Identifying patterns of delinquency and victimization and their associations with mental disorders: a population-based investigation among Ontario children

by

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Author's Declaration

This thesis consists of material all of which I authored or co-authored: see Statement of

Contributions included in the thesis. This is a true copy of the thesis, including any required final

revisions, as accepted by my examiners.

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

Statement of Contributions

Within this thesis contains three manuscripts that have been submitted to peer-reviewed journals for publication in collaboration with dissertation committee members. Exceptions to sole authorship are as follows:

Chapter 5: Luther, A.W., Leatherdale, S.T., Dubin, J.A., Ferro, M.A. (2023). Examining informant reports of youth delinquency in school and home settings using the trifactor model.

Chapter 6: Luther, A.W., Leatherdale, S. T., Dubin, J. A., & Ferro, M. A. (2023, August). Classifying Patterns of Delinquent Behaviours and Experiences of Victimization: A Latent Class Analysis Among Children. In *Child & Youth Care Forum* (pp. 1-25). New York: Springer US. https://doi.org/10.1007/s10566-023-09767-4

Chapter 7: Luther, A.W., Leatherdale, S.T., Dubin, J.A., Ferro, M.A. (2023). Associations between patterns of delinquency and victimization and mental health among children in Ontario.

As lead author of these three chapters, I was responsible for conducting background research, developing the research questions and analytic approaches, conducting the statistical analyses, interpreting the results, drafting manuscripts, and managing submission to journals. The co-authors listed provided important direction during each step of the research and valuable feedback on draft manuscripts in their role as dissertation committee members.

Abstract

Childhood and early adolescence are a critical period when individuals are at greater risk of engaging in delinquent behaviours – such as theft, vandalism, and assault – as committers, victims, or both. Current data on delinquent behaviours among children in the Canadian context are limited. However, a 2012 report found that 37% of Canadian children under 20 reported having engaged in at least one of these delinquent behaviours in their lifetime and that 40% had been victimized at least once in the past year.

Similarly, the transition between childhood and early adolescence has been shown to be when most mental health disorders develop. While the majority of children with mental disorder do not participate in delinquent behaviors, mental disorders are more prevalent among individuals accused of, or victimized by crime (39% and 37%), than in the general population (26%). Delinquency or victimization can further compound existing health and social inequities related to mental disorder, previous trauma, or low socioeconomic status that dampens health, social, and economic trajectories throughout the lifespan. Given their high prevalence, long-term effects, and associations with other poor health behaviours and outcomes, delinquency and victimization among children is of public health concern.

Typically, research has examined delinquency and victimization separately when determining their associations with health outcomes despite knowledge that delinquency and victimization often co-occur. Further, while children spend most of their time at home and school, findings from both settings are not often investigated together. There has also been limited study of delinquency, victimization, and mental health in the general population.

To address these knowledge gaps this dissertation examined differences in how parents and teachers report delinquency, what classes of delinquency and victimization are present

among children, and how these classes are associated with mental disorders. Specifically, the study objectives were to: 1) determine the prevalence of delinquency and victimization among children; 2) define the level of agreement between parent and teacher reports of child delinquency; 3) examine the effects of child and informant characteristics on level of agreement; 4) identify specific patterns of delinquency and victimization across home and school settings; 5) examine the relationships between latent class membership and child and informant characteristics; 6) delineate the associations between latent classes and mental disorders; and 7) explore the moderating effect of covariates on the associations between latent classes and mental disorders. To accomplish these objectives the analyses used data from the 2014 Ontario Child Health Study and included children aged 4-14 years.

The first manuscript developed a trifactor model to examine levels of agreement between parent and teacher reports of delinquent behaviours, and the effects child and informant characteristics had on levels of agreement. Results showed low levels of agreement between parents and teachers. Further, older child age, female reporting parents, lower income households, immigrant households, and parental depression were associated with greater agreement between parents and teachers. Lower parental education and lower teacher experience were associated with lesser agreement. These findings indicate that children exhibit delinquent behaviours differently between home and school settings.

The second manuscript used latent class analysis to identify four classes of children, indicating patterns of co-occurrence of delinquent behaviors and victimization experiences: *low victimization and low delinquency, moderate victimization and moderate school delinquency, high victimization and moderate home delinquency*, and *high victimization and high home and school delinquency*. Results revealed that child sex, household income, ethnicity, parental

education, and parental depression were associated with differences in class membership. These findings suggest that distinct subgroups of delinquent behaviours and victimization are present among children and that child and parent characteristics have an effect on the likelihood of membership.

The third manuscript conducted multinomial regression analysis to provide evidence on the associations between the determined latent classes and mental health disorders, and if child and informant characteristics moderated these associations. The results displayed that the *high victimization and moderate home delinquency* class was associated with both internalizing and externalizing disorders, while the *high victimization and high home and school delinquency* and *moderate victimization and moderate school delinquency* classes were associated with externalizing disorders. None of the covariates tested moderated these associations. These findings suggest that differential associations exist between latent classes of delinquency and victimization and mental health disorders.

This body of research fills a critical gap in terms of knowledge of how child delinquency and victimization co-occur across home and school contexts, and associations with internalizing and externalizing disorders. Taken together, these findings conclude that mental health and social behaviour interventions should account for different patterns of delinquency and victimization and adopt a trauma-informed approach. Due to the high prevalence of delinquent behaviours and experiences of victimization, universal prevention programs should be implemented to reduce frequency and worsening impact and behaviours. Future longitudinal research should investigate the temporality of delinquent behaviours, victimization, and mental health to strengthen understandings of these items and points for effective interventions.

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List of Abbreviations

DSM-IV   Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition
ICD-10   International Classification of Disease, Tenth Revision
LCA   Latent Class Analysis
MAR   Missing At Random
MINI-KID   Mini International Neuropsychiatric Interview for Children and Adolescents
OCHS   Ontario Child Health Study
OCHS-EBS   Ontario Child Health Study – Emotional Behavioural Scale
SEM   Structural Equation Modeling
SMHS   School Mental Health Survey

Chapter 1: Introduction

A Canadian report released in 2012 showed that approximately 37% of children and adolescents under 20 reported having engaged in one or more delinquent behaviours in their lifetime, which mostly consisted of acts of violence, acts against property, or those involving illicit drugs (NCPC, 2012). Similarly, 40% had been victimized at least once in the year that preceded the survey (NCPC, 2012). Another Canadian study indicated that children who perpetrated delinquent behaviours were more likely to report being victimized than non-delinquent children, and vice-versa, highlighting the reciprocal nature of these behaviours and experiences (Savoie, 2007). Striking parallels are seen in the prevalence and influence of risk and protective factors implicated in both perpetration and victimization of delinquency and crime (Hensel et al., 2020; Stewart et al., 2015; NCPC, 2012).

Similarly, most mental disorders develop during childhood and adolescence (Stewart et al., 2015; Public Safety Canada, 2017; Allen & Superle, 2016; Malla et al., 2018). Recent Canadian research reports that the prevalence of mental disorder among individuals accused of or victimized by crime (39% and 37%) is higher than that found in the general population (26%) (Hensel et al., 2020). Perpetration of, or victimization by delinquent behaviours, including various forms of vandalism, theft, bullying, and assault, has adverse effects on multiple domains of life trajectories, generates negative consequences for families, and burdens the health, education, and justice systems in Canada (Eggink et al., 2019; Farrington et al., 2017; Jolliffe et al., 2017; Assink et al., 2015; David-Ferton et al., 2015). Thus, it is imperative that a public health focus be directed to understanding the complexities of delinquency, victimization, and mental health during adolescent development (Wadman et al, 2019).

Engaging in delinquency or experiencing victimization, especially poly-victimization, may compound existing health and social inequities derived from factors such as childhood trauma and low socioeconomic status (Eggink et al., 2019; Farrington et al., 2017; Jolliffe et al., 2017; Assink et al., 2015; Finkelhor et al., 2007; Dierkhising et al. 2019). If left unaddressed, children with mental disorder may experience further reduced health and social trajectories due to their experiences with these factors.

This dissertation expounds the interrelationships of childhood delinquency, victimization, and mental health across eight chapters. Chapter 2 provides an overview and summary of relevant academic literature relating to the dissertation's topic and scope. Chapter 3 identifies the rationale of the dissertation and specifies the objectives and hypotheses for each research question to be addressed by the dissertation. Chapter 4 outlines the general methods of the dissertation. It describes the 2014 Ontario Child Health Study (OCHS), relevant measures, and the statistical analyses that were conducted. Chapters 5, 6, and 7 discuss the relevant work and answers for each research question in the form of three manuscripts. Lastly, Chapter 8 delivers an integrated discussion of the overall body of work, including overall findings, implications for policy and practice, as well as avenues for future research.

Chapter 2: Background

2.1 Prevalence of Child Delinquency and Victimization

Children are a particularly high-risk group for engagement in criminal activity, as the rate at which children ages 12 to 17 are accused of a crime is almost twice that of individuals 25 and older (Allen & Superle, 2016). In 2017, approximately 88,700 children were accused of a criminal offence, and due to the increase in violent crimes such as robbery, homicide, and sexual assault, the Youth Crime Severity Index increased by 3% for the first time since 2007 (Allen, 2018). In 2017, the most frequent criminal offences committed were: (1) theft of or under $5,000, (2) common assault (pushing, punching, etc.), (3) administration of justice violations, (4) mischief (vandalism, property damage, etc.), and (5) cannabis possession (Allen, 2018).

A 2012 report found that among Canadian children that completed the International Self-Report Delinquency Study, 37% reported participation in at least one type of delinquent behaviour and approximately one quarter reported participation in two or more types of delinquent behaviours (NCPC, 2012). Similarly, 60% of all victims of sexual assault were individuals under the age of 18 (Ogrodnik, 2010). In 2008, over 75,000 children were victims of a violent crime in Canada (Ogrodnik, 2010). The most frequent experiences of victimization were: (1) common assault, (2) sexual assault, (3) assault with a weapon, (4) receiving threats, (5) robbery, and (6) sexual harassment (Ogrodnik, 2010).

Different types of these behaviours and experiences often co-occur or cluster (CIHI, 2008; Cyr et al., 2013; Bettencourt & Farrell, 2013; Davis et al., 2020). Police-reported data in Canada highlight that two-thirds of children who do commit crimes have committed more than one type of offence (CIHI, 2008). Also, a survey of Quebec children reported that almost a quarter have been poly-victimized at some point

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throughout their life, while 8% reported poly-victimization in the past year (Cyr et al., 2013). It is important to note as well that it is estimated that less than a third of criminal activities are reported to authorities, and that the prevalence of both childhood delinquency and childhood victimization are vastly under-reported (Perrault, 2015; NCPC, 2012; Savoie, 2007). Approximately 60% of the victims of childhood delinquent behaviours are children themselves, with peer victimization being a noted concern in the development of negative outcomes (NCPC, 2012; Llewellyn & Rudolph, 2014). Delinquent children are more likely to report being victimized (56%) than children who do not participate in delinquent behaviours (36%) (Savoie, 2007), highlighting how statuses of perpetrator and victim often coincide. Studies have also shown that children who have been victimized begin to engage in aggressive and delinquent behaviour at higher rates (Baglivio et al., 2014; Ogrodnik, 2010; Health Canada, 2004). Many children seemingly occupy the status of both perpetrator and victim, and this intersection is quite prevalent in the period of childhood and adolescence when transitions in many other health-related domains occur as well.

2.2 Prevalence Among Individuals with Mental Health Disorders

Although most children with mental disorder do not participate in delinquent behaviours, a high prevalence of children involved with the criminal justice system do report previous and current mental disorders (Stewart et al, 2015). Canadian research has also found that individuals with a mental disorder are more likely to be a victim of a crime than those without a mental disorder (Hensel et al., 2020; Public Safety Canada, 2017; Boyce et al., 2012). Canadian data have indicated that poor mental health is a significant risk factor for violent victimization especially, as children with poor or fair mental health are up to four times more likely to be violently victimized than those with excellent or very good mental health (Perreault, 2015). Studies have reported that 40 to

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70% of children that encounter the criminal justice system as perpetrators or victims have diagnosed or undiagnosed mental disorder (Stewart et al., 2015). Of note is that victimization among those with mental disorder is estimated to be notably higher than delinquency among those with mental disorder (Hart et al., 2012). A bidirectional relationship between victimization and delinquent behaviours can exist among those with mental disorders, where these experiences or behaviours exacerbate the disorder and result in a cycle of depleting mental health (Public Safety Canada 2017; Khalifeh et al., 2015; Choe et al., 2008).

2.3 Impacts of Child Delinquency and Victimization

The significant physiological, cognitive, and social change that occurs during childhood, suggests the salience of studying delinquency and victimization during this period of life (Davis et al., 2018; Troop-Gordon, 2017). Participating in delinquent behaviours in childhood has been associated greater risk of engaging in poor health behaviours such as smoking, binge drinking, misuse of other substances, and unsafe sex practices as they age (Joliffe et al., 2017; Assink et al., 2015). Children who are victimized, and in particular violently victimized, are at much greater risk to suffer post-traumatic stress disorder, depression, anxiety, sleeping problems, and suicidal ideation (Hensel et al., 2020; Perreault, 2015; Troop-Gordon, 2017). Peer victimization is consistently associated with health risk behaviours such as disordered eating and substance misuse (Sutin et al., 2020; Troop-Gordon, 2017), while household victimization is associated with homelessness and transience, exacerbating risk for further experiences of victimization (Bender et al., 2014). A Canadian study found that, as they transition into adulthood, children who participate in delinquent behaviours are more likely to have lower educational and occupational attainment (Tanner et al., 1999).

Similar consequences on work and school performances are seen in children who have been victimized (Smithyman et al., 2014).

Childhood delinquency and victimization have significant impacts on the health and well-being of families and communities as well. Families with children who participate in delinquent behaviours or who have been victimized may have increased conflict, greater stress, reduced mental health outcomes, and greater financial burdens (Loeber & Farrington, 2000), thereby contributing to the cycle of delinquency and victimization. For communities with prevalent child delinquency or victimization, known consequences included reduced social cohesion and trust, less socialization, greater child welfare agency involvement, and greater strain on criminal justice, healthcare, and education systems (Loeber & Farrington, 2000).

2.4 Factors in Child Delinquency and Victimization

Similar upstream risk and protective factors have been identified in the development of delinquent behaviours and experiences of victimization (Boyce et al., 2015; Eggink et al., 2019; Ford et al., 2010; Shevlin et al., 2015; Arbeit et al., 2014; Cauffman et al., 2007; Mallet et al., 2009; Sitnick et al., 2019; Kowalski, 2018; Dierkhising et al., 2013). Studies show that individual, familial, neighbourhood, and broader social factors influence likelihood of delinquency and victimization, with each domain offering opportunities to reduce the prevalence and associated impacts (Logan-Greene et al., 2018; Joliffe et al., 2017; Farrington et al., 2016; Assink et al., 2015; Corrado & Leschied, 2011). It is important to understand how biological, psychosocial, and environmental risk factors interact across different contexts to facilitate behaviours and outcomes related to delinquency and victimization (Liu, 2011). Identifying and

recognizing the impact of risk factors from these domains is critical for risk assessment, prevention efforts, and the implementation of targeted interventions.

At the individual level, factors related to childhood trauma, self-esteem, quality of friendships, recreational activities, chronic health conditions, and school performance are known to affect the probability of delinquency or victimization (Craig et al., 2017; Braga et al., 2017; Jolliffe et al., 2017; Corrado & Lescheid, 2011). At the household level, factors related to family interactions, conflict levels, family resources, and behaviour role modelling have been proven to influence delinquency and victimization among children (CIHI, 2008; Jolliffe et al., 2017; Sitnick et al., 2019; Scott & Brown, 2018). At the community level, factors related to community resources and investment, availability of health and social services, marginalization, and neighbour relations can impact the likelihood of childhood delinquency and victimization (Jolliffe et al., 2017; Markowtiz, 2011; CIHI, 2008; Davis et al., 2020; Savignac, 2009). At the school level, factors related to student and staff engagement and relationships, safety, rule enforcement, and availability of numerous programs and supports are known to influence childhood delinquency and victimization (Fitzgerald, 2009; David-Ferton et al., 2015; Doucette & Hoffman, 2016; Cornell & Luang, 2016; Loeber et al., 2003).

2.5 Reporting of Child Delinquency and Victimization

It is common for multiple informants, such as parents and teachers, to provide reports to assess children's mental health and behaviours (Qadeer & Ferro, 2018; Kraemer et al., 2003; Bauer et al., 2013; Salbach-Andrea et al., 2009). However, different informants can produce different reports for the same child, known as informant discrepancies (Kaurin et al., 2016; De Los Reyes et al., 2015). Informant discrepancies may not reflect inaccuracies in the reporting of an objective truth, but instead represent subjectively meaningful differences for clinical and research purposes

that should be further investigated (Tompke & Ferro, 2019; De Los Reyes et al., 2015; Kaurin et al., 2016). Informant discrepancies have also been shown to predict clinically relevant outcomes (De Los Reyes & Epkins, 2023). Reports from different informants (e.g., teachers, parents, coaches) can reflect the actual characteristics of the child, the context in which they are being observed, or informant characteristics and informant-child relationship (De Los Reyes et al., 2015; Kaurin et al., 2016; Hartley et al., 2015). Informant characteristics that can potentially influence reports of children's well-being or behaviours include sex, age, ethnicity, socioeconomic factors, and mental health of both the individual being observed and the informant (Oltean & Ferro, 2019; Qadeer & Ferro, 2018; Muller et al., 2011; Kraemer et al., 2003).

Informant discrepancies can reduce the ability for clinicians to accurately assess youth behaviours, implement appropriate interventions, and measure adherence or outcomes (Fitzpatrick et al., 2023). While not delinquent behaviours specifically, previous work on assessments of multi-informant reports of disruptive or antisocial child behaviours have indicated low to moderate agreement (Roest et al., 2023; Castagna & Waschbusch, 2023). This may compound issues for children with problematic or disruptive behaviours as they may already be inclined to worse treatment responses and approaches to improve behaviours rely on informants observing children in separate contexts (home versus school) (Roest et al., 2023; Fitzpatrick et al., 2023; Castagna & Waschbusch, 2023).

2.6 Conclusions

This chapter summarized relevant research and outlined the importance of addressing delinquency and victimization among children. Delinquent behaviours and experiences of victimization are common among children in Ontario and Canada, with approximately a quarter of youth report past year participation in more than one

instance of delinquent behaviours and/or poly-victimization (NCPC, 2012; Cyr et al., 2013). Mental health disorders, as both a risk factor and outcome associated with delinquency and victimization, are of considerable significance when investigating delinquency and victimization because individuals with mental health disorders are more likely to exhibit these behaviours and be victimized by them (Stewart et al., 2015; Khalifeh et al., 2015; Choe et al., 2008). As shown, biological, psychosocial, and environmental domains contain other relevant items that can be conceptualized as risk factors and outcomes that pertinent to studies of delinquency and victimization as well (Joliffe et al., 2017; Farrington et al., 2016; Assink et al., 2015). Given that youth behaviours and experiences occur across multiple contexts and environments, understandings of the role or value that informant discrepancies and levels of agreement have are imperative to adequately preventing these behaviours, experiences, and their associated consequences. Understanding how constellations of these factors contribute to delinquency and victimization, and how they are reported, is crucial to risk assessment, designing targeted interventions, and program or policy evaluation.

Chapter 3: Rationale, Objectives, and Hypotheses

Childhood and adolescence are a critical period of physical, mental, and emotional development that can influence behaviours and alter trajectories into adulthood (Troop-Gordon, 2017; Stewart et al., 2015). The many health inequity issues related to childhood delinquency and victimization, including prior trauma, household conflict, and socioeconomic disadvantage, highlight the need to reduce participation in and victimization by these behaviours before they exacerbate health and social deficits across the lifespan (Eggink et al., 2019; Farrington et al., 2017; Jolliffe et al., 2017; Assink et al., 2015; Arbeit et al, 2014). Although progress has been made at the nexus of these items, further research into the nuances of associations between delinquency, victimization, and mental disorders among children is necessary because critical knowledge gaps remain (Stewart et al., 2015).

3.1 Study 1

Canadian evidence shows that up to 37% of children participate in at least one type of delinquent behaviour, and approximately 25% participate in two or more types of delinquent behaviours (NCPC, 2012). Delinquent behaviours can be influenced by social and contextual factors (De Los Reyes et al., 2021; Bauer et al., 2013; Salbach-Andrea et al., 2009), which differ across the home and school settings that children spend most of their time. Indeed, it is standard practice in many clinical contexts to obtain reports from multiple informants such as parents and teachers (Castagna & Waschbusch, 2023). However, this may lead to informant discrepancies that can impact assessment and decision-making related to child delinquency.

Further, numerous characteristics can influence discrepancies found in multi-informant assessments. For example, the relationship between child and informant (e.g., parent-child, teacher-student) has been established as a significant factor in the

reporting of many child behaviours (De Los Reyes et al., 2015; Van de Ende et al., 2012; Müller et al., 2011). Child and informant characteristics such as sex, age, ethnicity, and other sociodemographic characteristics are known to influence reports (van der Ende et al., 2012; Egli et al., 2010; Kraemer et al., 2003). Also, previous research has regularly concluded that cognitive or perceptual distortions associated with mental disorders (e.g., depression distortion) can lead to individuals perceiving behaviours more negatively (Oltean & Ferro, 2019; van der Ende et al., 2012; De Los Reyes et al., 2011; Salbach-Andrae et al., 2009; Truetler & Epkins, 2003; Richters, 1992).

