Behavioural resilience in sport: Mediation of effects of socioeconomic risk on child and

youth behaviours through sports participation

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Abstract

This study links findings from previous literature on (a) effects of family income and socioeconomic status (SES) and related family and community influences on child and youth development and mental health (b) child and youth strength development and resilience behaviours in organized and unorganized sports participation, and (c) opportunities for child and youth sports participation based on family income and SES and related factors. Connections are made based on opportunities and strengths acting as mediators of the SES-behavioural health relationship. Drawing from Ungar's (2012) expansion of Lewin's (1951) model of behavioural resilience and cross-sectional data from cycles 1, 2, and 3 of the NLSCY parent and child/youth respondent survey, pathways of development of person strengths to positive behavioural functioning that arise through sports participation are identified. Children from low-income and low-socioeconomic status (SES) families are of particular interest due to the high level of developmental risk attributable to poverty. An ecological approach is taken, such that statistical relationships are considered as dynamic, and endogenous, and the model is a very small snapshot of the process of resilience that occurs over time, and within a broader context. Cross-sectional data and endogeneity of key variables prevent causality or reliability of magnitude of coefficients. Strong associations between income/SES and organized sports participation are indicated. Positive peer associations and self-esteem also appear to be related to how often a child participates in sports, whether organized or unorganized. Girls in the 14 to 15 year old age group appear to gain the most from sport participation, compared to boys and younger age groups. Prosociality seems to act as a protective factor in other behavioural domains as well as indicating resilience in its own right.

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1. INTRODUCTION

Costs of mental illness borne by Canadian society are estimated in the tens of billions of dollars, and rising (Conference Board of Canada, 2012; Deraspe, 2013; Smetanin, Stiff, Briante, Adair, Ahmad, & Khan, 2011). Direct costs include government health services, private insurance, and out-of-pocket expenditures on services and medications, while indirect costs are measured in terms of lost productivity through human capital losses and friction (replacement of lost workers) costs, and reductions in wellbeing quantified by disability adjusted life years (DALYs) (Deraspe, 2013). To stem this growing burden, the Mental Health Commission of Canada (2013) recommends early prevention and intervention efforts in childhood.

Poverty, low income, and low socioeconomic status (SES) are cited as omnipresent risk factors in current literature on child and adolescent mental disorders (Banerjee, Middleton, & Faraone, 2007; Canadian Institute for Health Information, 2008; Côté Borge, Geoffrey, Rutter, & Tremblay, 2008; Currie & Stabile, 2009; Fergus & Zimmerman, 2005; Fraser-Thomas, Coté, & Deakin, 2005; Johnston, Propper, Pudney, & Shields, 2014; Smetanin et al., 2011; Tremblay et al., 2004; Wu, Hou, & Schimmele, 2008; Yoshikawa, Aber, & Beardslee, 2012). Disadvantage in childhood often has detrimental consequences for future health and social wellbeing. As well, deprivation, both material and perceived, leads to cognitive and behavioural setbacks for children in low-income families, reducing human capital potential (Conti & Heckman, 2014; Deraspe, 2013; Smetanin et al., 2011). Impacts of early experiences of poverty necessitate prevention, not remediation, of negative side effects. In designing effective interventions, underlying determinants and desirable outcomes of multidimensional (physical, cognitive,

emotional, and behavioural) child development should be identified (Allin & Stabile, 2012; Conti & Heckman, 2014).

Every child is equipped with a unique set of strengths and challenges that will either impede or assist healthy development (Ungar, 2012). The individual exists within a greater ecological system, also comprised of a unique set of variables with the similar potential for harm or health. Through interactions within and between personal and environmental factors, developmental pathways emerge through which the process of *resilience* is one possible trajectory that can occur when positive growth is achieved in the presence of risk (Bell, Romano, & Flynn, 2013; Biglan, Flay, Embry, & Sandler, 2012; Fergus and Zimmerman, 2005; Liebenberg, Ungar, & Vijvar, 2012; Ungar, 2012).

Protective and promotive factors associated with resilience processes are context specific, just as in chemistry, entirely different molecules form out of various combination of the same elements, child development occurs through a similar, albeit less objective process (Fergus & Zimmerman, 2005; Liebenberg et al., 2012). "Elements" of child development include child, family, and community characteristics (Conti & Heckman, 2014) such as self-esteem, parental nurturance, and neighbour cohesiveness (Kohen, Leventhal, Dahinten, & McIntosh, 2008). Current literature and government policy suggest that sports and recreation create space conducive to development and enhancement of child strengths through positive relationships and physical activity (Eccles, Barber, Stone, & Hunt, 2003; Eime, Young, Harvey, Charity, & Payne, 2013; Fraser-Thomas et al., 2005). Despite the potential benefits of sport, many communities home to children who face socioeconomic risk are ill equipped for recreation (Xu, Gauthier, & Strohschein, 2009).

If causal relationships do exist between sport and youth resilience, the barriers to participation blocking those at risk only serve to reinforce the intergenerational cycle of poverty.

This paper proceeds as follows: first, a background is provided of the literature regarding mental disorder in the context of poverty, current developments in the study of child and youth resilience, and the social exclusion of low-income children from protective sport opportunities. Data obtained from the National Longitudinal Survey of Children and Youth (NLSCY) is described. Subsequently, a model predicting behavioural outcomes based on sports participation and subsequent strength acquisition is proposed and tested. Methodology and limitations of analysis are explained. A summary of results is presented followed by a discussion of findings and conclusions.

2. LITERATURE REVIEW

"A survey of child and adolescent mental disorders would be of limited use for primary prevention without assessment and quantification of putative risk and protective factors (Goodman et al., 1998, p.163)."

2.1 Socioeconomic risk

Approximately one in seven children in Canada live in poverty measured as "the proportion of children 17 years and under living in households where disposable income is less than half the median in a given country" (The Conference Board of Canada, 2013). Since the mid-1990s the Canadian child poverty rate has increased about 3 percent. Statistics Canada (StatsCan) measures a low-income cut-off (LICO), a threshold below

which families have very little disposable income beyond what is spent on essential goods like food and housing; by this measure, more than 8 percent of Canadian children are poor (StatsCan, 2010; as cited in The Conference Board of Canada, 2013).

Family income has compounding effects on health throughout childhood and adolescence that act indirectly through factors associated with low-income environments (Allin & Stabile, 2012; Yoshikawa et al., 2012). Poverty can affect biology, parenting, critical experiences (e.g. violence), school environment, and neighborhood conditions, all of which impact the psychological growth of children and adolescents (Yoshikawa, et al., 2012).

Yoshikawa et al. (2012) explore the process through which poverty threatens the mental, "behavioural and emotional health" (p.272) of children and youth: why certain people are poor, dimensions of the poverty experience, and how the environmental outcomes of poverty go on to affect child health and development.

The *selection processes* of poverty, by which socio-demographic factors influence SES (Yoshikawa et al., 2012) often arise through systemic discrimination, and play an important role in how economic opportunities are distributed within, and between families and communities. For instance, British single parents (usually mothers) and disabled people, including those experiencing mental impairments, are significantly more likely to be unemployed than two-parent and non-disabled labour force participants, respectively (Aldridge et al., 2011). It is known that experiences of poverty in childhood, including a lack of family resources, less parental investment in child development, and fewer publicly funded opportunities, can hinder accumulation of skills necessary for future socioeconomic success in adulthood, thereby perpetuating disadvantage through family generations (Conti & Heckman, 2014). For example, lower neighborhood SES is

negatively associated with family literacy rates (Kohen et al., 2008), and academic achievement in adolescence (Leventhal & Brooks-Gunn, 2003). As well, materially deprived children experience significant setbacks in secondary education in the UK (Aldridge et al., 2011). Fergus and Zimmerman (2005) also point to environmental side effects of poverty as potential hindrances to educational and behavioural development.

Dimensions of poverty include financial and material deprivation, social exclusion from educational opportunities and extracurricular programs, insecure employment (i.e. part-time), (Yoshikawa et al., 2012), lower neighborhood SES and cohesion (Kohen et al., 2008), community violence (Rosewater, & Goodmark, 2007 as cited in Wekerle, Waechter, & Chung, 2012), and lower quality of housing, healthcare (Allin & Stabile, 2012) and community supports (Conti & Heckman, 2014). Each dimension leads to conditions that can affect mental health, as WHO (2008) states "Together the structural determinants and conditions of daily life constitute the social determinants of health and are responsible for a major part of health inequities between and within countries" (as cited in Wekerle et al., 2012, p.187).

Mediating mechanisms of income-mental health interactions are individual, relational, and institutional (Yoshikawa et al., 2012), and can promote or hinder development. To start, access to preventative healthcare in childhood seems to protect child health (Allin & Stabile, 2012), and family housing consumption and expenditure on child activities appear to positively affect a child's behavioural and emotional outcomes (Dooley & Stewart, 2007). Additionally, institutions involved in child development, such as school and extracurricular activities, help to determine peer-groups and educational attainment (current and future), both of which shape the behaviours and emotions of young people (Caprara et al., 2014; Yoshikawa et al., 2012). However, poor past maternal

health, including depression, is negatively associated with current child health, and in-access to non-healthcare social services may influence the "steepening socioeconomic gradient in child health with age" (p.240) (Allin & Stabile, 2012). Kohen et al. (2008) find that neighbourhood SES is associated with decreased neighbourhood cohesion, which is related to higher levels of maternal depression and family dysfunction, both of which are associated with inconsistent and punitive parenting, and that all of these factors are related to behavioural problems in children. This domino effect is an example of how combinations of mediating mechanisms interact to jointly impact outcomes.

Child outcomes are the resulting level of mental, behavioural, and emotional health experienced by the child who lives in poverty (Yoshikawa et al., 2012). Gilman, Kawachi, Fitzmaurice, and Buka (2003a, 2003b) find lower SES families have higher lifetime rates of depression, and that combinations of poverty "co-factors" are related to early (adolescent) onset of depression (as cited in Yoshikawa et al., 2012, p.274). The direct stress experienced from deprivation, and the secondary stress from witnessing parents dealing with the challenges of providing on very low incomes, may negatively impact a child's physical and mental health. Supporting the notion that individual, family, and neighbourhood factors all contribute to the way a child feels and behaves are findings that show threats to positive feelings and behaviours, such as maternal depression, hostile and punitive parenting, and low collective efficacy at the neighbourhood level (Romano, Tremblay, Boulerice, & Swisher, 2005; Tremblay et al., 2004), are often associated with poverty (Fergus and Zimmerman, 2005). Banerjee et al. (2007) also find that low social class, maternal mental disorder, and poor prenatal health are among the long list of environmental factors that seem to affect child development.

McEwan, Waddell, and Barker (2007) suggest that future social and economic wellbeing are largely influenced by experiences in childhood. Currie and Stabile (2009) find that both internalizing (e.g. depression) and externalizing (e.g. hyperactivity) disorders put children at greater risk for academic setbacks than either family income or physical health conditions, and that an increase in family income does not necessarily protect from the negative effects of mental disorders. Long-term effects of hyperactivity also include problems with drug addiction, low self-esteem, and poor physical health (Shaw, Hodgkins, Caci, Young, Kahle, Woods, & Arnold, 2012). When physical aggression problems go untreated in childhood, there is a much greater risk that such behaviours will continue into adulthood, causing significant emotional and physical harm to both victims and the perpetrator throughout life (Tremblay et al., 2004). Additionally, depression can contribute to heart disease, substance abuse, and comorbid mental disorders, as well as negatively affecting the children of those suffering from depression (particularly maternal depression) (Muñoz, Beardslee, & Leykin, 2012).

2.2 Resilience in children and youth

Resilience is facilitated through individual and environmental resources available to someone who is vulnerable to risk, and is employed to either avoid or overcome the impacts of potentially harmful conditions. These assets are often referred to in the literature as *promotive* or *protective factors* (Fergus & Zimmerman, 2005). Fergus and Zimmerman (2005) emphasize that resilience is a *process*, rather than an outcome, explaining various theories of resilience, some of which describe interactions between risks and protections, and others that posit the dominance of positive, but independent effects of promotive factors. Resilience is also conditional on context; that is, the set of

risks and protections affect the outcome cumulatively as opposed to independently (Fergus & Zimmerman, 2005). Liebenberg et al. (2012) also emphasize the significance of context and point to avenues of resilience facilitated through protective factors at the individual, relational, and community level.

Ungar (2012) describes resilience from a social ecological perspective, one that considers the interactions between the individual and the dynamic qualities of their surroundings as an ecosystem, within which resilience may occur if the impacts of protective and promotive factors outweigh risk. The interrelationships of child and ecological factors are complex, and therefore the resilience process is person-specific. *Nurturing environments*, Biglan et al. (2012) explain, are a set of conditions that minimize or moderate risks through the promotion of positive behaviours, self-awareness, and emotional and physical regulation.

Bell et al. (2013) define behavioural resilience as the ability of children who are at elevated risk of behavioural problems, including emotional difficulties, low levels of prosociality, aggression, and conduct disorder, to function in the average range of these measures. *microsystem* (family), *exosystem* (community), and *macrosystem* (cultural) influences feed into resilience frameworks in addition to the *mesosystem* influence that are the interaction between each level of influence (Bell et al., 2013).

Side effects of poverty increase risk of poor functioning in low-income children. The mediating mechanisms explained by Yoshikawa et al. (2012) are the link between family income and child outcomes. If these promotive mediators can be inserted into ecosystems where they would otherwise be missing due to lack of resources, developmental trajectories might be effectively redirected.

2.3 Protective factors in organized sport

Improved self-esteem is often associated with physical activity (PA) (Brunet, Sabiston, Chaiton, Barnett, O'Loughlin, Low, & O'Loughlin, 2013). However, effects of PA on emotional and behavioural outcomes are thought to be conditional on mediating factors (Biddle & Asare, 2011; Strauss, Rodzilsky, Burack, & Colin, 2001). Biddle and Asare (2011), for instance, review the impact of chronic PA on child and adolescent outcomes (depression, anxiety/stress, self-esteem, and cognitive functioning), in addition to the relationship between sedentary behaviours and mental health. They conclude that effects of PA on the mental health of children and youth are likely to be greater for those with lower initial mental health, and are context dependent. Strauss et al. (2001) explore correlates of PA in healthy children, only the highest level of physical activity tested is associated with improvements in self-esteem; also notable, the anxiety scores included in the analysis (Revised Children's Manifest Anxiety Scale) are not found to be associated specifically with PA level.

