.

We note that relational victimization was unrelated to nutrition in the current study. Some studies have found that weight-related criticism has stronger effects on

weight-related outcomes compared to general teasing or criticism (Baker, Whisman & Brownell, 2000). Accordingly, relational victimization may need to be contextualized, or highly specific, to affect eating habits. Past studies typically collapse the various forms of victimization into a single item when examining eating habits, which may help explain the inconsistent or non-significant findings in the literature (e.g., Turagabeci et al., 2008).

Effects of different forms of victimization. The current study found that relational victimization was more consistently associated with three of the five health outcomes (physical symptoms, subjective well-being, physical activity), while physical victimization had stronger effects on nutrition. These findings extend previous research that highlights the unique effects of physical and relational victimization on adolescent adjustment (e.g., Baldry, 2004; Sullivan et al., 2006). Other studies have similarly found that relational victimization was a stronger predictor of poor health (Nixon et al., 2011; Prinstein, Boergers & Vernberg, 2001). One explanation for these findings is that rates of physical victimization tend to be lower than those for relational victimization in adolescence, as seen in the current study. Relational aggression may be seen as a safer means of expressing dislike given the disciplinary and legal sanctions for physical violence that are increasingly being enforced in schools and communities. Some researchers suggest, however, that relational victimization may be particularly hurtful and harmful to adolescents and young adults because of the increased importance placed on open, trusting, and supportive friendships during this developmental period (Prinstein et al., 2001).

Effects of the timing of victimization. The results of the current study support that peer victimization plays a significant role in the development of longer-term physical

health problems. Most of the prospective effects on health were accounted for by peer victimization at T1, a period when almost all participants were enrolled in middle or high school (65%).The long-term impact of peer victimization on health has rarely been investigated, and to our knowledge, this is the first project to examine the unique effects of victimization at different points in time. In previous research with a younger sample, Frisen and Bjarnelind (2010) found that being bullied in high school was associated with poorer health to a greater extent than being bullied in elementary or middle school. Using the V-HYS sample, Leadbeater et al. (2014) found that peer victimization at T1 accounted for most of the prospective effects on depression and anxiety compared to victimization at T2 to T5. Taken together with our findings, research indicates that high school may represent a particularly vulnerable period to experience peer victimization. Victimized young people continue to struggle with their physical health for years after they leave high school or change peer networks, even after controlling for victimization at subsequent points in time. The mechanisms through which this process occurs is not yet clear, but may have to do with the structure and function of peer groups during this developmental period. Social relationships in childhood and young adulthood tend to be dyadic in nature, and may provide more opportunity to escape negative interactions and form new bonds. In contrast, adolescent peer interactions tend to be structured in large groups, which make it particularly challenging for those who are excluded. Furthermore, friendships become increasingly important in high school as adolescents develop a stronger need for intimacy and belonging. In the absence of a strong, supportive network, adolescents may become distressed and lonely, which can put them at risk of ongoing health difficulties (i.e., via a sensitized stress response system, depression, or

anxiety). Moreover, victimized adolescents may be afraid or lack the ability to form close friendships when they transition to young adulthood and new peer contexts, such as university residences or the workplace. The social isolation itself may escalate the risk of physical health problems over time.

Sex differences in the association between peer victimization and health. With the exception of nutrition, time-varying covariate growth curve models fit differently for males and females for each health outcome. No sex differences were found in the association between peer victimization and nutrition, suggesting that the underlying processes influencing this association are similar for males and females. In the case of physical symptoms, subjective well-being, and physical activity, females were more likely to be impacted by their peer victimization experiences. Findings may be more consistent for females compared to males given that the victimization trajectories are more stable for females in the current sample (Leadbeater et al., 2014). Another possibility is that victimized females are more vulnerable to health complaints, poor perceptions of their health and body, and sedentary behaviour compared to victimized males. Previous studies have shown that boys and girls react differently to their victimization experiences. For instance, victimized females are more likely to develop depression and anxiety compared to victimized males (Yeung, Thompson & Leadbeater, 2013). It is possible that these higher rates of internalizing symptoms among females account for the stronger effects of victimization on health. Sex differences found in this study have important implications for intervention programs. In particular, young women may require efforts that specifically target self-esteem and self-worth in order to boost self-perceptions and self-care.