However, while informant discrepancies and the influence of child and informant characteristics on reporting of delinquency by children and their parents has been established (De Los Reyes et al., 2015; Van de Ende et al., 2012; De Los Reyes et al., 2011; Egli et al., 2010), less is known about how these issues present in parent and teacher reports and effect their level of agreement. Understanding how parent and teachers reports of home and school behaviours differ and how child, parent, and teacher characteristics influence multi-informant reports is important for accurate assessments and decision making related to childhood delinquency.

3.1.1 Objectives and Hypotheses

The first objective of Study 1 was to define the level of agreement between parent and teacher reports of child delinquency among children aged 4-14 years in the 2014 OCHS. I hypothesized that agreement would be low or moderate between parent and teacher reports. The second objective of Study 1 was to investigate the effects of child and informant characteristics on agreement between parent and teacher reports. I hypothesized that older child age and male sex would be associated with higher levels

of agreement, while lower parental education, and parental depression would have a negative effect on levels of agreement.

3.2 Study 2

Canadian data has shown that almost a quarter of children are poly-victimized at some point throughout their lives, while 8% report poly-victimization in the past year (Cyr et al., 2013). While research has reported that delinquent behaviours and victimization co-occur, particularly in showing that children who have been victimized begin to engage in delinquent behaviour more frequently, clusters of these items are typically studied independently (Eggink et al., 2019; Farrington et al., 2017; Jolliffe et al., 2017; Assink et al., 2015; Hasking et al., 2011). Because these behaviours and experiences do not occur in isolation oversimplified analyses of individual items has been a noted concern in the field (Davis et al., 2020; Turner et al., 2016; Bettencourt & Farrell, 2013; CIHI, 2008). While some previous research has examined the clustering of delinquent behaviours and victimization experiences, these studies often use highly selected samples of incarcerated or institutionalized children (Hensel et al., 2020; Eggink et al., 2019; Hasking et al., 2011; Schwartz, 2000). It is necessary to have a better understanding of the relationships between a large set of behaviours and experiences in a population sample to inform interventions that reduce the prevalence and impact of childhood delinquency and victimization.

Among studies that have conducted examined the co-occurrence of child delinquency and victimization items within the general population, limited sets of predictors have been measured and the samples were restricted to older children (teenagers) (Bettencourt & Farrell, 2013; Davis et al., 2020). There is limited knowledge regarding patterns of delinquency and victimization for children aged 4-14 years. Similarly, if there is a lack of understanding on how delinquent behaviours and

victimization experiences cluster among this age group then the degree to which sociodemographic and informant factors are associated with such clusters is less understood as well. It is necessary to have a deeper understanding of the co-occurrence of delinquency and victimization across home and school settings to inform both universal and tailored prevention programs to limit the long-term impacts of these items.

3.2.1 Objectives and Hypotheses

The primary objective of Study 2 was to identify latent classes of delinquency and victimization among children aged 4-14 years in the 2014 OCHS. I hypothesized that classes would differ in severity and combination of items, such as: high victimization and low delinquency, high delinquency and low victimization, and no delinquency or victimization. The secondary objective of Study 2 was to examine associations of child, parent, and teacher covariates on delinquency and victimization class membership. I hypothesized that older child age and male sex, lower household income, and parental psychopathy would be associated with class membership.

3.3 Study 3

Children are a particularly high-risk group for engagement in delinquent behaviours, as perpetrators and/or victims. Similarly, early adolescence is a high-risk period for development of mental health disorders (Kessler et al., 2007; Malla et al., 2018). The prevalence of mental disorder among individuals accused of, or victimized by crime (39% and 37%), is higher than in the general population (26%), though most children with mental disorder do not participate in delinquent behaviours (Hensel et al., 2020). Canadian data have indicated that poor mental health is associated with violent victimization especially, as children with poor or fair mental health are up to four times

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more likely to be violently victimized than those with excellent or very good mental health (Perreault, 2015). The bidirectional relationship between victimization and delinquent behaviours can be especially damaging among those with mental disorders, where these experiences or behaviours exacerbate the disorder and result in a cycle of depleting mental health (Khalifeh et al., 2015; Choe et al., 2008).

Limited research has examined the relationships between patterns of childhood delinquency *and* victimization and mental disorders among the general population (Haney-Caron et al., 2019). While most studies have examined associations between delinquency *or* victimization and psychosocial outcomes, those that have evaluated their co-occurrence often utilize samples of incarcerated or in-patient children (Hensel et al., 2020; Pane-Seifert et al., 2022; Haney-Caron et al., 2019; Khalifeh et al., 2015). This limits generalizability as children who are in treatment or who are incarcerated are more like to have poor mental health, previous trauma, and disruptive behaviours than the general population (Markowtiz, 2011). It is important to understand how different clusters of delinquency and victimization are associated with mental health in the general population to inform tailored interventions that consider the differential effects of behaviours and experiences on mental health outcomes.

3.3.1 Objectives and Hypotheses

The primary objective of Study 3 was to delineate associations between latent classes of delinquency and victimization and internalizing or externalizing mental disorders among children aged 4-14 years in the 2014 OCHS. I hypothesized that latent classes of more severe delinquency and victimization would be more strongly associated with internalizing and externalizing disorders. The secondary objective of Study 3 was to explore the potential moderating effects of social relationships, mental health services, and demographic variables on associations between latent classes and

mental disorders. I hypothesized that that healthier social relationships and use of

mental health services would be a protective factor in these associations.

Chapter 4: Methodologies and Analytic Approaches

4.1 The 2014 Ontario Child Health Study

Data come from the 2014 OCHS, a population survey of 10,530 children and youth aged 4 to 17 years and their families from 240 neighbourhoods across Ontario, conducted by Statistics Canada (Boyle et al., 2019a). The sampling units were households occupied by families with age-eligible children. Sample selection was conducted through stratified, clustered, and random sampling. Participants were recruited through a three-stage clustered approach of areas and households that identified population sampling units, stratified by income, and allocated households for selection (Boyle et al., 2019a). Due to these design features bootstrap weights and sampling weights to generate proper variance estimates (Boyle et al., 2019a). In households with two or more eligible children, one was randomly selected to serve as the selected child (n=6,537) for all assessments while up to three more children were included in a subset of assessments (Georgiades et al., 2019). The reporting parent was the parent deemed to be most knowledgeable about the child, while the reporting teacher was designated as the most knowledgeable about the child by the reporting parent.

Data collection occurred through telephone interviews and household interview visits (both computer-assisted and paper-pencil). Data were collected in homes and over the telephone by Statistics Canada interviewers between October 2014 and October 2015 (Georgiades et al., 2019). The surveys contain measures about individuals, families, neighbourhoods, and schools, and include information from the Ministries of Education, Children and Youth Services, and Health and Long-Term Care (Boyle et al., 2019a). Information related to some neighbourhood variables, socioeconomic factors, and familial demographics were obtained from the 2011 Canadian Census (Boyle et al.,

2019a). Where possible, participant data were linked to the School Mental Health

Survey (SMHS), an affiliated study of school socioeconomic, demographic, and

resource factors (Boyle et al., 2019a). Further description of the 2014 OCHS

methodology has been described previously (Boyle et al., 2019; Georgiades et al.,

2019), and can be found online (https://ontariochildhealthstudy.ca/ochs/).

4.1.1 Study Samples

While full detail of the samples used analyses in this dissertation can be found

the manuscript chapters (Chapters 5-7), a brief overview follows.

For the purposes of the analyses conducted for Study 1 only children with parent

and teacher reports of delinquency were included in the analysis. By design, only the

children aged 4 to 14 years in the OCHS that were designated as the selected child had

their teachers provide assessments. A total of 3,072 children had teachers who

participated and were therefore eligible for the study. Of eligible children, 2,376

(77.3%) had complete parent and teacher reports on delinquency and were used as the

sample for Study 1. Having missing data for delinquency items was associated with

male child sex (OR=1.64; 95% CI: 1.27-2.01) and household income being below the

low-income measure (OR=0.59; 95% CI: 0.51-0.68). A second set of analyses was done

using imputed data (further described in Section 4.3.4). Although the estimates were

slightly different between the two datasets, the overall inferences and conclusions

remained the same.

For Study 2 only children with parent and teacher reports of delinquency and

victimization were included in the analysis. Similar to the Study 1 sample, 2,376

children had complete parent and teacher reports on delinquency items available and

were eligible for Study 2. Of eligible children, 1,948 (82.0%) individuals had

victimization data available for analysis as well. Again, having missing data was

associated with male child sex (OR=1.77; 95% CI: 1.54-2.01) and household income being below the low-income measure (OR=0.71; 95% CI: 0.60-0.82). A second set of analyses was done using imputed data (further described in Section 4.3.4), and these results are included in Appendix A (Supplemental Tables 4 and 5).

For the analysis conducted in Study 3 the sample from Study 2, who had been assigned latent class membership, was used. Of these 1,948 individuals, 40.6% (n=792) had incomplete data on mental disorders. Missing data was associated with child age (OR=0.89; 95% CI: 0.86-0.93). Multiple imputation was conducted to complete the analysis for the models in Study 3 (further described in Section 4.3.4).

4.2 Study Measures

4.2.1 Delinquency Measures

Parents and teachers reported delinquent behaviours over the past six months as part of the validated OCHS Emotional Behavioural Scales (OCHS-EBS) (Boyle et al., 2019b, Duncan et al., 2019). For all questions, the response options were on a three-point ordinal scale that ranged from 'never' (1), 'sometimes' (2), and 'often' (3). Parents responded to four questions on cruelty-related behaviours (i.e., "Cruelty, bullying, meanness to others," "Cruelty to animals"), four on vandalism-related behaviours (i.e., "Destroys things belonging to his/her family or other children," "Sets fires"), four on theft-related behaviours (i.e., "Has mugged people," "Steals outside the home"), three on violence-related behaviours (i.e., "Gets in many fights," "Physically attacks people"), and one on truancy-related behaviours (i.e., "Truan3,072cy, skips school"). Teachers responded to four questions on cruelty-related behaviours, four on vandalism-related behaviours, one on theft-related behaviours, three on violence-related behaviours, and one on truancy-related behaviours. Previous studies of delinquent behaviours and victimization have used similar questions as measures (Davis et al.,

2020; Bettencourt & Farrell., 2013) that have been previously shown as reliable (Farrell et al., 2000; Schwartz, 2000). The internal consistency reliabilities of summed scores for each behaviour type ranged from α=0.66–0.74. Full description and examples of indicator questions and the internal consistency reliabilities for each behaviour item are included in the Appendix A.

For Study 1 parent and teacher responses were converted to a binary variable, where responses of 'sometimes' and 'often' for each behaviour were coded as 'present' (1), while responses of 'never' for each behaviour were coded as 'not present' (0). Converting these responses to dichotomous variables allows a clearer description of the frequency of these items rather than the degree to which they are experienced (Haegele et al., 2020).

For Study 2 parent and teacher responses for all questions were maintained as 'never' (1), 'sometimes' (2), and 'often' (3). Parent and teacher responses were then summed separately for each type of behaviour, with higher scores indicating more frequent instances of the behaviour, which is consistent with previous work that aimed to investigate severity (Davis et al., 2020).

4.2.2 Victimization Measures

Parents reported victimization over the past six months through responses to four on experiences of their child being bullied (i.e., "Is picked on by other children," "Called names by peers"), and one on experiences of being assaulted (i.e., "Is hit or kicked by other children")." For these questions, the response options were on a three-point ordinal scale that ranged from 'never' (1), 'sometimes' (2), and 'often' (3). Similar to the delinquency measures for Study 2, parent and teacher responses were then summed separately for each with higher scores indicating more frequent

experiences. The internal consistency reliability of the bullied summed score was
α=0.88.

4.2.3 Mental Health Disorder Status

Mental disorder in the 2014 OCHS was measured using a modified version of
the Mini International Neuropsychiatric Interview for Children and Adolescents (MINI-
KID) (Boyle et al., 2019a). The MINI-KID assesses DSM-IV and ICD-10 psychiatric
disorders among children and can be administered to children and parents (Sheehan et
al., 1998, Sheehan et al., 2010). Research has confirmed the MINI-KID provides valid
and reliable psychiatric diagnoses and is often used in clinical and research work
(Sheehan et al., 1998; Ferro et al., 2019; Duncan et al., 2018). Mental disorders of
interest for this study included conduct disorder, opposition defiant disorder, attention
deficit hyperactivity disorder, major depressive disorder, generalized anxiety disorder,
separation anxiety disorder, and social phobia/social anxiety disorder. Parent modified
MINI-KID responses were used for the analyses. A composite variable developed by
the OCHS team was used for this dissertation, which categorizes mental disorders as
either internalizing disorders (major depressive disorder, generalized anxiety disorder,
separation anxiety disorder, and social phobia) or externalizing disorders (conduct
disorder, opposition defiant disorder, attention-deficit hyperactivity disorder).

4.2.4 Child Measures

Parents reported child age and sex. Parents reported peer relationships by
responding to the question '*During the past 6 months, how well has your child gotten
along with other kids such as friends or classmates?'*, with responses 'no problems' (1),
'hardly any problems' (2), and 'occasional problems' or 'frequent problems' (3).
Parents reported family relationships by responding to the question '*During the past 6*

months, how well has your child gotten along with family?' with the same response options. School mental health services was measured by asking parents '*Since the beginning of the school year, did this child receive any individual or group counselling, or any other help at school for these concerns?*'"

4.2.5 Parent and Household Measures

Parents reported their sex, ethnicity, education level, urbanicity, family immigrant status (one or both parents born outside Canada), and parental depression. Previously diagnosed parental depression was measured by asking caregivers if a doctor had ever diagnosed them with depression. Questions from the 2011 Canadian Census were used to assess household income, with parents reporting household income in $10,000 intervals. The Statistics Canada low-income measure refers to a fixed percentage (50%) of median adjusted after tax income for households (Statistics Canada, 2023). Ethnicity (white or non-white), parent education level (post-secondary or no post-secondary), urbanicity (urban or rural), and household income (above or below the low-income measure) were dichotomized.

4.2.6 Teacher Measures

Teachers reported their sex, class size, and years of experience teaching. Class size (<24 or ≥24 students), and teachers experience (<10 or $10\geq$ years of teaching) were dichotomized.

4.3 Statistical Analyses

This dissertation conducted multiple statistical methods to achieve each objective. While a comprehensive explanation of the analyses completed for each manuscript can be found within their respective chapters (Chapters 5-7), a brief overview of the methods used follow.

4.3.1 The Trifactor Model

The trifactor model was used to model parent and teacher reports of children's delinquent behaviours and examine levels of agreement, as well as factors that influenced agreement. The trifactor model can be applied to provide insights on how to interpret multi-informant assessments (Bauer et al., 2013). Modelling began with loading parent and teacher assessments for all 10 items onto the common factor, which represented the consensus view or agreement on child delinquency items. Next, five parent and five teacher reports for items were loaded onto their respective perspective-specific factor, which represented their individual view and variability on delinquency items. Parent and teacher reports for children's delinquency items were then loaded onto an item-specific factor, representing shared views and variability attributed to each specific delinquency item. Through this approach, the trifactor model identified target, informant, and item-specific biases to illustrate the common and unique perspectives of informants and aid report interpretation (Bauer et al., 2013). After the trifactor model was developed, regression analyses were conducted to examine whether covariates were associated with the common factor and parent- and teacher-perspective factors using the R3STEP method (Muthén & Muthén, 2017). When perspective factors are regressed onto covariates the results indicate the extent to which covariates are associated with informant-specific reports, and when the common factor is regressed onto covariates the results indicate the extent to which covariates are associated with agreement between informants. These analyses were conducted using MPlus v8.5 (Muthén & Muthén, 2017).

4.3.2 Latent Class Analysis

Latent class analysis (LCA) was used to identify classes of delinquency and victimization among children. Conducting LCA organizes and classifies individuals into mutually exclusive groups (i.e., latent classes) from a heterogeneous sample based on their underlying response patterns (Weller et al., 2020; Sullivan, 2008; Muthén & Muthén, 2000). Associations between factors and determined classes can then be examined to understand their associations with class membership. The LCA was conducted using 10 delinquent behaviour indicators and two victimization experiences indicators from reports provided by parents and teachers. Modelling began with a two-class model that added further classes while comparing model fit indices to determine the best model. Model building was concluded when model fit did not improve significantly compared to the previous model. Once the final model was selected, multinomial regression was conducted to examine how covariates were associated with likelihood of class membership. These analyses were conducted using MPlus v8.5 (Muthén & Muthén, 2017).

4.3.3 Multinomial Regression Analysis

Multinomial regression analysis was conducted to examine the relationship between the latent classes determined through LCA and internalizing and externalizing mental disorders. The analysis began by first investigating the differences in mental disorder status by latent class membership using logistic regression analyses, followed by similar investigations for sociodemographic, social relationship, and health service use variables. Factors that demonstrated a significant association from the initial analyses were then included in a multinomial regression model to predict mental health status by latent class membership and investigate the moderating effect of covariates. Moderators of the association between latent class membership and mental health status

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were tested by including a product-term interaction with latent classes in the model. These analyses were conducted using SAS v9.4 (SAS Institute, 2013).

4.3.4 Missing Data

Missing data were imputed while the assumption of missing at random (MAR). This assumption was made because while missingness was related to child sex and household income, these were not cause of missingness.

Regarding missing data, Study 1 conducted two analyses: one complete case analysis and one using the multiple imputation procedures available in MPlus v8.5 and the listwise command (using the LISTWISE function) (Bowen, 2015; Asparouhov & Muthén, 2010a; Asparouhov & Muthén, 2010b). In MPlus multiple imputation of missing data is generated through the Markov Chain Monte Carlo (MCMC) method. This method uses all available data to estimate the model and adjust standard errors (Muthén & Muthén, 2017). MPlus was instructed to run 20 iterations and once converged, store the missing data values until the determined number of imputations was complete. The imputed data sets were then analyzed using the weighted least squares method (using the estimator function) (Asparouhov & Muthén, 2010a; Asparouhov & Muthén, 2010b). This approach has been confirmed to provide consistent and reliable estimates when dealing with missing data for MPlus procedures (Asparouhov & Muthén, 2010a; Asparouhov & Muthén, 2010b). Similarly, Study 2 utilized the same approach and conducted a complete case analysis and one using the multiple imputation procedures available in MPlus v8.5.

For the Study 3 sample a three-step approach was conducted using SAS v9.4 to impute 25 datasets used for further analysis (SAS Institute, 2013). The three-step approach first uses the PROC MI command to impute the missing data, followed by

analysis of the imputed datasets using various PROC SURVEY procedures, and then

using PROC MIANALYZE command to conduct the final analysis of imputed datasets

and output of general analytic procedures (Berglund, 2010). Conducting these

procedures for multiple imputation for MAR missing data situations has been reported

to improve precision in estimates (Hughes et al., 2019). In imputing the missing data for

the internalizing and externalizing variables we included the other variables from the

main analysis and standard sociodemographic items (child sex, child age, family

relationships, peer relationships, latent class, parent sex, parent education, ethnicity,

urbanity, household income, recent immigrant, parental depression, and internalizing or

externalizing disorder variables). Missing data pattern shown in Appendix A (Table 7).

Chapter 5: Manuscript 1

Examining informant reports of youth delinquency in school and home settings using the trifactor model.

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Abstract

It is standard practice that multiple informants provide assessments of youth delinquent behaviours, though this may lead to informant discrepancies. Informant discrepancies can impact assessment and decision-making to reduce youth delinquency and its sequelae. This study aimed to develop a trifactor model to investigate how youth and informant (parent and teacher) characteristics influence levels of agreement and reports of youth delinquency. Five delinquency items reported by parents and teachers were used as latent variable indicators. The sample consisted of 2,376 youth aged 4-14 years (51% male, 71.6% White) from the 2014 Ontario Child Health Study. Informant agreement was low or failed to exceed the threshold of agreement ($\kappa = 0.15$-0.26). Older youth age, female reporting parents, lower household income, immigrant status, and parental depression, were associated with greater agreement between parents and teachers while lower parental education and greater teacher experience were associated with lower agreement. Younger youth age, male sex (both parent and youth) and parental depression were associated with higher frequency of delinquency reported by parents. Younger youth age and male teachers were associated with higher teacher-reported frequency. Parent and teacher reports each contribute unique information to assessing delinquent behaviours and should be maintained for comprehensive assessments that determine appropriate strategies for reduction among youth.

Keywords: Multi-informant, Delinquency, Reporting, Youth, Trifactor Model

Public Significance Statement

This study suggests that it is important for researchers and practitioners that assess children's behaviours to recognize that informant discrepancies are affected by various factors, which can impact decision-making. These findings emphasize the need for a comprehensive approach that obtains reports from multiple sources, such as parents and teachers, to appropriately assess and intervene in delinquent behaviors among youth.

Introduction

Youth are a high-risk group for participating in delinquent behaviours – such as cruelty, theft, truancy, vandalism, and violence. Canadian surveys indicate that up to 37% of youth report participation in at least one type of delinquent behaviour, and approximately 25% reported participation in two or more types of such behaviours (NCPC, 2012). Youth aged 12 to 17 years are twice as likely to be accused of a crime as individuals 25 and older (Allen & Superle, 2016). In 2017, approximately 88,700 Canadian youth were formally accused of a criminal offence, with the Youth Crime Severity Index increasing for the first time since 2007 (Allen, 2018). Due to the consequences of delinquent behaviours on youth health, social, and economic trajectories (Assink et al., 2015; Eggink et al., 2019; Joliffe et al., 2017), understanding and addressing youth delinquency is a critical public health issue.