Brunet et al. (2013) test cross-sectional and longitudinal effects of moderate-to-vigorous PA on depressive symptoms, and of PA within the context of school team sports on depressive symptoms. Longitudinal relationships are examined from adolescence to early adulthood and cross-sectional relationships are tested in early adulthood. Both general PA, and team sport PA are negatively related to depressive symptoms in the cross-sectional relationship, but only team sport participation effects are significant in the longitudinal analysis. It seems the nature of the exercise (e.g. intensity, type of activity) may play a role in the magnitude of effects on depressive symptoms (Brunet et al., 2013). Other factors identified in team environments include social support from peers and adult role models, and increased self-esteem and prosocial behaviour, all or which are potential

protective factors of mental health (Brunet et al., 2013). The Canadian Council on Social Development (CCSD) describes many benefits related to (PA) and recreation including increased self-esteem and self-concept, reduced emotional and anti-social problems, support from coaches and leaders, and structured out-of school time as an alternative to engaging in risky behaviours (CPRA, 2001). Biglan et al. (2012) also suggest that after-school supervision may in turn be an effective moderator of problem behaviours and low academic achievement.

Sport environments facilitate several important developmental factors in one space, including PA (Strauss et al., 2001; Biddle & Asare, 2011; Brunet et al., 2013) prosocial peer relationships and adult coach/leaders as positive mentors (Brunet et al., 2013; Eccles et al., 2003), in addition, out-of-school time spent engaging in positive activities reduces the amount of time available for risk behaviours (Biglan et al., 2012; CPRA (2001).

2.4 Child and youth development in organized sport

"At different points in a child's development, there are windows of opportunity that maximize the potential for positive growth or change" (Masten & Wright, 2010 as cited in Ungar, 2012, p.20).

Eccles et al. (2003), test for protective effects of extracurricular youth activities, throughout high school and early adulthood. Results for sports participation interestingly show an increase in both risk behaviours, and positive academic outcomes; higher rates of drinking and getting drunk are found in high school students who play sports, however these rates level out with non-participating peers in college years. Those who played high school sports have higher grades in high school, are more likely to attend college,

experience more satisfaction from school experiences, and better job prospects (Eccles et al., 2003). The risky behaviours young athletes engage in, such as drinking and skipping school, are possibly mediated by the concurrent benefits of sport participation; sport involvement in childhood and adolescence fosters self-identity, through peer associations and activities, this can lead to subsequent pathways of development through activity choice, institutional support and adult mentors, and positive, structured use of out-of-school time (Eccles et al., 2003).

The relational and institutional support systems built into extracurricular activities, facilitate a sense of belonging and community participation, a large component of prosociality. Those who played sports throughout their high school career, were least likely to experience emotional problems, when compared to those who dropped out of sports or joined late (grade 12), likely due to early development and continued support of identity associated with being a "jock", and an attachment to school that promotes regular attendance; extracurricular activities also appear to provide students with a wide range of non-family adult mentors, who provide emotional support, and academic and career advice (Eccles et al., 2003).

Positive reinforcement and fostering of specific aptitudes and interests, in lieu of traditional measures of success and achievement are found to be effective approaches to prosocial development (Biglan et al., 2012). If healthy development is a desired outcome, sport programs must be inclusive, accessible, and of a design that promotes assets beyond athletic abilities; coaches and parents should be educated in the broader intentions of the intervention (Fraser-Thomas et al., 2005). "The prevailing psychological climate and social interactions inherent in such settings will also be crucial (Biddle & Asare, 2011, p.894)".

Fergus and Zimmerman (2005) find self-esteem and adult mentors may counteract the negative effects of poverty on educational and behavioural development; extracurricular and community participation, academic achievement, and prosocial behaviour are linked to cases of positive developmental occurring in spite of adverse conditions (Fergus & Zimmerman, 2005). Biglan et al. (2012) cite multiple sources arguing for an emphasis on prosocial behaviours as a vital component of nurturing environments, and describe prosociality as a desire to participate in the greater community, and the aptitude to do so. Experiments involving rewards for teamwork and self-regulation seem to have significant and lasting positive effects on behaviour, and educational attainment. Flynn et al. (2004) examine resilience in a particularly high-risk population: youth in foster care, and find high levels of self-esteem, prosociality and general health to have the strongest indications for protective effects on risk. In a slightly older population of fostered adolescents, Legault, Anawati, and Flynn (2005) find potential mitigating effects of anxiety and physical aggression problems in peer friendships and self-esteem.

Ungar (2012) observes that while some children may appear to have a disadvantage in particular situation, for example those children predisposed to higher levels of anxiety in stressful environments, in a low stress context these same children outperform others academically, and excel creatively; one could argue that it is not only resilience that is context specific, but also behavioural and emotional "problems" that are hindrances only in certain situations, but valuable elsewhere. The answer may be to find those conditions that tease out the positive potential of particular characteristics, as opposed to suppressing "negative" behaviours. The common themes of self-esteem, positive peer relationships, prosocial behaviour, and adult mentors, are common in the

literature linking sport and development, as well as in resilience research. Family consumption on a child's participation in extracurricular activities, including organized sports, has been shown to improve child behavioural and emotional scores (Dooley & Stewart, 2007). It is possible that sport may promote resilience, in the right context, but only in the case that sport is accessible to children who also face developmental risks.

2.5 Socioeconomic barriers to resilience

Economic deprivation is one of the most significant barriers to organized sport participation. "Access to physical activities, such as locations of parks and schools, and opportunities to participate are important factors affecting which children get to play sports (Strauss et al., 2001, p.897)". There is irony in that increased threat to wellbeing experienced by children living in low-SES families, is often coupled with social exclusion from environments most conducive to resilience (Xu et al., 2009). Assets and strengths in youth can be fostered through intervention, however potentially beneficial programs like sport are discriminatory on socioeconomic, cultural, gender, and elitist bases to name a few (Fraser-Thomas et al., 2005).

Xu et al. (2009) find that income adequacy, average neighbourhood income (by household), parental education, and gender (female) contribute to the likelihood that a child will participate in organized sports, testing longitudinal data for ages 4 to 9 from the National Longitudinal Study of Children and Youth (NLSCY) cycles 2, 3, and 4. Guèvremont, Findlay, and Kohen (2008) examine the connection between socio-demographic factors and organized extracurricular participation in Canadian children and youth across several age groups from the NLSCY cycle 4 (2000/2001). Participation varies by age, single-parent status, and family income to name a few, participation rates

are highest for 10-13 year olds, and sports are the most popular type of extracurricular activity. Sports participation is shown to be significantly higher for children from high-income families for ages 6 through 13, but not for 14 to 17 year olds.

The CCSD reviews the literature on barriers to recreation access for poor children and youth, and the benefits gained from recreation by those living in poverty; activities included in the definition of recreation extend beyond sports in this report, to other leisure time activities including arts and culture (CPRA, 2001). Risk factors of note include single parent status, poor parenting styles, poverty and low income (of family, and neighbourhood/community), "lack of positive adult role models (p.2)", and risky behaviours. Crawford, Jackson, and Godbey (1991) find indications that social class is a strong determinant of whether someone is afforded recreation opportunities, and Donnelly and Harvey (1996) include three levels of in-access in their model of the socioeconomic barriers to recreation: infrastructural (cost, facilities), superstructural (discrimination), and procedural (social support) (as cited in CPRA, 2001, p.8). Recreation fees, expensive equipment and lessons, and ill-equipped and unsafe neighbourhoods inhibit access to recreation for low-income families; girls in poor families are least likely to participate in physically active recreation due to certain barriers unique to or magnified for them, including the need for neighbourhood safety, negative experiences associated with sport, and less encouragement from sports marketing than for boys (CPRA, 2001).

2.6 Contribution to the literature

Several major themes emerge in the study of child and youth development: socioeconomic risk, mediating mechanisms, and behavioural outcomes are all elements of

consequence. This study seeks to link each of these through correlation analysis and logistic regression in order to provide insight into pathways of resilience.

Yoshikawa et al. (2012) note an insufficient examination, beyond the income dimension, of the complex pathways of poverty and SES to child development. Banerjee et al. (2007) find a gap in findings regarding interactions between individual and environmental factors that affect behaviour. Child and youth sports participation in Canada has been examined as a function of income and gender, and it is known that income itself, as well as associated ecosystem factors can pose as barriers (Xu et al., 2009). Studies of the relationship between sports and child development often consider individual benefits of sport such as physical activity and self-esteem. This type of research generally results in weak and inconsistent associations at best (Biddle & Asare, 2011; Eime et al., 2013). Bell et al. (2013) encourage a broad consideration of developmental outcomes when assessing resilience.

In this study, child and youth behaviour as a proxy for mental health is considered as a function of family income and SES. Cofactors such as opportunities, strengths, and challenges that exist within the ecosystem created by particular "social classes" are tested as mediators of the relationship between income and outcomes. Identifying developmental benefits that arise through sport participation in children and youth experiencing socioeconomic (and related) risk may help to reveal pathways of behavioural resilience. Xu et al. (2009) encourage investigation into the mechanisms through which income affects children's sport participation. Finding specific ecosystem correlates that are common across multiple domains will help direct policy makers to targeted programs, "and these factors may be more modifiable than neighbourhood levels of income and may therefore represent an important area of intervention." (Xu et al, 2009,

p.339). The purpose of this study is to investigate if connections exist between recreational opportunities for children and youth in low-income/SES families, multiple strengths, and behavioural and emotional outcomes.

3. DATA

3.1 The NLSCY

The National Longitudinal Survey of Children and Youth (NLSCY) is a nationally (Canada) representative long-term study conducted by StatsCan and Human Resources Development Canada (HRDC). The study is designed to measure factors that influence child and youth development over time in order to inform researchers and policy makers on the many dimensions of child development. Children from all ten provinces are surveyed, not including children living in institutions or on First Nations reserves. Among the goals of the survey is determining the long-term impacts of risk and protective factors on development, as well as to measure social and economic characteristics thus developing a holistic account of each child's experiences and outcomes over time (StatsCan & HRDC, 1995; 1997a; 1999a).

3.2 Study sample

This study draws from three cross-sectional subsets of cycles 1, 2, and 3 of the NLSCY of children ages 10 and older. Each subset is further reduced to children from low-income (cycle 1) or low-SES (cycles 2, and 3) for certain parts of the model.

The NLSCY consists of several questionnaires administered to different respondents. The "person most knowledgeable" (PMK) answers questions about

themselves, the family and the child, or children, in the household. 10 and 11 year olds in cycle one, children ages 10 to 13 in cycle 2, and children ages 10 to 15 in cycle 3 are also asked to respond to a self-administered questionnaire. Certain questions are matched with some of those on the PMK questionnaire in order to supplement existing information, which may improve reliability, other types of information are exclusively provided by the child, when they are the only reliable source regarding a topic (e.g. stage of puberty, or risk behaviours) (StatsCan & HRDC, 1995; 1997a; 1997b; 1999a; 1999b).

The sample of 10 and 11 year olds from cycle 1 consists of 3,434 participants, and is reduced to 2,339 to exclude any missing values for relevant variables. 1,864 live in households of low-income cut-off ratio LICOR greater than 1 and 475 are from households with LICOR less than 1. 1,206 are female and 1,133 are male in the un-weighted sample. LICOR is a measure of low-income calculated on the NLSCY by taking the ratio of household or family income to the low-income cut-off for a given year, 1991 in this case (StatsCan, 1995b). The low-income cutoff is a threshold below which a large portion of household income is spent on basic necessities.

In cycle 2, 4,145 participants are between the ages of 10 and 13 and 2,520 remain in the sample after exclusion of missing values. 1,317 are female, and 1,203 are male. 323 are from low-SES families and the remaining 2,197 are from families of SES greater than -0.8.

5,539 cycle 3 respondents are aged 10 to 15, 3,522 do not have missing values for relevant variables. 1,790 are female, 1,732 are male, and 801 are from low-SES households while 2,721 are from households of SES greater than -0.8.

This study follows NLSCY User's Guide sample weight and scale weight guidelines for all tabulations and calculations, respectively. Standard errors are robust and clustered by household to account for non-independence of siblings.

Data is obtained through the Data Liberation Initiative (DLI) of StatsCan. Certain variables were only available for specific cycles. Cycle 1 provides for the most complete data set for this study. Longitudinal identification variables are omitted from the DLI in order to protect confidentiality of participants. This omission also limits data analysis to cross-sectional samples only.

3.3 Variables

3.3.1 Income

In the cycle 1 public microdata file (PUMF), the best available measure for household income is LICOR. This variable is grouped into ranked categories, ranging from "less than 0.75" to "greater than 1.25" I construct a dummy variable from this that is 1 if the ratio is less than 1.0 and 0 if it is more than 1.0, or 1 for low-income household, and 0 for non-low-income household.

A variable of socioeconomic status, ranked, grouped, bottom-coded at -1.7, and top-coded at 1.7 is available for cycles 2 and 3. I construct a "low-SES" dummy variable by coding 1 for SES less than -0.8 and 0 for SES greater than or equal to -0.8 to create a sub-sample of children from low-SES households. Socioeconomic status is a ranked value assigned to the PMK or household based on parents' education and occupations, family assets (financial and cultural), and educational resources (Socioeconomic status [SES], Statistics Canada, 2008).

Neighbour cohesion and neighbourhood safety scores are constructed from PMK responses. Neighbour cohesion score is calculated based on questions regarding neighbours helping one another, looking out for one another's children and homes, and solving community problems together. Neighbourhood safety measures level of public drug and alcohol use, little and garbage, burglaries, delinquency, and ethnic or religious unrest (StatsCan, 1995a; StatsCan & HRDC 1995).

3.3.2 Sport

On the self-administered questionnaire for ages 10 and 11 of cycle 1, children are asked questions regarding their participation in a range of activities including sports. "Outside of school, I take part in sports with a coach or instructor" and "Outside of school, I play sports or do physical activities WITHOUT a coach or instructor" are the two variables I use as proxies for organized and unorganized sports participation, respectively. Responses are ranked frequencies of participation, "Never", "Less than once a week", 1 to 3 times a week" and "4 or more times a week" (StatsCan, 1995a; StatsCan & HRDC 1995).

