Stuck on the Wrong Side of the Tracks:

Crime and Neighbourhood Change Across Adulthood

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A Thesis

In the Department

of

Psychology

Presented in Partial Fulfillment of the Requirements

For the Degree of

Doctor of Philosophy (Psychology) at Concordia University

Montréal, Québec, Canada

March 2024

CONCORDIA UNIVERSITY
SCHOOL OF GRADUATE STUDIES

This is to certify that the thesis prepared

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Entitled: *Stuck on the Wrong Side of the Tracks: Crime and Neighbourhood Change Across Adulthood*

and submitted in partial fulfillment of the requirements for the degree of

DOCTOR OF PHILOSOPHY (Psychology, Research and Clinical Training Option)

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Abstract

Stuck on the wrong side of the tracks: Crime and neighbourhood change across adulthood

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Concordia University, 2024

Moving from a disadvantaged neighbourhood to one of more affluence has been shown to improve life outcomes. However, not everyone manages to overcome the environmental and social hazards of such neighbourhoods. Success may depend on individual differences such as childhood social behaviour, education, and criminal activity. Crime and neighbourhood disadvantage are highly correlated, but the directional nature of this relationship and its transactional nature throughout life have rarely been examined. Part One of the current investigation examined whether individual characteristics, including childhood social behaviour, education, and criminality, contribute to the perpetuation of socioeconomic immobility across adulthood via neighbourhood disadvantage using a growth curve model. In Part Two, the potential transactional nature of associations between crime and disadvantage over time were examined utilizing a cross-lagged analysis.

Participants were drawn from the Concordia Longitudinal Research Project, a prospective, 47-year longitudinal investigation of over 4000 families from neighbourhoods of low socioeconomic status in Québec, Canada. In Part One, Growth curves modeled differences in change in participants' neighbourhood disadvantage (via census data) over 30 years, from middle-childhood (age 7-12) to middle-adulthood (age 46-57). Predictors included childhood social behaviours and total criminal charges in early adulthood (age 18-28). In Part Two, to

examine potential transactions, cross-lagged associations were modeled between neighbourhood disadvantage across four time points (1976, 1986, 1996, 2006). In this model, childhood neighbourhood disadvantage (1976) and aggression were included as predictors and total years of education was included as a mediator.

Part One results indicated that participants with no criminal charges showed the greatest improvement in neighbourhood over time, whereas those with many charges showed little improvement. Participants with histories of childhood aggression, withdrawal, or lower likeability were also less likely to experience improvements. Results from Part Two indicated that the association between charges and neighbourhood disadvantage was transactional over time and that education may play an important protective role for individuals who grow up in disadvantaged neighbourhoods or for more aggressive children. These findings provide evidence for the importance of criminality in undermining at-risk young adults' ability to overcome neighbourhood disadvantage, highlighting risk and protective factors that may inform early and long-term intervention and policy.

Acknowledgements

I would like to express my deepest gratitude to my research supervisor, Dr. Serbin, for the ongoing knowledge and guidance shared with me throughout this endeavor. Thank you for affording me the opportunity to work with you and pursue my dream career. I am also extremely grateful to Dr. Morin for his willingness to share his statistical expertise in the development of my analyses. Your knowledge has been invaluable in making the project what it is.

I would also like to extend sincere thanks to my committee members for their ongoing support and contributions throughout the development of my dissertation project. Additionally, this endeavor would not have been possible without the generous funding support from the Social Sciences and Humanities Research Council as well as the Fonds de Recherche du Québec. Many thanks as well to my fellow cohort members and interns for the moral support and advice shared as we have grown together through this program. I would also like to recognize our valued laboratory assistants for the work they have put into collecting and managing our data, as well as my clinical supervisors who have contributed to my growth throughout this program.

I will forever be grateful to my family and friends for being my support system throughout my doctoral program. In particular, I am extremely grateful to my partner for always being patient, encouraging, and supportive, even through periods when I felt discouraged and uncertain. Thank you also to my parents and stepparents for your generosity with time and tangible support whenever I needed help. Thank you especially to my mother for her unwavering support in all aspects of my growth throughout this program (and my life), not only tangibly but, more importantly, mentally and emotionally. She has always been my biggest inspiration and support and for this I am deeply indebted.

Contribution of Authors

Mari Shanahan Somerville was responsible for the conceptualization and design of the studies, conducting the statistical analyses, interpreting the findings, and writing and editing multiple drafts of this dissertation. Dr. Lisa Serbin, the student's research supervisor, contributed to the conceptualization of the study and reviewed multiple drafts of the manuscript. Dr. Dale M. Stack reviewed drafts of the manuscript.

Data for the manuscript was from the Concordia Longitudinal Research Project, which was originally conceptualized and initiated by Dr. Schwartzman and Dr. Jane Ledingham in 1976. Dr. Lisa Serbin and Dr. Dale Stack have been involved at multiple levels of conceptualization and data collection throughout the history of the Concordia Longitudinal Risk Project and are now responsible for its management.

All authors reviewed the final manuscript and approved the contents.

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Chapter 1: General Introduction

Costs of Living in Neighbourhood Disadvantage

Individuals who grow up in disadvantaged neighbourhoods tend to experience poor outcomes in a multitude of domains later in life (e.g., health, criminality; Almeida et al., 2005; Graif et al., 2014). The reasons for this are multi-faceted and complex. Research describes disadvantaged neighbourhoods as those characterized by high rates of poverty, unemployment, single-parent households, and crime (e.g., Christie-Mizell, 2022; Ross & Mirowsky, 2001). Those who grow up in disadvantaged neighbourhoods are exposed to a host of risks that negatively affect healthy functioning in multiple domains, including mental health, physical health, academic success, occupational success, family formation, and social relationships (e.g., Green et al., 2019; Mikhail et al., 2021; Ross & Mirowsky, 2001; Tung et al., 2021). In addition to risk exposure, those who live in disadvantaged neighbourhoods have reduced access to resources that could improve their situation compared to those living in better circumstances. Such resources include adequate physical and mental health care, safe housing, educational opportunities, greenspace, good air quality, grocery stores and transportation (e.g., Loignon et al., 2015; Mikhail et al., 2021; Ross & Mirowsky, 2001; Stafford & Marmot, 2003; Tung et al., 2021).

Not only are there several risks for poor outcomes on an individual-level associated with living in disadvantaged neighbourhoods, but there are also considerable societal-level consequences. It is clear from the literature that individuals and families living in disadvantage are more likely to suffer from poor health due factors such as bad diet, poor housing, and limited preventive health resources. As such, poverty results in higher burdens being placed on social and community services, including healthcare resources (Canadian Observatory on

Homelessness, 2021). There is also tremendous loss to society of human potential and human capital. According to research by the Canadian Observatory on Homelessness (2021), one in seven Canadians live in poverty and yearly costs for Canada range from72 to 84 billion dollars. This does not include the lifetime loss in economic productivity associated with growing up under conditions of poverty. The risks associated with neighbourhood disadvantage and poverty have been recognized for many years across Canada, and successive federal and provincial governments have attempted to address them.

Costs of Crime

Much like the burdens imposed by living in poverty, criminality is also associated with costs to individuals and to society. These are measured not only in terms of direct financial burden to society as a whole (e.g., incarceration; other Criminal Justice System involvement), but also in terms of the various financial, economic, and psychological costs of victimization to citizens. For example, based on self-reported victimization data from the General Social Survey, the estimated average financial cost of pain and suffering per victim of non-fatal violent crimes in Canadian dollars in 1999 was $72,000, or about $126,000 in current dollars, and the estimated total cost was $20.43 billion, or about $35.7 billion in current dollars (Lipinski, 2021). The total cost across all types of crime measured (e.g., violent, property, criminal code traffic offences) was estimated to be $35.8 billion, or about $62.6 billion in current dollars (Lipinski, 2021). In terms of psychological well-being, research has demonstrated that being a victim of crime contributes to short-term and long-term psychological distress, such as anxious, depressive, and psychotic symptomatology (e.g., Kilpatrick, 1987; Mackie et al., 2011; Reed et al., 2016; Verdun-Jones & Rossiter, 2010). Psychological effects resulting after victimization, and in particular traumatic victimization, can also lead to poor functioning in other domains of life,

impacting interpersonal, family, educational, and occupational functioning (e.g., Lambert et al., 2012; Potter et al., 2018).

Given the notable costs associated with living in disadvantaged neighbourhoods and with victimization which is especially common in areas of disadvantage (e.g., Gibson, 2012; Sampson, 2006; Shaw & McKay, 1942), it is essential to garner a complete and nuanced understanding of the relations among the various associated risk characteristics. Criminological theory helps to provide a framework for research in developing a thorough understanding of the ways in which neighbourhood disadvantage contributes to negative outcomes for residents. In the following section, relevant criminological theory positing explanations for negative outcomes will be elaborated.

Theoretical Basis of Reciprocal Hypothesis

Impact of Neighbourhood Disadvantage on Criminality

There are several theoretical explanations for why an individual's neighbourhood context may increase their propensity toward crime. Some criminological theories hold that common experiences and risks associated with living in disadvantaged neighbourhoods can lead young adult residents to engage in criminal offending. Strain Theory is one such theory. Neighbourhood strain consists of the stresses and/or pressures imposed upon individuals living in suboptimal or poor conditions (e.g., limited resources and/or social factors). According to Merton's (1938; 1968) Strain Theory, when residents' abilities to obtain goals (e.g., receiving gainful employment and/or being wealthy) in a prosocial manner are undermined by their socioeconomic conditions, they are more willing to resort to crime as a means to achieve such goals (Merton, 1938, 1968). According to General Strain Theory (GST; Agnew, 1992, 2002, 2006), this situation is further complicated by the fact that residents must not only cope with living in

disadvantaged situations but must also deal with other highly strained residents. This often results in more frequent instances of victimization (Agnew, 2002), witnessing crime, and deviant peer affiliation (Brody et al., 2001, 2003; Sampson, 1993), all of which may further encourage criminality. Warner and Fowler (2003) note that the link between neighbourhood strain and violent crime is strongest within disadvantaged neighbourhoods. Hoffman (2003) further finds that a similar relation is strongest when male unemployment is high.