Adolescence represents a confluence of physical, mental, and emotional development that impacts youth behaviours, and life trajectories into adulthood (Troop-Gordon, 2017; Stewart et al., 2015; Assink et al., 2015; Eggink et al., 2019; Joliffe et al., 2017). Notably, youth delinquency is the strongest predictor of adult criminality (NCPC, 2012; Tanner et al., 1999). Delinquent youth are more likely to report being victimized (56%) compared to youth who do not participate in delinquent behaviours (36%) (Savoie, 2007). Participating in delinquent behaviours has also been associated greater risk of engaging in poor health behaviours such as smoking, binge drinking, misuse of other substances, and unsafe sex practices throughout life (Joliffe et al., 2017; Assink et al., 2015). As they transition into adulthood, youth who participate in delinquent behaviours are more likely to have lower educational and occupational attainment (Tanner et al., 1999). Further, delinquent behaviours place significant

burdens on families, schools, and communities (Eggink et al., 2019; Joliffe et al., 2017; Tanner et al., 1999).

Behaviours such as delinquent behaviours result from a complex interplay of individual and contextual psychological, social, and cultural factors. As such, not all contexts will elicit the same actions and individuals may display behaviours in some settings to a greater degree than others (De Los Reyes & Makol, 2021). While ensuring accuracy and considering reasonable feasibility, in many clinical contexts evaluators ask multiple informants to provide assessments for items such as delinquent behaviours among youth to deliver information from different contexts (De Los Reyes et al., 2021; Bauer et al., 2013; Salbach-Andrea et al., 2009). Depending on the contexts in which informants provide their perspectives, multiple informant reports can provide incrementally valuable information and more a comprehensive assessment that can aid in decision making. However, there is a lack of clear guidelines on how to interpret multi-informant reports (De Los Reyes & Makol, 2021). One common concern is how to approach informant discrepancies. In their seminal study Achenbach and colleagues conducted a meta-analysis of 119 studies of multi-informant reports of youth behaviours and reported an overall low level of agreement (r = .28) (Achenbach et al., 1987). Further they concluded that different informant pairs had differing levels of agreement (r = .60 between parent pairs, r = .27 between parent and teacher pairs, and r = .24 between parents and mental health professional pairs) (Achenbach et al., 1987). Many other studies have consistently validated their findings on levels of agreement for multi-informant reports of youth health and behaviours (Ferro et al., 2022; Qadeer & Ferro, 2018; Van der Ende et al., 2012; Müller et al., 2011; Salbach-Andrea et al., 2009; Kim & von der Embse, 2021).

Various characteristics can influence informant discrepancies in multi-informant assessments. The relationship between youth and informant (e.g., parent-child, teacher-student), and characteristics of youth and informants are known to influence reporting of many youth behaviours (De Los Reyes et al., 2015; Van de Ende et al., 2012; Müller et al., 2011). Youth and informant characteristics are also known to influence reports including sex, age, ethnicity, and other sociodemographic characteristics (van der Ende et al., 2012; Egli et al., 2010; Kraemer et al., 2003). Studies have continually shown that cognitive or perceptual distortions associated with mental disorders (e.g., depression distortion) can lead individuals to view behaviours of others more negatively, as well (Oltean & Ferro, 2019; van der Ende et al., 2012; De Los Reyes et al., 2011; Salbach-Andrae et al., 2009; Truetler & Epkins, 2003; Richters, 1992). Understanding how different settings and informant types interact with informant and youth characteristics to influence multi-informant reports is important for accurate assessments and decision making related to youth delinquency.

The trifactor model can be applied to provide insights on how to interpret multi-informant assessments (Bauer et al., 2013). The model assumes there are three types of latent factors in multi-informant reporting. The common factor represents the overlap and consensus views without informant- and item-specific bias and is considered more reliable than simple averaging reports (van Dulman & Egeland, 2011). The unique perspective factors of informants represent differences in context, perspective, and other informant characteristics specific to each informant type. The item-specific factors capture the covariance shared across informants and is specific to each indicator item. Developing a trifactor model can identify target, informant, and item specific biases to investigate the common and unique perspectives of informants and aid report interpretation (Bauer et al., 2013). Further, the trifactor model allows exploration of

youth, informant, and contextual characteristic effects on reports and levels of agreement (Soland & Kuhfield, 2022; van Woerden et al., 2022; Clark et al., 2017). When perspective factors are regressed onto covariates the results show the extent to which covariates are associated with informant-specific reports, and when the common factor is regressed onto covariates the results show the extent to which covariates are associated with agreement among informants. The comparison of these values, which will communicate whether covariates exert greater influence on idiosyncratic reports or consensus reports, will improve interpretation of multi-informant reports. More meaningful interpretation of multi-informant reports can improve decision making regarding diagnoses, treatment plans, and implementation of interventions.

The Current Study

While the influence of youth and informant characteristics on reporting of delinquency by youth and their parents has been established (De Los Reyes et al., 2015; Van de Ende et al., 2012; De Los Reyes et al., 2011; Egli et al., 2010), less is known about how youth and informant characteristics influence parent and teacher reports and their level of agreement, specifically. Given that it is standard practice in many clinical contexts to obtain reports from multiple informants, and that youth spend most of their time in school and home settings, this is a significant knowledge gap. The trifactor model provides a novel approach to better interpret these multi-informant reports and has been applied to understand multi-informant reports of other youth behaviours (van Woerden et al., 2022; Clark et al., 2017; Bauer et al., 2013). Therefore, this study had two main objectives. The first objective was to define the level of agreement between parent and teacher reports of youth delinquency. We hypothesized that similar to previous work on other youth behaviours and informant pairs, agreement would be low

or moderate. The second objective was to investigate the effects of youth and informant characteristics on agreement between parent and teacher reports. We hypothesized that the factors known to influence reporting of youth delinquency broadly, such as youth age and sex, as well as informant age, sex, education, and mental health, would similarly be associated with levels of agreement.

Methods

Sample

Data come from the 2014 Ontario Child Health Study (OCHS), a cross-sectional population survey conducted by Statistics Canada of youth aged 4 to 17 from households across 240 neighbourhoods in the province of Ontario (Boyle et al., 2019). Participants were recruited through a three-stage clustered approach of areas and households that identified population sampling units, stratified by income, and allocated households for selection (Boyle et al., 2019). In households with two or more eligible children, one was randomly selected to serve as the selected child for all assessments while up to three more children were included in a subset of assessments (Georgiades et al., 2019). The survey assessed the health and well-being of youth and their families, including physical and mental health, health behaviours, health service use, household environments, and socioeconomic factors (Boyle et al., 2019; Georgiades et al., 2019). Data were collected in homes and over the telephone by Statistics Canada interviewers between October 2014 and October 2015 (Georgiades et al., 2019). Further description of the 2014 OCHS methodology has been described previously (Boyle et al., 2019; Georgiades et al., 2019). For the purposes of this paper, only youth with parent and teacher reports of delinquency were included in the analysis. The reporting parent was the parent deemed to be most knowledgeable about the child, while the reporting teacher was designated as the most knowledgeable about the child by the reporting

parent. By design, only the children aged 4 to 14 years that were designated as the selected child had their teachers contacted to provide assessments. A total of 3,072 individuals were eligible for the current study and 2,376 (77.3%) individuals had complete parent and teacher reports available for analysis. Having missing data was associated with male youth sex (-0.07; $p<0.01$) and household income being below the low-income measure (-0.54; $p<0.01$), but no other variables. A second set of analyses was done using imputed data. While estimates were slightly different between the two datasets, overall inferences and conclusions remain unchanged.

Measures

Delinquency Items

Parents and teachers were asked to report on youth delinquent behaviours over the past 6 months as part of the validated OCHS Emotional Behavioural Scales (OCHS-EBS) (Boyle et al., 2019b, Duncan et al., 2019). For all questions, the response options were 'never' (1), 'sometimes' (2), and 'often' (3). Parents and teachers were asked to report on four cruelty items, four vandalism items, and three violence items. Parents were asked to report on four theft items, while teachers were asked to report on one theft item. Parents were asked to report on two truancy items, while teachers were asked to report on one truancy item. Parent and teacher reported items are displayed in Table 1. The internal consistency reliabilities of summed scores for each behaviour type ranged from $\alpha=0.66$–0.74. Parent and teacher responses were converted to a binary variable, where responses of 'sometimes' and 'often' for each behaviour were coded as 'present' (1), while responses of 'never' for each behaviour were coded as 'not present' (0). Converting these responses to dichotomous variables allows a clear description of the frequency of these items rather than the degree to which they are experienced

(Haegele et al., 2020). Parent and teacher responses across all delinquency items were also summed and converted to a binary variable to represent the presence of any delinquent behaviour (overall delinquent behaviour), where totals of zero were coded as 'not present' (0) and totals of one or more were coded as 'present' (1).

Covariates

Youth, parent, and teacher characteristics were included in the analysis to understand their association with parent, teacher, and composite reports of delinquency. Parents reported youth age and sex, parent sex, ethnicity, and education level, urbanicity (urban/rural), household income being below the low-income measure, family immigrant status (one or both parents born outside Canada), and parental depression. Parental depression was measured by asking caregivers if a doctor had ever diagnosed them with depression. Teachers reported their sex, class size, and years of experience teaching. Ethnicity (white or non-white), parent education level (post-secondary or no post-secondary), class size (<24 or ≥24 students), and teachers experience (<10 or 10≥ years of teaching) were dichotomized to maintain sufficient cell counts for the analyses and Statistics Canada data vetting protocols.

Analysis

The trifactor model was utilized to model the reporting of youth delinquency behaviours by parents and teachers and identify the effect of youth and informant characteristics on parent reports, teacher reports, and integrated scores. Modelling started by loading parent and teacher reports for all items onto the common factor (10 items), representing the consensus view and shared variability of youth delinquency items reported across informants. Next, parent and teacher reports for items were loaded onto their respective perspective-specific factor (five items), representing their

individual view and variability in reports of youth delinquency items. Parent and teacher reports for individual youth delinquency items were then loaded onto an item-specific factor (two items), representing shared views and variability attributed to each youth delinquency item. The three types of latent factors are orthogonal to each other and therefore correlations were fixed at zero, which allowed the variances between informant reports and latent factors to be partitioned. Factor loadings were interpreted as follows: <0.40 as weak, 0.41–0.60 as moderate, and 0.61< as strong (Tavakol & Wetzel, 2020). Model development was conducted using Mplus v8.5 (Muthén & Muthén, 2017).

After the trifactor model was developed, regression analyses were conducted to examine whether covariates were associated with the common factors and parent- and teacher-perspective factors. Adjusted odds ratios (OR) and 95% confidence intervals (CI) were calculated. Youth characteristics included age and sex. Parent characteristics included sex, ethnicity, education level, urbanity, household income, immigrant status, and depression. Teacher characteristics included sex, class size, and years of experience teaching. Regression analyses were conducted using MPlus v8.5 (Muthén & Muthén, 2017). Model fit was examined using the Comparative Fit Index (CFI) as the primary fit index, as well as the Tucker-Lewis Index (TLI), with values greater than 0.90 indicating good model fit for both indices. Further, the Root Mean Square Error of Approximation (RMSEA) was evaluated, with values less than 0.05 indicating adequate model fit (Xia & Yang, 2019). All analyses used sampling weights computed by Statistics Canada to ensure estimates were representative of the target population. Cohen's weighted kappa statistic estimated agreement between parent and teacher reports of individual delinquent behaviour items and the overall delinquent behaviour variable (McHugh, 2012). Kappa statistics were interpreted as follows: 0.01–0.20 as minimal agreement,

0.21–0.40 as fair, 0.41– 0.60 as moderate, 0.61–0.80 as substantial, and 0.81–1.00 as high agreement (McHugh, 2012). Agreement analyses were conducted using SAS v9.4 (SAS Institute, 2013).

Results

Sample Characteristics

A total of 2,376 youth had complete parent and teacher reports and were included in the analysis. Approximately 50.8% (n = 1,207) of the children in the sample were male, and the mean age was 6.2 years. Parent respondents were approximately 90.4% (n = 2,148) female, and 33.6% (n = 798) identified as an immigrant. Of youth in the analysis, approximately 17.5% (n = 416) were from households with income below the low-income measure, and 3.7% (n = 88) from households where at least one parent had depression. Teacher respondents were approximately 82.5% (n = 1,960) female, with 66.1% (n = 1,570) reporting 10 or more years of teaching experience. Further descriptive statistics of the sample are found in Table 1.

Endorsement Rates of Delinquency Items

The prevalence of youth delinquency reported by parents and teachers are shown in Table 2. From parent reports, 13.0% reported cruelty-related behaviours, 11.1% reported vandalism-related behaviours, 2.5% reported theft-related behaviours, 11.1% reported violence-related behaviours, and 1.8% reported truancy-related behaviours. According to teacher reports, 18.9% reported cruelty-related behaviours, 9.8% reported vandalism-related behaviours, 4.2% reported theft-related behaviours, 13.5% reported violence-related behaviours, and 6.0% reported truancy-related behaviours. Table 3 displays the proportion of parents and teachers reporting total number of delinquent behaviour types.

Agreement between Parent and Teacher Reports of Delinquency

Level of agreement between parent and teacher reports for delinquency types and the overall delinquency behaviour are shown in Table 4. Parent and teacher agreement was relatively small for violent behaviours ($\kappa = 0.26$). However, parent and teacher agreement for vandalism-related behaviours ($\kappa = 0.15$), truancy-related behaviours ($\kappa = 0.15$), cruelty-related behaviours (0.18), and theft-related behaviours ($\kappa = 0.20$) all failed to exceed the threshold of minimal agreement ($\kappa \geq 0.20$). Agreement between parents and teachers on overall delinquency was relatively small ($\kappa = 0.26$).

Trifactor Model Fit and Factor Loadings

Table 5 contains the standardized intercept and factor loading estimates for the estimated trifactor model. The final model provided good fit for the data as evaluated by the primary fit statistic CFI = 0.99, as well as secondary fit indicators TLI = 0.98 and RMSEA = 0.01 (95% CI = 0.00 – 0.01). For the common factor, parent-reported truancy ($\lambda = 0.72$), parent-reported violence ($\lambda = 0.70$), and teacher-reported violence ($\lambda = 0.68$) loaded most strongly. Parent-reported vandalism ($\lambda = 0.44$), teacher-reported truancy ($\lambda = 0.53$), and parent-reported theft and teacher-reported vandalism loaded less strongly but still greater than the threshold for moderate correlation. Vandalism ($\lambda = 0.54$), violence ($\lambda = 0.52$), and cruelty ($\lambda = 0.49$) indicators loaded moderately on the parent factor, while theft ($\lambda = 0.20$) and truancy ($\lambda = 0.16$) did not. For the teacher factor, all indicators except for truancy ($\lambda = 0.02$) loaded strongly: theft ($\lambda = 0.70$), vandalism ($\lambda = 0.68$), violence ($\lambda = 0.67$), and cruelty ($\lambda = 0.63$).

Effect of Youth, Parent, and Teacher Characteristics

Table 6 displays the regression results of youth and informant characteristics on the common and perspective factors. Youth age, parental education, household income, immigrant status, parental depression, and teacher experience were significantly associated with the level of agreement between parent and teachers (common factor). Older youth were more likely to have agreement between their parent and teacher reports ($\hat{\beta}$ = 0.40; 95%CI=[0.14-0.67]). Informant reports were more likely to agree when the parent reporting was female ($\hat{\beta}$ = 0.32; 95%CI=[0.13-0.50]). Parental education less than a university/college degree was a negative predictor of agreement compared to those with a university/college degree ($\hat{\beta}$ = -0.44; 95%CI=[-0.60-(-0.27)]), as was teachers having greater than 10 years' experience ($\hat{\beta}$ = -0.19; 95%CI=[-0.34-(-0.04]). Youth from households below the low-income measure were more likely to have agreement between the reports ($\hat{\beta}$ = 0.34; 95%CI=[0.19-0.50]), and among youth from households of immigrants ($\hat{\beta}$ = 0.23; 95%CI=[0.06-0.40]). Lastly, parent depression was associated with greater parent-teacher agreement ($\hat{\beta}$ = 0.27; 95%CI=[0.02-0.52]). Youth age, parental sex, depression, and youth sex were significantly associated with parent reports of delinquency. Results indicated that older youth were less likely to have their parent report delinquent behaviours ($\hat{\beta}$ = -0.59; 95%CI=[-1.14-(-0.03]). Parents of female youth were less likely to report delinquency than parents of male youth ($\hat{\beta}$ = -0.35; 95%CI=[-0.66-(-0.04]), while female parents were less likely to report youth delinquency than male parents ($\hat{\beta}$ = -0.35; 95%CI=[-0.70-(-0.01]). Youth with a parent experiencing depression were more likely to be reported participating in delinquent behaviours ($\hat{\beta}$ = 0.48; 95%CI=[0.11-0.85]). Youth age and teacher sex were significantly associated with teacher reports of delinquency. The results show that older youth were less likely to have their teacher report delinquent behaviours ($\hat{\beta}$ = -0.46;

95%CI=[-0.71-(-0.21]), and female teachers were more likely to report youth

delinquency compared to male teachers ($\hat{\beta} = 0.21$; 95%CI=[0.02-0.40]).

Discussion

The current study applied the trifactor model to parent and teacher reports of

youth delinquency to explore the effects of youth and informant characteristics on these

reports and their levels of agreement. The determined model indicated good fit through

primary and secondary fit statistics and strong factor loadings for most indicators. Thus,

the trifactor model can be a valuable methodology to model multi-informant

assessments and level of agreement between parent and teacher reports of youth

delinquency. Use of the trifactor model offered three major findings, as specified below.

First, study findings indicate that youth delinquency is a pressing issue among

children as approximately one-quarter of parents and teachers endorsed at least one type

of delinquent behaviour. This suggests there is still considerable room for approaches to

reduce the frequency of different types of youth delinquency and their associated

impacts. Specifically, the most highly endorsed types of youth delinquency by parents

and teachers were cruelty and violence-related behaviours. The prevalence of these

antisocial behaviours in both home and school contexts is of concern due to the harms

associated with perpetration and victimization. Home-based violence reduction

programs have been found effective when addressing factors related to parenting style,

empathy, and broad positive behaviour development (Chen et al., 2020; Smith et al.,

2016; Bonnell et al., 2015). Literature evaluating school-based interventions has shown

them most effective when designed to specific patterns of behaviours, and to address

items such social cohesion and climate (Patte et al., 2020; Salmivalli et al., 2021;

Bradley et al., 2018). When reports from youth themselves are unavailable these

assessments could be used to identify youth at risk of poor health behaviours and overall well-being, due to known associations with negative health outcomes. Similarly, youth delinquency is one of the strongest predictors of adult criminality (Leschied et al., 2008), and thus intervening with at-risk youth to reduce likelihood of transitioning into adult offenders, and experiencing associated consequences to health and social trajectories, is of importance.

Second, this study shows little agreement between parent and teacher reports of youth delinquency, with levels of agreement for all types falling below minimum thresholds except for violent behaviours and the overall delinquency variable. These findings are consistent with previous literature which indicates parents and teachers differ in their reporting of youth behaviours (De Los Reyes & Makol, 2021; Kim & von der Embse, 2021; De Los Reyes et al., 2015; van der Ende et al., 2012; Müller et al., 2011). The low levels of agreement between parent and teacher reports suggest that youth exhibit delinquent behaviours differently across contexts. For example, teachers report youth delinquency within the context of students interacting in classrooms, where social drivers are different than at home, and where relative comparisons can be made. As a result, data from each informant should be maintained to avoid valuable information loss in comprehensive assessment approaches, in comparison to aggregated or 'and/or' approaches. Indeed, the accuracy of assessment and treatment is improved by maintaining the contributions of parent and teacher reports to avoid any data gaps from the respective contexts they observe youth. This also suggests that if investigating school-related delinquent behaviours that teacher reports are more trustworthy than parent reports. Past research on youth aged 11 to 18 years showed that youth self-reported higher levels of problem behaviours than their parents and teachers, suggesting youth themselves could be the most reliable source and provide information across

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contexts (van der Ende & Verhulst, 2005). Researchers should consider the feasibility and implications of collecting reports from various informant types. Future research should investigate how levels of agreement between parents and teacher reports of youth delinquency (and youth self-reports) change of over time, and if the impact of covariates differs as youth age. Also, while our study indicates youth exhibit delinquent behaviours differently between home and school there is considerable value in research investigating overlapping factors that could be targeted to efficiently reduce delinquent behaviours in both contexts.