Limitations to the Current Study and Future Directions

Findings from this study should be interpreted in light of a number of limitations. Regarding generalizability, this project is based on a predominantly Caucasian sample from one medium-sized city in Canada. The sample, however, was randomly recruited from a community sample and represents the socioeconomic diversity in the broader population. Attrition across the four waves of data did not create a sample bias.

A second limitation to this study concerns the directional pathways tested in our models. A number of studies indicate that physical health problems serve as risk factors for victimization (Van Cleave & Davis, 2008), suggesting that health problems make an adolescent seem more vulnerable and easier to target to aggressive peers. In the current study, correlations between physical health problems and subsequent levels of relational and physical victimization were significant for physical symptoms at T4 and for subjective well-being at each time point, suggesting that bi-directional influences may be likely in some cases. In contrast, health problems like substance abuse and chronic illness may be associated with school truancy and decreased opportunities for victimization. We were unable to test the directional effects of physical health on victimization in this study due to the nonlinear patterns of change in victimization over time. Future studies should clarify these reciprocal effects using larger samples and more points of measurement.

The self-report nature of the data may question the validity of our findings, especially in the absence of confirmatory health records. Empirical evidence indicates, however, that self-reported health problems discriminate well between healthy and chronically ill adolescents (Sapin, Simeoni, Khammar, Antoniotti, & Auquier, 2005).

Previous studies have also shown that increased health complaints reported by victims are not accounted for by reporting bias (Kelsall et al., 2004). Moreover, adolescents' subjective ratings of their health are discrepant from their parents' ratings; they are often poorer and take into account other unique domains of functioning (Johnson & Wang, 2011). Thus, self-report data provide valuable insights into adolescents' own experiences with health and wellness and how young people may choose to manage their health (i.e., use of medical or psychological services, self-medication, lifestyle changes).

Another limitation to this project is that other variables not accounted for in the analyses may serve as confounds. For instance, other forms of interpersonal aggression, such as child abuse, dating victimization, or cyber-bullying, were not controlled for in this examination of the data. Thus, those reporting no peer victimization experiences may still have experienced some type of victimization that might contribute to health difficulties. A sizeable proportion of adolescent victimization survivors have experienced multiple forms of victimization in their lifetime (Finkelhor, Ormrod, & Turner, 2007), which makes it difficult to account for all interpersonal aggression in a single research study. This study also did not control for the presence of a physical health condition that may be accounting for reported health problems. Approximately one quarter of our sample reported a health condition that limits everyday functioning and so this may be possible. However, past research indicates that the association between peer victimization and physical health problems hold even after controlling for a chronic health condition (e.g., Abada et al., 2008).

We acknowledge that our measure of physical health is not exhaustive. Wilson and Cleary (1995, p.60) describe health domains "on a continuum of increasing

biological, social, and psychological complexity", ranging from physiological variables to functional status and health perceptions. Because of the psychosocial nature of this project, we did not incorporate laboratory tests or physician diagnoses into our analyses. Future studies would benefit from the inclusion of health data across health domains (i.e., salivary cortisol levels, observed functional limitations) to test the consistency of the relationship between victimization and physical health.

Despite these limitations, the current study has several strengths. The sample was large and represented the greater population from which it was sampled. Attrition rates were low and so we were able to follow participants across several years. Moreover, peer victimization was assessed with a comprehensive and well-validated measure (Leadbeater et al., 2014), which allowed us to reliably assess the unique impact of multiple forms of aggression. This study was also the first of its kind to establish a developmentally-appropriate model of physical health for young people. We also provide a broad assessment of the physical health problems that concern victimized adolescents. Understanding how young people experience their own health concurrently and in the aftermath of victimization experiences can greatly inform clinical practice.