In cycles 2 and 3, two questions with slightly different wording are asked regarding sports participation: "In the past year (last 12 months), how often have you played sports WITH a coach or instructor, other than in gym class (school teams, swimming lessons etc.)?" and "In the past year (last 12 months), how often have you played sports or done physical activities WITHOUT a coach or instructor (biking, skateboarding etc.)?" Response choices are replicated from cycle 1 (StatsCan & HRDC, 1997d; 1999d). I use these variables as proxies for organized and unorganized sports participation respectively.

3.3.3 Person strengths

The PMK of children ages 4 and older is asked questions regarding the child's physical health. Physical activity level is assessed with one question borrowed from Fitness and Amateur Sport, Health Canada. The question reads "In your opinion, how physically active is he/she compared to other children the same age and sex?" Responses range from 01-"Much more?" to 05-"Much less?" with 03 corresponding to "Equally?" (StatsCan & HRDC, 1995a, p.35). I recode the responses in reverse order so that positive associations between the variable representing physical activity level will be in relation to greater levels of physical activity. This variable is only available for NLSCY cycle 1.

A "friends score" is calculated on the NLSCY self-complete questionnaire for children ages 10 and older. The score is intended to measure the child's perception of peer relationships. Questions that make up the friends score in cycle 1 are drawn from the *Marsh Self-Description Questionnaire*, and remain the same through cycles 2 & 3 with the addition of an intimacy measure taken from *Furman and Buhmester's Network of Relationships Inventory*. Scores range from 0 to 16, a high score indicates a high number of positive friend relationships with peers. Cronbach's alpha coefficient of reliability is 0.779 (StatsCan & HRDC, 1995; 1997a; 1999a).

The "general self-scale" intended to measure self-esteem is also drawn from the *Marsh Self-Description Questionnaire* and used on the self-complete questionnaires for children ages 10 and older. Questions regarding having a lot to be proud of, belief in one's own good qualities and self-efficacy, and general self-like are used to assess self-esteem. Scores range from 0 to 16, a high score indicates a positive general self-image. Cronbach's alpha coefficient of reliability is 0.728 (StatsCan & HRDC, 1995).

On the self-complete questionnaire, children ages 10 and older are asked: "Other than your friends, do you have anyone else in particular you can talk to about yourself or your problems?" If the child responds "yes", a second part of the question is administered with one response option being "What is their relationship to you-Coach or leader (e.g. Scout or church leader)", responses are coded 0 for "No" and 1 for "Yes" (StatsCan, 1995a). Data from this question is only available for NLSCY cycle 1 through the DLI.

3.3.4 Behaviours

Resilience behaviours evaluated in this study are taken from factor scores calculated from NLSCY self-administered questionnaires for ages 10 and older. "Prosocial behaviour", "hyperactivity/inattention", "emotional disorder and anxiety", and "conduct disorder and physical aggression" scores are used as proxies for resilience behaviours in this study. **Table 3.1** presents Cronbach's alpha coefficient of reliability for each score.

Table 3.1 – Cronbach's alpha coefficient of reliability for behavioural scores (self-administered questionnaires for ages 10 and older)		
Behaviour	**Cronbach's alpha**	**Scale range**
Prosocial behaviour	0.766	0 – 20
Hyperactivity/inattention	0.751	0 – 15
Emotional disorder and anxiety	0.760	0 – 16
Conduct disorder and physical aggression	0.738	0 – 12
(StatsCan & HRDC, 1995; 1997a; 1999a)		

Prosocial behaviour involves feelings of empathy and concern for others, and expression of those feelings through actions like sharing and helping, especially with those less able (Capara et al., 2014; StatsCan & HRDC, 1995).

Hyperactivity and inattention is highly common in children. Diagnoses of attention-deficit hyperactivity disorder look for problems paying attention, regulating

behavioural response, hyperactivity, and problem-solving difficulties (Banerjee et al., 2007; Shaw et al., 2012).

The emotional disorder and anxiety is constructed from questions regarding feelings of unhappiness, depression, worry, fear, and trouble enjoying oneself (StatsCan & HRDC, 1995).

Conduct disorder and physical aggression is measured on the NLSCY self-administered questionnaire for children ages 10 and older based on behaviours like theft, destruction of own and others' property, bullying and physical attacks, lying, cheating, and school disobedience (StatsCan & HRDC, 1995).

Questions on the NLSCY pertaining to the "feelings and behaviours" factors used in this study are drawn from the Ontario Child Health Study (OCHS) and the Montreal Longitudinal Study. This study employs data from self-administered questionnaires for children and youth ages 10 and older for behaviour scores, as well as strengths, with the exception of the PA variable drawn from the PMK response. Choice of child-response as measure of true behaviours over parent response is explained in **Section 5.3.**

3.4 Sample composition

The differences between children in families below versus above the LICO are much more apparent in organized sport participation, as opposed to unorganized sport participation.

Characteristic	Cycle 1 – 1994/95 Ages 10 to 11 (n=2,339)		Cycle 2 – 1996/97 Ages 10 to 13 (n=2,520)		Cycle 3 (1998-'99) Ages 10 to 15 (n=3,522)	
	n	%	n	%	n	%
Female	1207.52	51.63	1226.60	48.67	1739.65	49.39
Low-income/SES	458.59	19.61	242.92	9.64	805.53	22.87
Organized sports participation (at least once a week)	**1316.08** M: 715.58 F: 600.71	**56.27** M: 63.16 F: 49.81	**1709.2** M: 848.32 F: 855.87	**67.82** M: 70.52 F: 64.99	**2,05.42** M: 1065.12 F: 1038.55	**59.78** M: 61.50 F: 58.02
Unorganized sports participation (at least once a week)	**1534.88** M: 825.30 F: 709.80	**65.62** M: 72.85 F: 58.86	**1897.43** M: 946.87 F: 944.22	**75.29** M: 78.71 F: 71.70	**2533.25** M: 1343.08 F: 1184.44	**71.92** M: 77.55 F: 66.17
Organized sports participation of low-income/SES sample (at least once a week)	**192.39** M: 103.48 F: 89.90	**40.5** M: 43.67 F: 37.77	**180.06** M: 94.48 F: 85.13	**55.74** M: 61.75 F: 50.08	**398.61** M: 183.93 F: 214.63	**49.77** M: 49.05 F: 50.38
Unorganized sports participation of low-income/SES sample (at least once a week)	**299.65** M: 170.38 F: 132.01	**63.08** M: 71.89 F: 55.47	**232.42** M: 120.87 F: 111.01	**71.95** M: 79.01 F: 65.30	**562.76** M: 280.34 F: 282.82	**70.26** M: 74.76 F: 66.39

Table 3.2 – Sample (weighted) composition by NLSCY cycle

M – male, F – female

4. THEORETICAL FRAMEWORK & EMPIRICAL MODEL

"The whole approach to the study of resilience has to start with a careful, rigorous quantified measurement of risk and protection" (Rutter, 2012, p.49). Resilience and individual protective factors are not synonymous, according to Ungar (2012); whereas protective factors are positive attributes possible in all children and youth, resilience is a process that is specific to the most vulnerable young people, the presence of risk is a necessary component, and it is therefore necessary to take risk factors into account along with strengths, when developing models of resilience. Flynn et al. (2004) identify comparisons between at risk groups (youth in foster care), and their peers who are representative of the average level of risk, as "the cornerstone of our method of

identifying resilient outcomes (p.69)". Socioeconomic risk is the developmental threat of interest in this model.

4.1 Resilience

Ungar (2012) builds upon Lewin's (1951, as cited in Ungar, 2012) model of resilience that describes resilience as a function of person and environment. Ungar adds opportunity availability (O_{AV}), opportunity accessibility (O_{AC}), and meaning (M) to the model, expands resilience to an observable set of behaviours ($R_{B(1,2,3,...)}$) and person to encompass individual strengths and challenges (P_{SC}), and replaces environment with ecology to accommodate a greater level of interactivity, and complexity.

Equation 4.1

$$R_{B_{1,2,3,...}} = \frac{f(P_{sc}, E)}{(O_{AV}, O_{AC})(M)}$$

(Ungar, 2012, p.19)

This study considers behavioural resilience as a function of person strength and challenges, ecosystem, opportunity, and meaning, in more of a system of relationships or equations.

4.2 Opportunity

The development opportunity of interest is sports participation, both organized and unorganized, that may serve as a mediating mechanism between family income or SES, and behavioural outcomes in children and youth.

Equation 4.2

$$O_{AV,AC} = f(E_{Family}, E_{Community})$$

Sports participation (*Opportunity*) is not widely *accessible* on an organized level to children of all socioeconomic backgrounds, ethnicities, or gender. Sports also may not be *available* to children living in rural areas with small and widely dispersed populations, or in poor communities that lack proper facilities. Therefore, both accessibility and availability of opportunity may both be affected by family income, i.e. social exclusion. **Table 3.2** demonstrates a clear difference in organized sports participation by low-income status/SES and by gender.

Equation 4.2.1

$$E_{Family} = f(SES, Parents, Discrimination, E_{Community})$$

The *Parents* component can be broken down further into parents' values and preferences, and mental and physical health. These factors in turn affect parenting capabilities and styles, parents' behaviours, relationships between both child and parents, and between siblings, family structure, and family social networks.

Equation 4.2.2

$$E_{Community} = f(SES, Culture, Geography, Discrimination, E_{Family})$$

The *Community* ecosystem and the *Family* ecosystem are inextricably linked to one another, and to opportunities. Not to mention, a family is itself a small community, nested within a larger one. There is endogeneity in each relationship, a common theme throughout the model that is inherent in the examination of any ecosystem, defined as "A biological community of interacting organisms and their physical environment" (Ecosystem, Oxford Dictionaries, 2015).

Discrimination influencing family and community ecosystems, affects the opportunities and resources afforded those of different race, ethnicity, family structure,

gender, and social class to name a few. Inadequate recreational facilities, neighbourhood violence, and inaccessible mental health resources are examples of how public policy discrimination affects families and communities.

4.3 Person strengths and challenges

Equation 4.3

$$P_{SC} = f(O_{AV}, O_{AC}, E_{Family}, E_{Community})$$

Endogenous in the opportunity and ecosystem variables is the impact of SES. Opportunity and other elements of ecosystem are determined in large part by financial resources, and in turn influence that nature of a child's strengths and challenges. While opportunity is a function of ecosystem, there are many other elements of ecosystem that directly affect strengths and challenges. These risks and protections may be acute, or chronic "normative" (Ungar, 2012) developmental influences. "Research has shown that the manner in which family members relate to each other has a significant impact on...presence of certain child mental health conditions." (StatsCan & HRDC, 1995, p.33). For example, a single parent might not have the time or financial resources to invest in a child's participation in extracurricular activities, indirectly limiting strength acquisition through opportunity deprivation. Also, single parenthood is strongly correlated with parental depression, posing a direct challenge to a child's emotional wellbeing.

Person strengths and challenges range from biological characteristics that a child is born with or predisposed to develop (Banerjee et al., 2007), personality assets and learned coping mechanisms that can be harmful or helpful, and external resources such as peer supports and adult mentors (Eccles et al., 2003; Eime et al., 2013). Ungar (2012) refers to observable strengths such as perceived self-esteem, academic achievement, and

prosocial peer groups as "proxies for internal integration and external adaption that makes individual coping more likely" (p.20). This study employs NLSCY measurements of physical activity levels, friend relationships, self-esteem, and coaches or leaders as support resources. Each of these is thought to be accessible through sport participation.

4.4 – Resilience behaviours

Equation 4.4

$$R_{B_n} = f(P_{sc}, O_{AV}, O_{AC}, E_{Family}, E_{Community}, M)$$

Hypothesized explanatory variables of *resilience behaviours* (R_{B_n}) are expected to act as mediators between family SES and child development as explained.

Bell et al. (2013) define behavioural resilience as "lower frequency of conduct and emotional problems, higher frequency of prosocial behaviour" (abstract), while

Theories involving *environmental* perspectives draw on positivist approaches that focus on causality and hierarchy resulting in linear models of change. In contrast, post-positivist ecological models do not rank outcomes. Rather, they involve examination of relationships with regard to subjective meaning (value) and the context in which they arise (Ungar, 2012). This study focuses on behaviours and emotions from the child's own perspective.

Behavioural resilience requires the presence of risk factors, such as those related to low-SES, that would be expected to increase the likelihood of a greater level of challenges. Functioning within the normal range of certain behaviours despite risk is the second necessary component of resilience.

Equation 4.4.1

$$R_{B_n} = \prod_{i=1}^{n} R_{B_i}$$

Disorder behaviours are interrelated, and often comorbid (Knapp, 1997; Shaw et al., 2012). A high degree of overlap exists between influences of behavioural and emotional disorders in children and youth (Yoshikawa et al., 2012), it is therefore not surprising that on the resilient end of the spectrum determinants are also fairly consistent across domains of measurement (Flynn et al., 2004).

The model is designed to identify groups of related factors that are nested within the greater ecology of child and youth development. The endogenous and cross-sectional nature of variables limits the conclusions that can be drawn from results, and prevent causal inference. Hierarchical structure is not intended to discount any particular stage or influence of child and youth development, but to group variables that are most closely related to one another, or that may occur simultaneously.

5. METHODOLOGY

Cross-sectional samples of children and youth ages 10 and older are drawn from the NLSCY cycles 1, 2, and 3, and tested by cycle, income/SES and gender. Replicating previous literature (Guèvremont et al., 2008, Xu et al., 2009), effects of income/SES and gender on sports participation are tested for. The model is expanded to include family and community ecosystem influences on sports participation.

5.1 Family and community ecosystems

The NLSCY measures factors in a child's environment on several different levels: individual, family, school, and neighbourhood/community, most of which interact with one another in some way and affect developmental outcomes cumulatively.

Table 5.1 – Variables tested as explanatory of frequency of sport participation odds	
NLSCY Cycle 1	
Family	Parental nurturance score Parental rejection score PMK depression Family score Single-parent status
Neighbourhood	Neighbour cohesiveness score Neighbourhood safety score
Control	Household income-to-LICO ratio less than 1 Gender
NLSCY Cycle 2	
Family	Parental nurturance score Parental rejection score Single-parent status (PMK depression and Family score unavailable)
Neighbourhood	(Neighbourhood variables unavailable)
Control	Socioeconomic status (grouped) Gender
NLSCY Cycle 3	
Family	Parental nurturance score Parental rejection score (PMK depression, Family score, and Single-parent status unavailable)
Neighbourhood	(Neighbourhood variables unavailable)
Control	Socioeconomic status (grouped) Gender

Family income and SES, parenting styles, family structure, neighbour cohesiveness, and neighbourhood safety are the elements of family and community ecosystems included in this study, due in part to availability of data, and in part to emphasis in the literature on the correlation of such variables with one another, and particularly with income and SES.