Third, the current study shows that levels of agreement between parents and teachers are influenced by numerous youth and informant characteristics. Findings show that older youth, female parents, lower household income, immigrant parents, and parental depression were associated with greater agreement between parent and teacher reports of delinquent behaviours, while lower parental education and greater teacher experience were associated with lower agreement. While the novel contribution of this study was evaluating their effect on levels of agreement, these variables have previously been found to be associated with assessments of youth delinquency to varying degrees (van der Ende et al., 2012; Egli et al., 2010; Kraemer et al., 2003; van der Ende & Verhulst, 2005; De Los Reyes & Kazdin, 2005). For example, previous work determined that as youth increased in age, their self-reports diverged further from parent and teacher assessments of their problem behaviours (van der Ende & Verhulst, 2005). In the context of delinquent behaviours being observed in one setting (school or home) these factors could be utilized as markers for investigation of delinquent behaviours in other settings, creating opportunities for more comprehensive interventions. Our study findings also confirmed the effects of parent, teacher, and youth sex, youth age, and parental depression on parent and/or teacher reports of youth delinquency. Future

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research should investigate these items in smaller age groups or developmental periods to examine more specific age differences. In practice, these items should be interpreted as relevant factors regardless of which approach to interpreting multi-informant reports of youth delinquency is utilized to inform decision-making.

One factor of particular interest is parental depression. Our findings indicate that depressed parents are more likely to report their children as exhibiting delinquent behaviours, with a greater effect observed on their parent perspective factor rather than the common factor. This indicates that parental depression exerts a greater effect on their individual reporting of delinquent behaviours than it does the level of agreement their reports have with teachers. These findings are in line with previous research on reporting of delinquent behaviours, in that parents with depression are more likely to perceive behaviours as problematic than parents without depression (De Los Reyes & Kazdin, 2005; Clark et al, 2017; Müller et al., 2011; Van der Ende & Verhulst, 2005; Truetler & Epkins, 2003). This may be due to genuine differences in youth delinquency (the accuracy model), or the result of informant bias related to parental psychopathy (the distortion model) (Müller et al., 2011; De Los Reyes & Kazdin, 2005; Najman et al., 2001). However, it is interesting that the association seen in this work indicates that parents with depression have greater agreement with teachers. Previous work has shown that parents with depression have lower levels of agreement with teacher regarding children's behaviours (Müller et al., 2011; Najman et al., 2001). But it may be that higher levels of agreement between parents with depression and teachers do reflect authentic consistency of youth delinquency between home and school settings. While speculative, it may be possible that parents without depression positively bias assessments of their children, resulting in under-reporting and lower agreement with teacher reports, because of the anti-social nature of delinquent behaviours. In practice,

practitioners that evaluate youth delinquency should bear in mind that positive parent reports may indicate parent psychopathy and could offer parents appropriate directions to professional help. Though previous research has supported the distortion model in comparison to the accuracy model (Müller et al., 2011), further research is required to delineate the contexts in which either model is most applicable to understanding reports of youth delinquency, and how reports could be influenced by both true differences in youth behaviours and the pathologic distortions of parents with depression. Continued research is necessary to understand how these mechanisms influence multi-informant agreement of other informant pairings, including investigating the influence of other mental health conditions.

More broadly, our findings on levels of agreement between parents and teacher reports and the impact of youth and informant characteristics can improve assessment. Practitioners have limited time and resources available to assess the complexity of youth behaviours and make important decisions. Further, decisions regarding behavioural problems among youth, such as delinquent behaviours, can have significant implications in educational and clinical contexts. Therefore, assessments need to provide enough information to maintain accuracy but balance efficiency and swift interpretation. Applying the novel trifactor model to explore factors that influence levels of agreement between informants provided new insights that can aid interpretation. It is possible that differences in behaviour between contexts may be predicted with one informant report and the inclusion of sociodemographic covariates. Regarding comprehensive approaches to reducing the high prevalence of youth delinquency in home and school settings, evidence-based toolkits for planning integrated interventions to reduce violence and delinquency among youth are freely available (David-Ferdon et al., 2016). While prevention approaches should be tailored to each setting, the timing of

secondary prevention programs in one setting could be aligned with offerings of primary prevention in another.

Strengths and Limitations

Our findings build on previous work to improve assessments of youth delinquency by utilizing the trifactor model to explore parent and teacher reports and levels of agreement. The new insights provided by this work is the comparison of reports representing home and school behaviours, and factors associated with their levels of agreement. This study used data from the 2014 OCHS, a large population-based survey of children and families; thus, findings provide generalizable conclusions in comparison to previous literature on the subject that almost exclusively had used smaller samples of psychiatric patients or incarcerated youth to examine delinquency (Hensel et al., 2020; Eggink et al., 2019; Stewart et al., 2015; Cropsey et al., 2008; Markowitz, 2011). This study is one of few to provide prevalence estimates that are more broadly representative of the general population of youth in Ontario. Finally, few previous studies have been able to include as large a set of delinquent behaviour items to be evaluated (Egli et al., 2010).

Although the study sample included only youth who had both parent and teacher reports, which may introduce bias, this approach provided necessary information on prevalence of delinquent behaviours across home and school settings. Further, many covariates and informant characteristics were included to understand their effects on informant reports. These included standard items for the field (age, sex, parental depression), as well as an extended array household sociodemographic information and teacher characteristics. Due to the cross-sectional design of the 2014 OCHS, evidence on the temporality of associations is limited. Also, the 2014 OCHS excluded potentially

high-risk populations such as youth living on reserves and in various institutional settings (Boyle et al., 2019). Further, the dataset does not contain information about the context or severity of the delinquent behaviours.

Constraints on Generality

While the study sample is from a large population-based survey of youth there are mild constraints on generality. First, while the 2014 OCHS used a three-step sampling approach that stratified by income, high risk populations such as Indigenous youth living on reserve or in institutional settings were excluded. Second, missing data was associated with male youth sex and household income being below the low-income measure. A second analysis was conducted with an imputed dataset that included individuals with missing data and although the overall inferences and conclusions remain unchanged, the unimputed dataset did under-sample male children and households below the low-income measure. Third, minority ethnicities in the study sample (28.4%) were representative of the Ontario population (29.3%) (Statistics Canada, 2017). However, systemic biases in perceptions of delinquent behaviours between White and visible minority children may exist.

<div align="center">

Conclusions

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Taken together, this study presents valuable findings relevant to multi-informant reports of youth delinquency. In particular, the findings show that contextually meaningful information should be maintained in settings that regularly use multi-informant reports to accurately assess youth delinquency. Parent and teacher reports had low agreement across most types of delinquent behaviours, indicating youth display these behaviours differently at home and school. Study findings show that older youth,

female parents, lower household income, immigrant parents, and parental depression were associated with greater agreement between parent and teacher reports of delinquent behaviours. This suggests that informant discrepancies, in some part, reflect youth, parent, and teacher characteristics. Lower parental education and greater teacher experience were associated with lower levels of agreement. The use of both parents and teachers as informants provides relevant information for contexts that utilize comprehensive assessments and can aid in determining appropriate strategies to reduce delinquent behaviours among youth in the settings where they spend most their time. Interventions to reduce youth delinquency should be cognizant of these contextual differences and coordinate between home and school settings when possible.

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Table 5.1 - Sample 1 Characteristics

	Percentage	Mean (SD)
Youth characteristics		
Age		6.2 (2.5)
Male	50.89	
Parent characteristics		
Male	9.55	
University degree	46.81	
Minority ethnicity	28.41	
Urban	86.60	
Below LIM	17.53	
Immigrant	33.62	
Parental depression	3.73	
Teacher characteristics		
Male	17.49	
Class size <24	48.47	21.6 (4.9)
10+ years experience	66.17	

Table 5.2 - Endorsement Rates for Delinquency Items in Sample 1

Item	Parent	Teacher	Weighted Kappa
Cruelty	0.13	0.19	0.18 (0.17 – 0.18)
Vandalism	0.11	0.10	0.15 (0.14 – 0.15)
Theft	0.03	0.04	0.20 (0.19 – 0.21)
Violence	0.11	0.14	0.26 (0.25 – 0.26)
Truancy	0.18	0.06	0.15 (0.14 - 0.15)

Table 5.3 - Proportion of Delinquency Types Reported by Parents and Teachers

Number of Types	Parent	Teacher
0	0.77	0.75
1	0.13	0.12
2	0.06	0.07
3	0.03	0.04
4+	0.01	0.02

Table 5.4 - Standardized Intercept and Factor Loading Estimates from the Final Trifactor Model Fit to Study 1 Sample

| Item | Intercept | Factor loading | | |
		Common	Perspective	Item specific
Parent reported				
Cruelty	1.13	0.58	0.49	0.71
Vandalism	1.96	0.44	0.54	0.53
Theft	1.22	0.54	0.20	0.79
Violence	2.09	0.70	0.52	0.69
Truancy	0.88	0.72	0.16	0.55
Teacher reported				
Cruelty	1.72	0.58	0.63	0.57
Vandalism	1.10	0.54	0.68	0.52
Theft	1.55	0.58	0.70	0.78
Violence	1.22	0.68	0.67	0.75
Truancy	1.29	0.53	0.02	0.58

Fit information: CFI = 0.99; TLI = 0.98; RMSEA = 0.01.

Table 5.5 - Standardized Regression Coefficients of the Common and Perspective Factors on Covariates

Covariate	Estimate (standardized)	SE	95% CI	p
Common factor				
Youth age	**0.40**	**0.13**	**0.14 – 0.67**	**<0.01**
Youth sex	-0.12	0.12	-0.36 – 0.12	0.31
Parent sex	**0.32**	**0.09**	**0.13 – 0.50**	**<0.01**
Parent education level	**-0.44**	**0.08**	**-0.60 – (-0.27)**	**<0.01**
Ethnicity	-0.11	0.10	-0.30 – 0.07	0.23
Urbanity	0.10	0.10	0.09 – 0.29	0.30
Household income	**0.34**	**0.08**	**0.19 – 0.50**	**<0.01**
Immigrant status	**0.23**	**0.09**	**0.06 – 0.40**	**0.01**
Parental depression	**0.27**	**0.13**	**0.02 – 0.52**	**0.03**
Teacher sex	0.02	0.09	-0.16 – 0.20	0.85
Class size	0.07	0.08	-0.09 – 0.22	0.42
Teacher years of experience	**-0.19**	**0.08**	**-0.34 – (-0.04)**	**0.01**
Perspective factors				
Youth age (parent)	**-0.59**	**0.28**	**-1.14 – (-0.03)**	**0.04**
Youth age (teacher)	**-0.46**	**0.13**	**-0.71 – (-0.21)**	**<0.01**
Youth sex (parent)	**-0.35**	**0.16**	**-0.66 – (-0.04)**	**0.03**
Youth sex (teacher)	-0.17	0.14	-0.44 – 0.09	0.20
Parent sex	**-0.35**	**0.18**	**-0.70 – (-0.01)**	**0.04**
Parent education level	-0.44	0.12	-0.02 – 0.60	0.69
Ethnicity	0.29	0.16	-0.29 – 0.19	0.07
Urbanity	-0.05	0.13	-0.20 – .031	0.66
Household income	-0.09	0.13	-0.34 – 0.15	0.46
Immigrant status	0.03	0.14	-0.27 – 0.27	0.99
Parental depression	**0.48**	**0.19**	**0.11 – 0.85**	**0.01**
Teacher sex	**0.21**	**0.10**	**0.02 – 0.40**	**0.03**
Class size	-0.12	0.10	-0.32 – 0.09	0.27
Teacher years of experience	0.14	0.09	-0.05 – 0.33	0.15

Note: Bolded entries identify those that are significant at $p < .05$.

Chapter 6: Manuscript 2

Classifying patterns of delinquent behaviours and experiences of victimization: a latent class analysis among children.

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Abstract

Background: Delinquent behaviours among youth harms health and social trajectories, and public health broadly. Despite evidence that engaging in and being victimized by delinquent behaviours often cluster, most studies have examined the clustering of delinquent behaviours *or* victimization experiences independently. Information on patterns of co-occurrence is crucial to design appropriate interventions. Objectives: The primary purpose was to identify latent classes of delinquency and victimization among youth from the general population. The secondary purpose of this study was to examine associations of individual, household, and classroom covariates on latent class membership. Methods: The sample consisted of 1,948 youth aged 4-14 from the 2014 Ontario Child Health Study. Latent class analysis was performed to identify patterns of delinquent behaviours and experiences of victimization, while multinomial regression was conducted to examine how covariates were associated with likelihood of class membership. Results: The analysis identified four classes of youth in the OCHS sample: 1) low delinquency and low victimization (75.4%), 2) moderate victimization & moderate school delinquency (7.8%), 3) high victimization & moderate home delinquency (11.8%), and high victimization & high home and school delinquency (5.0%). Youth sex, household income, ethnicity, parental education, and parental depression were associated with differences in class membership. Conclusions: Approximately one quarter of youth engaged in delinquent behaviours, with patterns of co-occurrence suggesting these youth engage in delinquent behaviours and are victimized by delinquent behaviours across environments. Interventions should approach youth delinquency and victimization as a spectrum of clustered behaviours and experiences in these environments.

Keywords: Children; Behaviours, Delinquency, Victimization, Latent Class Analysis

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Classifying patterns of delinquent behaviours and experiences of victimization: a latent class analysis among children

Childhood and early adolescence are a time when individuals are at greater risk of delinquent behaviours – such as cruelty, theft, assault, truancy, and vandalism – either as perpetrators, victims, or both. Engagement with these behaviours is a public health concern given their high prevalence, with 28-37% of American youth aged 12-18 years reporting being victimized by them and 35% perpetrating them (Davis et al., 2020). However, current data on delinquent behaviours among children in the Canadian context are limited. A 2012 report found that 37% of Canadian youth under 20 reported having engaged in at least one of these delinquent behaviours in their lifetime, with approximately 25% reporting participation in two or more types of delinquent behaviours (NCPC, 2012). Similarly, 40% of youth had been victimized at least once in the past year by bullying, assault, and other aggression or violence related behaviours (NCPC, 2012). Another survey of Canadian youth found that nearly two-thirds reported being victimized in the past year, and three-quarters over their lifetime from a measure of over 30 different types of victimization (Cyr et al., 2013). Over a quarter of participants reported having been poly-victimized (experiencing multiple victimization events) at some point throughout their life while 8% reported poly-victimization in the past year (Cyr et al., 2013).

Although seemingly opposite, the status of youth as both participators and victims are often intertwined. Conceptual frameworks such as strain theory and trauma theory suggest that children who experience trauma or victimization similar or delinquent behaviours as maladaptive coping mechanisms (Piquero et al., 2015; Shonkoff & Garner, 2012). Previous research has

confirmed that youth who participate in delinquent behaviours are more likely to report being

victimized than youth who do not participate in delinquent behaviours, and youth who have been

victimized are more likely to engage in aggressive and delinquent behaviours (Ford et al., 2010;

Savoie, 2007; Baglivio et al., 2014; Ogrodnik, 2010). Aside from earlier experiences with

delinquent behaviours or victimization, previous work has shown that numerous factors can

influence likelihood of both delinquency and victimization (Logan-Greene et al., 2018; Joliffe et

al., 2017; Farrington et al., 2017; Assink et al., 2015). At the individual level, factors such as sex,

age, social relationships, and health disorders are known to be associated with higher likelihood

of delinquency or victimization among youth (Stubbs-Richardson et al., 2018 Braga et al., 2017;

Jolliffe et al., 2017). For example, male youth are more likely to be perpetrators of delinquent

behaviours, while female youth are more likely to be victims (Romano et al., 2020; Stubbs-

Richardson et al., 2018; Freeman et al., 2016). At the household level, low family income and

poor parent mental health have been associated with greater likelihood of delinquency and

victimization (Sitnick et al., 2019; Jolliffe et al., 2017; Scott & Brown, 2018; Tippet & Wolke,

2014). Parental depression specifically has been shown to influence reporting of youth

problematic behaviours, including delinquency (Muller et al., 2011; De Los Reyes & Kazdin,

2005). At the school level, factors such as student and staff engagement, safety, rule

enforcement, and presence of behavioural programs are known to effect the prevalence of youth

delinquency and victimization (Doucette & Hoffman, 2016; Cornell & Luang, 2016; David-

Ferdon et al., 2015).

Engagement with delinquent behaviours are a serious public health concern as they have adverse

effects on life trajectories for youth and families, and risk exacerbating existing health inequities

(Eggink et al., 2019; Farrington et al., 2017; Jolliffe et al., 2017; Assink et al., 2015; David-Ferdon et al., 2015). For example, previous work has consistently shown that individuals with a mental health disorder are more likely to engage with delinquent behaviours than those without a mental health disorder (Hensel et al., 2020; Romano et al., 2020; Boyce et al., 2012). Canadian data have indicated that poor mental health is a significant risk factor for violent victimization, particularly. Youth with poor mental health are up to four times more likely to be a victim of violent behaviour than those with good mental health (Perreault, 2015). Experiences of delinquency or victimization among youth can compound existing health and social inequities derived from factors such as childhood trauma or low socioeconomic status (Eggink et al., 2019; Farrington et al., 2017; Jolliffe et al., 2017; Assink et al., 2015; Arbeit et al, 2014). Participation and victimization by delinquent behaviours is also associated with greater risk of youth engaging in poor health behaviours such as smoking, binge drinking, misuse of other substances, high screen time, and unsafe sex practices (Williams et al., 2020; Sampasa-Kanyinga et al., 2020; Jolliffe et al., 2017; Assink et al., 2015). Further, as they transition into adulthood, youth who participate in or are victimized by delinquent behaviours are more likely to have lower educational and occupational attainment (Smithyman et al., 2014). Families with youth who engage with delinquent behaviours experience increased conflict, greater stress, and poorer mental health outcomes (Eggink et al., 2019; Jolliffe et al., 2017). Communities with prevalent youth delinquency and victimization experience reduced social cohesion and trust, less socialization, greater child welfare agency involvement, and a greater strain on social systems (Eggink et al., 2019; Jolliffe et al., 2017).

Previous work for this age group has investigated delinquency *or* victimization (Finkelhor et al., 2007; Cry et al., 2013), but studies that have investigated delinquency *and* victimization have been with older youth (ages 12-17) or juvenile-justice involved youth (Pane-Siefert et al., 2021; Bettencourt & Farrell, 2013; Dierkhising et al., 2019; Davis et al., 2020). There is scarce information regarding patterns of delinquency and victimization for children aged 4-14 years. Children of this age are transitioning into elementary or middle school, where an increased emphasis on social relations and new social environments can influence behaviours (Finklehor et al., 2007). Indeed, previous work has suggested that entry into elementary school is a time of increased victimization (Finkelhor et al., 2009a). Ecological systems theory (or the socioecological model) emphasizes the numerous spheres of influence that interact to shape behaviours (Bronfenbrenner, 1979). For children aged 4-14 years this includes new social environments (such as school), new social dynamics (such as peer relationships), as well as individual and household characteristics. Previous work has suggested the socioecological framework is an important model for addressing problematic behaviours among children, including delinquency and victimization (Catalano et al., 2015; Swearer et al., 2012). Thus, as they transition through different school environments there are new factors that could be shaping behaviours and experiences for children. Given that evidence shows developmental timing of these items can lead to different outcomes (Dierkhising et al., 2019), and that previous delinquency or victimization is the strongest predictor of future delinquency or victimization (Logan-Greene et al., 2018; Joliffe et al., 2017; Farrington et al., 2017), it is vital to identify at risk children as early as possible.

Despite evidence that engaging in and being victimized by delinquent behaviours often cluster (Cyr et al., 2013; Bettencourt & Farrell, 2013; Davis et al., 2020), these behaviours and experiences have typically been examined independently (CIHI, 2008). While some studies have examined the clustering of delinquent behaviours *or* victimization experiences independently, few have examined their co-occurrence. Further, though associations have been previously delineated, the associations between clusters of these items and risk factors are less known (Eggink et al., 2019; Farrington et al., 2017; Jolliffe et al., 2017). One approach to understand clustering or co-occurrence of these items is latent class analysis (LCA) (Weller et al., 2020). With LCA, groupings of similar response patterns across a set of survey questions or assessment items are identified (Weller et al., 2020; Sullivan, 2008). As a result, LCA organizes and classifies individuals into mutually exclusive groups (i.e., latent classes) from a heterogeneous sample, based on their underlying response patterns (Muthén & Muthén, 2000). Associations between factors and determined classes can then be examined to understand their associations with class membership, since LCA provides insight on both class membership characteristics and the conditional probability of an individual's response given their class membership.

Current Study

Currently, much of the previous work examining the clustering of delinquent behaviours and victimization experiences have used highly selected samples of incarcerated or institutionalized youth and a limited set of predictors (Hensel et al., 2020; Eggink et al., 2019). It is necessary to have a better understanding of the relationships between a large set of behaviours and experiences in a population sample to inform interventions that reduce the prevalence and impact of youth delinquency and victimization. Only two studies have conducted LCA for both delinquency and victimization items within the general population, albeit with limited sets of

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predictors and among older youth (teenagers). A 2013 investigation that identified distinct clusters of perpetrators and victims used two physical aggression items and three victimization items as predictors among a sample of middle school children (Bettencourt & Farrell, 2013). The results indicated four classes of youth: aggressive victims, non-victimized aggressors, predominately victimized, and well adjusted. A more recent investigation used two violence exposure items, and two bullying perpetration and victimization items as predictors in a sample of middle and high school children (Davis et al., 2020). Three classes of bullying were determined: high bullying perpetration and victimization, high victimization, and low perpetration and victimization.