The prevailing notion of Strain Theory and GST is that living in a disadvantaged neighbourhood exposes residents to various risks that interfere with development of healthy and prosocial functioning, leading to engagement in crime. Notably, this explanation leaves out the important consideration of the potential negative impact that engagement in crime may have on living circumstances. In the following section, theory supporting the possibility that criminality maintains or leads to living in disadvantaged neighbourhoods will be discussed.

Impact of Criminality on Neighbourhood Disadvantage

While it is clear from theory and literature presented above that neighbourhood disadvantage is a potent risk factor for a number of negative life outcomes, an important question is posed from the unidirectional nature of these sources. Specifically, it is prudent to consider what may be the risk and maintaining factors for neighbourhood disadvantage. For instance, living in disadvantage itself may promote poor social circumstances at critical developmental periods, which in turn may limit a person's ability to overcome such disadvantage later in life. The many consequences of growing up in neighbourhood disadvantage (e.g., limited educational attainment, poor occupational prospects) are likely also the factors which promote remaining in disadvantaged neighbourhoods over the lifespan. With respect to criminality, in particular, theory suggests that engaging in crime may add to the risk for living in disadvantage in the future.

Becker's (1963) Labelling Theory may, in part, shed some light on the ways in which criminality can serve to perpetuate neighbourhood disadvantage. According to this theory, individuals' identities and behaviours can be determined by a self-fulfilling prophecy resulting from stereotyping. Specifically, an individual is identified as deviant when he/she does not ascribe to the cultural expectations or breaks rules set by society (Becker,1963). 'Deviant' minorities henceforth carry a negative label which leads them to perpetuate the behaviours expected of them. It is this interaction between the individual and society that defines deviance (Becker,1963). Individuals may self-identify with labels of "deviance", but external labelling occurs as well.

Criminal records are an archival measure which are publicly available in many jurisdictions. These records are commonly available to employers and others. In addition to convictions, records typically include crimes for which individuals were charged but not formally convicted. This information has been likened to a "negative curriculum vitae or resume" (p. 2), as this record is referenced for various reasons throughout life, including for housing and job applications (Jacobs, 2015). In this way, having a criminal record, regardless of its magnitude, impedes individuals' abilities to successfully act on opportunities for prosocial socioeconomic advancement, as the individual is henceforth labelled a 'criminal'. In addition, individuals possessing criminal records tend to be treated more harshly and are more likely to be detained, searched, and arrested by law enforcement and other individuals within the criminal justice system, thereby perpetuating their roles as criminals (Jacobs, 2015). In this way, being charged for criminal behaviour may serve to maintain or increase neighbourhood disadvantage by leading offenders to be labelled as such, which follows them throughout life and limits their prosocial opportunities in society, thus necessitating continuing to live in disadvantage. In turn,

according to Strain Theory, the constraints placed on individuals' abilities to obtain their economic goals by having to remain in socioeconomically disadvantaged conditions may explain continued engagement in crime (Merton, 1938, 1968), creating and maintaining a vicious cycle.

Engaging in crime, in and of itself, may lead to limited prospects for prosocial and legal avenues of socioeconomic advancement. This may be due to factors such as stigmatization within the legal system, housing market, and/or job market. In the context of criminological theory, it seems likely that not only does living in a disadvantaged neighbourhood increase one's likelihood of turning toward a criminal lifestyle, but that engaging in crime may perpetuate or necessitate living in disadvantaged circumstances. Thus, the association between these two variables is likely to be far more complex than can be understood by examining simple unidirectional links. The association between crime and neighbourhood disadvantage is likely to be complex, involving a number of other common associated risk factors that impede healthy development and functioning and, as such, many factors must be accounted for in its examination.

Developmental Links Between Neighbourhood Disadvantage and Crime

Based on the literature presented above, it seems likely that the link between neighbourhood disadvantage and crime is more complex than a simple predictive relationship from disadvantage to crime. Neighbourhood disadvantage may promote engaging in criminal behaviour and criminal behaviour may, in turn, limit opportunities and access to legal or ethical means of social mobility (e.g., stable employment, moving out of poor neighbourhoods). This suggests a transactional relation may exist between the variables. Of course, however, these two variables do not exist in a vacuum and a number of other factors must be considered. According to Bronfenbrenner's Bioecological Systems Theory, individual factors work in transaction with

environmental factors, such as home and neighbourhood life, to influence and shape development. A contextual developmental model would suggest that early risk factors, individual factors, and life-course experiences operate together to influence experience and development (e.g., education, health; Bronfenbrenner, 1979, 2005; Mercon-Vargas et al., 2020; Rosa & Tudge, 2013).

Individual Risk Factors

The interplay between individual-level risk factors, such as aggression, poor social functioning, criminality, and low education, within the context of environmental risk in the form of disadvantage must be considered in order to clarify nuanced risk for future negative outcomes. For instance, research demonstrates that living in a disadvantaged neighbourhood is associated with higher levels of childhood aggression (e.g., Kalff et al., 2001; Mrug & Windle, 2009) which, in itself, is an individual behavioural risk factor that contributes to several other areas of risk for negative outcomes (i.e., cumulative risk). Unsurprisingly, higher aggression is a strong predictor of future hostility, delinquency, and crime (e.g., Dudeck et al., 2016; Huesmann et al. , 2002; Pingault et al., 2013). It has also been linked to lower educational attainment and reduced future occupational success (Kokko & Pulkinnen, 2000; Risi et al., 2003). Risi and colleagues (2003) proposed that, as aggressive children may pose a risk to the safety of their classmates, they may be more likely to be expelled from school, thus interfering with their abilities to participate, be successful, and to graduate. Regardless, these two risk factors appear to function together when it comes to criminal propensity, with education acting as a protective factor in the predictive relationship from aggression to later crime (Kennedy-Turner et al., 2019).

Low educational attainment interferes with the ability of individuals to foster success and well-being (e.g., Belfield, & Levin, 2007; Rumberger, 2011) which, as previously discussed,

may increase the likelihood that they will turn toward criminal means for advancement (e.g., De Coster et al., 2006; Merton, 1938, 1968). In fact, a lower level of educational attainment is consistently linked to an increased likelihood of criminal offending (Buonanno & Leonida, 2006; Groot & van den Brink, 2010; Lochner, 2004; Lochner & Moretti, 2004).

Other individual-level risk factors for future negative outcomes (e.g., low educational attainment and/or criminality) relate to social functioning. For example, withdrawn children are more likely to display low performance on tests of language and literacy (e.g., Crozier & Perkins 2002; Hall et al., 2016; Spere et al., 2004). On the other hand, it is possible that more outgoing or likeable children experience the opposite effect with respect to educational attainment, as likeability has been shown to have a significant negative association with withdrawal (e.g., Kennedy-Turner, 2019). Moreover, research has linked social isolation or withdrawal (Bub et al., 2007) from positive social connections to future criminality (e.g., De Li, 2004). These findings are in line with criminological theories of social learning. More specifically, Sutherland's (1947) Theory of Differential Association (TDA) postulates that skills and positive beliefs related to criminal behaviour are learned through close social bonds with individuals who endorse them (Matsueda, 2010). Research supports this notion, as socializing with deviant peers is associated with higher deviant and criminal behaviour (e.g., Fergusson et al. 2002; Holt et al., 2011). In contrast, socialization with peers who endorse prosocial beliefs and behaviours relates to one's own integration of a prosocial orientation (Barry & Wentzel, 2006), which has been linked with positive adjustment in adulthood (Do et al., 2017; Telzer et al., 2019).

The literature presented above suggests that a number of individual characteristics are likely to be involved in the development of risk associated with engaging in crime and/or living in a disadvantaged neighbourhood. Moreover, it seems likely that one risky 'outcome' may pose

a risk for the other; that is, it is possible that engaging in crime, often considered a risk outcome, serves as a risk factor for future disadvantage in a cumulative sequence or 'cascade' of increasing risk for negative outcomes over time. The following section underlines the importance of developing a nuanced understanding of the interplay between various individual characteristics and life events, such as offending and education, and neighbourhood-level variables.

Understanding the Relation between Crime and Disadvantage

Interrelations among all of these individual and social characteristics are likely to shed light on the mechanisms of risk for future negative outcomes. In particular, they could help to explain variations in levels of neighbourhood disadvantage and chances for upward social mobility. It is essential to consider influences on individual, social, and societal levels in order to glean a thorough and cohesive understanding of target risk and protective factors for intervention.

Given the immense costs associated with both disadvantage and criminality, not only to society and victims of crime but also potentially to those charged with a crime, disentangling these complex associations remains a prudent concern for Canadians. Painting a more cohesive and accurate picture of these factors, associated influential variables, and how they interact may have important implications for prevention and intervention within at-risk communities. Specifically, such knowledge could inform targeted prevention strategies at treatable levels to minimize the negative impact of risk factors at both micro (e.g., individual, familial, occupational) and macro (e.g., societal costs, victimization costs) levels. This may involve prevention strategies targeting neighbourhood-level characteristics, such as social-services and/or education, or individual and family-level characteristics, such as intervention for

behavioural or social difficulties at an early age. Such research also has the potential to illuminate more specified avenues of research for rehabilitation of offenders in order to decipher the factors that may hinder adequate reintegration and/or development of prosocial values. If intervention and prevention strategies can be implemented targeting early risk factors as well as risk factors in adulthood, there is the potential to prevent innumerable societal, financial, and psychological costs.

Current Study

In sum, a better understanding of the factors which serve to perpetuate and maintain individuals' neighbourhood disadvantage, in addition to the processes by which this occurs, is warranted. Criminality and other associated risk factors are likely to be important targets for the development of effective and efficient intervention and prevention services. The primary goal of the current dissertation was to help illuminate the potentially complex nature of associations in the service of preventing costs to Canadians. Of particular interest is the association between crime and neighbourhood disadvantage across the life course.