5.1.1 Sport participation hypotheses

I have several hypotheses regarding the significant influences of child and youth sports participation. These include: the expectation of significant associations between neighbourhood safety and unorganized sports participation, particularly in low-income/SES samples. Also expected is significance of the predictions of both types of sports participation based on income/SES and gender as well as a negative association between income/SES as well as being female and higher levels of participation. I also anticipate that single-parent status will be a significant predictor of participation, especially in organized sports.

5.2 Person strengths

I then test for associations between child strengths and various levels of organized and unorganized sports participation frequency. Ordinal logistic regressions are run for the total sample for each cycle, and subsequently for children from low-income/SES families. The low-income/SES samples are then divided by gender and separate regressions are run for these groups as well.

5.2.1 Strengths in sport hypotheses

I expect that higher frequencies of organized sports participation will be associated with greater odds of high physical activity levels, as well as greater likelihood of having a supportive coach/leader to talk to. More regular organized and unorganized sports participation are hypothesized to predict greater odds of higher self-esteem and greater number of positive peer relationships. I expect that organized sports participation will be will be more significant in the associations with greater odds of high self-esteem and friends score compared to unorganized sports. Adult supervision and regular

schedules of organized sports are expected to facilitate more consistent reinforcement of self-esteem and positive peer associations. I predict findings will indicate greater gains in strengths and positive behaviours in boys over girls and younger age groups of 10 and 11 year olds based on participation rates.

5.3 Resilience behaviours

Baetchmann, Staub, and Winkelmann (2011) recommend the use of ordered logit models for this type of data. Such models do not impose linearity on dependent variables of a subjective nature, such as behaviours. The distances between levels on a behavioural scale are not necessarily uniform (i.e. $[2 - 1] \neq [20 - 19]$ on a prosocial behaviour scale), each level is simply a category, and in the case of behaviours on the NLSCY, they are ranked by numerical values. The same reasoning holds true for odds prediction of sports participation, self-esteem, and friends scores.

Self-administered responses on the NLSCY from children ages 10 and older are the source of data in this study, with the exception of income/SES, neighbourhood, age, gender, and physical activity variables, "Subjective health status might be more closely tied to certain behavioural responses than actual health" (Baetchmann et al., 2011, p.1). Johnston et al. (2014) find that measurement error is evident across parent, teacher, clinical professional, and child reports of child mental health, noting that children may behave or emote differently based on setting and situation. For school-aged children, a large portion of the day is spent away from parents. Therefore, the self-administered report is plausibly a better indication of behaviours and emotions across multiple environments.

Odds ratios of higher scores for prosocial behaviour, hyperactivity and inattention, emotional disorder and anxiety, and conduct disorder and aggression, are predicted by frequency of sport participation, both organized and unorganized. Associations are tested for in overall samples for each NLSCY sample, and in subsamples of children from low-income (cycle 1) or low-SES (cycles 2 & 3) families and non-low-income/SES counterparts, as well as by gender. All samples are cross-sectional.

5.1 Limitations

Coefficient comparisons should not be made between models based on different subsamples (e.g. only those living in households below the LICO) from the overall sample for each cycle. Sample size can impact the magnitude and significance of results. Significance of coefficients indicates possible relationships between factors but does not reliably demonstrate the magnitude of the effects. Ordinal logistic regression models that include subjective and categorical variables are prone to unobserved heterogeneity due to individual specific fixed effects. Simultaneity of certain variables, for example peer relations and self-esteem, is likely in this model. Factors of the same level are potentially co-determinant while also jointly influencing other outcomes. Anchoring of self-reported evaluations of subjective variables such as behaviours and emotions varies between participants (Carro, 2006). Endogeneity of the assessed variable in the self–assessment, as well as unmeasured differences between individual, family, and neighborhood units that affect perception of the dependent variable, may cause bias and inconsistency in the model (Baetchmann et al., 2011; Carro, 2006). Cross-sectional data does not accommodate for certain useful remedies for endogeneity based on time-invariant effects (Baetchmann et al., 2011). Confidentiality requirements of the NLSCY result in omission

of certain identifying variables from the DLI Public Use Microdata Files, this prevents construction of a longitudinal dataset. Results demonstrate possible interactions, not causal relationships.

6. RESULTS

Table 6.1 – Pearson's correlations (pairwise) of LICOR (cycle 1) / SES (grouped) (cycles 2 & 3), and ecological factors for NLSCY a. Cycle 1, ages 10-11 (n=2,339), b. Cycle 2, ages 10-13 (n=2,520), and c. Cycle 3, ages 10-15 (n=3,522)

	1. LICOR / SES (grouped)	2. Single-parent status	3. PMK depression score	4. Parental nurturance score	5. Parental rejection score	6.Neighbour cohesiveness score	7. Neighbour–hood safety score
1.	1.00						
2.	**a.** -0.416*** **b.** -0.282*** **c.** n/a	1.00					
3.	**a.** -0.309*** **b.** n/a **c.** n/a	**a.** 0.258*** **b.** n/a **c.** n/a	1.00				
4.	**a.** 0.066** **b.** 0.083*** **c.** 0.103***	**a.** -0.080*** **b.** -0.029(ns) **c.** n/a	**a.** -0.117*** **b.** n/a **c.** n/a	1.00			
5.	**a.** 0.014(ns) **b.** -0.057** **c.** -0.015(ns)	**a.** 0.025(ns) **b.** 0.086*** **c.** n/a	**a.** 0.116*** **b.** n/a **c.** n/a	**a.** -0.203*** **b.** -0.309*** **c.** -0.389***	1.00		
6.	**a.** 0.196*** **b.** n/a **c.** n/a	**a.** -0.194*** **b.** n/a **c.** n/a	**a.** -0.241*** **b.** n/a **c.** n/a	**a.** 0.125*** **b.** n/a **c.** n/a	**a.** -0.087*** **b.** n/a **c.** n/a	1.00	
7.	**a.** 0.182*** **b.** n/a **c.** n/a	**a.** -0.083*** **b.** n/a **c.** n/a	**a.** -0.166*** **b.** n/a **c.** n/a	**a.** 0.054** **b.** n/a **c.** n/a	**a.** -0.026(ns) **b.** n/a **c.** n/a	**a.** 0.454*** **b.** n/a **c.** n/a	1.00
*p<0.05, **p<0.01, ***p<0.001, ns – non-significant, n/a – not available							

Single-parent status is notably correlated with family LICOR or SES, PMK depression score, and neighbour cohesiveness score. Also of interest are the correlations between LICOR, neighbour cohesiveness score, and neighbourhood safety score, in cycle 1. This supports the notion that family and community environments are in fact related to family income and SES.

6.1 Sports participation

Ordered logit results show that 10 and 11 year olds in cycle 1 who's PMK reported higher on the depression scale are 2 percent less likely to play organized sports at the higher of the four possible frequency levels, compared to children who's PMK reports lower on the depression scale after controlling for LICOR and gender. Odds of participating frequently are significantly higher for 10 and 11 year old from households with family LICOR greater than 1, about twice that of children in low-income households. Females are about 40 percent less likely than males to participate in organized sports more often. When friends score is included in the model, coefficients of parent factors are non-significant. There is likely reverse causality in the relationship between friends score and sport participation which I will test for in Section 6.2.3.

Neighbourhood characteristics do not appear to be associated with different odds of participation in organized sport, but higher reported neighbour cohesiveness increases odds of frequent participation in *unorganized* sports by about 6 percent for children from families of all incomes, and about 19 percent for children in low-income households. Higher levels of parental nurturance are also associated with greater odds of more frequent unorganized sports participation, about 8 percent for 10 and 11 year olds overall, and about 17 percent for children from low-income families. Parental nurturance and neighbour cohesiveness remain significant after controlling for gender effects when tested individually. Neighbour cohesiveness does not, however, remain significant when family and neighbourhood factors are included simultaneously in the model. LICOR does not appear to affect the odds of frequent unorganized sports participation.

Cycle 1 variables listed in **Table 5.1** that do not appear in **Table 6.2** are non-significant in ordered logit models. These include parental rejection, family score, single-parent status, and neighbourhood safety.

Table 6.2 – Odds ratios (ordered logistic regression) of sports participation frequency by income and related factors (NLSCY cycle 1, ages 10 to 11) **1. All children (n=2,339)** **2. Children in low-income families (n=475)** **3. Boys in low-income families (n=237)** **4. Girls in low-income families (n=238)**		
	Odds Ratio (OR) (Robust std. err.)	**Wald χ^2**
1. a) How often played organized sports (n=2339)		
		65.85*
Friends score	1.10 (0.0222)***	
LICOR is less than 1.0	0.426 (0.0614)***	
Gender is female	0.595 (0.0703)***	
		61.84*
Parental nurturance score	1.07 (0.023)**	
PMK depression score	0.978 (0.010)**	
LICOR is less than 1.0	0.467 (0.070)***	
Gender is female	0.613 (0.073)***	
1. b) How often played unorganized sports (n=2339)		
		45.84
Parental nurturance score	1.08 (0.022)***	
Gender is female	0.509 (0.058)***	
		33.32*
Neighbour cohesiveness score	1.06 (0.028)*	
Gender is female	0.534 (0.061)***	
2. a) How often played unorganized sports (n=475)		
		18.00*
Parental nurturance score	1.17 (0.053)***	
Gender is female	0.465 (0.128)**	
		17.06*
Neighbour cohesiveness score	1.19 (0.054)***	
Gender is female	0.506 (0.140)*	
3.a) How often played unorganized sports (n=237)		
		6.56*
Parental nurturance score	1.17 (0.073)**	
4.a) How often played organized sports (n=238)		
		3.78*
Parental nurturance score	1.14 (0.078)*	
4.b) How often played unorganized sports (n=238)		
		18.07*
Parental nurturance score	1.14 (0.062)*	
Neighbour cohesiveness score	1.27 (0.076)***	
*p<0.05, **p<0.01, ***p<0.001		

Pearson correlations presented in Table 6.3 demonstrate that the factors found to be significantly associated with odds of sports participation for children from low-income families are also associated with LICOR within the low-income cohort, indicating possible links between family income and opportunities for sport.

Table 6.3 – Pearson's correlation coefficients of sport participation frequency explanatory variables for children from low-income families, (n=475) (Cycle 1 ages 10 to 11)			
	1.	2.	3.
1. LICOR	1.00		
2. Parental nurturance score	0.144**	1.00	
3. Neighbour cohesiveness score	0.203***	0.190***	1.00
*p<0.05, **p<0.01, ***p<0.001, ns – non-significant			

In cycle 2, socioeconomic status of less than -0.8 is associated with lower odds of more frequent *organized* sports participation (OR=0.688, p<0.05), but is not a significant factor in unorganized sports participation frequency for the overall cycle 2 group (n=2,520). Gender (female) however, is significantly associated with lower odds of participating more often in both organized (OR=0.805, se=0.090, p<0.05) and unorganized (OR=0.534, p<0.001) sports. Parental nurturance score is a significant family ecosystem mediator of the family SES-sports opportunity relationship, with higher scores associated with increased odds of more regular organized and unorganized sports participation overall for 10 to 13 year olds from cycle 2, and organized sports participation for boys from low-income families (OR=1.14 [0.0656], p<0.05) and unorganized sports participation for girls from low-income families (OR=1.15 [0.0482], p<0.01). Parental rejection is associated with increased odds of unorganized sports participation for boys from low-SES families (OR=1.10 [0.0538], p<0.05). Regression results are reported in **Table A.1** in **Appendix A**.

In the overall sample of children from all socioeconomic backgrounds (n=3,522), aged 10 to 15 in cycle 3, a family socioeconomic status of less than -0.8 is associated with odds of frequently participating in organized sports that are about 40 (OR=0.625 [0.0589], p<0.001) percent lower than the odds of children from higher SES' playing organized sports more often. The effect of SES on organized sports participation frequency is significant after controlling for parental nurturance and rejection, both of which show small effect sizes, gender (OR if female is 0.839 [0.0616], p<0.05) and age. Children ages 12 and 13 do not differ significantly in participation frequency from 10 and 11 year olds. However, 14 and 15 year olds are about half as likely (OR=0.529 [0.0509], p<0.001) to participate more often (χ^2=135.06, p<0.001).

Girls, and 14 and 15 year olds in cycle 3 are also significantly less likely to participate in unorganized sports more often, than their male and younger counterparts respectively. This is true for the overall sample (n=3,522) as well as the low-SES sample (n=801). Parental nurturance is the only significant factor associated with the odds of boys from low-SES families (n=375) participating in unorganized sports. Parental rejection does not appear to affect frequency of unorganized sports participation. Regression results are reported in **Table A.2** in **Appendix A**.

6.2 Person strengths

Table 6.4 presents correlations of sport with child strengths from NLSCY cycle 1 in children aged 10 to 11 (n=2,339) that have the potential to mediate the impacts of family income or SES on behavioural outcomes. 'Strengths' are scored on ranked scales on the NLSCY. Higher scores represent strengths, whereas low scores represent

challenges (e.g. low self-esteem). Highlighted results indicate large differences between

low-income and non-low-income sample correlations.