To address this knowledge gap, this study used LCA to examine patterns of delinquency and victimization at home and school in a Canadian sample of children aged 4-14 (Boyle et al., 2019a). The primary purpose of this study was to identify latent classes of delinquency and victimization among children from the general population, using a large complement of context-specific behaviours to determine latent classes. Consistent with previous research we hypothesized that classes would differ in severity and combination of items, such as: high victimization and low delinquency, high delinquency and low victimization, and no delinquency or victimization (Schwartz, 2000; Bettencourt & Farrell, 2013; Davis et al., 2020). Similarly, if knowledge gaps remain in how delinquent behaviours and victimization experiences cluster then the extent to which sociodemographic factors are associated with such clusters is less understood as well. Therefore, the secondary purpose of this study was to examine associations of individual, household, and classroom-level covariates on delinquency and victimization class membership. Based on previous research we hypothesized that sociodemographic factors such as higher child age and male sex, informant female sex, lower household income, as well as

parental psychopathy would influence likelihood of class membership (Davis et al., 2020; Logan-Greene et al., 2018; Joliffe et al., 2017; Farrington et al., 2017; Bettencourt & Farrell, 2013).

Methods

Sample

Data come from the 2014 Ontario Child Health Study (OCHS), a population survey conducted by Statistics Canada of 10,802 children and youth aged 4-17 years from 240 neighbourhoods across the province of Ontario, Canada (Boyle et al., 2019a). Selection was conducted through stratified, clustered, and random sampling. Participants were recruited through a three-stage clustered approach of areas and households that identified population sampling units, stratified by income, and allocated households for selection (Boyle et al., 2019a). In households with two or more eligible children, one was labelled as the selected child (n=6,537) who was the focus of all questionnaires. Other eligible children were labelled as siblings, with responses to a subset of questionnaires. Due to these design features bootstrap and sampling weights are used to generate unbiased variance estimates. Data collection occurred through telephone interviews and household interview visits (both computer-assisted and paper-pencil) from October 2014 to October 2015. Information related to some neighbourhood variables, socioeconomic factors, and familial demographics were obtained from the 2011 Canadian Census. Where possible, participant data are linked to the School Mental Health Survey (SMHS), an affiliated study of school socioeconomic, demographic, and resource factors (Boyle et al., 2019a), which provided a unique opportunity to analyze school and home factors. Further description of the methodological approach of the OCHS and data linkages to government databases are described

in previous reports (Boyle et al., 2019a; Georgiades et al., 2019), and can be found online (https://ontariochildhealthstudy.ca/ochs/).

For the purposes of this paper only children with parent and teacher reports of delinquency and victimization were included in the analysis. By design only the selected children in the OCHS had parents respond to questions of victimization, and only children aged 4-14 years had their teachers invited to complete reports. Therefore, a total of 2,376 individuals were eligible for this current study. In total, 1,948 (82.0%) individuals had complete indicator data available for analysis. Having missing data was associated with male child sex and household income being below the low-income measure. A second set of analyses was done using imputed data, and these results are included in the supplementary material. While estimates were slightly different between the two datasets, overall inferences and conclusions remain unchanged.

Measures

Delinquency and Victimization

Parents and teachers were asked to report on children's delinquent behaviours and experiences of victimization as part of the validated Ontario Child Health Study Emotional Behavioural Scales (OCHS-EBS), further described in previous literature (Boyle et al., 2019b, Duncan et al., 2019). Responses for all questions were 'never' (1), 'sometimes' (2), and 'often' (3). Parent and teacher responses were then summed separately for each type of behaviour, with higher scores indicating more frequent instances of the behaviour, which is consistent with previous work on the subject (Davis et al., 2020). Parents responded to four questions on cruelty-related behaviours (i.e., "Cruelty, bullying, meanness to others," "Cruelty to animals"), four on vandalism-related behaviours (i.e., "Destroys things belonging to his/her family or other children," "Sets fires"), four on theft-related behaviours (i.e., "Has mugged people," "Steals outside the home"), three on

violence-related behaviours (i.e., "Gets in many fights," "Physically attacks people"), and one on truancy-related behaviours (i.e., "Truancy, skips school"). Parents also responded to four on experiences of their child being bullied (i.e., "Is picked on by other children," "Called names by peers"), and one on experiences of being assaulted (i.e., "Is hit or kicked by other children"). Teachers responded to four questions on cruelty-related behaviours, four on vandalism-related behaviours, one on theft-related behaviours, three on violence-related behaviours, and one on truancy-related behaviours. These items were chosen for their similarity to measures used in previous studies of delinquent behaviours and victimization (Davis et al., 2020; Bettencourt & Farrell., 2013) that have been shown as acceptable, good, or excellent scale reliability (Farrell et al., 2000; Schwartz, 2000). The internal consistency reliabilities of summed scores for each behaviour type ranged from $\alpha = 0.66 - 0.74$. The internal consistency reliability of the bullied summed score was $\alpha = 0.88$. Full description and examples of indicators questions and the internal consistency reliabilities for each behaviour item are included in the supplementary material.

Covariates

Child, parent, and teacher characteristics were included in the analysis to understand their association with parent, teacher, and composite reports of delinquency, respectively. Parents reported children's age and sex, parent sex, ethnicity, and education level, urbanicity (urban/rural), household income being below the low-income measure, family immigrant status (one or both parents born outside Canada), and parental depression. Parental depression was measured by asking caregivers if a doctor had ever diagnosed them with depression. Teachers reported teacher sex, class size, and years of experience teaching. Ethnicity (white or non-white), parent education level (post-secondary or no post-secondary), class size (<24 or $\geq$24 students),

and teachers experience (<10 or 10≥ years of teaching) were dichotomized to maintain sufficient cell counts for the analyses and Statistics Canada data vetting protocols.

Analysis

Latent class analysis was conducted to identify classes of delinquency and victimization among children from 12 indicators from reports provided by parents and teachers. To capture the complexity of behaviour patterns LCA is increasingly employed to address multivariate and interactive components in health behaviour research (Weller et al., 2020; Laxer et al., 2017; Hammami et al., 2019). By utilizing LCA for this study, children were grouped into mutually exclusive groups of shared response patterns revealing delinquency and victimization profiles present in the sample.

Modelling started with a two-class model and subsequent classes were added while comparing model fit indices (Weller et al., 2020). The relative fit of models was evaluated using the primary fit statistic Bayesian Information Criteria (BIC) as well as Akaike Information Criterion (AIC), with lower values in each case indicating better fit. Entropy was also evaluated; a 0 to 1 scale with values closer to 1 indicating better model fit. Lastly the mean posterior probabilities, which describe the average probability that the model accurately predicts class membership for each individual, were evaluated (values closer to 1 indicating better fit). All analyses were conducted using MPlus v8.5 (Muthén & Muthén, 2017). Model building was concluded when model fit did not improve significantly compared to the previous model. Inconsistent findings across fit indicators for LCA models is common, so model determination considered class interpretability as well (Weller et al., 2020; Nylund-Gibson & Choi, 2018). MPlus software accommodates for missingness by assuming data are missing at random (MAR) and utilizes the full-information

maximum likelihood (FIML) method (Muthén & Muthén, 2017). This method uses all available data to estimate the model and adjust standard errors (Muthén & Muthén, 2017).

After model selection and determination of classes multinomial regression was conducted to examine how covariates were associated with likelihood of class membership. Adjusted odds ratios (OR) and 95% confidence intervals (CI) were calculated using the three-step approach, as an alternative to single-step mixture modeling. Single step mixture modeling estimates the measurement model every time a covariate is added, affecting the formation of latent classes (Asparouhov & Muthén, 2014). In the three-step approach, the latent class model is estimated first, then most likely class membership is determined using the posterior distributions, and finally class membership is regressed on covariates.

To examine the amount of variance accounted for at the school level (students are nested within schools), the intraclass correlation coefficient (ICC) was computed. However, not all schools that OCHS children attended were included in the SMHS. As a result, the sample size was significantly reduced and a multilevel LCA could not be conducted. Protocols implemented by Statistics Canada prevented the release of the specific ICC because of the relatively small cell counts for each school. However, the ICC was between 10-20%, indicating that school-level factors play an important role in how children experience delinquency and victimization. Similarly, parents and teachers were not considered as separate levels in modelling. Although models could be structured so that students are clustered in households, clustered by teacher, and clustered by school, only one child from each household had teacher reports of delinquency.

Results

Sample Characteristics

A sample of 1,948 children had complete parent and teacher reports and were included in the analysis. Approximately half of the children in the sample were male and the average age was 7.6 years. Parent respondents were 88.8% female, while 34.4% identified as an immigrant. Over 17.6% of children came from households below the low-income measure, and 3.6% from households where at least one parent had depression. Teacher respondents were 87.9% female and 65.7% reported ten or more years of teaching experience. Additional descriptive statistics of sample characteristics are found in Table 1.

Prevalence of Delinquency and Victimization

The prevalence of childhood delinquent behaviours and victimization experiences reported by parents and teachers are shown in Table 2. From parent reports, 14.0% reported cruelty-related behaviours, 11.5% reported vandalism-related behaviours, 2.3% reported theft-related behaviours, 11.6% reported violence-related behaviours, and 1.2% reported truancy-related behaviours. According to teacher reports, 20.2% reported cruelty-related behaviours, 10.9% reported vandalism-related behaviours, 4.5% reported theft-related behaviours, 14.7% reported violence-related behaviours, and 5.5% reported truancy-related behaviours. Parent reports showed that 43.2% of children experienced victimization through bullying behaviours and 16.3% had been assaulted.

Model Fit Results

Table 4 presents the overall fit statistics and model comparisons. Latent class models were conducted and compared for two- through six-class models. The primary model fit statistic (BIC) decreased significantly through the two-, three-, and four-class model, but then increased for the five- and six-class models. The AIC decreased continually from the two-class model through to the six-class model. Entropy was 0.90 for the two- and four-class models, while the three-, five-

and six-class models were all <0.85. The mean posterior probabilities for the four-class model were higher, ranging from 0.86 to 0.98. Given most fit indices indicated it as the superior model, and in consideration of class interpretability, the four-class model was selected as best representing children delinquency and victimization profiles for this study.

Latent Classes

Table 5 displays the item response probabilities and prevalence of each of the four classes in the sample. The classes were labelled as: *low delinquency & low victimization*, characterized by little overall participation in delinquent behaviours and few experiences of victimization (75.4%); *moderate victimization & moderate school delinquency*, characterized by little participation in delinquent behaviours as reported by parents, moderate participation in cruelty, vandalism, and violence related delinquent behaviours by teachers, and some experiences of victimization (7.8%); *high victimization & moderate home delinquency*, characterized by moderate participation in cruelty, vandalism, and violence related delinquent behaviours as reported by parents, little participation in delinquent behaviours as reported by teachers, with many experiences of victimization (11.8%); and *high victimization & high home and school delinquency*, characterized by high participation in cruelty, vandalism, and violence related delinquent behaviours as reported by parents, high participation in cruelty, vandalism, theft, and violence related delinquent behaviours as reported by teachers, with many experiences of victimization (5.0%).

Impact of Covariates

As shown in Table 6, child age and sex, ethnicity, parental education, household income, parental depression, and teacher sex were significantly associated with class membership. Older children were less likely to be members of the *high victimization & high home and school*

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delinquency class than younger children (OR=0.88, 95% CI: 0.80-0.96). The likelihood of

reporting *high victimization & moderate home delinquency* compared to *low delinquency & low*

victimization for female children was OR=0.42 (95% CI: 0.23-0.74). The likelihood of *moderate*

victimization & moderate school delinquency compared to *low delinquency & low victimization*

for female children in comparison to male children was OR=0.15, 95% CI: 0.05-0.38).

Comparisons of household income indicate that the likelihood of membership in the *high*

victimization & high home and school delinquency class was OR=2.73 (95% CI: 1.44-5.16)

greater for children from households below the low-income measure than those above the low-

income measure. Regarding ethnicity, the likelihood of membership in the *high victimization &*

high home and school delinquency class was OR=0.39 (95% CI: 0.16-0.92); lower likelihood for

non-white children than white children.

Lastly, parental depression was significantly associated with the likelihood of some class

memberships. The likelihood of reporting *high victimization & high home and school*

delinquency compared to *low delinquency & low victimization* for children with parents who

have depression was OR=5.17 (95% CI: 1.63-16.47) versus children with parents without

depression. Similarly, the likelihood of reporting *high victimization & moderate home*

delinquency compared to *low delinquency & low victimization* for children with parents who

have depression was OR=11.66 (95% CI: 3.48-39.10). The likelihood of reporting *moderate*

victimization & moderate school delinquency compared to *low delinquency & low victimization*

for children with parents who have depression was OR=8.28 (95% CI: 2.41-28.42).

Discussion

The current study explored the presence of heterogeneous groups of childhood delinquency and victimization. Four distinct classes were determined that indicate distinct patterns of delinquent behaviours and victimization experiences among children. This study showed that three of the classes participated in delinquent behaviours and had experiences of victimization, characterizing a quarter of children in Ontario, Canada. Two findings are of particular cause for concern: both the frequency of high victimization and participation in delinquent behaviours.

There was a high prevalence of students within two high-risk clusters where high levels of experiences of victimization are common (16.8%), with a further 8% of children experiencing moderate victimization. This suggests substantial room for interventions to address the prevalence of poly-victimization among children and its impacts. Previous research has shown poly-victimization to be more common than single victimization experiences, that it is often underreported, and the presence of specific subtypes (Finkelhor et al., 2007; Finkelhor et al., 2009b; Dierkhising et al. 2019; Turner et al., 2010). Further, studies have regularly discussed the compounding consequences of poly-victimization in childhood and adolescence in the general population and high-risk subgroups (Pane-Seifert et al., 2022; Dierkhising et al. 2019; Turner et al. 2010). The known consequences of cumulative victimization events and fact that victimization is strong predictor of future aggression and involvement in bullying (McCuddy & Esbensen, 2022; Davis et al., 2020), broader trauma-informed interventions to address multiple types of victimization offer a unique opportunity to reduce involvement in delinquent behaviours and break the cycle of violence. Our findings indicate that approximately one in four children are engaging in delinquent behaviours at either moderate or high levels as well, highlighting that full attention should be given to primary prevention of victimization to reduce the continuation of

these acts as children transition into adulthood. Children in these classes also had a higher likelihood of parental depression, and some were more likely to be from low-income families. Addressing the intersection of these items could occur through designing and implementing interventions that address household stress and problems, offering substantiative benefits and children and their families (Dierkhising et al. 2019; David-Ferdon et al., 2015). Previous work has suggested that emotional dysregulation may be a mechanism that links victimization to future delinquent or aggressive behaviours, indicating that interventions that integrate emotional regulation strategies may offer wide-ranging benefits (Herts et al., 2012).

The study findings also support the notion of the 'bully-victim' spectrum and that clustering of these items occurs among children aged 4-14. These findings are consistent with previous research on clusters of delinquency and victimization among juvenile justice involved or inpatient children (Pane-Seifert et al., 2022; Haney-Caron et al., 2019; Choe et al., 2008) and among the general youth population (Davis et al., 2020; Bettencourt & Farrell, 2013). We suggest that children who have been victimized be given priority access to tailored care to reduce the likelihood of further victimization and associated consequences across contexts, including engaging in delinquent behaviours. Our findings provide new knowledge on the specific delinquency and victimization patterns at a developmental period that was previously less understood. Associations with a wide range of outcomes that can negatively impact health and social trajectories of children across the lifespan with delinquent behaviours and victimization experiences among children has been previous established, such as smoking, binge-drinking, substance misuse, mental health disorders, and reduced educational and occupational attainment (Williams et al., 2020; Romano et al., 2020; Jolliffe et al., 2017; Assink et al., 2015).

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Experiencing victimization can lead to feeling less safe and is associated with lower academic achievement as well (Brofosky et al., 2013). Comprehensively assessing delinquency and victimization by recognizing these patterns of clustered behaviours and experiences in clinical and school settings can aid identifying children at risk of other poor health behaviours and reduced well-being. School-based prevention programs have been found more effective for children than adolescents and when designed for specific behaviours and student characteristics, suggesting early and tailored interventions are needed (Salmivalli et al., 2021). Interventions that serve to boost feelings of connectedness and social engagement in school settings have also been shown to reduce negative and risky social behaviours, including those related to violence, bullying, and truancy (Patte et al., 2020). Future research should continue evaluating the impact of preceding factors of delinquency and victimization using clustered behaviours, explore the transitions between classes over time, the temporality of delinquent behaviours and experiences of victimization, as well as evaluate the effectiveness of delinquency and victimization prevention and reduction programs on class membership.

The classes of delinquency and victimization were not only differentiated by severity, but the setting in which they occur as well. Teachers consistently reported delinquent behaviours more frequently than parents suggesting that the context in which children are being observed is important to consider as well. For example, teachers are observing children during school months, with a larger number of peers, interacting in a more complex social environment than parents in the home environment (Hartley et al., 2011). Whereas parents observe children more continuously, over years, in more controlled settings. As a result, it is likely that many initiatives delivered across various contexts and settings are required to address the settings in which

children are at risk. A large literature base has evaluated school-based interventions can reduce delinquency and victimization if designed to address specific patterns of behaviours and improve overall social cohesion (Patte et al., 2020; Salmivalli et al., 2021). Further, a meta-analysis of parenting programs to reduce problematic bullying behaviours and victimization were found effective when addressing factors related to parenting style, empathy, and parent-child interactions (Chen et al., 2020). Another recent meta-analysis of digital health interventions showed promising results regarding bullying and cyberbullying reduction when components on understanding bully-victim roles and coping skills training are included (Chen et al., 2022). Given the shift to online programming during the COVID-19 pandemic, integrating digital health interventions into delinquency and victimization prevention is quite feasible. Widespread availability of these types of programs across contexts can aid in reducing childhood delinquency and victimization by addressing behaviours across settings that the study findings show patterns of behaviours and experiences occur in, but their impact or effectiveness require evaluation.

The presence of the *high victimization & high school and home delinquency* class implies that interventions to reduce childhood delinquency and victimization must consider school and home-based interventions that ideally work in tandem. These findings can inform how to best integrate previously fragmented interventions for behaviours and experiences into ones that address the interconnectedness of these items. In practice, knowledge on how experiences of victimization and acts of delinquency coincide can allow early identification of at-risk children and interventions to support children before such negative experiences accumulate further (Troop-Gordon, 2017). It may be that strategies focusing on subgroups of children may need specific interventions to reduce delinquency and victimization. Indeed, recent meta-analyses and

literature reviews have shown that school anti-bullying campaigns can reduce delinquent behaviour participation and victimization if they are evidence-based, and that tailored interventions for subgroups, and involvement of parents and teachers can increase their effectiveness (Gaffney et al., 2022; Hall, 2017). However, health promotion programs that address psychological well-being and social skills could be considered primary prevention for these behaviours and experiences and be integrated into existing health curriculum in educational settings for all children as well. Further research should investigate associations with other school factors, such as social cohesion, school climate, and safety, on the prevalence of classes of delinquency and victimization and possible transitions over time.

Further, a large amount of research has shown there are numerous biases known to have an effect of parental reports of childrens delinquency and victimization, such as social desirability bias and gendered behavioural expectations (Bouffard et al., 2021; Najman et al., 2001). One informant characteristic worth significant consideration is how parental depression influences the likelihood and perceptions of childrens delinquency and victimization. Children with parents who have depression had a lower likelihood of membership in the *low delinquency & low victimization* class, suggesting that parental depression is associated with both delinquency and victimization. These findings are in line with previous research on delinquent behaviours, in that parents with depression view their children's delinquent behaviours differently and are more likely to perceive behaviours as problematic than parents without depression (Muller et al., 2011; Van der Ende & Verhulst, 2005; Truetler & Epkins, 2003). This may be due to real differences in childrens behaviours and experiences or could reflect informant bias related to parental psychopathy (i.e., depression distortion) (Muller et al., 2011; De Los Reyes & Kazdin, 2005).

Previous work on the effect of parental depression on the reporting of victimization and delinquency items together is scarce, and future work is needed to determine causal relationships and mechanisms. However, the study findings show a large effect, indicating that future work that incorporates parental depression as a risk factor in childhood delinquency and victimization could have significant effects.

Female children had less likelihood of membership in the *moderate victimization & moderate school delinquency* and *high victimization & moderate home delinquency* classes. Previous research has found mixed results regarding sex differences (Jolliffe et al., 2017; Bettencourt & Farrell., 2013; Doucette & Hoffman, 2016). One explanation for these mixed findings could be whether analyses include both delinquency and victimization items, as prior work as found that males are more likely to participate in delinquent behaviours while females are more likely to experience victimization (Perrault, 2015; Jolliffe et al., 2017). Similarly, there are known differences in effectiveness of bullying prevention programs by sex (Kennedy, 2020). Due to the large effects found in this study, future research should evaluate if victimization reduction, delinquency reduction, or combined interventions are more or less suited for male or female children. Although older adolescents have been shown to have more victimization (Finkelhor et al., 2009), and delinquency independently, previous work on predictors of class membership for co-occurring delinquency and victimization has indicated older youth are less likely to be 'aggressive-victims' (Bettencourt & Farrell, 2013). Mixed results in the literature may be the result of measurement differences or the cumulation of experiences as one ages, suggesting the generalizability of the findings may be limited to only children aged 4-14 years. Due to the large age range among the study sample, smaller age groups or developmental periods should be

examined to determine more specific age differences in delinquent behaviours and victimization among children. The study findings show that ethnicity also had large effects in its association with class membership, where white children were found to have increased likelihood of membership in the *high victimization & high school and home delinquency* class. Systemic evaluations and literature reviews have shown that, when based on sound theory and evidence, culturally sensitive interventions tailored for children from specific subgroups are effective (Gaffney et al., 2022; Jackson, 2009). The study findings confirm previous research on household income and childhood delinquency, showing that lower family income has been associated with higher levels of delinquent behaviours and victimization (Sitnick et al., 2019; Scott & Brown, 2018; Jolliffe et al., 2017). Poverty and income inequality in communities are known risk factors of aggressive and violent childhood behaviours, with research showing that school connectedness and psychosocial education programs can reduce perpetration of and victimization by delinquent behaviours (Pabayo et al., 2022). Future research should evaluate the effectiveness of these interventions in reducing childhood delinquency and victimization and could potentially use natural experiments to explore differing effects of poverty reduction programs on childhood delinquent and victimization across jurisdictions.