At this time, more research is needed to clarify the mechanisms underlying the associations between peer victimization and physical health. Future studies should incorporate measures of mental health, particularly depression and anxiety, as well as physiological measures, to test their mediational effects. Future research should also begin to unpack the factors that increase and decrease the risk of health problems among victimization survivors. For example, supportive peer and parent relationships have been found to mitigate the effects of peer victimization on mental health outcomes (Desjardins

& Leadbeater, 2011) and may operate similarly in the case of physical health. Longer-term longitudinal projects will advance our understanding of the prospective effects of peer victimization across adulthood. Given that persistent health difficulties and health-risk behaviours across adolescence increase the risk for morbidity and mortality in later life, it will also be important to test the impact of peer victimization on more severe health outcomes, such as chronic illness, substance dependence, and functional impairment.

Implications of the Current Research

This project indicates that rates of peer victimization are high across adolescence and young adulthood. This study also highlights the persistence of, and often increases in, health problems across this developmental period. Furthermore, adolescents who experience peer victimization are particularly likely to report higher levels of physical health problems both concurrently and over time. Several implications for health professionals, educators, and policy makers can be drawn. This project calls for greater bullying prevention efforts. Bullying prevention is a multifaceted feat, shown to be facilitated by the engagement of teachers, principals, school support staff, community members, and parents who are all invested in the identification and reporting of incidents as well as the implementation of preventative strategies (Leadbeater & Sukhawathanakul, 2011). For example, educational institutions need to create climates that emphasize positive peer networks and mentorship. Young people should be encouraged to seek help if their schools are unsafe and to feel supported by counsellors, teachers, and administrators. School nurses, in particular, have a central role in caring for adolescents affected by bullying because they are often the first adults a victim goes to for help

(Cooper, Clements, & Holt, 2012). Nurses can have a large impact on the adjustment of a victim, as well as the interruption of bullying if they are equipped with skills for sensitive and targeted screening of interpersonal aggression and subsequent referrals.

Although adolescents are regarded as a healthy contingent of the population, their self-reported health, subjective well-being, and health risk and promoting behaviours get worse over time. Physical health concerns and risk behaviours that persist across this developmental transition increase the risk of morbidity and mortality later in life (Grant et al., 2006), as well as poorer economic, employment, and relationship outcomes (Arnett, 2000). This study's findings suggest that adolescents require health promotion programs that specifically target the domains of health most affected in this age group (e.g., body image, substance use, somatic concerns, fitness). For example, we need to engage young women in physical activities they find rewarding and wish pursuing after high school. We need to educate young men and women on healthy food choices and provide them with access and opportunity to develop healthy eating habits. Several school-based educational programs targeting body image have demonstrated efficacy in the literature (e.g., McVey, Davis, Tweed, & Shaw, 2004). These programs need to be more widely disseminated, targeting body size acceptance, and also understanding and acceptance of normal bodily functions and changes (e.g., girls' weight gain and increased symptoms during puberty).

The findings from the current study also emphasize that health professionals working with adolescents need to be aware of the physical health complications, in addition to psychological symptoms, associated with interpersonal aggression. Students may be presenting with physical discomfort or missing school for physical health reasons

and may require different services from young people with organic medical complications. Multi-disciplinary treatment approaches would have great utility for victimized individuals given the psychological and social context of many physical health complications. In particular, young people experiencing peer victimization would benefit from interventions that target stress management and effective coping strategies, such as relaxation, problem solving, support seeking, and assertiveness training. School nurses are well-equipped to provide students with these techniques and are encouraged to refer on to mental health specialists in more extreme cases. It will be important to challenge survivors' negative self-perceptions, such as self-blame, and to reduce distress associated with victimization experiences in therapy. These techniques may indirectly minimize the impact of victimization on physical health or help survivors better manage health difficulties from which they may be suffering (i.e., body dissatisfaction). Interventions in high school will be particularly important in the prevention of ongoing social difficulties and long-term health complications.