Table 6.4 – Pearson's correlations (pairwise) of LICOR, sports participation, and child strengths for a. All children (n=2,339), b. Children from above LICO families (n=1,864), and c. Children from below LICO families (n=475, 450 for 7.) (NLSCY cycle 1, age 10-11)							
	1. LICOR	2. Organized sports partic-ipation freq-uency	3. Unorg-anized sports participation frequency	4. Physical activity level	5. Friends score	6. General self score (self-esteem)	7. Someone to talk to other than friends: Coach or leader
1.	1.00						
2.	a. 0.192*** b. 0.085*** c. 0.063 (ns)	1.00					
3.	a. 0.019(ns) b. -0.013 (ns) c. 0.132**	a. 0.184*** b. 0.195*** c. 0.148**	1.00				
4.	a. 0.041(ns) b. 0.010 (ns) c. 0.072 (ns)	a. 0.270*** b. 0.312*** c. 0.087 (ns)	a. 0.202*** b. 0.179*** c. 0.290***	1.00			
5.	a. 0.053* b. 0.011 (ns) c. 0.105*	a. 0.117*** b. 0.109*** c. 0.121*	a. 0.139*** b. 0.147*** c. 0.110*	a. 0.101*** b. 0.141*** c. -0.060 (ns)	1.00		
6.	a. 0.056** b. 0.020 (ns) c. 0.079 (ns)	a. 0.093*** b. 0.094*** c. 0.053 (ns)	a. 0.076*** b. 0.071** c. 0.091*	a. 0.099*** b. 0.137*** c. -0.057 (ns)	a. 0.500*** b. 0.504*** c. 0.481***	1.00	
7.	a. 0.049* b. 0.083*** c. 0.018 (ns)	a. 0.129*** b. 0.134*** c. 0.085 (ns)	a. 0.014 (ns) b. 0.032 (ns) c. -0.062 (ns)	a. 0.113*** b. 0.126*** c. 0.049 (ns)	a. 0.036 (ns) b. 0.058* c. -0.061 (ns)	a. 0.078*** b. 0.094*** c. 0.001 (ns)	1.00
*p<0.05, **p<0.01, ***p<0.001, ns – non-significant							

Positive associations of strengths with income and SES indicate the possible

magnification of challenges when combined with reduced opportunity and risk factors

associated with low SES. Note that sample sizes are largely different when divided into

children from above or below low-income families. This may affect significance and size

of coefficients. For example, the correlation of self-esteem with having a coach or leader

to talk to for low-income children is extremely low and non-significant, much different

from results for the overall sample and for children from non-low-income families. This

may be a result of the small number of children from low-income families who have

access to a coach or leader (n=48/450, un-weighted) as opposed to the actual relationship between these two strengths. Differences in the other correlations respective to organized sports may also be attributable to the large differences in proportion of children who participate in organized sports based on family income. Physical activity levels for children from low-income families may be most strongly correlated with unorganized sports because most of those children only have access to informal activities, the same may be true for self-esteem (general self score).

6.2.1 Physical activity (PA)

Results regarding level of PA are limited to cycle 1 of the NLSCY. Increasing frequency of organized sports participation is associated with greater odds of being more physically active in all children after controlling for gender (OR if female is 0.793 [0.0945], p<0.05). 10 and 11 year olds who play organized sports 1-3 times a week are twice as likely to be more physically active (OR=1.99 [0.323] p<0.001) than those participate less, while playing organized sports 4 or more times a week increases odds by more than 5 times (OR=5.20 [1.01], p<0.001) (χ^2=88.93, p<0.001). Unorganized sports participation is also associated with increased odds of being more physically active; odds are approximately double if participation is less than once a week (i.e. at all) (OR=1.94 [0.366], p<0.001), and more than triple for participation of at least 4 times a week (OR=3.29 [0.583], p<0.001), after controlling for gender (χ^2=49.53, p<0.001).

Organized sports participation of 1 to 3 times a week (OR=2.02 [0.452], p<0.01), and 4 or more times a week (OR=7.44 [2.43], p<0.001), (χ^2=39.31), and unorganized sports participation of 4 or more time a week (OR=2.36 [0.721], p<0.01), (χ^2=8.15,

p<0.05) are both significantly associated with greater odds of higher level of PA for girls from non-low-income families (n=968). No controls tested are found to be significant.

Unorganized sports participation increases the odds of being more physically active for boys and girls from low-income families, however the effects are much more significant for boys, increasing odds by about 6 times (OR=6.47 [3.52], p<0.01) when they participate at least 4 times a week, after controlling for neighbour cohesiveness (OR=0.878 [0.0570], p<0.05), (χ^2=19.14, p<0.001) and about 3 times (OR=3.34 [1.70], p<0.05) for girls are the same level of participation (χ^2=9.05, p<0.05).

Gender, LICOR, family factors, and neighbourhood safety do not affect the odds of children being more physically active. Data related to physical activity levels is not available for NLSCY cycles 2 and 3 through the DLI.

6.2.2 Self-esteem

For cycle 1 results, overall LICOR effect (n=2,339) is moderately significant (OR=1.07 [0.0325], p<0.05), when tested individually (χ^2=4.64, p<0.05). However once organized sports participation is added to the model, LICOR is no longer significant. The effect of organized sports participation of 4 or more times a week is significant (OR=1.68 [0.296], p<0.01) after controlling for family level variables, parental nurturance (OR=1.26 [0.0302], p<0.001), parental rejection (OR=0.941 [0.0200], p<0.01), and family score (OR=1.35 [0.0390], p<0.001) (χ^2=329.10, p<0.001). Replacing family controls with neighbourhood cohesiveness (OR=1.06 [0.0208], p<0.01) yields similar results, playing sports 4 or more times a week is associated with greater odds of higher self-esteem scores (OR=1.79 [0.200], p<0.01) (χ^2=27.28, p<0.001). The effects of family controls dominate the effects of neighbourhood cohesiveness when both are included.

Also found in cycle 1 data, the effects of LICOR (OR=1.06 [0.0324], p<0.05) on odds of higher self-esteem scores remain significant after adding unorganized sports participation to the regression, which is also significant at 1-3 times a week (OR=1.48 [0.254], p<0.05) and 4 or more times a week (OR=1.62 [0.276], p<0.01) (χ^2=13.36, p<0.01). Unorganized sports participation of 1-3 times a week (OR=1.41 [0.243], p<0.05) and 4 or more times a week (OR=1.54 [0.261], p<0.05) when only neighbour cohesiveness is controlled for (χ^2=20.59, P<0.001). However, LICOR and unorganized sports participation are non-significant after controlling for family level factors. For low-income boys, unorganized sports participation is associated with significantly larger odds of higher self-esteem scores after controlling for neighbourhood factors but is no longer significant when controlling for family factors.

Cycle 1 results show that gender, and low-income status, single-parent status, PMK depression, and neighbourhood safety do not affect the odds of higher self-esteem score.

Participation in organized sports of 1 to 3 times a week in cycle 2 increases odds of higher self-esteem scores by about 50 percent (OR=1.55 [0.260], p<0.01) after controlling for parental nurturance (OR=1.24 [0.0223], p<0.001), parental rejection (OR=0.926 [0.0122) p<0.001), and gender (OR if female is 0.675 [0.0746], p<0.001), for the overall sample (n=2,520), (χ^2=239.79, p<0.001). Organized sports participation of 1 to 3 times a week also affects the odds of higher self-esteem scores in low-income boys (OR=3.60 [2.14], p<0.05) after controlling for family factors (χ^2=15.10, p<0.01), but does not have an effect on the self-esteem of low-income girls. Unorganized sports participation and age group do not appear to affect the odds of self-esteem scores.

For the total cycle 3 sample (n=3,522) organized sports participation of 1-3 times a week (OR=1.34 [0.123], p<0.01) and 4 or more times a week (OR=1.83 [0.193], p<0.001) is associated with greater odds of higher general self scores after controlling for parental nurturance score (OR=1.16 [0.0103], p<0.001), parental rejection score (OR=0.949 [0.00825], p<0.001), gender (OR if female is 0.633 [0.0460], p<0.001), and age groups 12 to 13 years old (OR=0.558 [0.0507], p<0.001) and 14 to 15 years old (OR=0.664 [0.0601], p<0.001) in comparison to 10 and 11 year olds (χ^2=609.63, p<0.001).

Unorganized sports participation is not significantly related to the odds of higher general self scores in the overall cycle 3 sample of 10 to 15 year olds.

For low-income girls ages 14 to 15 (n=165) in cycle 3, organized sports participation of 4 or more times a week is associated with greater odds of higher self-esteem scores (OR=3.13 [1.74], p<0.05) after controlling for parental nurturance score (OR=1.14 [0.0550], p<0.01) (χ^2=10.19, p<0.05). The same results are found for unorganized sports participation (OR=4.32 [2.85], p<0.05) after controlling for parental nurturance score (χ^2=14.99, p<0.01).

6.2.3 Friends score

In the total sample for cycle 1 (n=2,339), any organized sports participation reported within the last year is associated with increased odds of higher friends scores and the odds of higher friends scores are even greater in unorganized sports participation (see table **A.3** in **Appendix A**).

In the low-income cycle 1 sample boys' (n=237) odds of higher friends scores are associated with organized sports participation less than once a week (OR=2.28 [0.845],

p<0.05) and 1-3 times a week (OR=2.67 [1.15], p<0.05) after controlling for parental nurturance (OR=1.22 [0.0790], p<0.01), (χ^2=15.97, p<0.01).

Odds of higher friends scores in cycle 2 are associated with organized sports participation of 4 or more times a week (OR=1.55 [0.262], p<0.01) for the overall sample after controlling for parental nurturance (OR=1.11 [0.0176], p<0.001), parental rejection (OR=0.944 [0.0127], p<0.001), gender (OR if female is 1.51 [0.174], p<0.001) and age (OR if 12 to 13 is 1.57 [0.183], p<0.001), (χ^2=109.79, p<0.001).

The source of these results for the overall sample comes from one group in particular: girls ages 10 and 11 from families of SES greater than -0.8 (n=550). Interestingly for this sample of girls, playing organized sports less than once a week is associated with significantly lower odds of higher friends scores (OR=0.409 [0.159, p<0.05) compared to those who never play organized sports, however participating 4 or more times a week is associated with greater odds of higher friends scores (OR=2.21 [0.785, p<0.05) compared to those who never participate after controlling for parental nurturance (OR=1.15 [0.0333], p<0.001) and parental rejection (OR=0.936 [0.0243], p<0.01), (χ^2=61.17, p<0.001). Odds of higher friends scores for girls ages 12 and 13 from low-SES families predicted by sports participation of 4 or more times a week are significant (OR=5.99 [4.33], p<0.05) however Wald's χ^2 is non-significant (n=89).

Both organized and unorganized sports participation of more than once a week predict greater odds of higher friends scores for the overall cycle 3 sample (n=3,522).

Organized sport participation of 1 to 3 times a week (OR=1.60 [0.147], p<0.001) and 4 or more times a week (OR=2.13 [0.217], p<0.001) are significant after controlling for parental nurturance (OR=1.08 [0.00882], p<0.001), gender (OR if female is 1.52

[0.109], p<0.001) and age (OR if ages 12 and 13 is 1.34 [0.117], p<0.001), (OR if ages 14 and 15 is 1.97 [0.177], p<0.001), (χ^2=189.93, p<0.001).

Similar results are found in odds associated with unorganized sports participation for odds of higher friends scores. Participation of 1 to 3 times a week (OR=1.46 [0.192], p<0.001) and 4 or more time a week (OR=1.90 [0.253], p<0.001) are significant in the model predicting odds of higher friends scores after controls for parental nurturance, gender, and age are included (χ^2=168.79, p<0.001).

6.2.4 Supportive coach

Data regarding supportive relationship with leader/coach is limited to cycle 1 of the NLSCY. Organized sport participation of 4 or more times a week is associated with greater odds of having a coach or leader to talk to about problems or oneself (OR=3.41 [1.02], p<0.001) compared to less regular organized sports participation (χ^2=26.43, p<0.001) for the total cycle 1 sample (n=2,339). Boys from non-low-income families appear to have the greatest odds of having a coach/leader support based on more frequent organized sports participation.

6.2.5 Cumulative effects of strengths

The association between having a supportive coach or leader and self-esteem scores for the overall sample is significant in cycle 1, however when the sample is divided into children from low-income families and children from non-low-income families, only the self-esteem scores for those above the LICO are significantly associated with the coach variable. In the above-LICO group, coach remains significant (OR=1.38 [0.210], p<0.05) after controlling for organized sports participation (if 4 or more times a week OR=1.54 [0.318], p<0.05), and neighbour cohesiveness (OR=1.09 [0.0275], p<0.01)

(χ^2=26.98, p<0.001). When friends score (OR=1.41 [0.0414], p<0.001) and parental nurturance (OR=1.26 [0.0330], p<0.001) are added to the model, none of the other variables remain significant (χ^2=281.10, p<0.001). Parental nurturance appears to be associated with organized sports participation, which is in turn associated with having a supportive coach as well as higher friends scores in children from above-LICO families, both of these are associated with higher odd of self-esteem in non-low-income 10 and 11 year olds.

6.3 Behavioural outcomes

	1. Income/SES	2. Age group	3. Prosocial behaviour	4. Hyper-activity /inattention	5. Emotional disorder-anxiety	6. Conduct disorder/physic al aggression
Table 6.5 – Pearson's correlations (pairwise) of income/SES and behavioural scores for a. Cycle 1 (n=2,339), b. Cycle 2 (n=2,520), and c. Cycle 3 (n=3,522)						
1.	1.00					
2.	**a.** 0.0461* **b.** – 0.0117(ns) **c.** 0.0494**	1.00				
3.	**a.** 0.0379(ns) **b.** – 0.0011(ns) **c.** 0.0398*	**a.** 0.0210(ns) **b.** – 0.149*** **c.** – 0.214***	1.00			
4.	**a.** – 0.0885*** **b.** – 0.130*** **c.** – 0.0803***	**a.** – 0.0584** **b.** – 0.0090(ns) **c.** 0.0104 (ns)	**a.** – 0.236*** **b.** – 0.182*** **c.** – 0.167***	1.00		
5.	**a.** – 0.0830*** **b.** – 0.0606** **c.** – 0.0383*	**a.** – 0.0832*** **b.** – 0.0872*** **c.** – 0.0018(ns)	**a.** – 0.0685*** **b.** – 0.0227(ns) **c.** 0.0208(ns)	**a.** 0.502*** **b.** 0.484*** **c.** 0.441***	1.00	
6.	**a.** – 0.0671** **b.** – 0.0996*** **c.** – 0.0736***	**a.** – 0.0480* **b.** – 0.0326(ns) **c.** – 0.0774***	**a.** – 0.261*** **b.** – 0.310*** **c.** – 0.259***	**a.** 0.480*** **b.** 0.439*** **c.** 0.436***	**a.** 0.362*** **b.** 0.332*** **c.** 0.260***	1.00
*p<0.05, **p<0.01, ***p<0.001, ns – non-significant						

6.3.1 Prosocial Behaviour

Boys from low-SES families ages 14 and 15 from cycle 3 (n=133) have significantly greater odds of higher prosocial scores associated with organized sports participation of 4 or more times a week after controlling for parental nurturance. Parental

rejection, general self score, friends scores, and SES group are non-significant in this regression.