Methods and Sample

Neighbourhood and criminal data from at-risk neighbourhoods in Montréal, Québec over the timespan from 1976 to 2006 was the focus of the current research. Data for the current dissertation were collected over the course of 30 years, which allowed for the modelling of complex relations among individual and neighbourhood characteristics over time. Data utilized for the current studies was from the Concordia Project (Schwartzman et al., 1985), an extensive and unique database collected from childhood through adulthood, including data on individual behavioural characteristics and archival records of participants from lower-socioeconomic, inner city Québec neighbourhoods (N = 4110). Children included in the study were considered to be at

risk for poor health and social outcomes in adulthood, due to low average levels of education and employment status within their families (Serbin et al., 2011; Serbin et al., 2004; Véronneau et al., 2015).

Considerations: Québec Rates of Disadvantage and Crime

As the result of many programs aimed at reducing poverty and neighbourhood disadvantage, Québec experienced overall improvement in standards of living during the period following the 'Quiet Revolution' of the 1960's. During this time (1970's and 1980's), there were notable increases in average levels of education, family income, and occupational status (Behiels, 1985; Fortin, 2001; Shapiro & Stelcner, 1997). Despite these general improvements, however, as of 2011, the proportion of low-income residents in disadvantaged neighbourhoods in Montréal Québec was still considered to be relatively high (33.6%). Moreover, in comparison across the large Canadian metropolitan areas (i.e., Montréal, Toronto, and Vancouver), Montréal housed the majority of low-income neighbourhoods (i.e., 35.8%; compared with 15.7% and 7.1% for Toronto and Vancouver, respectively; Statistics Canada, 2013).

It is also important to note that, between the early 1990's and 2004, aggregated rates of crime generally decreased in Montréal, with a reduction of about 18%. They remained slightly below the Canadian average until 2004, when they were found to be slightly above the Canadian average (Savoie et al., 2006). In 2006, the police reported crime rate for the population of Québec was 5.91% (Silver, 2007). In disadvantaged neighbourhoods within cities, however, the rate is considerably higher (e.g., Blau & Blau, 1982; Boggs, 1965; Shaw & McKay, 1942) and accordingly, risk factors may be stronger or specific to particularly disadvantaged neighbourhoods. Notably, within the sample utilized for this dissertation, 15% of participants had one or more charges in adulthood, suggesting a higher risk of crime as compared to the

general population. The at-risk nature of this sample allowed for the examination of complex relations between crime and disadvantage, while accounting for other influential variables.

Hypotheses

It has been clearly demonstrated in the literature that growing up and living in a disadvantaged neighbourhood is associated statistically with future behavioural problems and/or criminality (e.g., Graif et al., 2014; Pratt & Cullen, 2005). In other words, growing up under conditions of neighbourhood disadvantage increases risk for these problems in adolescence and adulthood. What has yet to be examined empirically is whether the inverse of this association is also true. That is, whether or not engaging in crime also has a negative impact on an individual's future neighbourhood circumstances. The primary hypothesis for the first part of the current study was that higher rates of charges in early adulthood would predict living in neighbourhood disadvantage in the future. The goal of the second part of the study was to statistically determine whether or not the associations between neighbourhood disadvantage and crime were transactional over time.

Furthermore, individual-level risk factors were hypothesized to play a part in this developmental process. Specifically, it was hypothesized that participants with higher aggression in childhood would show less of an improvement in neighbourhood quality over time. The effects of related childhood social characteristics were also explored within the context of associations between crime and disadvantage, including childhood withdrawal and likeability. Specific indirect effects were anticipated to arise from Part Two analyses, including: (1) higher childhood aggression would predict lower level of education, which would predict more criminality in early adulthood which would, in turn, predict higher neighbourhood disadvantage later in adulthood, and another in which (2) higher early neighbourhood disadvantage would

predict lower level of education, which would predict more criminality in early adulthood which, in turn, would predict higher neighbourhood disadvantage later in adulthood. The study is presented in manuscript format, in the next section, followed by a General Discussion.

Manuscript, submitted to **Development and Psychopathology** (under review)

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Acknowledgements

This research was partially supported by grants from the Social Sciences and Humanities Research Council (435-2015-1281; 435-2020-1193), the Canadian Institutes of Health Research (MOP-82876; PJT-159518), and the Fonds de Recherche du Québec en Société et Culture (2023-SE3-315353). The Concordia Longitudinal Research Project (CLRP) was initiated in 1976 by Jane Ledingham and Alex Schwartzman. Dr. Schwartzman passed away in 2018. He was instrumental in the design and data collection for this longitudinal project. The authors wish to thank the CLRP team, in particular Ms. Shaneha Patel, Claude Senneville, and Dr. Alexandre Morin for their assistance in data collection, statistical design, and analysis. Finally, we are most indebted to the participants in the study.

Author Notes

Competing interests: The author(s) declare none.

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To be submitted in this format to the journal of Development and Psychopathology.

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Abstract

Crime and neighbourhood disadvantage are highly correlated, but the directional nature of this relationship and its transactional nature throughout life have rarely been examined. The current investigation examined whether individual characteristics, including childhood social behaviour, education, and criminality, contribute to the perpetuation of socioeconomic immobility across adulthood via neighbourhood disadvantage. We further explored whether associations between crime and disadvantage are transactional over time utilizing a cross-lagged analysis. Participants were drawn from the Concordia Longitudinal Research Project, a prospective, 47-year longitudinal investigation of over 4000 families from neighbourhoods of low socioeconomic status in Québec, Canada. Part One results indicated that participants with no criminal charges showed the greatest improvement in neighbourhood over time, whereas those with many charges showed little improvement. Participants with histories of childhood aggression, withdrawal, or lower likeability were also less likely to experience improvements. Part Two results suggested that the association between charges and neighbourhood disadvantage was transactional over time, and that education may be protective for individuals growing up in disadvantage and for more aggressive children. Findings demonstrate the importance of criminality in undermining at-risk young adults' ability to overcome neighbourhood disadvantage, highlighting risk and protective factors that may inform early and long-term intervention and policy.

Key words: disadvantage; criminality; childhood risk; education

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Neighbourhood disadvantage is determined by demographic factors such as household structure, low income and education, and high unemployment (e.g., Mann et al., 2022). Research demonstrates that individuals who grow up in disadvantaged neighbourhoods have reduced opportunities for education, health care, and occupational success, and have greater exposure to environmental and social hazards (pollution, low access to goods, violence, drug activity; e.g., De Coster et al., 2006; Hicks et al., 2018; Zuberi, 2012). Neighbourhood disadvantage also contributes to physical and mental health consequences, such as stress, depression, and poor well-being (e.g., Clark et al., 2013; Hastings et al., 2019).

Limited attention, however, has been paid to the processes by which the effects of neighbourhood disadvantage are maintained across the life-course. Specifically, even faced with socio-demographic challenges, some individuals can overcome neighbourhood disadvantage and thrive (Cauce et al., 2003). For those who cannot, it is likely that various individual and social risk factors reinforce lifelong continuation of disadvantaged circumstances. The present research is an examination of longitudinal relations between neighbourhood disadvantage and adult criminality, which often co-occurs with many established risk factors (e.g., Ford & Schroeder, 2010; Lin, 2008; Schroeder et al., 2011).

Links Between Crime and Neighbourhood Disadvantage

Research consistently suggests that neighbourhood disadvantage is linked to crime. Several studies demonstrate that residents of economically vulnerable communities are more likely to be charged with, or arrested for, a crime (e.g., Graif et al., 2014; Pratt & Cullen, 2005). These associations remain even after controlling for other risk factors, such as previous

externalizing behaviours and mental health problems (Aebi et al., 2014). De Coster and colleagues (2006) identified a longitudinal link wherein adolescents from families living in disadvantaged neighbourhoods showed greater increases in violent tendencies over time when compared to those in other neighbourhoods, even after controlling for initial individual and family level demographics (e.g., race, low education, and income; De Coster et al., 2006). Results from these studies support the likelihood that risks inherent in disadvantaged neighbourhood environments are contributing factors to antisocial and criminal behaviour.

It is evident that the many risk factors associated with living in disadvantaged neighbourhoods may contribute to a higher likelihood of engaging in crime. It is also likely, though less evident from the literature, that remaining in disadvantaged neighbourhoods across adulthood is perpetuated by engaging in crime. Research consistently demonstrates poor economic outcomes for offenders. Observational studies show that ex-offenders have far lower rates of employment and wages than their non-offending counterparts (e.g., Pettit & Lyons, 2007; Western, 2002). Criminal offending also relates to self-reported life failure in aspects such as living accommodations, employment, relationships, substance abuse, and mental health (Piquero et al., 2010). The mechanisms linking criminal offending to ongoing conditions of neighbourhood disadvantage may relate to impediments to educational opportunities and employment. Crime is related to lower academic and occupational achievement (e.g., Borland & Hunter, 2000; Masten et al., 2005), restricting abilities to obtain financial security in a prosocial manner. Moreover, economic hardship related to having been charged with a crime likely often leads to barriers to the ability to move from poor neighbourhoods to those of higher affluence and lawful economic opportunity. Specifically, decreased employability and low wages may result in a need to maintain or to move to a disadvantaged neighbourhood to ensure affordability

of the basic costs of living (Coulton et al., 2012). In this sense, it seems likely that a transactional relationship exists between neighbourhood disadvantage and crime whereby disadvantage predicts criminality and, in turn, criminality predicts disadvantage.

Developmental Risk Factors

Developmental risk can arise from multiple sources, occurring on individual, familial, and environmental levels (e.g., Bronfenbrenner, 1979, 2005). Research demonstrates that childhood exposure to cumulative risk negatively impacts social, emotional, and cognitive development and that timing of exposure to risk may determine long-term achievement and socio-emotional outcomes (e.g., Leventhal, 2018; Moffitt & Caspi, 2001). It is important to consider the roles of influential variables consistently linked with crime and disadvantage, such as childhood aggression, other childhood social behaviours and level of education when examining the ongoing relations between crime and neighbourhood disadvantage over time (e.g., Dudeck et al., 2016; Kennedy-Turner et al., 2020).

Research suggests that living in poor neighbourhoods is related to higher levels of externalizing behaviour in childhood (e.g., Kalff et al., 2001; Mrug & Windle, 2009). Childhood aggression is a risk factor for increased delinquency, hostility, and criminality, and has been repeatedly shown to predict adult criminal offending (e.g., Dudeck et al., 2016; Huesmann et al., 2002; Pingault et al., 2013). Childhood aggression is also linked to lower levels of academic attainment and is shown to predict poor adjustment in school, influencing future unemployment (Kokko & Pulkinnen, 2000; Risi et al., 2003). Kennedy-Turner and colleagues (2020) demonstrated that aggression and lower educational attainment act in tandem, as education was found to be a partial mediator in the relation between childhood risk factors and later criminality.