Overall, reducing delinquent behaviours among children will require tailored interventions that address the prevalence of poly-victimization and not just delinquent behaviours among children. All of the latent classes in the study findings experienced some victimization, and by addressing the impacts of these events interventions will be able to address delinquent behaviours as well. Interventions to address these items need to be integrated to address the different roles of children across various contexts. Synchronized interventions available to parents, teachers,

schools, and health professionals that help address the needs of children across settings should be designed to complement existing programs to improve uptake and effectiveness.

Strengths and Limitations

Study findings build on previous work by determining the rate of children's participation in delinquent behaviours and experiences of victimization through a wider range of predictor items than previous studies. Previous literature on the subject has almost exclusively used smaller samples from inpatient psychiatry or incarcerated individuals, who have been shown to participate in more delinquent behaviours and have more prevalent experiences of victimization (Hensel et al., 2020; Eggink et al., 2019; Stewart et al., 2015). In comparison, this study expanded on previous works by using data from the 2014 OCHS—a large and representative population-based survey of children and families. To the best of our knowledge, this is only the third study that has examined latent classes of children's delinquent behaviours and victimization experiences using a general population (Davis et al., 2020; Bettencourt & Farrell, 2013), though with a larger set of predictors.

Similarly, the large sample was adequately powered to generate reliable associations. While the cross-sectional design of the 2014 OCHS prevents any causal inference, let alone temporal ordering, among variables, the reciprocal nature of victimization and delinquency indicate our findings and commentary could be applied at any point within these interrelationships. Although the study sample included only children who had both parent and teacher reports on the variables of interest, which may introduce bias, this approach provided valuable differences in the prevalence of delinquent behaviour and victimization classes across home and school settings.

Further, this study extends on previous literature by including child, parent, and teacher characteristics as covariates to understand their effects on class membership.

The 2014 OCHS had a relatively low response rate and excluded potentially high-risk populations such as children living on Indigenous reserves and in institutions (Boyle et al., 2019a). Similarly, although no overall inferences and conclusions changed compared to the imputed dataset, the unimputed dataset under-sampled male children and households below the low-income measure. No information was provided about the context of the delinquent behaviours or experiences of victimization being reported and social desirability bias may underestimate prevalence. Lastly, although model fit statistics indicate the model as adequate and reliable, class membership is determined by probabilities and misclassification is possible, though standard for these analyses (Muthén & Muthén, 2000).

Conclusion

In sum, this study identified four distinct patterns of delinquent and victimization experiences among children. While one pattern exhibited low victimization and delinquency, three patterns displayed children who have a co-occurrence of delinquent behaviours and being victimized by them. In particular, the findings illustrate how children often cyclically occupy different roles related to delinquent behaviours. Study findings indicate that male children, children from low-income households, and children with parents who have depression were more likely to have moderate or high-level delinquent behaviours and victimization. Interventions to address delinquency, victimization, and associated health impacts should address the complex interrelated behaviours and experiences children have with delinquency and victimization, and the different contexts that they occur in. Taken together, these findings advocate for an integrated

and tailored approach that addresses the impact of prior victimization in delinquent behaviour participation and considers broader household factors that uniquely influence the likelihood of delinquency and victimization.

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Table 1

Table 6.1 - Sample 2 Characteristics

	Percentage	Mean (SD)
Youth characteristics		
Age		7.6 (2.3)
Male	49.02	
Parent characteristics		
Male	10.21	
University degree	47.68	
Minority ethnicity	29.48	
Urban	87.44	
Below LIM	17.61	
Immigrant	34.35	
Parental depression	3.58	
Teacher characteristics		
Male	12.14	
Class size <24	54.57	22.7 (4.8)
10+ years experience	65.73	

Table 6.2 - Endorsement of Delinquency and Victimization Items in Sample 2

Item	Frequency					
	0	1	2	3	4	5
Parent reported						
Cruelty	85.99	9.54	2.17	1.81	0.50	-
Vandalism	88.50	7.42	3.43	0.66	-	-
Theft	97.68	1.70	0.62	-	-	-
Violence	88.40	8.15	2.76	0.69	-	-
Truancy	98.82	1.17	-	-	-	-
Bullied	56.85	13.15	9.29	6.19	11.26	3.25
Assaulted	83.72	15.33	0.95	-	-	-
Teacher reported						
Cruelty	79.80	11.95	3.96	2.42	0.65	1.22
Vandalism	89.12	5.81	2.74	1.23	1.09	-
Theft	95.54	3.91	0.55	-	-	-
Violence	85.29	8.11	4.46	0.99	1.15	-
Truancy	94.52	4.12	1.36	-	-	-

Note: Data reported are proportions.

Table 6.3 - Proportion of Delinquency and Victimization Types Reported by Parents and Teachers

Number of Types	Parent	Teacher
Delinquency Items		
0	0.77	0.75
1	0.13	0.12
2	0.06	0.07
3	0.03	0.04
4+	0.01	0.02
Victimization Items		
0	0.55	-
1	0.33	-
2	0.12	-

Table 6.4 - Fit Statistics for latent class models of youth delinquent and victimization items

Model	Log likelihood	AIC	BIC	Entropy
2 classes		19757.207	20242.194	0.907
3 classes	-9506.477	19286.954	20050.669	0.849
4 classes	-9304.895	18983.790	20026.232	0.902
5 classes	-9154.923	18783.846	20105.017	0.808
6 classes	-9029.141	18632.283	20232.181	0.850

Table 6.5 - Conditional item-response probabilities and the prevalence of latent classes of youth delinquency and victimization items

	High victimization & high home and school delinquency	High victimization & moderate home delinquency	Moderate victimization & moderate school delinquency	Low victimization & delinquency
Prevalence	4.98%	11.84%	7.76%	75.42%
Parent-reported items				
Cruelty				
0	0.548	0.304	0.887	0.972
1	0.279	0.434	0.105	0.025
2	0.102	0.112	0.001	0.003
3	0.048	0.125	0.000	0.000
4	0.022	0.025	0.008	0.000
Vandalism				
0	0.692	0.569	0.834	0.957
1	0.138	0.289	0.130	0.027
2	0.110	0.116	0.034	0.015
3	0.061	0.026	0.002	0.000
Theft				
0	0.877	0.951	0.957	0.990
1	0.077	0.020	0.043	0.010
2	0.046	0.029	0.000	0.000
Violence				
0	0.518	0.492	0.858	0.978
1	0.182	0.353	0.142	0.022
2	0.203	0.139	0.000	0.000
3	0.097	0.016	0.000	0.000
Truancy				
0	0.866	0.991	0.962	0.999
1	0.134	0.009	0.038	0.001
Bullied				
0	0.237	0.253	0.457	0.657
1	0.218	0.193	0.095	0.119
2	0.104	0.178	0.051	0.082
3	0.159	0.113	0.037	0.049
4	0.084	0.199	0.280	0.081
5	0.198	0.063	0.079	0.011
Assaulted				
0	0.648	0.605	0.723	0.902
1	0.299	0.382	0.218	0.098
2	0.052	0.014	0.059	0.000
Teacher-reported items				
Cruelty				
0	0.001	0.755	0.146	0.932
1	0.053	0.238	0.446	0.067
2	0.109	0.007	0.398	0.000
3	0.468	0.000	0.010	0.000

4	0.129	0.000	0.000	0.000
5	0.241	0.000	0.000	0.000
Vandalism				
0	0.229	0.870	0.550	0.978
1	0.173	0.071	0.365	0.014
2	0.248	0.059	0.029	0.007
3	0.169	0.000	0.041	0.000
4	0.181	0.000	0.015	0.001
Theft				
0	0.461	0.989	0.817	0.999
1	0.439	0.007	0.183	0.001
2	0.100	0.004	0.000	0.000
Violence				
0	0.000	0.845	0.130	0.993
1	0.079	0.119	0.686	0.007
2	0.509	0.031	0.184	0.000
3	0.184	0.005	0.000	0.000
4	0.228	0.000	0.000	0.000
Truancy				
0	0.851	0.911	0.852	0.968
1	0.105	0.083	0.075	0.026
2	0.044	0.006	0.074	0.006

Table 6.6 - Estimated odds ratios from a latent class analysis reflecting the effects of covariates on membership of latent classes of youth delinquency and victimization

	Low victimization & delinquency	High victimization & high home and school delinquency	High victimization & moderate home delinquency	Moderate victimization & moderate school delinquency
Youth age	Reference group	**0.88 (0.80 – 0.96)**	0.99 (0.93 – 1.05)	0.94 (0.87 – 1.01)
Youth sex	Reference group	0.54 (0.27 – 1.08)	**0.41 (0.23 - 0.74)**	**0.15 (0.06 – 0.38)**
Ethnicity	Reference group	**0.38 (0.16 – 0.92)**	0.63 (0.32 – 1.27)	1.27 (0.41 – 3.99)
Household income	Reference group	**2.73 (1.44 – 5.16)**	1.17 (0.60 – 2.27)	1.93 (0.85 – 4.34)
Parental depression	Reference group	**5.17 (1.63 – 16.46)**	**11.66 (3.48 – 39.11)**	**8.28 (2.41 – 28.42)**

Estimated include adjusted odds ratios and 95% confidence intervals. Youth sex (male/female), ethnicity (white/non-white), household income (above LICO/below LICO), parental depression (present/not present).

Chapter 7: Manuscript 3

Associations between patterns of delinquency and victimization and mental health among youth.

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Abstract

Importance: Despite evidence that engaging in and being victimized by delinquent behaviors often cluster, previous research has historically evaluated these behaviors independently when investigating their associations with mental health.

Objective: This study aimed to delineate associations between latent classes of delinquency and victimization and mental disorder and explore the moderating effects of social relationships, mental health services, and demographic variables in associations between latent classes and mental disorders.

Design: Data come from the cross-sectional 2014 Ontario Child Health Study (OCHS). Latent class analysis was performed to identify patterns of delinquent behaviors and victimization. Multinomial regression examined the association between latent classes and mental disorders and influence of moderators on these associations.

Setting: The 2014 OCHS is a population-based study conducted by Statistics Canada.

Participants: The sample consisted of 1,948 children aged 4-14 years from the 2014 OCHS.

Outcomes and Measures: Delinquent behaviors and experiences of victimization were measured using the OCHS-Emotional Behavioral Scales. Mental disorders were measured using the Mini International Neuropsychiatric Interview for Children and Adolescents.

Results: Four classes were identified: 1—high victimization & high home and school delinquency; 2—high victimization & moderate home delinquency; 3—moderate victimization & moderate school delinquency; and 4—low victimization and low delinquency. Children in the high victimization & moderate home delinquency class were more likely to have internalizing (OR=2.01; 95%CI=1.28–3.17) and externalizing (OR=5.76; 95%CI=3.68–9.03) disorders. Children in the high victimization & high home and school delinquency (OR=12.52;

95%CI=6.93–22.60) and moderate victimization & moderate school delinquency (OR=6.96; 95%CI=4.29–11.32) classes were more likely to have externalizing disorders. None of the covariates tested exerted moderating effects on the associations between latent classes and mental disorders.

Conclusions and Relevance: Differences exist in associations between specific patterns of delinquency and victimization and internalizing and externalizing disorders among children. Social relationships, mental health services, and demographic variables did not moderate these associations. Mental health interventions should adopt a trauma-informed approach that accounts for different patterns of delinquency and victimization.

Keywords: Mental health, Delinquency, Victimization, Relationships, Children

Introduction

Childhood is an important period in the development of behaviors that often persist through the lifespan (Troop-Gordon et al., 2017; Stewart et al., 2015). Children are a high-risk group for engagement in delinquent behaviors, as perpetrators and/or victims. A 2012 Canadian study reported 37% of children engaged in one or more delinquent behaviors in their lifetimes, which mostly consisted of acts of violence, property damage, or those involving illicit drugs (NCPC, 2012). Similarly, 40% of Canada children had been victimized in the year that preceded the survey (NCPC, 2012). Studies have shown that children who have been victimized begin to engage in aggressive and delinquent behavior at higher rates (Baglivio et al., 2014).

Similarly, childhood has been proven to be when most mental health disorders develop (Kessler et al., 2007). Although most children with mental disorder do not participate in delinquent behaviors, the prevalence of mental disorder among individuals accused of, or victimized by crime (39% and 37%), is higher than in the general population (26%) (Hensel et al., 2020). Studies have reported that 40 to 70% of children that encounter the criminal justice system as perpetrators or victims have diagnosed or undiagnosed mental disorder (Davis et al., 2020).

The significant physiological, cognitive, and social change that occurs during childhood suggests the salience of studying delinquency, victimization, and health during this period of life [Troop-Gordon et al., 2017; Davis et al., 2020). Experiences of delinquency or victimization among children may compound existing inequities derived from factors such as childhood trauma, lack of social supports, and low socioeconomic status (Jolliffe et al., 2017). Studies have found that children who participate in delinquent behaviors or are victimized are more likely to have lower

educational and occupational attainment in adulthood (Jolliffe et al., 2017). However, despite evidence that engaging in and being victimized by delinquent behaviors often cluster (Davis et al., 2020; Bettencourt & Farrell, 2013), research has historically evaluated these items independently when determining associations with mental health (Hensel et al., 2020; Haney-Caron et al., 2019). Further, differences between internalizing (symptoms related to internal sense of self) and externalizing (symptoms related to interactions with external environments) mental disorders have not been explored.

Objectives

Limited research has examined the relationships between patterns of childhood delinquency and victimization and mental disorders among the general population (Haney-Caron et al., 2019). While studies have examined associations with psychosocial outcomes independently, those that have evaluated their co-occurrence often utilize samples of incarcerated or in-patient children (Hensel et al., 2020; Haney-Caron et al., 2019; Khalifeh et al., 2015). However, children in treatment and/or incarcerated are more inclined to have poor mental health and disruptive behaviors, generating results with limited generalizability (Markowitz, 2011). Similarly, if knowledge gaps exist on how clusters of delinquency and victimization are associated with mental disorders then the extent to which moderators influence this association in the general population is also less understood.

To address this knowledge gap, this primary objective of this study was to delineate associations between latent classes of delinquency and victimization and internalizing or externalizing mental

disorders. The secondary objective was to explore the potential moderating effects of social relationships, mental health services, and demographic variables on these associations.

Methods

Sample

This study used data from the 2014 Ontario Child Health Study (OCHS), a population survey of 10,802 children and children aged 4 to 17 years across Ontario (Boyle et al., 2019a). Sample selection was conducted through multistage random sampling that identified population sampling units, stratified by income, and allocated households for random selection was used (Boyle et al., 2019a). Due to these complex design features, sampling weights were used to generate reliable variance estimates (Boyle et al., 2019a). Data collection occurred through in-person and telephone interviews. In households with two or more children, one was labelled as the selected child (n=6,537) who was the focus of all questionnaires. Further explanation of the 2014 OCHS methodology is described in Boyle et al., 2019a. The OCHS was approved by the Hamilton Integrated Research Ethics Board (HIREB 13-140). For the purposes of this paper only children with parent and teacher reports of delinquency and victimization were included in the analysis. By design only selected children aged 4 to 14 years had parents respond to questions of victimization, and their teachers were invited to complete reports. In all, 2,376 individuals were eligible for the study, of which 1,948 (82.0%) individuals had complete data on delinquency and victimization. Of the 1,948 individuals in the final sample, 40.6% (n=792) had incomplete data

on mental disorders. Missing data were associated with male child sex (-0.07; p<0.01) and household income being below the low-income measure (-0.54; p<0.01).

Measures

Latent Classes

Parents and teachers reported child delinquent behaviors over the past six months and experiences of victimization as part of the validated Ontario Child Health Study Emotional Behavioral Scales (OCHS-EBS) (Boyle et al., 2019b). Parents responded to four questions on cruelty-related behaviors, four on vandalism-related behaviors, four on theft-related behaviors, three on violence-related behaviors, two on truancy-related behaviors, four on experiences of their child being bullied, and one on experiences of being assaulted. Teachers responded to four questions on cruelty-related behaviors, four on vandalism-related behaviors, one on theft-related behaviors, three on violence-related behaviors, and one on truancy-related behaviors. Responses for questions were 'never' (1), 'sometimes' (2), and 'often' (3) and were summed for each behavior, with higher scores reflecting more frequent delinquency or victimization. Internal consistency reliabilities for each delinquent behaviour type ranged from Cronbach $\alpha= 0.66 – 0.74$. The internal consistency reliability of the bullied summed score was $\alpha=0.88$. Full description and examples of indicators questions for each behaviour item are included in the supplementary material.

Mental Disorder

Mental disorder in the OCHS was measured using a modified version of the Mini International

Neuropsychiatric Interview for Children and Adolescents (MINI-KID) (Boyle et al., 2019b;

Sheehan et al., 1998). The MINI-KID assesses DSM-IV and ICD-10 psychiatric disorders among

children and can be administered to children and parents (Sheehan et al., 1998; Sheehan et al.,

2010). Research has confirmed the MINI-KID provides valid and reliable psychiatric diagnoses

and is often used in clinical and research work (Sheehan et al., 1998; Duncan et al., 2018). For

this study mental disorders measured by the MINI-KID were categorized as internalizing (major

depressive disorder, generalized anxiety disorder, separation anxiety disorder, and social phobia)

or externalizing (conduct disorder, opposition defiant disorder, attention deficit hyperactivity

disorder).

Covariates

Peer relationships were measured by asking parents 'During the past 6 months, how well has

your child gotten along with other kids such as friends or classmates?', with responses 'no

problems' (1), 'hardly any problems' (2), and 'occasional problems' (3) or 'frequent problems'

(4). Occasional and frequent problem responses were collapsed, and no problems was coded as

the referent group. Family relationships were measured by asking parents 'During the past 6

months, how well has your child gotten along with family?' with the same response options and

organization. School mental health services was measured by asking parents 'Since the

beginning of the school year, did this child receive any individual or group counselling, or any

other help at school for these concerns?'

Parents reported child age and sex, parent sex, ethnicity, and education level, urbanicity (urban/rural), immigrant status (one or both parents born outside Canada), and parental depression. Previously diagnosed parental depression was measured by asking caregivers 'If a doctor had ever diagnosed you with depression'. Teachers reported teacher sex, class size, and years of experience teaching. Household income was assessed through 2011 Canadian Census data. To maintain sufficient cell counts for analyses and satisfy Statistics Canada data vetting protocols ethnicity (white or non-white), parent education level (post-secondary or no post-secondary), class size (<24 or ≥24 students), and teachers experience (<10 or 10≥ years of teaching) were dichotomized.

Analysis

Latent class analysis (LCA) was used to determine mutually exclusive groups of delinquency and victimization patterns using MPlus v8.5 (Muthén & Muthén, 2017). Modelling began with a two-class model and further classes were added while comparing model fit indices to determine the best model. Model fit was evaluated using the Bayesian Information Criteria (BIC) and Akaike Information Criterion (AIC), with lower values indicating better fit. After LCA model selection, differences in mental disorder by latent class membership and covariates were explored through logistic regression analyses (unadjusted). Backwards stepwise elimination was used to screen out variables for inclusion in an adjusted multinomial regression model, with the procedure dictating which levels of categorical variables were to be kept in the model (instead of all or none). Moderators of the association between latent class membership and mental health

status were tested by including a product-term interaction with latent classes in the model. A type I error of α=0.05 was used for all statistical tests, and odds ratios (OR) and 95% confidence intervals (CI) were calculated using SAS v9.4 (SAS Institute, 2013). Missing data were considered missing at random (while missingness was related to child sex and household income, these were not cause of missingness), imputed using PROC MI (25 datasets), and analyzed using PROC MIANALYZE.

Results

Sample Characteristics

Approximately half of the sample was male (49.0%, n=955) and the average age was 7.6 (SD=2.3) years, 17.6% (n=343) of children came from households below the low-income measure, and 3.6% (n=70) from households where at least one parent had previously diagnosed depression. Of the children in the sample, 22.1% were reported to have a mental disorder (n=431), 16.4% (n=320) and 14.2% (n=275) of children were reported to have occasional or frequent problems in peer relationships and family relationships, respectively, and 8.7% received mental health services at school (n=170). Table 1 displays additional sample characteristics. The behaviours most frequently reported by parents were reported cruelty-related behaviours (14.0%), violence-related behaviours (11.6%), and vandalism-related behaviours (11.5%), with teachers also reporting these most frequently at 20.2%, 14.7% and 10.9%, respectively. Parent reports showed that 43.2% of children experienced victimization through bullying behaviours

and 16.3% had been assaulted. Table 2 presents full information on the frequency of delinquency and victimization items.