Table 6.6 – Odds of higher prosocial behaviour scores by organized sports participation for boys ages 14-15 from low-SES families (Cycle 3, n=133)		
	Odds Ratio	**Wald χ^2**
(Reference group: Never) Frequency played organized sports is "less that once a week"	(ns)	25.28***
Frequency played organized sports is "1 to 3 times a week"	(ns)	
Frequency played organized sports is "4 or more times a week"	13.74 (8.73)***	
Parental nurturance score	1.12 (0.0403)**	
*p<0.05, **p<0.01, ***p<0.001, ns – non-significant		

6.3.2 Hyperactivity/inattention

10 to 13 year old boys in cycle 2 (n=153) have lower odds of high hyperactivity and inattention scores associated with organized sports participation of 1 to 3 times a week (OR=0.207 [0.102], p<0.01) after controlling for parental rejection scores (OR=1.14 [0.0457], p<0.01), however coefficients are no longer significant after controlling for general self scores, which are significantly related to reduced odds of scoring higher for hyperactivity and inattention (OR=0.755 [0.0558], p<0.001, χ^2=14.46).

12 and 13 year old girls from low-SES families in cycle 3 (n=139) have lower odds of high hyperactivity scores associated with organized sports participation of at least once a week after controlling for self-esteem. The effects of organized sports participation are non-significant after controlling for parental nurturance, however, when self-esteem and parental nurturance are tested simultaneously, only self-esteem is significant.

Table 6.7 – Odds of higher hyperactivity and inattention scores by organized sports participation girls ages 12-13 from low-SES families (Cycle 3, n=139)		
	Odds Ratio	**Wald χ^2**
		16.29**
(Reference group: Never) Frequency played organized sports is "less that once a week"	(ns)	
Frequency played organized sports is "1 to 3 times a week"	0.357 (0.154)*	
Frequency played organized sports is "4 or more times a week"	0.446 (0.179)*	
General self score	0.836 (0.0494)**	
*p<0.05, **p<0.01, ***p<0.001, ns – non-significant		

6.3.3 Emotional disorder and anxiety

For cycle 1, organized sports participation of 4 or more times a week is associated with reduced odds of higher emotional disorder-anxiety scores after controlling for parental nurturance, parental rejection score, family score, and gender. Results are reports in table **A.4** in **Appendix A**. Similar results are observed when organized sports is replaced with unorganized sports participation, results are significant for participation less than once a week (OR=0.597 [0.130], p<0.05), 1 to 3 times a week (OR=0.570 [0.113], p<0.01), and 4 or more times a week (OR=0.575 [0.114], p<0.01) with the same control variables (χ^2=198.75, p<0.001).

Smaller odds of high emotional disorder-anxiety scores are predicted by organized sports participation of 4 or more times a week for boys from families with income above the LICO (n=896) (OR=0.470 [0.136], p<0.01) after controlling for parenting and family variables (χ^2=70.91, p<0.001). Sports participation and parental nurturance are no longer significant after controlling for friends score (OR=0.883 [0.0322], p<0.01) and general self score (OR=0.860 [0.0461], p<0.01), (χ^2=91.56, p<0.001).

Odds of higher emotional disorder-anxiety are predicted to be even lower by unorganized sports involvement, and are significant at all participation frequencies greater than "never", less than once a week (OR=0.294 [0.0929], p<0.001), 1 to 3 times a week (OR=0.302 [0.0842], p<0.001), and 4 or more times a week (OR=0.326 [0.0899], p<0.001) after controlling for parental nurturance and rejection, and family score (χ^2=85.98, p<0.001). Odds ratio predictions remain significant at all levels of organized sports participation frequency for boys of non-low-income families after adding friends score, and general self score to the model (χ^2=107.66, p<0.001).

Physical activity level, having a coach or leader to talk to, single-parent status, PMK depression score, and neighbourhood factors are not significantly associated with the odds of emotional disorder scores for boys from non-low-income families.

For girls from non-low-income families, general self score (OR=0.713 [0.0384], p<0.001), and physical activity of moderately more than other children of the same age (OR=0.142 [0.120], p<0.05) and much more (OR=0.147 [0.128], p<0.05) are significantly associated with smaller odds of higher emotional disorder-anxiety scores after controlling for neighbourhood safety (OR=0.849 [0.0706], p<0.05), parental rejection and family score (χ^2=154.83, p<0.001). Friends scores and sports participation of either kind are not directly associated with the odds of emotional disorder-anxiety scores. However, in section 6.2.1, both organized and unorganized sports participation are significantly associated with increases in physical activity level for girls from non-low-income families.

For cycle 2 girls from low-SES families, unorganized sports participation of 4 or more times a week is associated with smaller odds of higher emotional disorder and anxiety scores (OR=0.314 [0.171], p<0.05) and remains significant after controlling for

friends scores (OR=0.876 [0.0559], p<0.05), (χ^2=12.69, p<0.05). Unorganized sports participation is no longer significant once parental nurturance is added to the model. Recall from Section 6.1.2 that parental nurturance is a significant factor in the odds of girls from low-SES families participating in unorganized sport.

Boys from low-SES families in cycle 2 have lower odds of higher emotional disorder and anxiety scores associated with *organized* sport participation of 1 to 3 times a week (OR=0.357 [0.170], p<0.05) after controlling for parental rejection score (OR=1.13 [0.0610], p<0.05) and general self score (OR=0.798 [0.0665], p<0.01), (χ^2=43.80, p<0.001).

Refer to Table 6.9 in Section 6.4 for an explanation of the connections between sports participation and emotional disorder and anxiety scores for 14 and 15 year old girls from low-SES families in cycle 3.

6.3.4 Conduct disorder and physical aggression

In cycle 3, 12 and 13 year old boys from low-SES families, reduced odds of higher conduct disorder and physical aggression scores are associated with participation in organized sports of 1 to 3 times a week, after controlling for parenting factors and personal strengths.

Table 6.8 – Odds of higher conduct disorder and physical aggression scores by organized sports participation for boys ages 12-13 from low-SES families (Cycle 3, n=127)		
	Odds Ratio	**Wald χ^2**
		31.57***
(Reference group: Never) Frequency played organized sports is "less that once a week"	(ns)	
Frequency played organized sports is "1 to 3 times a week"	0.257 (0.128)**	
Frequency played organized sports is "4 or more times a week"	(ns)	
Parental nurturance score	0.898 (0.0327)**	
Parental rejection score	1.19 (0.0461)***	
		32.12***
(Reference group: Never) Frequency played organized sports is "less that once a week"	(ns)	
Frequency played organized sports is "1 to 3 times a week"	0.282 (0.144)*	
Frequency played organized sports is "4 or more times a week"	(ns)	
Parental nurturance score	(ns)	
Parental rejection score	1.14 (0.0499)**	
General self score	0.785 (0.0543)***	
*p<0.05, **p<0.01, ***p<0.001, ns – non-significant		

6.4 Connections

Table 6.9 demonstrates the objectives of this study. A pathway of connections is found from SES to behaviours. Recall from **Section 6.1.3** that 14 and 15 year old girls from low-SES families are the least likely group in cycle 3 to participate in organized or unorganized sports. Sport participation is in turn associated with self-esteem, peer relationships, prosocial behaviour, hyperactivity and inattention, emotional disorder and anxiety, and conduct disorder and physical aggression.

Associations are direct as in the case of self-esteem, friends and hyperactivity scores, and indirect in the case of prosocial behaviours, emotional disorder and anxiety, and conduct disorder and physical aggression scores. The indirect relationships are presented in by showing the odds ratio results of sports participation before controlling

for strengths such as self-esteem and prosocial behaviour, and family ecosystem factors, and subsequently presenting the most significant model that includes factors influenced by SES and by strengths associated with sports participation. When a second model is presented that does not included sports participation, it indicates that mediating mechanisms exist within the relationship of sports participation and behavioural outcomes.

Table 6.9 – Girls from low-SES families ages 14 to 15 (Cycle 3, n=165)		
	Odds Ratio	**Wald χ^2**
Odds of higher general self scores		
		10.19*
(Reference group: Never) Frequency played organized sports is "less that once a week"	(ns)	
Frequency played organized sports is "1 to 3 times a week"	(ns)	
Frequency played organized sports is "4 or more times a week"	3.13 (1.75)*	
Parental nurturance score	1.14 (0.0550)**	
Odds of higher general self scores		
		14.99*
(Reference group: Never) Frequency played unorganized sports is "less that once a week"	(ns)	
Frequency played unorganized sports is "1 to 3 times a week"	(ns)	
Frequency played unorganized sports is "4 or more times a week"	4.32 (2.85)*	
Parental nurturance score	1.13 (0.0472)**	
Odds of higher friends scores		
		12.26*
(Reference group: Never) Frequency played organized sports is "less that once a week"	(ns)	
Frequency played organized sports is "1 to 3 times a week"	3.32 (1.27)**	
Frequency played organized sports is "4 or more times a week"	4.29 (2/97)*	
Odds of higher prosocial behaviour scores		
		7.54 (ns)
(Reference group: Never) Frequency played unorganized sports is "less that once a week"	(ns)	
Frequency played unorganized sports	3.82 (2.16)*	

is "1 to 3 times a week"		
Frequency played unorganized sports is "4 or more times a week"	(ns)	
General self score	1.30 (0.0777)***	**18.63***
Odds of higher hyperactivity/inattention scores		
(Reference group: Never) Frequency played unorganized sports is "less that once a week"	(ns)	**25.19***
Frequency played unorganized sports is "1 to 3 times a week"	0.337 (0.170)*	
Frequency played unorganized sports is "4 or more times a week"	(ns)	
General self score	0.825 (0.0466)**	
Parental rejection score	1.09 (0.0417)*	
Odds of higher emotional disorder-anxiety scores		
(Reference group: Never) Frequency played **organized** sports is "less that once a week"	(ns)	**26.75***
Frequency played **organized** sports is "1 to 3 times a week"	0.405 (0.151)*	
Frequency played **organized** sports is "4 or more times a week"	(ns)	
Parental rejection score	1.19 (0.0430)***	
General self score	0.724 (0.0437)***	**50.51***
Parental rejection score	1.16 (0.0451)***	
Odds of higher conduct disorder and physical aggression scores		
(Reference group: Never) Frequency played **organized** sports is "less that once a week"	(ns)	**25.13***
Frequency played **organized** sports is "1 to 3 times a week"	0.349 (0.185)*	
Frequency played **organized** sports is "4 or more times a week"	(ns)	
Parental rejection score	1.23 (0.0515)***	
Prosocial behaviour score	0.876 (0.0397)***	**37.85***
General self score	0.857 (0.0503)**	
Parental rejection score	1.19 (0.0525)***	
*p<0.05, **p<0.01, ***p<0.001, ns – non-significant		

7. DISCUSSION & CONCLUSIONS

Despite cross-sectional and endogeneity limitations of this study, there is strong evidence as in previous literature that income does indeed affect opportunities for recreation, and it is not likely that the strong associations observed involve reverse-causality (i.e. child sport participation affecting family income). The same is likely true for the effects of parenting styles, neighbourhood factors, and gender on child sport participation. The relationship between family and community ecosystem factors, and strengths, behaviours, and emotions is more complicated, and more likely to interact in multiple directions. For example, the direction of the relationship between a child's friends score and their frequency of sports participation is ambiguous. A child who has more friends may be more likely to participate in sports if their friends are enrolled in programs, while signing a child up for sports may increase their odds of making more friends.

Results indicate that females appear to be less likely to participate in both types of sports, replicating the results of Guèvremont et al. (2008), however gender differences are greater for samples including all levels of income/SES compared to those including only those children from low-income/SES families. Youth ages 14 and 15 are less likely to participate than 10 and 11 year olds. Across each sample, LICOR and SES are associated with organized sports participation, however income related factors do not appear to affect unorganized sports participation, at least not directly. Ecosystem factors such as neighbourhood cohesion and parental nurturance and rejection are possible mediators of unorganized sports opportunities for children from low-SES families.

Neighbourhood safety scores are surprisingly not found to be associated with unorganized sports participation as expected. However, there is a strong correlation between neighbourhood safety scores and neighbour cohesion, which is a significant factor in models relating unorganized sports participation to income. Unorganized sports opportunities for girls from low-income families (in cycle 1) appear to be especially influenced by neighbour cohesion.

These findings are interesting in that, while children from low-income families may be excluded from organized sports participation opportunities, they may still be afforded unorganized sports opportunities through factors like neighbourhood cohesiveness and parental nurturance.

Both organized and unorganized sports are associated with increased odds of being more physically active; however low-income children only seem to receive physical activity benefits from unorganized sports, possibly due to the fact that far fewer low-income children play organized sports compared to the proportion that participate in unorganized sports.

Organized sports participation is significant in regressions predicting odds of self-esteem scores for overall samples in all cycles, however the majority of the low-income/SES samples' odds of higher self-esteem scores are not significantly associated with organized sports participation. This again may be a result of low participation rates in organized sports for low-income/SES groups. Gender only seems to affect self-esteem in samples that include age groups of 12 years and older.

Increased odds of higher friends scores are associated with sports participation in various groups of different genders and ages across the three samples, and show significance for both unorganized and organized sports participation. This is contrary to

my hypothesis that organized sports participation would have a greater impact on friends scores. Several explanations are plausible. First, reverse-causality or simultaneity of friend groups and unorganized sports participation, those children with many friends are more likely to be involved in unorganized activities through peer connections. Second, the correlation coefficients between organized and unorganized sports participation across all samples are large and significant, so those who benefit from peer supports in one type of sport participation, will also likely benefit from the other in the same way.

Evidence of a relationship between organized sports and the development of prosocial behaviour is not demonstrated in the regression models for the overall cycle 1 sample. While the effect of the highest frequency of organized sports participation on odds of higher prosocial scores appears to be moderately significant when gender is the only control, it becomes non-significant once parental nurturance is added to the model, or when self esteem score and friends score are added to the model, both of which are significantly related to parental nurturance. The pathway of parenting effects on prosocial behaviour that appears to be mediated, in part, by self-esteem and peer relationships, may exist regardless of involvement in organized sports.

There is stronger evidence to support a relationship between prosocial behaviour and unorganized sports participation in cycle 1. The odds of higher prosocial scores remain significant when a child participates in unorganized sports at least 4 times a week, even when controls for parental nurturance, family score, and gender are added. The odds based on unorganized sports participation are made non-significant by the addition of friends score. Referring to Section 6.2.3 we see that the odds of higher friends scores at the highest frequency of organized sports participation are almost double the odds associated with lower frequencies of participation. Unorganized sports participation and

prosocial outcomes appear to be connected to prosociality through development of peer support groups that are associated with unorganized sports participation.