Social withdrawal may also be linked to increased criminality. Research indicates that

social connection is an important contributing factor to whether or not an individual engages in crime. Specifically, social isolation and a lack of positive social bonds have been associated with increased criminality (e.g., De Li, 2004). Withdrawn children are typically also those who are socially isolated (Bub et al., 2007). However, it is important to note that social connections with deviant individuals can have the opposite effect, having been associated with increased likelihood of deviance and criminality (e.g., Fergusson et al., 2002; Holt et al., 2011). In general, research suggests that withdrawal from strong positive relationships may be a risk factor for future criminality, whereas being likeable and forming positive social bonds is likely to have the opposite effect except when peer groups are engaged in deviant behaviour.

Links Between Neighbourhood Disadvantage, Education, and Crime

Research suggests that education provides protective effects against criminality and neighbourhood disadvantage. The likelihood of criminal offending, conviction, and incarceration decrease with increasing years of education (e.g., Hjalmarsson et al., 2014; Meghir et al., 2012). Living in a disadvantaged neighbourhood is associated with lower levels of educational attainment, partially due to reduced opportunities and access to quality schooling (e.g., Galster et al., 2007). Moreover, low levels of education impede socioeconomic success and well-being (e.g., Rumberger, 2011; Raghupathi & Raghupathi, 2020). The literature may suggest a cyclical effect whereby disadvantage impedes the ability to attain higher education which could otherwise serve as a protective factor, helping individuals to move from disadvantaged circumstances and gain access to prosocial employment (thereby decreasing criminal risk). As such, it is important to consider the influence of level of education in the evaluation of the links between criminality and ongoing neighbourhood disadvantage.

Current Study

Although effects of neighbourhood disadvantage and neighbourhood change on children's development and future criminality have been documented (e.g., Coulton et al., 2012; Graif et al., 2014), effects of criminal offending on neighbourhood change and disadvantage across the life course are less clear from the existing literature. The first objective of the present two-part study was to examine how offending perpetuates economic and social immobility via neighbourhood disadvantage over the course of early to mid-adulthood, and to investigate the impact of other established risk factors on these trajectories over time. While research shows that neighbourhood disadvantage predicts future criminality (e.g., Pratt & Cullen, 2005), it is also possible that criminality in early adulthood perpetuates living in disadvantaged neighbourhoods across adulthood. The first goal of this study was to examine the continuity of neighbourhood disadvantage from childhood to adulthood using a growth model, with an emphasis on whether continuity is influenced by important life events such as educational attainment or being charged with a crime. This design allowed for a demonstration of the long-lasting effects of criminality on the course of an individual's experience of neighbourhood disadvantage, in the context of other risk factors such as low educational attainment and childhood aggression.

Because the growth model tested in Part One did not allow for transactional processes between crime and neighbourhood disadvantage over time to be tested, in Part Two we expanded upon the growth-curve results using a cross-lag model. This was used to test a transactional model whereby growing up in neighbourhood disadvantage leads to a higher number of charges which, in turn, prevents upward mobility later in life. In Part Two, an emphasis was placed on potential mediators of these transactional processes (i.e., years of education) and influential characteristics in childhood (i.e., aggression, withdrawal, and likeability) which might influence transactional relations over time.

Part One

Data collected over a 30-year period encompassing mid-childhood to mid-adulthood from the Concordia Longitudinal Research Project were used for the present study. This project is a long-term study of over 4000 families from low-income neighbourhoods in a large urban city located in Québec. Because the overall standard of living improved and neighbourhood disadvantage declined across Québec after 1976 (Fortin, 2001), it was hypothesized that a greater number of charges and higher levels of other risk factors in childhood and early adulthood would predict "less improvement" in neighbourhood disadvantage over time. That is, participants with more criminal charges and higher childhood aggression would show less of an improvement in their neighbourhood quality across adulthood, relative to others in the sample. Effects involving other childhood characteristics (i.e., withdrawal and likeability) as predictors of the trajectory of neighbourhood disadvantage were exploratory as the literature was too limited to make specific predictions.

Method Part One

Participants and Sampling

Original Sampling

The present study utilized data from an intergenerational longitudinal project in Québec, Canada, the Concordia Longitudinal Research Project (e.g., Kennedy-Turner et al., 2021; Hastings et al., 2019). This is a unique longitudinal data archive initiated in 1976, which merges information regarding neighbourhood characteristics with individual behavioural and archival records from childhood onward, within a large lower-socioeconomic inner-city Québec sample (N = 4110, 2049 female). Participating families' average incomes and occupational status were below the average levels for both Canada and Québec, based on a sub-sample (n = 503) for

whom detailed information about parents' education and occupational status was available from Time 1 of the project (Véronneau et al., 2015). As the sample was drawn from schools serving low-income communities, and because of the low average levels of education and occupational status in their families, children in the study were considered at-risk for a variety of adverse health and social outcomes in adulthood, including criminal offending (Serbin et al., 2011; Serbin et al., 2004).

Participants were mostly Caucasian and French-speaking (>95%). Beginning in 1976, all children in Grades 1, 4, and 7 (averaging 6, 9, and 12 years of age; mean age of the total sample = 9.51 years; SD= 2.6) from 36 French-language inner-city public schools in Québec were screened for aggression, social withdrawal, and likeability based on peer ratings (see below). Elevated values were determined relative to children of the same gender within classrooms. For more details on the original selection and recruitment, see Schwartzman and colleagues (1985).

For the purposes of the current study, participants with any criminal charge before completion of their schooling were excluded from the sample (n = 213). This was done so that education could be examined as a predictor and mediating variable between childhood risk and later criminal activity (i.e., education preceding charges). The current sample includes 3897 (1882 males, 2015 females) participants and the developmental range includes mid-childhood (mean age 9.5 years, SD = 2.6) through mid-adulthood (mean age 39.5 years, SD = 2.6). Multiple measures and comprehensive archival data have been utilized over the course of the study, such as neighbourhood quality (based on Canadian Census Tract records; Statistics Canada, 1998, 2008, 2019) and criminality (based on Québec criminal court records).

Procedure

At initiation, in 1976, the project was approved by the school board, administration, and participating schools' parent and teacher committees from which participants were drawn. Prior to data collection at each time point, the Concordia University Institutional Review Board provided ethical approval. Initial collection occurred between 1976 and 1978. To gain information about levels of aggression, social withdrawal, and likeability, and among children screened for participation, children in each classroom were asked to use the Pupil Evaluation Inventory (PEI; Pekarik et al., 1976) to rate up to four boys and four girls in their respective classes best represented by the items (for a more thorough description, see Serbin et al., 1998). With permission from the Commission d'accès à l'information du Québec (CAI), Educational records of all participants were obtained from the *Ministère de l'Éducation et de l'Enseignement Supérieur (MEES)*, when participants averaged 39.5 years of age (*SD* = 2.6 years). Cumulative criminal records from age 18 to mid-adulthood were obtained at a public access terminal from the city's criminal justice courthouse.

Measures

Pupil Evaluation Inventory (PEI; Pekarik et al., 1976)

Childhood behaviour was assessed using a French translation of the PEI. The PEI is a 35-item peer-nomination measure which is used to assess three factors: aggression, social withdrawal, and likeability. Twenty items are used to assess aggression (e.g., *those who are mean or cruel to other children*), ten are used to assess social withdrawal (e.g., *those who are too shy to make friends easily*), and four are used to assess likeability (e.g., *those who are especially nice*). To calculate scores, nominations for each child were summed for each scale. To control for the size of the class and for potential gender differences, these sums were standardized according to gender and class. In this way, children with higher z-scores were those who were

nominated more often as being represented by that characteristic as compared to same-gender classmates. Reliability and validity of this measure has been demonstrated within the present sample (Schwartzman et al., 1985) and across similar samples (Lyons et al., 1988; Pekarik et al., 1976; Serbin et al., 1987; Tessier et al., 1997). For the present sample, mean internal consistencies across grades for the three PEI scales were $M_{\omega} = 0.96$ for aggression, $M_{\omega} = 0.88$ for withdrawal, and $M_{\omega} = 0.84$ for likeability.

Education

Highest level of education completed was coded from official diploma records into four categories (1 = *Below High School*; 2 = *High School Completed*; 3 = *2 or 3-Year Community College Program/ Entry or some University Attendance*, 4 = *University Completed*), which were then converted into a value approximating number of years of schooling. The most typical final level of schooling was secondary education or an equivalent degree (e.g., vocational diploma), with a mean of 11.78 ($SD = 1.69$) years of education.

Neighbourhood Disadvantage

Census Tract data (Statistics Canada, 1998, 2008, 2019) providing information about the sociodemographic landscape of participants' neighbourhoods (defined by postal sortation codes) was collected. At each census year, information collected included the proportion of households within participants' neighbourhoods that had a household income below the Canadian poverty line (below $10,000 CAD, or approx. $9800 USD at the first time point in 1976), that were headed by a single-parent, whose head-of-household had lower than a Grade 10 education, and whose head-of-household was unemployed. Factor analyses demonstrated that each of these variables had significant factor loadings at each time point (ranging from .47 to 1.06, $p < .05$), indicating that the neighbourhood disadvantage factor extracts sufficient variance from each

variable. Neighbourhood disadvantage scores were calculated as means of these four proportion scores. Of note, there was a considerable amount of missing neighbourhood data for the 1996 time-point due to a change in collection procedures for the 1996 census only. As such, postal codes were utilized to replace missing neighbourhood data with data from other participants living in the same neighbourhood for whom data were available. Although the average level of disadvantage in participants' neighbourhoods was higher than for the city in general, there was a wide range of neighbourhood disadvantage scores allowing for the examination of the broad effects of disadvantage.