Latent Class Analysis

The best fitting LCA model was determined to be the four-class model (model fit statistics shown in Supplemental Materials). Four distinct patterns of delinquency and victimization were determined, labelled as: 1—high victimization & high home and school delinquency, characterized by many experiences of victimization, and high participation in both parent- and teacher-reported delinquent behaviors (5.0%); 2—high victimization & moderate home delinquency, characterized by many experiences of victimization as well as low and moderate participation in teacher- and parent-reported delinquent behaviors, respectively (11.8%); 3—moderate victimization & moderate school delinquency, characterized by some experiences of victimization, and low and moderate participation in parent- and teacher-reported delinquent behaviors, respectively (7.8%); and 4—low victimization & low delinquency, characterized by few experiences of victimization and low participation in delinquent behaviors (75.4%). Table 3 outlines the prevalence and response probabilities of the latent classes.

Logistic Regression Analysis

Several factors were associated with the likelihood of internalizing and externalizing disorders (Table 4). Compared to children from the low victimization and low delinquency class, children from the high victimization & high home and school delinquency (OR=1.81; p=0.04), high

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victimization & moderate home delinquency (OR=3.53; p<0.01), and moderate victimization & moderate school delinquency (OR=1.98; p<0.01) had greater odds of internalizing disorders. Compared to children from the low victimization and low delinquency class, children from the high victimization & high home and school delinquency (OR=20.81; p<0.01), high victimization & moderate home delinquency (OR=14.46; p<0.01), and moderate victimization & moderate school delinquency (OR=6.32; p<0.01) had greater odds of externalizing disorders.

Older children had a higher likelihood of internalizing (OR=1.13; p<0.01) and externalizing disorders (OR=1.05; p<0.01), and children from lower income households had higher odds for internalizing (OR=1.34; p<0.01) or externalizing disorder (OR=1.96; p<0.01) as well. Male children had lower odds of internalizing disorder (OR=0.44), but higher odds of externalizing disorder (OR=2.65; p<0.01). Previously diagnosed parental depression was also associated with internalizing (OR=7.57; p<0.01) and externalizing disorders (OR=10.31; p<0.01). Children who had frequent or occasional problems with peer relationships had greater odds of internalizing (OR=7.12); p<0.01) or externalizing disorder (OR=19.03; p<0.01). Children who had frequent or occasional problems with family relationships had greater odds of internalizing (OR=3.77; p<0.01) or externalizing disorder (OR=13.22; p<0.01).

Multinomial Regression Analysis

Multinomial logistic regression analysis was performed to predict mental disorders with significant variables from the logistic regression analyses (shown in Table 5). None of the covariates moderated the association between latent class membership and mental disorders

(shown in Supplemental Materials). For both internalizing and externalizing disorders (reported respectively), child age by latent class (2.48; p=0.51) (1.51; p=0.65), child sex by latent class (1.35; p=0.74) (1.85; p=0.72), household income by latent class (2.71; p=0.49) (1.67; p=0.41), previously diagnosed parental depression by latent class (2.34; p=0.24) (2.68; p=0.57), school mental health service use by latent class (4.74; p=0.57) (3.62; p=0.34), peer relationships by latent class (2.83; p=0.82) (6.06; p=0.38), and family relationships by latent class (7.12; p=0.29) (3.25; p=0.68) were found insignificant. However, covariates had varying effects on the likelihood of mental disorders.

Compared to children with no mental disorder, children with an internalizing disorder were more likely to be from the high victimization & moderate home delinquency (OR=1.95; p<0.01) and have frequent or occasional problems in peer relationships (OR=3.17; p<0.01), but less likely to be from lower income households (OR=0.53; p<0.01) and to have accessed mental health services at school (OR=0.32; p<0.01). Children with an externalizing disorder were more likely to be from the high victimization & high home and school delinquency (OR=8.64; p<0.01), high victimization & moderate home delinquency (OR=4.18; p<0.01), and moderate victimization & moderate school delinquency classes (OR=5.47; p<0.01). They were less likely to have a parent previously diagnosed with depression (OR=0.36; p=0.02) and have accessed mental health services at school (OR=0.15; p<0.01), but more likely to be male (OR=1.81; p=0.01), and to have frequent or occasional problems in peer (OR=2.71; p<0.01) and family relationships (OR=2.62; p<0.01).

Discussion

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This study modelled associations between latent classes of delinquency and victimization and mental disorders and tested potential moderating effects of these associations. The strongest associations were found between high or moderate victimization classes and externalizing disorders. Different associations were found between the high victimization & moderate home delinquency class and internalizing and externalizing disorders, while the high victimization & high home and school delinquency and moderate victimization & moderate school delinquency class were associated with externalizing disorders only. These findings confirm previous research on the associations between clusters of delinquency and victimization and mental health among juvenile justice involved or inpatient children (Haney-Caron et al., 2019), while expanding to describe associations among the general population. Our findings are also consistent with research that has examined clusters of delinquency or victimization with mental health (Jennings et al., 2019; Holt et al., 2017), while contributing new knowledge for relationships between clusters of delinquency and victimization with mental health.

These findings inform the provision of mental health interventions that address patterns of clustered delinquency and victimization. Children experiencing high victimization are most likely to need trauma-informed services to reduce the impacts of mental health problems, and blunt risk of more serious delinquency. Individuals working in sectors related to children's behavior (e.g., behavioral therapists, educators, social workers) must be equipped to identify risk of mental disorder based on patterns of behaviors and experiences in which children present. Mental health services and delinquency interventions require integrated and aligned goals to improve efficacy (McCormick et al., 2017). Longitudinal research is necessary to dissect the

temporality of events and diagnoses, as well as the potential impact of mental disorder symptoms on the effectiveness of delinquency and victimization reduction programs.

None of the variables moderated the associations between latent classes and mental disorders. However, child sex, household income, previously diagnosed parental depression, school mental health services, and peer and family relationships had significant and varying associations with likelihood of internalizing and externalizing behaviors. These findings align with previous research, which has found these items to be associated with delinquent behaviors, victimization, and mental disorders independently (Jolliffe et al., 2017; Logan-Greene et al., 2019). Children with mental disorders had a higher likelihood of previously diagnosed parental depression and lower household income. Interventions that address household mental health and stressors could have broad benefits (Dierkhising et al., 2019). Previous work has suggested that emotional dysregulation may be a mechanism that links victimization to future delinquent behaviors, indicating that interventions that integrate emotional regulation strategies may offer benefits as well (Herts et al., 2012).

Study findings indicate that children in high or moderate victimization and delinquency classes were more likely to have mental disorders, indicating early intervention is necessary to address the nexus of these items. Our findings also show sex differences in the likelihood of internalizing and externalizing disorders which, when coupled with previous research indicating sex differences in likelihood of delinquency and victimization (Jolliffe et al., 2017; Perrault, 2015), suggest that sex-specific approaches are needed. For instance, interventions for female children should place greater emphasis on experiences of trauma when targeting internalizing disorders.

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Bivariate analyses indicated that older children were more likely to have internalizing and externalizing disorders than younger children, however age effects were not significant in the adjusted model. Future work would benefit from investigating these items in smaller age groups or developmental periods to determine the presence of specific age differences.

Social relationships had a strong effect on likelihood of internalizing and externalizing disorders, confirming research that shows healthy relationships and social skill development improves behavior and social climates for children, particularly at school (Bonell et al., 2015). Previous work has suggested school-level policies that foster socio-emotional skills could provide wide ranging psychosocial benefits (Romano et al., 2020). Future work should evaluate the effectiveness of school-level policies on the prevalence of specifics patterns of delinquency and victimization and relationships with mental disorders. Previous work utilizing natural experiments to study youth behaviours such as physical activity and substance use have identified school-level programs, such as school connectedness, that could be relevant to reducing delinquency and victimization as well (Weatherson et al., 2018). Universal school-based violence prevention programs have also been proven effective at reducing delinquency, particularly among children who have experienced victimization (Crooks et al., 2011).

Limitations

While the cross-sectional design of the 2014 OCHS limits causal inferences, shared risk factors and the co-occurrence of delinquency, victimization, and mental disorders suggest the implications of our findings could be applied broadly. Although bias may have been introduced

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by only including children who had both parent and teacher reports on the variables of interest in the study, this provided unique insights in the patterns of delinquent behavior and victimization classes across home and school settings. The 2014 OCHS had a relatively low response rate and excluded potentially high-risk populations such as children living on Indigenous reserves and in institutions (Boyle et al., 2019a). Finally, no information was provided about the context of delinquency or victimization being reported and social desirability bias may underestimate prevalence.

Conclusions

This is the first study to investigate associations between internalizing and externalizing disorders and distinct classes of delinquent and victimization experiences among children from the general population. Findings indicate children with patterns of high to moderate delinquency and victimization are most at risk, particularly for externalizing disorders. Sociodemographic variables, social relationships, and school mental health services did not moderate the relationship between latent classes and mental disorders but were associated with likelihood of internalizing and externalizing disorders. Overall, findings indicate that patterns of delinquent behavior and victimization must be considered in tailored mental health interventions that integrate a trauma-informed approach and reduce the risk of more severe delinquent behaviors.

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Tables

Table 7.1 - Sample 3 Characteristics

	n	%
Child characteristics		
Age		
Male	955	49.0
Any mental disorder	431	22.1
Internalizing	243	12.4
Externalizing	265	13.6
School counselling	170	8.74
Peer relationships		
No problems	1125	57.7
Hardly any problems	503	25.8
Occasional or frequent problems	320	16.3
Family relationships		
No problems	1148	58.9
Hardly any problems	525	26.9
Occasional or frequent problems	275	14.1
Parent characteristics		
Male	199	10.2
University degree	929	47.7
Minority ethnicity	574	29.5
Urban	1703	87.4
Below LIM	343	17.6
Immigrant	669	34.5
Parental depression	70	3.6
Teacher characteristics		
Male	236	12.1
Class size <24 students	1063	54.6
10+ years' experience	1280	65.7

Note: LIM: Low-Income Measure

Table 7.2 - Endorsement of Delinquency and Victimization Items in Sample 3

	Frequency					
	0	1	2	3	4	5
Item						
Parent reported						
Cruelty	85.99	9.54	2.17	1.81	0.50	-
Vandalism	88.50	7.42	3.43	0.66	-	-
Theft	97.68	1.70	0.62	-	-	-
Violence	88.40	8.15	2.76	0.69	-	-
Truancy	98.82	1.17	-	-	-	-
Bullied	56.85	13.15	9.29	6.19	11.26	3.25
Assaulted	83.72	15.33	0.95	-	-	-
Teacher reported						
Cruelty	79.80	11.95	3.96	2.42	0.65	1.22
Vandalism	89.12	5.81	2.74	1.23	1.09	-
Theft	95.54	3.91	0.55	-	-	-
Violence	85.29	8.11	4.46	0.99	1.15	-
Truancy	94.52	4.12	1.36	-	-	-

Note: Data reported are proportions.

Table 7.3 - Conditional item-response probabilities and the prevalence of latent classes of childhood delinquency and victimization items

	High victimization & high home and school delinquency	High victimization & moderate home delinquency	Moderate victimization & moderate school delinquency	Low victimization & delinquency
Prevalence	4.98%	11.84%	7.76%	75.42%
Parent-reported items				
Cruelty				
0	0.548	0.304	0.887	0.972
1	0.279	0.434	0.105	0.025
2	0.102	0.112	0.001	0.003
3	0.048	0.125	0.000	0.000
4	0.022	0.025	0.008	0.000
Vandalism				
0	0.692	0.569	0.834	0.957
1	0.138	0.289	0.130	0.027
2	0.110	0.116	0.034	0.015
3	0.061	0.026	0.002	0.000
Theft				
0	0.877	0.951	0.957	0.990
1	0.077	0.020	0.043	0.010
2	0.046	0.029	0.000	0.000
Violence				
0	0.518	0.492	0.858	0.978
1	0.182	0.353	0.142	0.022
2	0.203	0.139	0.000	0.000
3	0.097	0.016	0.000	0.000
Truancy				
0	0.866	0.991	0.962	0.999
1	0.134	0.009	0.038	0.001
Bullied				
0	0.237	0.253	0.457	0.657
1	0.218	0.193	0.095	0.119
2	0.104	0.178	0.051	0.082
3	0.159	0.113	0.037	0.049
4	0.084	0.199	0.280	0.081
5	0.198	0.063	0.079	0.011
Assaulted				
0	0.648	0.605	0.723	0.902
1	0.299	0.382	0.218	0.098
2	0.052	0.014	0.059	0.000
Teacher-reported items				
Cruelty				

0	0.001	0.755	0.146	0.932
1	0.053	0.238	0.446	0.067
2	0.109	0.007	0.398	0.000
3	0.468	0.000	0.010	0.000
4	0.129	0.000	0.000	0.000
5	0.241	0.000	0.000	0.000
Vandalism				
0	0.229	0.870	0.550	0.978
1	0.173	0.071	0.365	0.014
2	0.248	0.059	0.029	0.007
3	0.169	0.000	0.041	0.000
4	0.181	0.000	0.015	0.001
Theft				
0	0.461	0.989	0.817	0.999
1	0.439	0.007	0.183	0.001
2	0.100	0.004	0.000	0.000
Violence				
0	0.000	0.845	0.130	0.993
1	0.079	0.119	0.686	0.007
2	0.509	0.031	0.184	0.000
3	0.184	0.005	0.000	0.000
4	0.228	0.000	0.000	0.000
Truancy				
0	0.851	0.911	0.852	0.968
1	0.105	0.083	0.075	0.026
2	0.044	0.006	0.074	0.006

Table 7.4 - Logistic regression analysis of variables influencing likelihood of internalizing and externalizing disorders

Variable	Internalizing Disorders		Externalizing Disorders	
	OR	95% CI	OR	95% CI
Child age	1.13	1.12 – 1.13	1.05	1.05 – 1.06
Child sex	2.65	2.58 – 2.73	0.44	0.43 – 0.45
Household income	1.34	1.29 – 1.38	1.96	1.90 – 2.01
Parental depression	7.57	7.23 – 7.93	10.31	9.85 – 10.80
School mental health programs	0.12	0.11 – 0.12	0.06	0.06 – 0.06
Peer relationships 2 v 1	3.64	3.52 – 3.77	3.79	3.66 – 3.94
Peer relationships 3 v 1	7.12	6.88 – 7.37	19.03	18.36 – 21.73
Family relationships 2 v 1	5.86	5.68 – 6.05	4.44	4.29 – 4.59
Family relationships 3 v 1	3.77	3.64 – 3.92	13.22	13.01 – 13.46
Latent Class 1 v 4	1.81	1.72 – 1.91	20.81	19.21 – 22.49
Latent Class 2 v 4	3.53	3.42 – 3.64	14.46	13.47 – 15.49
Latent Class 3 v 4	1.98	1.89 – 2.07	6.32	5.90 – 6.76

Note: Estimates include adjusted odds ratios and 95% confidence intervals. 'No Disorder' was the reference category. Child sex (female/male), household income (below Low-Income Measure/above Low-Income Measure), parental depression (not present/present), school mental health programs (accessed/ not accessed), peer and social relationships (1: no problems, 2: hardly any problems, 3: occasional or frequent problems).

Table 7.5 - Estimated adjusted odds ratios from multinomial logistic regression analysis

Variable	Internalizing Disorders		Externalizing Disorders	
	OR	95% CI	OR	95% CI
Child age	1.00	0.93 – 1.08	1.01	0.93 – 1.09
Child sex	**0.63**	**0.45 – 0.87**	**1.69**	**1.18 – 2.42**
Household income	**0.53**	**0.37 – 0.75**	1.02	0.68 – 1.53
Parental depression	**0.32**	**0.21 – 0.47**	**0.46**	**0.23 – 0.92**
School mental health programs	**3.48**	**2.24 – 5.40**	**7.56**	**4.70 – 12.16**
Peer relationships 2 v 1	1.06	0.70 – 1.61	1.41	0.79 – 2.18
Peer relationships 3 v 1	**1.97**	**1.22 – 3.04**	**2.58**	**1.60 – 4.17**
Family relationships 2 v 1	**2.07**	**1.39 – 3.09**	1.07	0.69 – 1.68
Family relationships 3 v 1	1.52	0.98 – 2.50	**2.52**	**1.57 – 4.05**
Latent Class 1 v 4	0.92	0.44 – 1.90	**12.52**	**6.93 – 22.60**
Latent Class 2 v 4	**2.01**	**1.28 – 3.17**	**5.76**	**3.68 – 9.03**
Latent Class 3 v 4	1.54	0.89 – 2.68	**6.96**	**4.29 – 11.32**

Note: Bolded entries identify those that are significant. 'No Disorder' was the reference category. Estimates include adjusted odds ratios and 95% confidence intervals. Child sex (female/male), household income (below Low-Income Measure/above Low-Income Measure), parental depression (not present/present), school mental health programs (accessed/ not accessed), peer and social relationships (1: no problems, 2: hardly any problems, 3: occasional or frequent problems).

Chapter 8: General Discussion

8.1 Overview

Delinquency and victimization among children and youth, along with their associations with relevant risk factors and outcomes, have been studied in isolation. However, both poly-participation in delinquent behaviours and poly-victimization are known to frequently co-occur (Cyr et al., 2013; Bettencourt & Farrell, 2013; Davis et al., 2020). Further, individuals who participate in delinquent behaviours are more likely to be victimized, and vice versa (Logan-Greene et al., 2018; Joliffe et al., 2017; Farrington et al., 2017; Ford et al., 2010; Savoie, 2007; Baglivio et al., 2014; Ogrodnik, 2010). Childhood and adolescence are a critical developmental period for addressing social behaviours and mental health (Stewart et al., 2015; Public Safety Canada, 2017; Allen & Superle, 2016). Early prevention and interventions need practical and timely information to improve individual and population mental health. The findings of this body of research will help inform interventions to address the nexus of these items.

The combined objectives of this dissertation were to: 1) determine the prevalence of delinquency and victimization among children; 2) define the level of agreement between parent and teacher reports of child delinquency; 3) examine the effects of child and informant characteristics on level of agreement; 4) identify specific patterns of delinquency and victimization; 5) examine the relationships between latent class membership and child and informant characteristics; 6) delineate the associations between latent classes and mental disorders; and, 7) explore the moderating effect of covariates on the associations between latent classes and mental disorders.

Given the frequent co-occurrence of these items, and the critical nature of childhood and adolescence in establishing health and social trajectories throughout the lifespan, this dissertation

addressed an important knowledge gap by investigating multi-informant reports, determining distinct patterns of clustered behaviours and experiences, and delineating associations with risk factors and mental health outcomes. The pairing of parent and teacher reports to compare home and school behaviours provided novel information on how children exhibit behaviours and experiences in the settings that shape their social behaviours most. Examining clusters of delinquency and victimization across home and school settings created new knowledge on specific patterns that suggest tailored-coordinated interventions could reduce prevalence and severity. By delineating the associations between latent classes of delinquency and victimization and mental disorders, novel findings were created that can inform interventions by considering the differential effects of delinquency and victimization on internalizing and externalizing disorders in the general population.

The following sections of this chapter present key findings for each manuscript presented in this dissertation (Section 8.2), integrated conclusions from this body of research (Section 8.3), implications for practice, policy, and future research (Section 8.4), strengths and limitations (Section 8.5), and overall conclusions (Section 8.6).

8.2 Summary of Key Findings

Study 1 (Chapter 5) used the trifactor model to examine levels of agreement between parent and teacher reports of child delinquency, the effect of child and informant characteristics on level of agreement, and associations between child and informant characteristics on parent and teacher reports independently. Study findings indicated there is little agreement between parent and teacher reports, with levels of agreement failing to meet minimum thresholds for all types of delinquency except for violence-related behaviours. While older children, female

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reporting parents, lower income households, immigrant households, and parental depression were associated with greater agreement between parents and teachers, lower parental education and lower teacher experience were associated with lesser agreement. This is consistent with previous research that has found relatively low levels of agreement across multi-informant assessments of children behaviours (De Los Reyes & Makol, 2021; Kim & von der Embse, 2021; De Los Reyes et al., 2015; van der Ende et al., 2012; Müller et al., 2011). While study findings were novel in presenting the effects that child and informant characteristics have on levels of agreement, the effect of said characteristics on reporting of delinquent behaviours have been previously reported (van der Ende et al., 2012; Egli et al., 2010; Kraemer et al., 2003; van der Ende & Verhulst, 2005; De Los Reyes & Kazdin, 2005). The finding that parents and teachers each provide information relevant to the contexts in which they observe children, highlights the value of comprehensive assessments; they can improve the selection of appropriate co-ordinated strategies to reduce childhood delinquency across settings.

Study 2 (Chapter 6) used latent class analysis to determine distinct patterns of delinquency and victimization among children as well as associations between latent classes and child and informant characteristics. Study findings identified four classes of delinquency and victimization: low delinquency & low victimization; moderate victimization & moderate school delinquency; high victimization & moderate home delinquency; and high victimization & high home and school delinquency. Child sex, household income, ethnicity, parental education, and parental depression were found to associated with differences in class membership. This confirmed previous research that has reported delinquency and victimization to be a spectrum of co-occurring behaviours among children (Pane-Seifert et al., 2022; Haney-Caron et al., 2019; Choe et al., 2008; Davis et al., 2020; Bettencourt & Farrell, 2013), while extending that

knowledge to contextual differences across home and school settings. These findings similarly addressed knowledge gaps by delineating the associations between clusters of these items and child or informant characteristics that had been previously reported to be differentially related to delinquency and victimization separately (Logan-Greene et al., 2018; Joliffe et al., 2017; Farrington et al., 2017; Assink et al., 2015). Taken together, these findings advocate for an integrated approach that addresses the impact of prior victimization in delinquent behaviour participation and considers household factors that uniquely influence the likelihood of different delinquency and victimization patterns.