Finally, programs may need to be devised to facilitate the transition out of high school and into post-secondary institutions or the workforce. Young people may benefit from education on healthy living outside the family home and how to get involved in positive peer networks in their new communities or schools. Such programs will help combat the cumulative consequences of early victimization; by curbing stress and health difficulties during this transition, we can enhance the productivity and overall wellness of future generations of young people.

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Appendix A: Study Materials

Social Experiences Questionnaire

Here is a list of things that people your age (peers) sometimes do. How often do they happen to you?

	Never (1)	Sometimes (2)	Almost all the Time (3)
How often do your peers leave you out on purpose when it is time to do an activity?			
How often do you get hit by your peers?			
How often does a peer who is mad at you try to get back at you by not letting you be in the group anymore?			
How often do your peers yell at you or call you mean names?			
How often do you get pushed or shoved by your peers?			
How often do your peers tell lies about you to make others not like you anymore?			
How often do your peers kick you or pull your hair?			
How often do your peers say they won't like you unless you do what they want you to do?			
How often do your peers say they will beat you up if you don't do what they want you to do?			
How often do your peers try to keep others from liking you by saying mean things about you?			

Physical Health Measures

During the past 6 months, how often have you had or felt the following?

	About every day	More than once a week	About every week	About every month	Rarely	Never
a. Headache	❍	❍	❍	❍	❍	❍
b. Abdominal pain	❍	❍	❍	❍	❍	❍
c. Backache	❍	❍	❍	❍	❍	❍
d. Dizziness	❍	❍	❍	❍	❍	❍
e. Sleeping Difficulties	❍	❍	❍	❍	❍	❍

Do you notice that you…	Never	Sometimes	Often
Are physically healthy?	❑	❑	❑

How satisfied are you with each of the following aspects of your body?

	Very Dissatisfied	Dissatisfied	Neither Dissatisfied/Satisfied	Satisfied	Very Satisfied
a) Face (facial features, complexion)	❑	❑	❑	❑	❑
b) Muscle tone	❑	❑	❑	❑	❑
c) Weight	❑	❑	❑	❑	❑

Please indicate whether you feel the following statements describe you:

	Yes	No
Most of the time I am happy with the way I look.	☐	☐
In the past year I have been very worried about my health.	☐	☐
I wish I were in better physical condition.	☐	☐
I am uncomfortable with the way my body is developing.	☐	☐
I am proud of my body.	☐	☐
I frequently feel ugly and unattractive.	☐	☐
When others look at me they must think that I am poorly developed.	☐	☐
My body is growing about as quickly as I would like it to.	☐	☐
I feel strong and healthy.	☐	☐

Starting yesterday and looking back over the last 7 days, how many cigarettes did you smoke each day?

How often in the past 12 months have you had 5 or more drinks on one occasion?

Never	a few times/year	a few times/month	once/week	more than once/week
❑	❑	❑	❑	❑

How often have you used any of the following drugs in the past 12 months:

Marijuana (pot, hash)

Never	a few times/year	a few times/month	once/week	more than once/week
❑	❑	❑	❑	❑

Please indicate how often you do the following things:

	Never	Sometimes	Always
I read labels on packaged foods I eat.	❑	❑	❑
I usually limit my intake of "junk food" for snacks.	❑	❑	❑
In an average week, I exercise 3-4 times (e.g., running, swimming, other sports).	❑	❑	❑
I usually follow a healthy diet.	❑	❑	❑
I exercise vigorously 20-30 minutes at least 3 times per week.	❑	❑	❑
I try not to eat too many foods high in fats.	❑	❑	❑
I often choose salads, fruits and vegetables for snacks.	❑	❑	❑
I participate in a regular program of sports/exercise at school.	❑	❑	❑