Composite reliability estimates demonstrated that internal consistencies ranged from adequate to good (M_{ω} = .59 to .96, average .86; Trizano-Hermosilla & Alvarado, 2016; Werts et al., 1974). Neighbourhood disadvantage non-linearly decreased from 1976 (M = 0.20, SD = 0.05) to 2006 (M = 0.14, SD = 0.05), with most of the decrease occurring before 1996. This does not present an issue for the current analyses as it affects intra-individual changes equally and, therefore, does not affect inter-individual differences. See Table 1 for descriptive statistics for neighbourhood disadvantage at the item and scale levels.

It should be noted that this sample experienced an average reduction in neighbourhood disadvantage over the period of the study (1976-2006), reflecting overall improvement in standards of living in Québec during the period following the 'Quiet Revolution' of the 1960's (i.e., notable increases in average levels of education, family income, and occupational status during the 1970's and 1980's; e.g., Fortin, 2001). Examining a subset of this sample (n = 503) for whom intergenerational data were available, participants were found to be better off in adulthood than their parents (i.e., improvements in educational attainment, occupational prestige, and SES; Véronneau et al., 2015). By implication, this sample, on average, is living in less

disadvantaged neighbourhoods in adulthood than in childhood. This reduction in neighbourhood disadvantage is to be expected along with rising levels of education and income. In addition, there was significant inflation during this period, causing the dollar amount of average incomes to rise over time. Both the effects of inflation and population-wide improvement in SES would be expected to affect intra-individual but not inter-individual changes (i.e., similar rate of change for all participants).

Criminal Offending

Criminal records were collected from the open access terminal of the Palais de Justice, a criminal courthouse in Montréal, Québec. Previous studies have determined that this sample is at elevated risk for criminal offending (Kennedy-Turner et al., 2020). Criminal records prior to age 18 are not public and so were not utilized for the current analyses. Information on types and frequencies of charges were collected from comprehensive records from age 18 upward and criminal charges were categorized into types (violence, property, drug, traffic, and miscellaneous). Participants could have had more than one type of charge. To limit the investigation to arguably more serious types of crime, charges investigated in the current study included violent (e.g., robbery, aggravated assault, kidnapping), property (e.g., burglary, theft, arson, vandalism), and drug charges (e.g., drug selling, drug use). Analyses focused on the number of charges accumulated in early- and mid-adulthood. Specifically, the number of all violence, property, and drug charges were calculated into two time periods based on the available data, resulting in a period of 9 years in early adulthood (ages 18 to 27) and 10 years in mid-adulthood (ages 28 to 38). In the current sample, 15% of participants had one or more charges between the ages of 18 and 38. In 2006, the total police-reported crime rate for the population was 7.52% in Canada and 5.91% in Québec (Silver, 2007), confirming that our sample had a

higher risk of criminality than the general population. This seems to be driven primarily by males in our sample, as 25.4% of males and 5.2% of females in our sample had at least one charge. This is unsurprising as research consistently reports that females are far less likely than males to commit crimes (e.g., Blanchette & Brown, 2019). See Table 1 for descriptive statistics.

Control Variables

Demographic information was collected at Time 1 (1976) from school records and included participant gender (male or female) and age.

Design and Analytic Strategy

Latent Growth Curve Model

The first set of analyses examined predictors of neighbourhood disadvantage in relation to criminal offending from childhood through mid-adulthood (1976-2006). Specific analyses examined sequences and processes involved in changes in the quality of the neighbourhoods in which the participants and their families lived over time. The model illustrated in Figure 1 was used to predict changes in neighbourhood quality from childhood to mid-adulthood, as well as to examine the influence of criminal offending in early adulthood and risk factors in childhood on these changes. Beginning with childhood, neighbourhood disadvantage and children's behavioural risk factors (i.e., aggression, withdrawal, and likeability), as well as criminal offending in early adulthood, were modeled as predictors of longitudinal trajectories of neighbourhood disadvantage. This was accomplished utilizing a latent growth curve model (LGCM; Burant, 2016). LGCMs allow modeling of repeated measures (i.e., neighbourhood disadvantage) as trajectories of development over time. These trajectories are represented by the shape function, which indicates divergence from the baseline (i.e., the intercept). A positive association between a predictor and the shape function indicates that the trajectory decreases at a

slower rate for participants with higher levels of the predictor compared to those with lower levels of the predictor. Likewise, a negative association indicates that the trajectory decreases at a faster rate for those with higher levels of the predictor.

Trajectories were modeled as a function of age. As an additional verification, models involving quadratic (curvilinear) and cubic trajectories were considered. These models provided no evidence of nonlinearity, thus providing support to the model retained here. The intercept was located at age 18 because the starting age for the participants (M = 10.63 years) was too early to have any criminal data. Given that the slope of a trajectory is always calculated based on total change occurring over the whole study period, it was impossible to eliminate all neighbourhood change occurring prior to age 18 from the model. As such, this model predicts change that partly occurred before criminal charge data was available. However, in a linear model this change is equal over time and, thus, this should not present an issue for the interpretation of analyses. Due to the presence of skewed distributions in the criminal data, the Robust Maximum Likelihood (MLR) estimator was used in MPlus (Muthén & Muthén, 1998-2011). Follow-up simple slope trajectory models were conducted, demonstrating neighbourhood trajectories over time for participants based on varying levels of charges (0, +1 SD, +2 SD, and +3 SD).

Results: Part One

Descriptive Statistics

As anticipated based on Québec population trends, neighbourhood disadvantage decreased over time in what appeared to be a non-linear trajectory (see Table 1). In other words, the neighbourhoods in which participants were living became less disadvantaged over time. As explained above, measures of changes in neighbourhood disadvantage, predicted as inter- and intra-individual differences, are unaffected by this overall decrease in neighbourhood

disadvantage. Descriptive statistics (Table 1) revealed that males received a greater number of charges than females across adulthood. T-tests confirmed that males had more charges than females between ages 18-27 (males' *M charges across this time period* = .87, SD = 2.69; females' *M*= .05, SD=.05; $t(3895)= 13.58$, $p < 0.01$) and also between ages 28-38 (male's *M charges across this time period* = 1.37, *SD* = 4.00, females' *M* = 0.13, *SD* = 1.02 , $t(3895)=13.54$, $p < 0.01$). Level of neighbourhood disadvantage was significantly positively correlated across time points. Correlations between study variables are presented in Table 2.

TABLE 1 HERE

TABLE 2 HERE

Latent Growth Curve Model (LGCM)

To examine possible gender differences, interactions between gender and predictors were examined. The results from these additional analyses revealed no interactions were significantly related to the intercept and slope of the trajectories, consistent with a lack of gender differences in the shape of the trajectories and effects of the predictors. Figure 1 presents results from the LGCM. R^2 values for the intercept and slope were .09 and .03 respectively and standardized values for predictors of the linear slope are presented in Table 3.

FIGURE 1 HERE

TABLE 3 HERE

In relation to the primary hypotheses for Part One, charges in early adulthood were positively significantly related to changes in neighbourhood disadvantage over time via the linear shape function ($b = 0.01$, $p \leq 0.05$). Regarding the latter association, greater instances of violence, property, and drug-related charges in early adulthood (18-27 years) predicted lower rates of overtime improvement in neighbourhood disadvantage. Similarly, higher aggression (*b* =

0.01, $p \leq 0.01$), higher withdrawal ($b = 0.01$, $p \leq 0.01$), and lower likeability ($b = -0.02$, $p \leq 0.01$), as rated by peers in childhood, all individually predicted lower rates of overtime improvement in neighbourhood disadvantage (via the latent shape function – the linear slope in the present model). The education slope coefficient in the equation was counterintuitive and anomalous ($b = .01$, $p \leq .01$). This is likely due to a cross-over suppression effect by the relations between education and both aggression and criminal offending (e.g., Paulhus et al., 2004), as it is clear in Table 2 that education negatively correlates with neighbourhood disadvantage (in addition to aggression and charges). Participant gender did not have a significant effect on the trajectory of neighbourhood disadvantage over time. The estimated effects of different amounts of charges (0, +1 SD, +2 SD, and +3SD) on the trajectory of neighbourhood disadvantage over time are presented in Figure 2. Compared to individuals with no charges, those with several charges appear to have decreased in neighbourhood disadvantage at a slower rate. Interactions among predictors were explored post hoc and generally found to be non-significant. There was one significant interaction between childhood aggression and withdrawal in the prediction of the intercept, suggesting that children high in both characteristics lived in more disadvantaged neighbourhoods at age 18 (intercept).

FIGURE 2 HERE

Part Two

Results of Part One confirmed that childhood risk factors as well as increased rates of criminal charges contributed to reduced improvement in neighbourhood circumstances. To expand these results, the goal of Part Two was to examine the potential transactional nature between neighbourhood disadvantage and criminality over time using a cross-lag model, as the LGCM did not allow for this analysis. Aggression and education were of particular interest given

their correlation with subsequent criminal charges. It was hypothesized that higher disadvantage earlier in life would predict higher future criminal charges which, in turn, would predict higher disadvantage later in life. While the LGCM allowed for a unidirectional relation to be established by which crime predicts later disadvantage, the cross-lag model allowed for the assessment of how these variables may influence each other reciprocally over time. In addition, specific indirect effects were hypothesized: (1) higher childhood aggression would predict lower education, which would predict more charges in early adulthood which would predict higher neighbourhood disadvantage later in adulthood, and (2) higher early neighbourhood disadvantage would predict lower education, which would predict more charges in early adulthood which would predict higher neighbourhood disadvantage later in adulthood.

Methods: Part Two

Sample and Method

As Part Two was a direct extension of Part One, the same sample and data set were utilized. Information presented above regarding original sampling methods and procedure also apply to Part Two. The same measures of childhood characteristics, education, neighbourhood disadvantage, criminal offending, and demographics were also utilized.

Design and Analytic Strategy

Auto-Regressive Cross-Lag (ARCL)

An ARCL allows for the examination of reciprocal and transactional associations between variables concurrently and across time (Kearney, 2017) and straightforward testing of potential mediators. It should be noted that it is not possible to completely distinguish within-person (intra-individual) from between-person effects (inter-individual differences in change; Hamaker et al., 2015).