Study 3 (Chapter 7) used multinomial regression analysis to delineate associations between mental disorders and the determined latent classes as well as the moderating effect of child and informant characteristics. Study findings showed differential associations between latent classes and internalizing or externalizing disorders, with the strongest associations being between the two high victimization classes and externalizing disorders. While none of the covariates exhibited moderating effects on these associations, child sex and age, household income, parental depression, school mental health services, and peer and family relationships had varying associations with likelihood of internalizing and externalizing behaviors. These findings are consistent with recent literature that examined clusters of delinquency *or* victimization with mental health independently (Heerde et al., 2019; Jennings et al., 2019; Loeber et al., 2001), but added new information on the differential associations between clusters of delinquency *and* victimization with internalizing and externalizing disorders. This indicates that mental health interventions integrating a trauma-informed approach that can be tailored for specific delinquency patterns could have broad behavioural and mental health benefits.

8.3 Integrated Findings

There were also findings that were consistent across the findings of all studies. First, the frequency of delinquency among children in Ontario is a pressing issue. Approximately one-quarter of parents and teachers reported that children were engaging in at least one type of delinquent behaviour, while 13% of teachers and 10% of parents reported children engaged in two more types. This is less than previous studies investigating delinquent behaviours in Canada and the US (28-37%) (Davis et al., 2020; NCPC, 2012). However, these studies used self-reports from children or youth which have been shown to report higher levels of problem behaviours than their parent or teacher reports (van der Ende & Verhulst, 2005). Similarly, 45% of parents and teachers reported were that children had at least one type of victimization experience. Two high-risk patterns with high levels of victimizations were identified representing 16.8% of children, with another 8% experiencing moderate victimization. This suggests there is significant room for improvement in reducing delinquency and victimization among children aged 4-14 years in Ontario. Considering the known consequences of poly-victimization, and fact that victimization is strong predictor of future delinquency (McCuddy & Esbensen, 2022; Davis et al., 2020), addressing either item through universal interventions is a unique opportunity to reduce involvement in both and improve children's overall well-being.

Second, trauma-informed approaches must be integrated into interventions that address any facet of mental health, delinquency, or victimization. Children exhibiting high levels of delinquency are likely to have previous victimization experiences, as shown by all moderate and high latent classes having corresponding moderate or high victimization as well. For externalizing disorders specifically, significant associations were identified with each latent class that displayed moderate or high victimization experiences. This is consistent with previous

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studies that have regularly reported the wide-ranging impacts of trauma or victimization in

childhood on future social behaviours, mental health, and overall well-being (Pane-Seifert et al.,

2022; Dierkhising et al. 2019; Turner et al. 2010). For children, a common sign of exposure to

victimization are disruptive, defiant, or delinquent behaviours (Phifer & Hull, 2016; McCuddy &

Esbensen, 2022; Davis et al., 2020). Adopting a trauma-informed approach in school settings

should shift from discipline or isolation as an intervention for these behaviours to providing

social-emotional supports and fostering positive, prosocial attitudes for individuals and the

school setting broadly. Guidance on strategizing how to implement trauma-informed approaches

exist, such as the trauma-informed program blueprint (Chafouleas et al., 2016). These resources

provide concrete steps and evidence that strategize the implementation (content knowledge,

implementation features, action planning), professional development (training, coaching,

utilizing expertise), and evaluation steps (outcomes, data collection, program changes) necessary

to build successful and sustainable trauma-informed approaches (Chafouleas et al., 2016).

Though systems changes are difficult to achieve, the impacts of poly-victimization, can

compound consequences and severely deteriorate children's mental health and life trajectories if

not addressed (Finkelhor et al., 2007; Finkelhor et al., 2009b; Dierkhising et al. 2019; Turner et

al., 2010).

Third, numerous factors are regularly involved in the nexus of delinquency,

victimization, and mental disorders among children. Mental disorders were associated with

parental depression, lower household income, and worse family relationships. High or moderate

delinquency and victimization classes were also associated with parental depression and lower

household income. This is consistent with previous research on mental disorders and problematic

behaviours among children that has examined parental psychopathy (such as the depression

distortion hypothesis) and lower socioeconomic status (De Los Reyes & Kazdin, 2005; Clark et al, 2017; Müller et al., 2011; Van der Ende & Verhulst, 2005; Truetler & Epkins, 2003). These findings were consistent across analyses and highlight the importance of conceptualizing children's mental health, and potential interventions, within the context and stressors of the family system. It could be the case that lower resources and a stressful family environment make children more inclined to experience emotional dysregulation, which then acts as a mechanism producing future delinquent behaviours and mental health impacts (Herts et al., 2012; Romano et al., 2020). This could indicate that interventions to integrate emotional regulation strategies for households may offer benefits for children and families broadly. Multisystemic therapies that combine parental training, structural family therapy, and social skills training has been found effective at addressing poor behaviours among children, including delinquency, although evidence of their benefits among the general population is limited (Hogue & Liddle, 2009; Robinson et al., 2011). However, for adolescents with clinically diagnosed conduct problems use of family therapy techniques have been found to predict significant decreases in delinquency among children (Henderson et al., 2019).

Fourth, the findings of this body of research communicate the need for tailored interventions to address the nuanced differences that factors have on specific patterns of delinquency and victimization. Further, the unique needs of different subpopulations as these nuances extend to associations with internalizing or externalizing disorders raises the same point. For example, children experiencing high levels of victimization are more likely to have externalizing disorders, while those in the high victimization and moderate home delinquency class are more likely to have both internalizing and externalizing disorders. Further, study findings indicated older children and those from lower-income households are more likely to

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have mental health disorders and higher likelihood of delinquency and victimization. Sex differences were also found in the likelihood of internalizing and externalizing disorders and latent class membership, suggesting the need for sex-specific approaches. Interestingly, teachers have reported that children's age and sex influence the effectiveness of interventions to address these items as well, further indicating that tailored approaches are necessary in assessment, intervention, and evaluation (Cunningham et al., 2016). These findings indicate that consideration of the unique needs and characteristics of children to effectively address the complexities of delinquency, victimization, and mental health is necessary. A recent meta-analysis found that universal approaches to address delinquency, victimization, and mental health have been proven valuable in reducing antisocial behaviours broadly, especially if they target multiple risk factors (MacArthur et al., 2018). However, these should be complemented with tailored interventions to address the juncture of these items (Winston et al., 2016), due to the complex interactions that occur between individual risk factors among children and broader environmental factors in the settings that they regularly occupy. Tiered interventions that have a universal design to address the needs of all children in respect to healthy and supportive environments, and a tailored design to address the specific patterns and factors relevant to children who are at higher risk or already experiences problems related to delinquency, victimization, and mental health, could prove effective (Phifer & Hull, 2016).

Fifth, this body of research highlights the importance of coordinated approaches between home and school to address delinquency, victimization, and mental health. Both home and school environments play a crucial role in shaping and addressing children's social behaviours and mental health. Just as the benefits of home or family-based therapies that were previously discussed, schools also play a critical role in addressing the needs of children with social

behaviours and mental health issues because children develop broad social-emotional skills at school. School is a setting where children have exposure to relationships and social connections that can shape future social behaviours (Polanain et al., 2021). It has been previously suggested that upstream approaches to improve student socioemotional and emotional regulation skills could prevent involvement in bullying behaviours and protect students from the impacts of bullying (Romano et al., 2019). The RULER approach is an evidence-based and validated intervention social and emotional learning program that was designed to improve the social climate of schools and classrooms (Brackett et al., 2019). School and classrooms that implement the RULER approach have been shown to not only have improved social climates and student behaviours but improved academic achievement and teacher-student interactions as well (Nathanson et al., 2016; Rivers et al., 2013; Hagleskamp et al., 2013). School and public health partnerships may aid in the development and success of upstream health promotion efforts, though funding and staffing often act as barriers to establishing these partnerships (Brown et al., 2018; Burnett et al, 2023; Vermeer et al., 2021). Further, any roles that engage with children regularly, such as behavioral therapists or social workers, should be equipped and knowledgeable on how to participate in addressing specific patterns and interplay between delinquency, victimization, and mental health as well. Aligning goals across settings and interventions can improve the efficiency and effectiveness of programs addressing the nexus of these items among children.

8.4 Implications for Policy, Practice, and Future Research

The knowledge created by this body of research has numerous implications for policy, practice, and research as they pertain to reducing childhood delinquency, victimization, and mental health. First, the findings of this dissertation suggest there are multiple ways we can

improve public health practices to better address delinquency, victimization, and mental health among children. Increasing funding and providing more resources for educators, social workers, and others that work with children would have far-reaching impacts, but this is not often feasible. However, integrating social behaviour programming into existing mental health or victimization focused programming could be an efficient way to provide more comprehensive solutions. In healthcare settings and early interventions for parental depression it is possible to incorporate aspects that address children's health and behaviours as well, especially for households who have high-risk children due to other systemic exposures. For example, in families with parental mood disorders both preventive family therapies or psychoeducational interventions have shown to decrease children's emotional symptoms and improve their pro-social behaviours (Solantaus et al., 2010). Ensuring that parents receive appropriate and adequate treatment for depression or other mood disorders has also been shown to improve children's behavioural and socioemotional outcomes for up to 18 months, though longer-term results show mixed effectiveness (Gunlicks & Weissman, 2008). Similarly, interventions for children's social behaviours or mental health could incorporate aspects that address parent or household health and behaviours, ensuring that parents are addressing their own mental health and are supported in accessing services. Developing materials in partnership with public health units or healthcare providers that could be by schools may educate parents on the juncture of delinquency, victimization, and mental health that provide strategies for improving household factors. Community-based programs could serve the same purpose and act as facilitators to social and emotional skill building opportunities for children as well.

There are also numerous policy options that can be adopted to reduce the prevalence and severity of childhood delinquency, victimization, and mental health disorders. Foremost,

educational settings should consider implementing universal mental health screening and programming. This would establish the foundation for regular programming tailored to children broadly, but also specifically high-risk groups. Policies that prioritize opportunities for professional development that emphasizes trauma-informed approaches in clinical and educational settings can be a significant step for improving environments for children (Phifer & Hull, 2016). Such policies could incorporate clear guidelines on delinquent behaviours as well as provide further structure and instruction for establishing healthier school social climates generally (Polanin et al., 2021). Broader public health policies could provide direction for coordination between mental health, social relationship and behaviour, and community-based programs. Mandated early screening for maternal depression and screening children of mothers with depression for mood disorders or behavioural issues may aid in reducing intergenerational consequences within high-risk families as well (Lescheid et al., 2005; Osyerman et al., 2002). Where possible, policies should focus on establishing clear agreements and protocols for information sharing across contexts.

Lastly, these studies highlight there are numerous opportunities for research to provide evidence that can inform strategies to improve childhood delinquency, victimization, and mental health. Future research focus on identifying existing interventions that could integrate tailored approaches to improving mental health outcomes while reducing delinquency and victimization. Similarly, research is needed to develop valid and reliable tools that can be used as measures for evaluation of said programs, and the potentially differing effectiveness across specific patterns of delinquency, victimization, and internalizing or externalizing disorders (Chafouleas et al., 2016). Longitudinal studies should dissect the temporality of events and diagnoses to inform strategies and programs on leverage points that could be the most effective or timely areas for intervention.

Future research is also needed to develop and evaluate programs that aim to improve family and peer relationships through family functioning or school socioemotional skill building programs. Program development would likely benefit from qualitative work that explored the perspectives and experiences of children on existing interventions and their experiences with delinquency, victimization, and mental health. It is important that future research continue to explore the role that sex, age, and ethnicity differences play in designing and delivering effective interventions as well. Given the potential benefits of coordinated interventions across settings, further research on how to best facilitate and address the barriers related to this level of synchronized programming will be necessary as well.

8.5 Strengths and Limitations

The body of research builds on previous work by using data from the 2014 OCHS, a large population-based survey of children and families. This provided generalizable conclusions in comparison to previous literature on the subject that almost exclusively used smaller samples of psychiatric patients or incarcerated children to examine the juncture of delinquency, victimization, and mental health (Pane-Seifert et al., 2022; Haney-Caron et al., 2019; Choe et al., 2008). These studies are unique in their ability to provide prevalence estimates that are more generally representative of the general population of children in Ontario and used a broader set of delinquent behavior items to be evaluated than previous studies (Davis et al., 2020; Bettencourt & Farrell, 2013; Egli et al., 2010).

Although the study sample included only children who had both parent and teacher reports, this approach provided new information on prevalence of delinquent behaviors across home and school settings. Despite reliance on complete data, the study was still adequately powered to generate reliable associations, and the findings provide new insights into the patterns

of delinquent behavior and victimization classes across home and school settings. However, the cross-sectional design of the 2014 OCHS limits causal inferences, and bias may have been introduced by only including children who had both parent and teacher reports on the variables of interest in the study. This may increase margins of error and potentially amplify estimates of association found within these studies. The study sample had a large age range (4 to 14 years old) that covered many developmental periods across childhood and early adolescence, during which delinquency, victimization, and mental disorders may be experienced or display themselves differently. While age effects were investigated, differences across developmental periods or smaller age groups may have produced different or more nuances results. The 2014 OCHS also had a relatively low response rate and excluded potentially high-risk populations such as children living on Indigenous reserves and in institutions (Boyle et al., 2019). Further, there was no information provided about the context or severity of the delinquent behaviors and experiences of victimization reported, and social desirability bias may underestimate prevalence.

8.6 Conclusions

This dissertation sheds light on the complex relationships between delinquency, victimization, and mental health among children. The findings demonstrate that contextual factors such as household income and parental depression influence multi-informant reports of delinquency across home and school settings. This body of research also identified four distinct patterns of delinquent behaviours and experiences of victimization among children and highlighted the importance of addressing the cycle of violence. Further, the findings found that children with patterns of high to moderate delinquency and victimization are at greater risk for mental health disorders, particular externalizing disorders. Taken together, these findings

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emphasize the need for trauma-informed approaches that are tailored to address the complexities

of personal characteristics of children and the environments they spent most their time.

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Appendix A

Supplemental Table 1
Survey Items used for Latent Class Analysis Indicators

Variable	Survey Items For each statement please selected the response that best describes your child (this student) now or within the past 6 months	Parent	Teacher
Cruelty	Cruelty, bullying, meanness to others.	X	X
	Cruelty to animals.	X	X
	Threatens people.	X	X
	Has been physically cruel to others.	X	X
Theft	Has mugged people.	X	
	Has broken into someone else's house, building, or car.	X	
	Steals at home.	X	
	Steals outside the home. *Teacher version: Steals.	X	X
Truancy	Truancy, skips school. *Teacher version: Truancy, unexplained absences.	X	X
Vandalism	Destroys his/her own things.	X	X
	Destroys things belonging to his/her family or other children.	X	X
	Vandalism.	X	X
	Sets fires.	X	X
Violence	Uses weapons when fighting.	X	X
	Gets in many fights.	X	X
	Physically attacks people.	X	X
Bullied	Is picked on by other children.	X	
	Is called names by peers.	X	
	Has peers who say negative things about them to other children.	X	
	Is teased or made fun of by peers.	X	
Assaulted	Is hit or kicked by other children.	X	

Supplemental Table 2

Internal consistency reliabilities (Cronbachs α) for each behaviour or experience type

Behaviour or experience type	Number of items	α
Parent reported		
Cruelty	4	0.78
Vandalism	4	0.75
Theft	4	0.66
Violence	3	0.74
Truancy	1	-
Bullying	4	0.88
Assaulted	1	-
Teacher reported		
Cruelty	4	0.70
Vandalism	4	0.70
Theft	1	-
Violence	3	0.70
Truancy	1	-

Supplemental Table 3
Fit Statistics for latent class models of child delinquent and victimization items (n =1,948).

	Log likelihood	AIC	BIC	Entropy
Model				
2 classes		19757.207	20242.194	0.907
3 classes	-9506.477	19286.954	20050.669	0.849
4 classes	-9304.895	18983.790	20026.232	0.902
5 classes	-9154.923	18783.846	20105.017	0.808
6 classes	-9029.141	18632.283	20232.181	0.850

Supplemental Table 4

Conditional item-response probabilities and the prevalence of latent classes of youth delinquency and victimization items (n =2,376).

	High victimization & moderate home delinquency	High victimization & high home and school delinquency	Moderate victimization & moderate school delinquency	Low victimization & delinquency
Prevalence	10.86%	3.01%	8.74%	77.38%
Item				
Parent reported cruelty				
0	0.401	0.422	0.849	0.966
1	0.359	0.353	0.129	0.031
2	0.099	0.128	0.016	0.003
3	0.121	0.068	0.000	0.000
4	0.020	0.029	0.006	0.000
Parent reported vandalism				
0	0.588	0.712	0.826	0.952
1	0.270	0.103	0.129	0.034
2	0.119	0.143	0.026	0.014
3	0.023	0.042	0.019	0.000
Parent reported theft				
0	0.932	0.944	0.883	0.994
1	0.039	0.012	0.077	0.006
2	0.029	0.044	0.040	0.000
Parent reported violence				
0	0.388	0.401	0.854	0.991
1	0.459	0.233	0.120	0.009
2	0.137	0.252	0.000	0.000
3	0.016	0.114	0.026	0.000
Parent reported truancy				
0	0.921	0.911	0.940	0.999
1	0.079	0.089	0.060	0.001
Parent reported bullied				
0	0.269	0.245	0.417	0.653
1	0.179	0.229	0.116	0.121
2	0.188	0.085	0.072	0.080
3	0.109	0.143	0.065	0.050

4	0.192	0.104	0.230	0.085
5	0.063	0.194	0.100	0.011
Parent reported assaulted				
0	0.612	0.598	0.731	0.900
1	0.373	0.339	0.215	0.100
2	0.015	0.063	0.054	0.000
Teacher reported cruelty				
0	0.786	0.000	0.154	0.924
1	0.187	0.045	0.398	0.072
2	0.027	0.037	0.345	0.004
3	0.000	0.381	0.100	0.000
4	0.000	0.201	0.003	0.000
5	0.000	0.336	0.000	0.000
Teacher reported vandalism				
0	0.866	0.051	0.550	0.985
1	0.056	0.169	0.331	0.012
2	0.067	0.326	0.054	0.003
3	0.007	0.221	0.044	0.000
4	0.004	0.233	0.021	0.000
Teacher reported theft				
0	0.979	0.375	0.768	0.999
1	0.021	0.501	0.190	0.001
2	0.000	0.124	0.042	0.000
Teacher reported violence				
0	0.830	0.000	0.128	0.991
1	0.103	0.000	0.624	0.009
2	0.061	0.430	0.237	0.000
3	0.006	0.254	0.011	0.000
4	0.000	0.316	0.000	0.000
Teacher reported truancy				
0	0.823	0.814	0.883	0.970
1	0.131	0.153	0.061	0.026
2	0.046	0.033	0.056	0.004

Supplemental Table 5
Estimated odds ratios from a latent class analysis reflecting the effects of covariates on membership of latent classes of youth delinquency and victimization (n = 2,376).

	Low victimization & delinquency	High victimization & high home and school delinquency	High victimization & moderate home delinquency	Moderate victimization & moderate school delinquency
Youth age	Reference group	**0.78 (0.72 – 0.84)**	0.97 (0.89 – 1.05)	0.96 (0.91 – 1.01)
Youth sex	Reference group	**0.18 (0.07 – 0.48)**	**0.45 (0.26 – 0.79)**	0.55 (0.28 – 1.08)
Ethnicity	Reference group	0.76 (0.38 – 1.53)	1.39 (0.45 – 4.31)	**0.34 (0.19 – 0.61)**
Household income	Reference group	**2.80 (1.31 – 6.00)**	0.71 (0.37 – 1.35)	0.53 (0.23 – 1.20)
Parental depression	Reference group	**5.29 (1.71 – 16.32)**	**4.61 (1.50 – 14.14)**	**2.96 (1.05 – 8.31)**

Youth sex (male/female), ethnicity (white/non-white), household income (above LICO/below LICO), parental depression (present/not present).

Supplemental Table 6
Moderator Interaction Information

Variable	INT		EXT	
	ß	*p*	ß	*p*
Child age	2.48	0.51	1.51	0.65
Child sex	1.35	0.74	1.85	0.72
Household income	2.71	0.49	1.67	0.41
Parental depression	2.34	0.24	2.68	0.57
School mental health programs	4.74	0.57	3.62	0.34
Peer relationships	2.83	0.82	6.06	0.38
Family relationships	7.12	0.29	3.25	0.68

Note: All interactions tested variable listed and latent class membership.

Supplemental Table 7
Missing Data Patterns for Multiple Imputation of Study 3 Sample

Variable	Group 1	Group 2
Child sex	X	X
Child age	X	X
Family relationships	X	X
Peer relationships	X	X
Latent class	X	X
Parent sex	X	X
Parent education	X	X
Ethnicity	X	X
Urbanity	X	X
Household income	X	X
Recent immigrant	X	X
Parental depression	X	X
Internalizing disorder		X
Externalizing disorder		X
Total	792	1156

Note: X: complete data for selected variable.