The relationship between sports participation and prosocial behaviour is further supported with results from the low-SES sample of girls aged 14 and 15 in cycle 3. Unorganized sports participation demonstrates a significant positive association with odds of higher self-esteem in this group, and self-esteem subsequently appears to mediate a relationship between unorganized sports participation and odds of higher prosocial behaviour scores. A relationship between organized sports participation and self-esteem scores is also indicated for this cohort.

In cycle 3, a direct link is drawn between frequent organized sports participation and greater odds of higher prosocial behaviour scores in 14 and 15 year old boys. The non-significance of the coefficients of self-esteem and peer relationship variables in this regression is interesting, as these are thought to be the key mediating mechanisms between sports and prosociality.

Although friends scores are significantly related to odds of higher prosocial scores when tested independently, the significance of the self-esteem coefficient dominates the overall effects. This is demonstrated in cycles 1 and 3, however the low-SES 14 and 15-year-old boys sample in cycle 3 indicates that other mediating mechanisms are at play and should be further investigated.

Capara et al. (2014) classify prosocial functioning as both an indication of resilience in its own right, as well as a mediator of reductions in externalizing disorders such as aggressive behaviour. Prosocial behaviours and attitudes are also shown to improve academic performance in adolescents. As well, youth are found to benefit from positive peer relationships to a greater degree than younger children. This may be in part

a result of declines in prosocial behaviour through the transition from childhood to adolescence observed in Capara et al.'s (2014) findings, as well as in correlations in this study that highlight a need for programs that foster positive development specifically in this age group.

It is not so surprising then, that more significant findings of sport-behaviour connections are present in the older samples, compared to those with 10 and 11 year olds. For 12 and 13 year olds who live in low-SES households, organized sports participation appear to reduce odds of emotional disorder and anxiety in boys from cycle 2, while unorganized sports seem to reduce odds for high emotional disorder and anxiety scores in girls from the same cohort. Organized sports appear to reduce hyperactivity/inattention scores for girls, and conduct disorder and physical aggression scores for boys, both of low-SES status and ages 12 to 13 from cycle 3. In cycle 1, while family and neighbourhood factors appear to affect the self-esteem of 10 and 11 year olds both directly, and through the mechanism of organized sports for the overall sample, effects of organized sports do not appear to be significant in the low-income cohort, this may be a result of smaller sample size, or a smaller number of low-income children participating in organized sports. Unorganized sports are only weakly associated with self-esteem and do not hold up against controls for family effects.

The most interesting findings are perhaps the results for the sample of 14 and 15-year-old girls in cycle 3. This group is the least likely in the cycle to participate in sports, organized or unorganized, although SES does not affect unorganized sports participation, gender and age do seem to make a difference in likelihood of participation frequency. This group also appears to gain the most from participation, in higher levels of self-esteem and peer supports, as well as increased prosocial functioning and reduced problem

behaviours. This series of connections explained in Table 6.9 demonstrates how youth who could likely benefit the most from opportunities for recreation are also those who experience the greatest level of social exclusion from such activities. Through this dimension of poverty developmental risk is magnified, teenage girls in low-SES families are not only at high risk because of negative family and community ecosystem influences, but may also be deprived access to protective environments like sport.

Possibilities for change exist in these processes. It is perhaps more realistic, as Xu et al. (2009) point out, to target mechanisms of poverty that mediate behavioural development, as opposed to the poverty itself. Neighbour cohesion and parental nurturance are two such elements that show promise. Parental nurturance in particular is significantly present in each stage of the model, appearing to mediate opportunities, person strengths and challenges, as well as resilience behaviours. The likelihood of causality in the relationship between parenting and subsequent stages of the model is akin to the assumptions made regarding the income-development relationship. It is unlikely that factors like sports participation, or child self-esteem and peer relationships impact the level of nurturance or rejection in the parent-child relationship. If, for instance, self-esteem influenced parental nurturance, we might expect that the relationship might be a negative one, where declines in child self-esteem result in greater levels of parental nurturance from a parent concerned for their child. This is not to say that there is causality in the relationship, but that if it is occurring, it is likely in the hypothesized direction. The same argument holds for neighbourhood and community ecosystem conditions that may influence child outcomes. Also of note is the correlation between parental nurturance and LICOR that is more than double that of the total sample when tested for exclusively in the

low-income sample of cycle 1. This could indicate the impact of small differences in household income on family ecosystem for those living below the LICO.

This supports research that finds value in interventions for parenting education (Biglan et al., 2012). Self-esteem, peer relationships, and prosocial behaviour are also potential targets that would prove influential in positive growth across multiple domains such as behaviours, academics, and emotional health. The relationship between these developmental outcomes with one another, and with opportunities and other behaviours, are marred with reverse-causality and simultaneity. Do growing peer support groups increase self-esteem in children, or do children with high self-esteem have a greater capacity to seek out new friend relationships? Do prosocial children involve themselves in more activities like unorganized neighbourhood sporting events, or do these activities foster prosocial behaviour in children who participate? It is possible that the answer to these questions is "both". A future avenue of research is to employ longitudinal data, instrumental variables, and fixed effects to remedy endogeneity of relationships and unobserved heterogeneity in order to gain a clearer picture of where causality is most likely. The evidence in this study suggests that sports activities, child strengths, and behavioural outcomes are in some way connected, but direct relationships are not inferred. The ecosystem of child development is more a web of relationships than a linear process. "Health is a dependent as well as an independent variable - it is an intrinsic characteristic which can impact various aspects of a child's life and it is one of the dimensions readily influenced by other factors." (StatsCan & HRDC, 1995, p.35).

Eccles et al. (2003) point out the importance of determining the interactions between features of the intervention program as well as characteristics of participants that result in positive change. While acknowledging that this study does not demonstrate

causal relationships between the different levels of child and youth development, important connections are made that point towards certain characteristics. Gender, age, and low-SES status all appear to play a role in the magnitude of benefits received through sports participation. In regards to features of intervention, effects of organized sports do not necessarily exceed those of unorganized sports, especially for children experiencing socioeconomic risk. Peer relationships and self-esteem that may be fostered in both organized and unorganized sport environments seem to play a greater role in psychosocial development than the physical activity and adult mentors associated with organized sports. Conditions for unorganized sport are likely less costly to provide for low-SES children compared to the investment required for organized competitive leagues. The potential for positive development through unorganized sports is a potential avenue for further research in searching for promotive environments for at-risk children and youth.

Ungar (2012) stresses the importance of examining the environment-based changes, as these can be most impactful on the greater population, particularly for at-risk groups, "the locus of change is the intervention (p.16)". Both program design and characteristics of participants shape the outcomes (Eccles et al., 2003). More detailed information is needed regarding these aspects such as what type of sports is being played, what is the level of physical activity involved, team size and interaction between players and coaches, level of competition and structure, and duration of the season. Investigating these would be useful in developing a more informative model of development through sport. Child characteristics regarding physical health, past behavioural functioning, and other ecosystem influences of behaviours and emotions are important pieces of information in determining why certain children benefit and in which domains of development. A more comprehensive picture of neighbourhood and community

environment such as available facilities, average household income or SES, neighbourhood safety, and program accessibility might serve effective direction of funding for recreation interventions.

In conclusion, it is known that SES impacts child and youth development, and that the pathways of this relationship are complex, across many domains and through interactions between characteristics of person and ecosystem. Mediators of these interactions are indicated in findings of this study: age, gender, parental nurturance and rejection, neighbour cohesion, and opportunities for sport. Both interrelated, and endogenous in behavioural and emotional functioning, these mediating mechanisms may lead to the social exclusion of those who would otherwise gain the most in regards to healthy development through sport. Poverty often bars access to windows of developmental opportunity (Ungar, 2012).

Other person strengths worth investigating in association with sport participation of low-SES children and youth are academic achievement, increased access to post-secondary education, physical health benefits, and efficacy in goal setting and perseverance. Challenges related to sports that might be considered are concussion related injuries, risk behaviours, and effects of sport dropout on physical and mental health. Longitudinal data collection involving a more detailed examination of the microsystem of sport in the context of participants' developmental ecosystems will facilitate effective program design with potential to foster behavioural resilience.

References

Aldridge, H., Parekh, A., MacInnes, T., & Kenway, P., (2011). Monitoring poverty and social exclusion 2011. *Joseph Rowntree Foundation*. Retrieved from <http://www.jrf.org.uk/publications/monitoring-poverty-2011>

Allin, S., & Stabile, M. (2012). Socioeconomic status and child health: What is the role of health care, health conditions, injuries and maternal health? *Health Economics and Policy Law 7*(2), 227-242. doi:10.1017/S174413311100034X

Baetschmann, G., Staub, K.E., Winkelmann, R. (2011). Consistent estimation of the fixed effects ordered logit model. *Institute for the Study of Labor (IZA), Germany, Discussion Paper No. 5443*. Retrieved from <http://ftp.iza.org/dp5443.pdf>

Banerjee, T.D., Middleton, F., & Faraone, S.V. (2007). Review article: Environmental risk factors for attention-deficit hyperactivity disorder. *Acta Paediatrica, 96*, 1269-1274. doi: 10.1111/j.1651-2227.2007.00430.x

Bell, T., Romano, E., & Flynn, R.J. (2013). Multilevel correlates of behavioral resilience among children in child welfare. *Child Abuse & Neglest, 37*(11), 1007-1020. doi:10.1016/j.chiabu.2013.07.005

Biddle, S. J., & Asare, M., (2011). Physical activity and mental health in children and adolescents: a review of reviews. *British Journal of Sports Medicine, 45*, 886-895. doi:10.1136/bjsports-2011-090185.

Biglan, A., Flay, B.R., Embry, D.D., & Sandler, I.N. (2012). The critical role of nurturing environments for promoting human well-being. *American Psychologist, 67*(4), 257-271. doi:10.1037/a0026796

Brunet, J., Sabiston, C. M., Chaiton, M., Barnett, T. A., O'Loughlin, E., Low, N. C., & O'Loughlin, J. L. (2013). The association between past and current physical activity and depressive symptoms in young adults: A 10-year prospective study. *Annals of epidemiology, 23*(1), 25-30. doi:10.1016/j.annepidem.2012.10.006

Canadian Institute for Health Information (2008). Improving the health of Canadians 2008: Mental health, delinquency and criminal activity. *Canadian Institute for Health Information, Ottawa, Canada*. Retrieved from <https://secure.cihi.ca /free_products/ mh_crime_full_report_apr11_08_e.pdf>

The Canadian Parks and Recreation Association (CPRA), (2001). Recreation and children and youth living in poverty: Barriers, benefits and success stories, section II: Literature review and analysis. *Developed by The Canadian Council on Social Development (CCSD) for CPRA*. Retrieved from <http://www.cpra.ca/UserFiles/ File/EN/sitePdfs/initiatives/EGTP/literature.pdf>

The Conference Board of Canada (2012). Mental health issues in the labour force: Reducing the economic impact on Canada. *The Conference Board of* Canada. Retrieved from <http://www.conferenceboard.ca.library.smu.ca: 2048/

e-library/abstract.aspx?did=4957>

The Conference Board of Canada (2013). *Child Poverty*. Retrieved from

<http://www.conferenceboard.ca/hcp/details/society/child-poverty.aspx>

Conti, G., & Heckman, J.J. (2014). Economics of child well-being. *Handbook of Child Well-Being, 2*(14), 363-401. doi: 10.1007/978-90-481-9063-8_21

Côté, S.M., Borge, A.I., Geoffroy, M.C., Rutter, M., & Tremblay, R.E. (2008). Nonmaternal care in infancy and emotional/behavioral difficulties at 4 years old: Moderations by family risk characteristics. *Developmental Psychology, 44*(1), 155-168. doi: 10.1037/0012-1649.44.1.155

Caprara, G.V., Kanacri, B.P.L., Gerbino, M., Zuffianò, A., Alessandri, G., Vecchio, G., ... , & Bridglall, B., (2014). Positive effects of promoting prosocial behavior in early adolescence: Evidence from a school-based intervention. *International Journal of Behavioral Development, 38*(4), 386-396. doi:10.1177/0165025414531464

Carro, J.M. (2006). Estimating dynamic panel data discrete choice models with fixed effects. *Journal of Econometrics, 140*(2), 503-528. doi:10.1016/j.jeconom.2006.07.023

Currie, J., & Stabile, M. (2009). Mental health in childhood and human capital. In Gruber,

    J. The problems of disadvantaged youth: An economic perspective (chapter 4).

    University of Chicago Press. Retrieved from <http://www.nber.org/chapters

    /c0585.pdf>

Deraspe, R. (2013). Current issues in mental health in Canada: The economic impact of

    mental illness. *Library of Parliament, Ottawa, Canada, Economics, Resources

    and International Affairs Division*, No. 2013-87-E. Retrieved from

    <http://www.parl.gc.ca/Content/LOP/ResearchPublications/2013-87-e.htm>

Dooley, M., & Stewart, J. (2007). Family income, parenting styles and child behavioural-

    emotional outcomes. *Health Economics, 16*, 145-162. doi:10.1002/hec.1142

Eccles, J.S., Barber, B.L., Stone, M., & Hunt, J. (2003). Extracurricular activities and

    adolescent development. *Journal of Social Issues, 59*(4), 865-889.

    doi:10.1046/j.0022-4537.2003.00095.x

Ecosystem. (2015). In *Oxford Dictionaries*. Retrieved from

    <http://www.oxforddictionaries.com/us/definition/american_english/ecosystem>

Eime, R.M., Young, J.A., Harvey, J.T., Charity, M.J., & Payne, W.R. (2013). A

    systematic review of the psychological and social benefits of participation in sport

    for children and adolescents: Informing development of a conceptual model of

health through sport. *International Journal of Behavioral Nutrition and Physical Activity, 10*(98). doi:10.1186/1479-5868-10-98

Fergus, S., & Zimmerman, M.A. (2005). Adolescent resilience: A framework for understanding health development in the face of risk. *Annual Review of Public Health, 26*, 399-419. doi:10.1146/annurev.publhealth.26.021304.144357

Flynn, R.J., Ghazal, H., Legault, L., Vandermeulen, G., & Petrick, S., (2004). Use of population measures and norms to identify resilient outcomes in young people in care: an exploratory study. *Child and Family Social Work, 9*(1), 65-79. doi:10.1111/j.1365-2206.2004.00322.x

Fraser-Thomas, J.L., Côté, J., & Deakin, J. (2005). Youth sport programs: An avenue to foster positive youth development. *Physical Education and Sport Pedagogy, 10*(1), 19-40. doi:10.1080/1740898042000334890

Goodman, S.H., Hoven, C.W., Narrow, W.E., Cohen, P., Fielding, B., Alegria, M., ... , Dulcan, M.K. (1998). Measurement of risk for mental disorders and competence in a psychiatric epidemiologic community survey: The National Institute of Mental Health Methods for the Epidemiology of Child and Adolescent Mental Disorders (MECA) study. *Social Psychiatry and Psychiatric Epidemiology, 33*(4), 162-173. doi: 10.1007/s001270050039

Guèvremont, A., Findlay, L., Kohen, D., (2008). Organized extracurricular activities of

      Canadian children and youth. *Health Reports, Statistics Canada, 19*(3), 65-69.