Due to the presence of skewed distributions in the criminal data, the MLR estimator was used in MPlus (Muthén & Muthén, 1998-2011). Cross-lagged associations were modeled between neighbourhood disadvantage over four time points (1976, 1986, 1996, 2006), and aggression, education, and the sum of violence, property, and drug charges, distinguished by male and female. As there were differences in the variances of education and charges between males and females, a single group model was not appropriate.

To arrive at the most parsimonious model and determine statistically significant differences between males and females, the fit of two models were first compared: one in which all paths were allowed to differ between females and males, and one in which all paths were constrained to equality. Decisions regarding goodness of fit were primarily based on the Root Mean Square Error of Approximation (RMSEA), Comparative Fit Index (CFI), and the Tucker-Lewis Index (TLI), given potential issues of using chi-square tests of exact fit. Specifically, chi-square tests tend to be significant in large samples regardless of fit. Guidelines indicating that RMSEA ≤.05 and/or CFI/TLI ≥ .95 signifies excellent fit, and RMSEA .05 to .08 and/or CFI/TLI ≥ .90 signifies adequate fit were utilized (Browne & Cudeck, 1993; Hu & Bentler, 1999).

It was concluded that the model with paths constrained to equality demonstrated worse fit, indicating the presence of significant differences between males and females. Using the modification indices from the failed model, the paths that appeared to differ the most were identified and freed from constraint to obtain a model of 'partial equality'. This was repeated until the model demonstrated fit comparable to the model in which all paths were free. In the final model, only two paths had to be freed: (1) charges in early adulthood predicting charges in later adulthood and (2) level of education predicting charges in early adulthood. All other paths

can be considered equal. Likewise, only indirect paths that were freely estimated in the two groups are considered statistically different. These will be discussed in further detail below.

Results: Part Two

Auto-Regressive Cross-Lag (ARCL)

Figure 3 shows cross-lagged associations between neighbourhood disadvantage, aggression, education, and the sum of violence, property, and drug charges, distinguished by gender. Variance differences in education and charges between females and males indicated a single group model was not appropriate. Neighbourhood disadvantage in 1976 and aggression were included as predictors and total years of education was included as a mediator. Controls included age, childhood likeability, and childhood withdrawal at time 1 (1976). The model demonstrated excellent fit (RMSEA $\leq .05$, CFI/TLI $\geq .95$). R^2 values for model outcomes are presented in Table 4.

FIGURE 3 HERE

TABLE 4 HERE

Table 5 presents the results for all possible indirect effects for both genders. In support of the hypothesis of an overall transactional relationship, an indirect effect was found for both groups whereby neighbourhood disadvantage during early life (ages 6-12) predicted charges in early adulthood (ages 18-27), which predicted continued neighbourhood disadvantage in later life. Moreover, the specific hypotheses for additional indirect effects were supported, but for males only. In males, childhood aggression predicted level of education, which predicted charges in early adulthood which, in turn, predicted later neighbourhood disadvantage. In addition, males' early neighbourhood disadvantage predicted level of education, which predicted criminality in

early adulthood which, in turn, predicted later neighbourhood disadvantage. Despite significant effects for females for each individual path, the overall indirect effects were not significant. This is possibly because of low power for this analysis due to the lower frequency of crime among females in the sample.

In addition to the hypothesized indirect paths, several other significant paths were identified (see Table 5). In relation to the primary hypothesis, a greater number of charges in early adulthood predicted less improvement in later neighbourhood disadvantage for both genders, as predicted. Neighbourhood disadvantage beginning in childhood (1976-1986) was also found to predict more charges in early adulthood, which persisted through mid-adulthood (i.e., stability was established between the number of charges in early adulthood and those in later adulthood).

TABLE 5 HERE

An indirect effect for both genders was found in which education mediated the relation between early aggression and charges in adulthood, as well as between early disadvantage and charges in adulthood. Charges persisted beyond early-adulthood through mid-adulthood. Education was also found to mediate the association between early and later neighbourhood disadvantage, as well as between childhood aggression and later disadvantage, highlighting a potential protective effect of education on disadvantage, as suggested by the LGCM in Part One. Overall, findings suggest that education is a protective factor for individuals with higher risk for criminality and/or continued disadvantage.

Discussion

To our knowledge, previous research has not examined complex and reciprocal longitudinal effects of engaging in crime on socio-economic outcomes. A primary objective of this study was to determine whether criminal offending perpetuates economic and social immobility via neighbourhood disadvantage. A second objective was to examine if this effect is part of a complex transactional process over time. It was anticipated that more charges would predict less improvement in neighbourhood disadvantage and that this would be part of a transactional process over time perpetuating criminal offending and disadvantage.

Results of the LGCM in Part One supported the hypothesis that more charges in early adulthood would predict lower rates of overtime improvement in neighbourhood disadvantage. Exposure to poorer environmental and social influences as well as lack of access to resources and positive or prosocial opportunities within disadvantaged neighbourhoods are likely to impede individuals from attaining socioeconomic advancement. In addition, stigmatization by society and the criminal justice system is a likely factor in why individuals who engage in crime sustain a relatively high level of neighbourhood disadvantage. This is supported by research demonstrating that having a criminal record makes it exceedingly difficult for offenders to gain prosocial, legal employment (e.g., Pager et al., 2009; Sheppard & Ricciardelli, 2020; Sugie, Zatz & Augustine, 2020).

Higher aggression and withdrawal in childhood, and lower likeability, also predicted less improvement in neighbourhood disadvantage. In conjunction with limited opportunities for prosocial occupational advancement, early aggression may contribute to individuals becoming ‘stuck’ in their circumstances. Counterintuitively, level of education positively predicted neighbourhood disadvantage in this model. As stated above, this is likely due to suppression effects caused by aggression and charges. Mediation effects in Part Two demonstrate clearly that

education works to improve outcomes over time and is protective against aggression (in addition to a history of neighbourhood disadvantage). While no specific predictions concerning childhood withdrawal and likeability could be made, findings may be unsurprising given that social isolation and a lack of positive social bonds have been associated with increased criminality (e.g., De Li, 2004), and withdrawn and socially rejected children are more often isolated than those who are not withdrawn (Bub et al., 2007).

The results of the LGCM in Part One demonstrate how childhood characteristics and levels of criminality influence differences in long-term trajectories of neighbourhood disadvantage, with effects independent of gender. The ARCL in Part Two supported the hypothesis that a transactional relation exists between neighbourhood disadvantage and charges and specific a priori hypotheses for indirect effects involving risk and protective factors were supported for males. These findings suggest that early environmental and individual characteristics are important risk factors for boys' later criminality and neighbourhood disadvantage, while education is likely to be a protective factor. Although intuitively it seems reasonable that similar processes might occur for females, these indirect effects did not reach statistical significance. Again, it is possible that this results from the lower rate of charges among females. Replication with larger samples is necessary to verify gender differences reported here.

Findings support previous research that education mediates the link between neighbourhood disadvantage and charges in adulthood (Kennedy-Turner et al., 2020) and extend these findings to demonstrate that charges remain consistent from early- to mid-adulthood for males and females. Similar findings supported the mediating role of education in the relation between childhood aggression and charges (Kennedy-Turner et al., 2020). Moreover, education mediated the relation between early neighbourhood disadvantage and later neighbourhood

disadvantage. Results suggest that education acts as a protective factor against continuing disadvantage and criminality.

Strengths and Limitations

Access to longitudinal data merging neighbourhood characteristics, behavioural data, and archival records, and spanning 30 years over the course of this study's timeline afforded unique strengths to this investigation. The analyses demonstrated that criminality sustains living under disadvantaged conditions in adulthood and the ARCL allowed the sequential analysis of influential variables over time.

It is important to note that the standardized coefficients and R^2 values (see Table 4) suggest effects ranging from small to large. This is not unusual in complex longitudinal research, particularly that focused on relatively uncommon events in the population (i.e., criminality). Given the magnitude of the current sample, the complexity of factors determining neighbourhood disadvantage, and the stability of disadvantage from childhood onward, it is unsurprising that some statistically significant predictors of change and deviation from population norms are small. These predictors may, however, provide avenues for prevention and intervention which would be quite important in terms of overall population-wide improvements. Although effects appear small, they were detectable because the sample utilized had a high frequency of criminality, with a rate of over twice that of the general population, allowing meaningful examination of specific predictors and mediators.

The current study is not without limitations. First, individual-level occupational status and income of study participants was unavailable, thus individual-level socioeconomic status could not be controlled (though educational data, which are highly correlated with income and

occupational status, were included). The focus of the paper was on neighbourhood-level disadvantage, which can provide valuable insight into residents' outcomes independent of the effects of individual-level socioeconomic status (e.g., Kalff et al., 2001). Both individual and neighbourhood disadvantage could not be examined together within the design. Other studies may be able to extend our findings through use of longitudinal data on both individual and neighbourhood levels. Second, there was a large amount of missing data for neighbourhood disadvantage at one time point (i.e., 1996) due to changes in census collection procedures for that year. This is not likely to have impacted the LGCM given that there was universal data for the sample at earlier and later time points. However, for the ARCL, significant associations predicting neighbourhood disadvantage in 1996 should be interpreted with caution. Third, a poverty indicator of $10,000 was utilized as part of the neighbourhood disadvantage measure in the present analyses. We were unable to adjust this for inflation over time as we were using income cut-off levels provided by Census Canada (Statistics Canada, 1998, 2008, 2019). This is an appropriate estimate of poverty for 1976 but, due to inflation, it may not be as appropriate for later time points and may represent more extreme disadvantage. In other words, inflation could contribute to apparent reductions in neighbourhood disadvantage for the full sample over time. Again, this is not a confound in the current study given that that inflation would presumably impact neighbourhood scores equally for all participants, and changes in neighbourhood disadvantage were examined as intra-individual differences.

Future Directions and Recommendations

These findings have implications for crime prevention and offender rehabilitation. Interventions targeting aspects of disadvantaged neighbourhoods that impede social and economic mobility are likely to have long term effects. Future research should delineate which

characteristics of disadvantaged neighbourhoods underlie the association between criminality and later neighbourhood disadvantage to pinpoint specified neighbourhood targets. Current findings also suggest that targeting education and interventions for childhood aggression may be helpful prevention strategies for reducing criminality and disadvantage. This may include educational programming and targeted interventions for aggressive behaviour in children.

Conclusions

To our knowledge, the current research is the first to examine longitudinal effects of criminality on neighbourhood disadvantage and the transactional associations between criminality and neighbourhood disadvantage. Evidence that crime impacts individuals' economic and social neighbourhood environment, perhaps feeding into a cycle of disadvantage and criminality, suggests that more attention should be paid to interventions and programs for the prevention of recidivism that start 'at home'. Intervening at the neighbourhood level to change circumstances could be the key to breaking a cycle characterized by limited opportunities, negative experiences, and poor outcomes for those who live in disadvantaged communities.

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Table 1. *Descriptive Statistics.*

Neighbourhood Disadvantage	1976	1986	1996	2001	2006
	$M_{proportion}$ *(SD)*	$M_{proportion}$ *(SD)*	$M_{proportion}$ *(SD)*	$M_{proportion}$ *(SD)*	$M_{proportion}$ *(SD)*
(1) Proportion households w/single parents	0.22 (0.05)	0.20 (0.06)	0.20 (0.07)	0.26 (0.10)	0.26 (0.10)
(2) Proportion households w/ very low income	0.16 (0.06)	0.14 (0.06)	0.08 (0.04)	0.06 (0.04)	0.02 (0.01)
(3) Proportion head of households with education < grade 9	0.31 (0.05)	0.28 (0.07)	0.20 (0.06)	0.16 (0.05)	0.23 (0.07)
(4) Proportion head of households unemployed	0.13 (0.03)	0.12 (0.04)	0.12 (0.04)	0.07 (0.03)	0.06 (0.03)
(5) Mean proportion (overall disadvantage)	0.20 (0.05)	0.20 (0.05)	0.15 (0.05)	0.14 (0.05)	0.14 (0.05)

Total Criminal Charges	Ages 18 to 27			Ages 29 to 38			Ages 18 to 38		
	Males *M (SD)*	Females *M (SD)*	Total *M (SD)*	Males *M (SD)*	Females *M (SD)*	Total *M (SD)*	Males *M (SD)*	Females *M (SD)*	Total *M (SD)*
All Participants	0.87 (2.69)	0.05 (0.39)	0.44 (1.93)	1.37 (4.00)	0.13 (1.02)	0.73 (2.94)	1.64 (5.28)	0.16 (1.29)	0.87 (3.85)

Additional Study Variables	Males *M (SD)*	Females *M (SD)*	Total *M (SD)*
Childhood Aggression in 1976 (z-scores)	-0.02 (0.96)	-0.02 (0.95)	-0.02 (1.93)
Childhood Withdrawal in 1976 (z-scores)	0.01 (0.98)	0.01 (0.97)	0.01 (0.97)
Childhood Likeability in 1976 (z-scores)	0.01 (0.97)	0.01 (0.97)	0.01 (0.97)
Total Years of Education	11.60 (1.65)	11.96 (1.70)	11.78 (1.69)

Note. n = 3897. $M_{proportion}$ = mean of the proportions found in all neighbourhoods in which participants resided. Total Criminal Charges = the total sum of violence, property, and drug charges.

Table 2. *Correlations Between Standardized Study Variables.*

	1	2	3	4	5	6	7	8	9	10
1. Aggression	-	-	-	-	-	-	-	-	-	-
2. Withdrawal	-.04/.06**	-	-	-	-	-	-	-	-	-
3. Likeability	-.19**/-.17**	-.03/-.14**	-	-	-	-	-	-	-	-
4. ND ‘76	.00/.00	.01/.00	.01/.00	-	-	-	-	-	-	-
5. ND ‘86	-.03/.00	-.02/-.02	-.02/-.01	.78**/.74**	-	-	-	-	-	-
6. ND ‘96	.07/.09**	.09**/ .08*	-.07*/-.09**	.30**/.23**	.33**/.26**	-	-	-	-	-
7. ND ‘01	.11**/.03	.08**/.04	-.10**/-.08**	.21**/.18**	.25**/.22**	.70**/.74**	-	-	-	-
8. ND ‘06	.07**/.05*	.08**/ .05*	-.10**/-.09**	.19**/.17**	.22**/.20**	.60**/.65**	.79**/.87**	-	-	-
9. Education	-.24**/-.16**	.00/-.06*	.27**/.26**	-.20**/-.18**	-.16**/-.18**	-.10**/-.20**	-.15**/-.15**	-.18**/-.17**	-	-
10. Charges 1	.22**/.12**	.01/-.02	-.10**/-.01	.02/.06*	.01/.06**	.06/.04	.12**/.03	.13**/.01	-.23**/-.08**	-
11. Charges 2	.22**/.13**	.01/-.01	-.10**/-.02	.03/.05*	.02/.06**	.07*/.02	.13**/.03	.13**/.00	-.24**/-.08**	.91**/.80**

Note. n = 3897; Pearson’s r correlations are presented for Males/Females; ND = neighbourhood disadvantage; Aggression = childhood aggression; Withdrawal = childhood; Likeability = childhood likeability; Charges 1 = charges in early-adulthood; Charges 2 = charges in mid-adulthood; * = $p \leq .05$; ** = $p \leq .01$.

Table 3. *Standardized Values for the Prediction of Neighbourhood Disadvantage Linear Slope.*

Predictor	*β*
Charges (before age 28)	.05
Aggression	.06
Withdrawal	.06
Likeability	-.10
Education	.06
Gender	-.03

Table 4. R^2 *Values for Cross-Lag Outcomes by Gender.*

	Males (n = 1882)	Females (n = 2015)
Outcome	R^2	R^2
Neigh. Dis. ‘86	.61	.57
Neigh. Dis. ‘96	.12	.13
Neigh. Dis. ‘06	.38	.42
Charges (before age 28)	.05	.03
Charges (after age 28)	.83	.65
Education	.14	.13

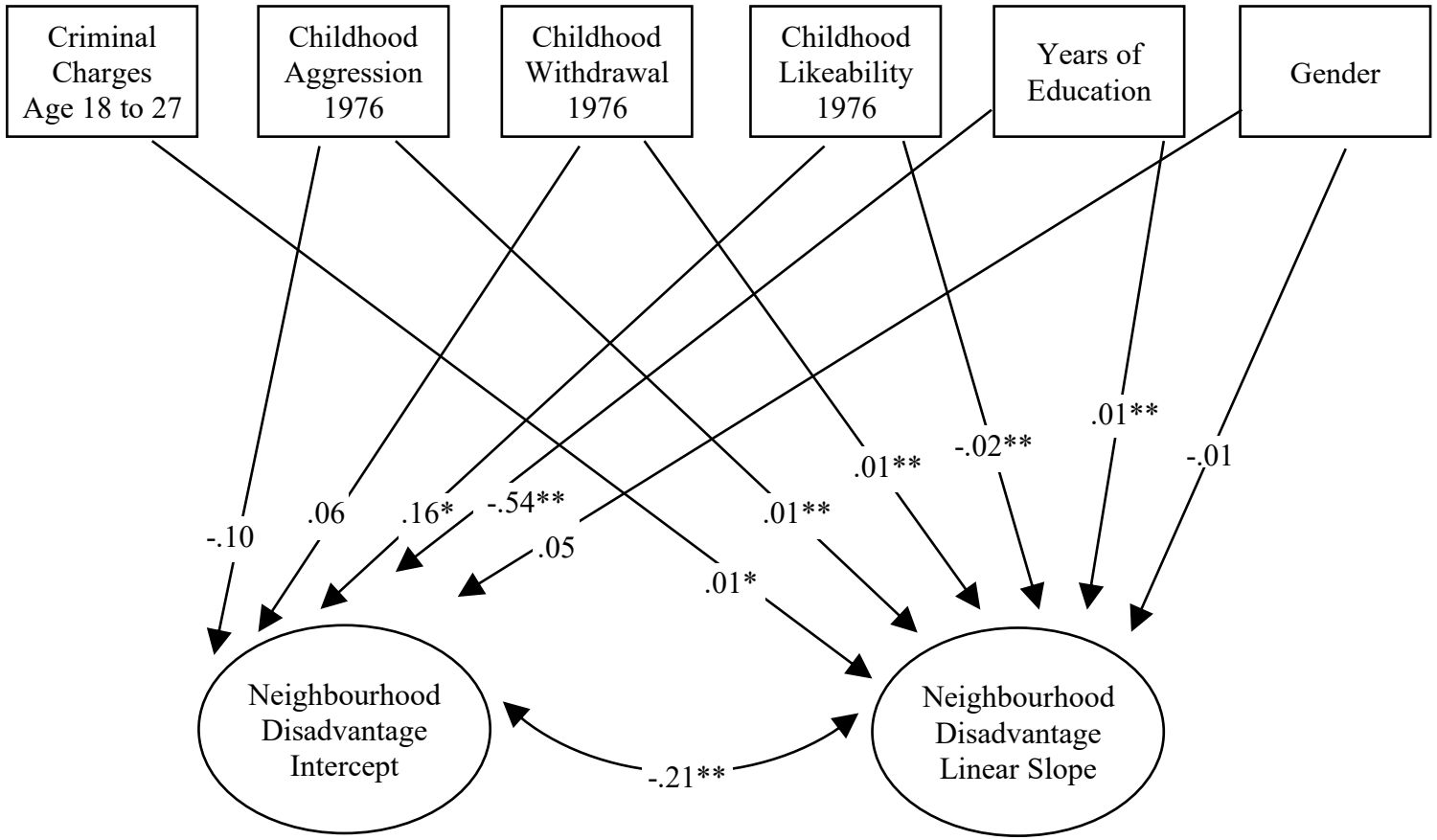
Note. R^2 values indicate the proportion of variance in the outcome that is explainable by the model. Neigh. Dis. = Neighbourhood disadvantage.