      Catalogue no. 82-003-XPE

Kohen, D.E., Leventhal, T., Dahinten, V.S., & McIntosh, C.N. (2008). Neighborhood

      disadvantage, Pathways of effects for young children. *Child Development, 79*(1),

      156-169. doi:10.1111/j.1467-8624.2007.01117.x.

Johnston, D.W., Propper, C., Pudney, S.E., & Shields, M.A. (2014). The income gradient

      in childhood mental health: All in the eye of the beholder? *Journal of the Royal*

      Statistical Society, Statistics in Society, Series A, 177(4), 807-827.

      doi:10.1111/rssa.12038

Legault, L., Anawati, M., Flynn, R., (2005). Factors favoring psychological resilience

      among fostered young people. *Children and Youth Services Review, 28*(9), 1024-

      1038. doi:10.1016/j.childyouth.2005.10.006

Leinenberg, L., Ungar, M., & Van de Vijver, F. (2012). Validation of the child and youth

      resilience measure-28 among Canadian youth. *Research on Social Work Practice,*

      22(2), 219-226. doi:10.1177/1049731511428619

Leventhal, T., & Brooks-Gunn, J., (2003). Children and youth in neighbourhood contexts.

      Current Directions in Psychological Science, 12(1), 27-31. doi: 10.1111/1467-

      8721.01216

Lim, K.L., Jacobs, P., & Dewa, C. (2008). IHE report: How much should we spend on

    mental health? *Institute of Health Economics & Alberta Health Services, Alberta*

    Mental Health Board, Alberta, Canada. Retrieved from <http://www.ihe.ca/

    publications/how-much-should-we-spend-on-mental-health->

McEwan, K., Waddell, C., & Barker, J. (2007). Bringing children's mental health "out of

    the shadows". *Canadian Medical Association Journal, 176*(4), 471-472.

    doi:10.1503/cmaj.061028.

The Mental Health Commission of Canada, (2013). Making the case for investing in

    mental health in Canada. *Mental Health Commission of Canada*. Retrieved from

    <http://www.mentalhealthcommission.ca/English/node/5020>

Muñoz, R.F., Beardslee, W.R., Leykin, Y., (2012). Major depression can be prevented.

    American Psychologist, 67(4), 285-295. doi:10.1037/a0027666

Romano, E., Tremblay, R.E., Boulerice, B., & Swisher, R., (2005). Multilevel correlates

    of childhood physical aggressions and prosocial behavior. *Journal of Abnormal*

    Child Psychology, 33(5), 565-578. doi:10.1007/s10802-005-6738-3

Rutter, M., (2012). Resilience: Causal pathways and social ecology. In Ungar, M., (2012).

    The social ecology of resilience: A handbook of theory and practice (chapter 3).

    Retrieved from Springer database. doi:10.1007/978-1-4614-0586-3

Shaw, M., Hodgkins, P., Caci, H., Young, S., Kahle, J., Woods, A. G., & Arnold, L. E.
(2012). A systematic review and analysis of long-term outcomes in attention
deficit hyperactivity disorder: effects of treatment and non-treatment. BMC
medicine, 10(1), 99. doi:10.1186/1741-7015-10-99

Smetanin, P., Stiff, D., Briante, C., Adair, C.E., Ahmad, S. & Khan, M. (2011). The life
and economic impact of major mental illnesses in Canada: 2011 to 2041.
RiskAnalytica, Toronto, Canada, on behalf of the *Mental Health Commission of
Canada 2011.* Retrieved from: <https://www.mentalhealthcommission.ca/
English/system/files/private/document/MHCC_Report_Base_Case_FINAL_ENG

Socioeconomic status (SES). (2008). In *Statistics Canada*. Retrieved from
<http://www.statcan.gc.ca/pub/81-004-x/def/4068719-eng.htm>

Statistics Canada, (1995a). NLSCY Cycle 1 user guide. *Statistics Canada, Special
Surveys Division*. Retrieved from <http://www.lib.unb.ca/gddm/data/
ftp_nlscy.html#nlscy_3>

Statistics Canada, (1995b). National longitudinal survey of children and youth: Cycle 1
primary file codebook. *Statistics Canada*. Retrieved from <http://www.lib.unb.ca/
gddm/data/ftp_nlscy.html#nlscy_3>

Statistics Canada & Human Resource Development Canada, (1995). National

longitudinal survey of children: Overview of survey instruments for 1994-95 data

collection cycle 1. *Statistics Canada & Human Resource Development Canada*.

Catalogue no. 89F0078XIE. Retrieved from <http://www.lib.unb.ca/gddm/data/

ftp_nlscy.html#nlscy_3>

Statistics Canada & Human Resource Development Canada, (1997a). National

longitudinal survey of children & youth: Overview of survey instruments for

1996-97 data collection cycle 2. *Statistics Canada & Human Resource

Development Canada*. Catalogue no. 89FOO78XIE. Retrieved from

<http://www.lib.unb.ca/gddm/data/ftp_nlscy.html#nlscy_3>

Statistics Canada & Human Resource Development Canada (1997b). National

longitudinal survey of children and youth: Cycle 2 user guide. *Statistics Canada

& Human Resource Development Canada*. Retrieved from

<http://www.lib.unb.ca/gddm/data/ftp_nlscy.html#nlscy_3>

Statistics Canada & Human Resource Development Canada (1997c). National

longitudinal survey of children and youth: Cycle 2 primary file codebook.

Statistics Canada & Human Resource Development Canada. Retrieved from

<http://www.lib.unb.ca/gddm/data/ftp_nlscy.html#nlscy_3>

Statistics Canada & Human Resource Development Canada (1997d). National

longitudinal survey of children and youth: Cycle 2 self-complete (10-13)

codebook. *Statistics Canada & Human Resource Development Canada*.

Retrieved from <http://www.lib.unb.ca/gddm/data/ftp_nlscy.html#nlscy_3>

Statistics Canada & Human Resource Development Canada, (1999a). National

longitudinal survey of children & youth: Cycle 3 survey instruments for 1998-99

book 1 – parent & child. *Statistics Canada & Human Resource Development*

Canada. Catalogue no. 89FOO77XIE, no. 3a. Retrieved from

<http://www.lib.unb.ca/gddm/data/ftp_nlscy.html#nlscy_3>

Statistics Canada & Human Resource Development Canada, (1999b). National

longitudinal survey of children & youth: Cycle 3 user guide. *Statistics Canada &*

Human Resource Development Canada. Retrieved from <http://www.lib.unb.ca/

gddm/data/ftp_nlscy.html#nlscy_3>

Statistics Canada & Human Resource Development Canada, (1999c). National

longitudinal survey of children & youth: Cycle 3 primary file codebook. *Statistics*

Canada & Human Resource Development Canada. Retrieved from

<http://www.lib.unb.ca/gddm/data/ftp_nlscy.html#nlscy_3>

Statistics Canada & Human Resource Development Canada, (1999d). National

longitudinal survey of children & youth: Cycle 3 secondary file codebook.

Statistics Canada & Human Resource Development Canada. Retrieved from

<http://www.lib.unb.ca/gddm/data/ftp_nlscy.html#nlscy_3>

Strauss, R.S., Rodzilsky, D., Burack, G., & Colin, M., (2001). Psychosocial correlates of

    physical activity in healthy children. *Archives of Pediatrics & Adolescent*

    Medicine, 155(8), 897-902. doi:10.1001/archpedi.155.8.897

Tremblay, R.E., Nagin, D.S., Séguin, J.R., Zocicolillo, M., Zelazo, P.D., Boivin, M.,

    Pérusse, D., & Japel, C., (2004). Physical aggression during early childhood:

    Trajectories and predictors. *Pediatrics, 114*(1), e43-e50.

    doi:10.1542/peds.114.1.e43

Ungar, M. (2012). *The social ecology of resilience: A handbook of theory and*

    practice. Retrieved from Springer database. doi:10.1007/978-1-4614-0586-3.

Wekerle, C., Waechter, R., & Chung, R., (2012). Contexts of vulnerability and resilience:

    Childhood maltreatment, cognitive functioning and close relationships. In Ungar,

    M., (2012). *The social ecology of resilience: A handbook of theory and practice*

    (chapter 16). Retrieved from Springer database. doi:10.1007/978-1-4614-0586-3

Wu, Z., Hou, F., & Schimmele, C.M. (2008). Family structure and children's

    psychosocial outcomes. *Journal of Family Issues, 29*(12), 1600-1624.

    doi:10.1177/0192513X08322818

Xu, L., Gauthier, A.H., & Strohschein, L. (2009). Why are some children left out? Factors

    barring Canadian children from participating in extracurricular activities.

    Canadian Studies in Population, 36(4), 325-345. Retrieved from

<http://www.rdc-cdr.ca/why-are-some-children-left-out-factors-barring-canadian-children-participating-extracurricular>

Yoshikawa, H., Aber, J.L., & Beardslee, W.R. (2012). The effects of poverty on mental, emotional, and behavioral health of children and youth. *American Psychologist, 67*(4), 272-282. doi:10.1037/a0028015

Appendix A

Table A.1 – Odds ratios (ordered logistic regression) of sports participation frequency by SES and related factors (NLSCY cycle 2, ages 10 to 13) 1. All children (n=2520) 2. Children in low-SES families (n=323) 3. Boys in low-SES families (n=153) 4. Girls in low-SES families (n=170)		
	Odds Ratio (OR) (Robust std. err.)	**Wald χ^2**
1. a) How often played organized sports in past 12 months (n=2520)		
		23.67***
Parental nurturance score	1.05 (0.014)***	
Socioeconomic status is < -0.8	0.688 (1.09)*	
Gender is female	0.805 (0.090)*	
1. b) How often played unorganized sports in past 12 months (n=2520)		
		56.74***
Parental nurturance score	1.08 (0.016)***	
Gender is female	0.534 (0.060)***	
2. a) How often played organized sports in past 12 months (n=323)		
		3.91*
Parental nurturance score	1.06 (0.029)*	
3.a) How often played organized sports in past 12 months (n=153)		
		4.88*
Parental nurturance score	1.14 (0.066)*	
4.a) How often played unorganized sports in past 12 months (n=170)		
		10.62**
Parental nurturance score	1.15 (0.048)**	
*p<0.05, **p<0.01, ***p<0.001		

Table A.2 – Odds ratios (ordered logistic regression) of sports participation frequency by SES and related factors for (NLSCY cycle 3, ages 10 to 15)
1. **All children (n=3,522)**
2. **Children low-SES families (n=801)**
3. **Boys in low-SES families (n=375)**

	Odds Ratio (OR) (Robust std. err.)	Wald χ^2
1. a) How often played organized sports in past 12 months (n=3,522)		
		135.06***
Parental nurturance score	1.05 (0.00836)***	
Parental rejection score	1.03 (0.00906)**	
Socioeconomic status is < -0.8	0.625 (0.0589)***	
Gender is female	0.839 (0.0616)*	
Ages 12-13 (reference ages 10-11)	(ns)	
Ages 14-15 (reference ages 10-11)	0.529 (0.0509)***	
1. b) How often played unorganized sports in past 12 months (n=3,522)		
		116.81***
Parental nurturance score	1.03 (0.00764)***	
Gender is female	0.527 (0.0390)***	
Ages 12-13 (reference ages 10-11)	(ns)	
Ages 14-15 (reference ages 10-11)	0.607 (0.0600)***	
2. a) How often played unorganized sports in past 12 months (n=801)		
		27.99***
Parental nurturance score	1.05 (0.0184)**	
Gender is female	0.616 (0.0987)**	
Ages 12-13 (reference ages 10-11)	(ns)	
Ages 14-15 (reference ages 10-11)	0.548 (0.114)**	
3.a) How often played unorganized sports in past 12 months (n=375)		
		10.09**
Parental nurturance score	1.08 (0.025)**	
*p<0.05, **p<0.01, ***p<0.001		

Table A.3 – Odds of higher friends scores by organized sports participation (Cycle 1, n=2,339)		
	Odds Ratio	**Wald χ^2**
		235.97*
(Reference group: Never) Frequency played organized sports is "less that once a week"	1.39 (0.227)*	
Frequency played organized sports is "1 to 3 times a week"	1.48 (0.198)**	
Frequency played organized sports is "4 or more times a week"	2.00 (0.330)***	
Parental nurturance score	1.16 (0.0266)***	
Family score	1.27 (0.0367)***	
Gender is female	1.44 (0.166)**	
		228.08*
(Reference group: Never) Frequency played unorganized sports is "less that once a week"	(ns)	
Frequency played unorganized sports is "1 to 3 times a week"	1.62 (0.289)**	
Frequency played unorganized sports is "4 or more times a week"	1.89 (0.343)***	
Parental nurturance score	1.15 (0.0269)***	
Family score	1.27 (0.0365)***	
Gender is female	1.46 (0.169)**	
*p<0.05, **p<0.01, ***p<0.001, ns – non-significant		

Table A.4 – Odds of higher emotional disorder and anxiety scores by organized sports participation (Cycle 1, n=2,339)		
	Odds Ratio	**Wald χ^2**
		197.78*
(Reference group: Never) Frequency played organized sports is "less that once a week"	(ns)	
Frequency played organized sports is "1 to 3 times a week"	(ns)	
Frequency played organized sports is "4 or more times a week"	0.664 (0.126)*	
Parental nurturance score	0.898 (0.0225)***	
Parental rejection score	1.14 (0.0221)***	
Family score	0.785 (0.0210)***	
Gender is female	1.50 (0.172)***	
*p<0.05, **p<0.01, ***p<0.001, ns – non-significant		