Table 5. *Indirect Effects for the Cross-Lag Model.*

	Males (n = 1882)	Females (n = 2015)
	b	*b*
Childhood Aggression to Neighbourhood Disadvantage 2006		
Aggression → Charges (before age 28) → Neigh. Dis. ’06	.01	.01
Aggression → Education → Charges (before age 28) → Neigh. Dis. ’06	.01*	.00
Aggression → Education → Neigh. Dis. ’96 → Neigh. Dis. ’06	.06***	.06***
Aggression → Neigh. Dis. ’86 → Neigh. Dis. ’96 → Neigh. Dis. ’06	-.02	-.02
Aggression → Neigh. Dis. ’86 → Charges (before age 28) → Neigh. Dis. ’06	.00	.00
Childhood Aggression to Charges (after age 28)		
Aggression → Charges (before age 28) → Charges (after age 28)	.00	.00
Aggression → Education → Charges (before age 28) → Charges (after age 28)	.12***	.01***
Aggression → Education → Neigh. Dis. ’96 → Charges (after age 28)	.00	.00
Aggression → Neigh. Dis. ’86 → Charges (before age 28) → Charges (after age 28)	.00	.00
Aggression → Neigh. Dis. ’86 → Neigh. Dis. ’96 → Charges (after age 28)	.00	.00
Neighbourhood Disadvantage 1976 to Neighbourhood Disadvantage 2006		
Neigh. Dis. ’76 → Neigh. Dis. ’86 → Neigh. Dis. ’96 → Neigh. Dis. ’06	.14***	.14***
Neigh. Dis. ’76 → Education → Neigh. Dis. ’96 → Neigh. Dis. ’06	.02***	.02***
Neigh. Dis. ’76 → Education → Charges (before age 28) → Neigh. Dis. ’06	.004*	.00
Neigh. Dis. ’76 → Neigh. Dis. ’86 → Charges (before age 28) → Neigh. Dis. ’06	.002*	.002*
Neighbourhood Disadvantage 1976 to Charges (after age 28)		
Neigh. Dis. ’76 → Education →Charges (before age 28) → Charges (after age 28)	.03***	.002***
Neigh. Dis. ’76 → Education → Neigh. Dis. ’96 → Charges (after age 28)	.00	.00
Neigh. Dis. ’76 → Neigh. Dis. ’86 → Charges (before age 28) → Charges (after age 28)	.34***	.53***
Neigh. Dis. ’76 → Neigh. Dis. ’86 → Neigh. Dis. ’96 → Charges (after age 28)	.00	.00

Note. n = 3897 (1882 males, 2015 females). Unstandardized coefficients presented. Neigh. Dis. = Neighbourhood disadvantage. * $p \leq .05$, ** $p \leq .01$, *** $p \leq .001$.

Figure 1. Results of Latent Basis Growth Curve Model.



Note. n = 3897. Unstandardized estimates reported – standardized values presented in Table 3. Intercept set at age 18 to best capture neighbourhood change after criminal data is available. "Neighbourhood disadvantage Linear slope" reflects the best form-fitting measure of change in neighbourhood disadvantage. Trajectories from the slope function were estimated as a function of age. * $p \leq .05$, ** $p \leq .01$ (two-tailed).

Figure 2. Estimated Influence of Charges on Longitudinal Trajectories of Disadvantage.

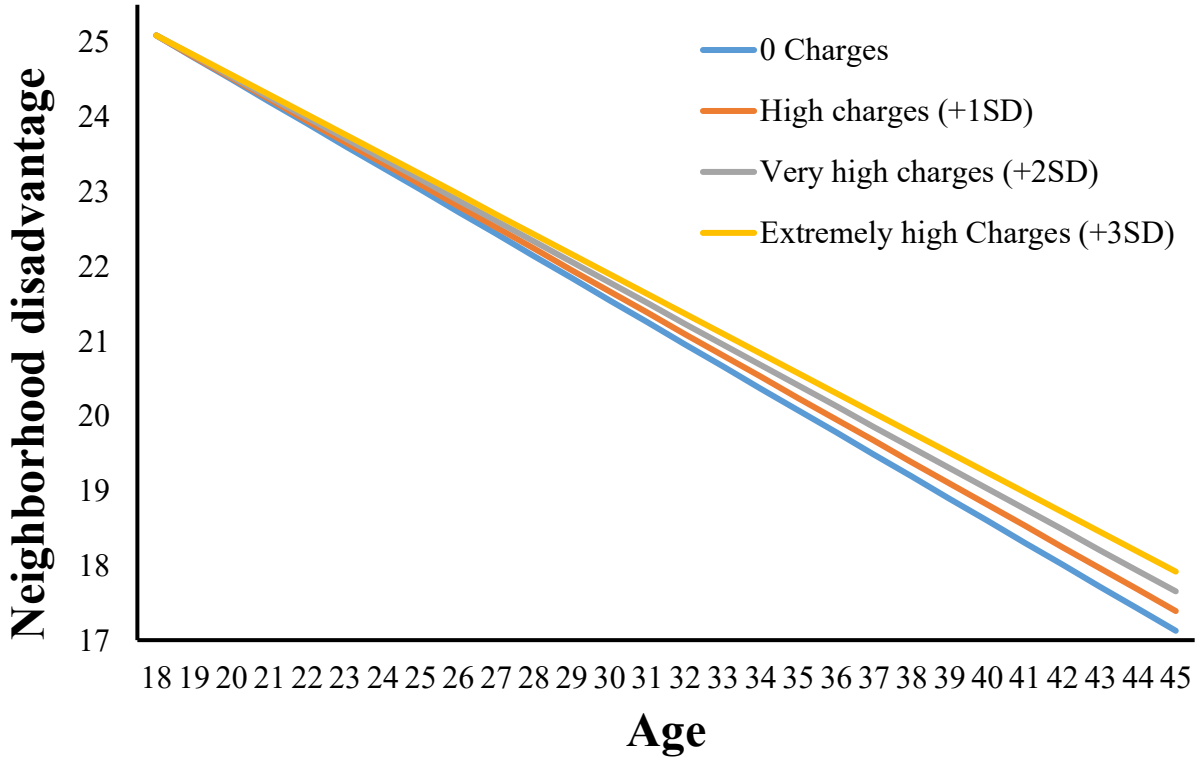
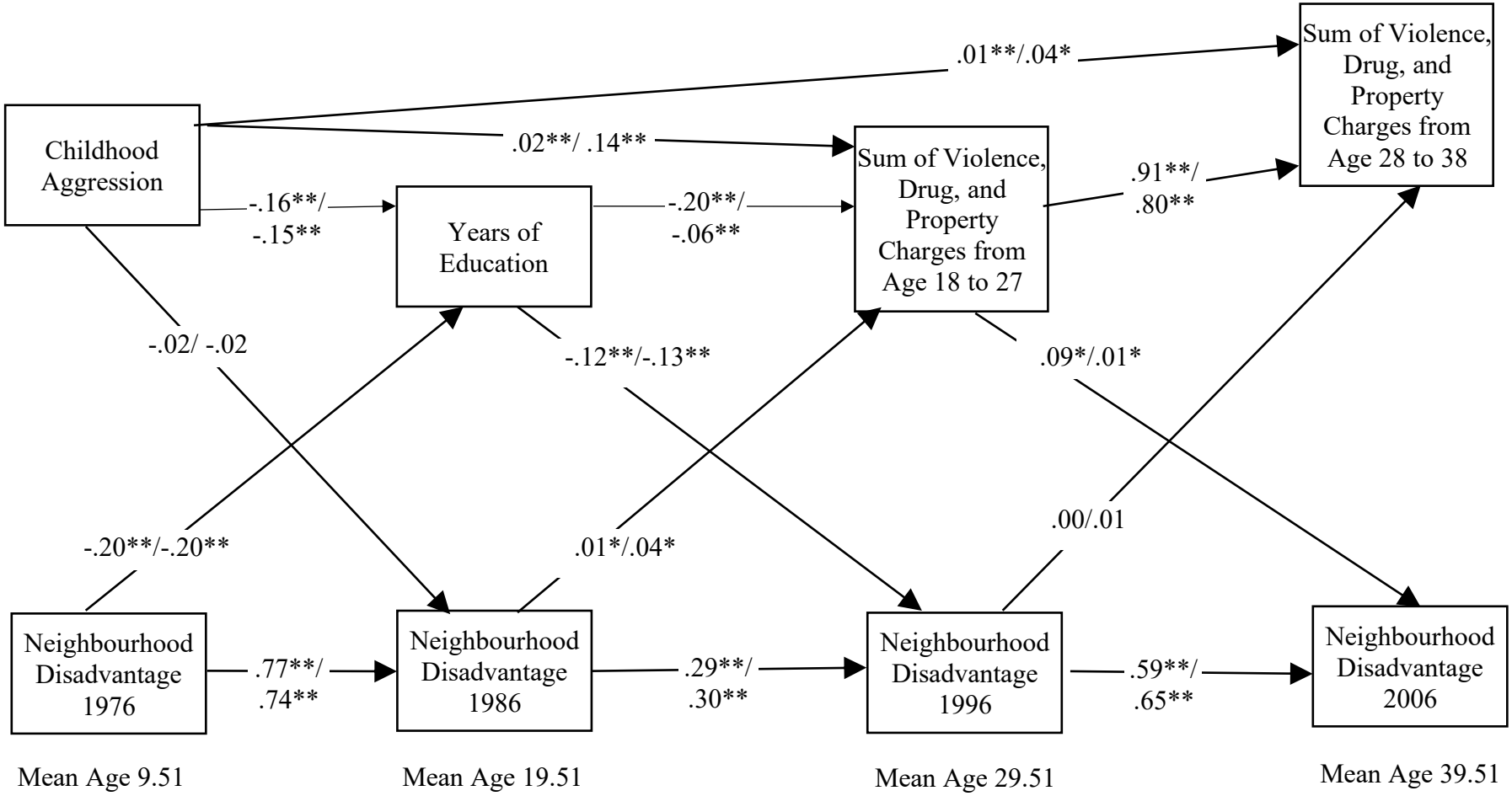


Figure 3. Multi-group cross-lag model between neighbourhood disadvantage, education, childhood aggression, and charges.



Note: n = 3897 (1882 males, 2015 females). Standardized coefficients are presented. Coefficients are presented for males and females (i.e., males/females). Controls included age, childhood likeability, and childhood withdrawal at time 1 (1976). * $p \leq .05$, ** $p \leq .01$.

General Discussion

The association between neighbourhood disadvantage in childhood and future criminality has been repeatedly demonstrated and is generally assumed to be a directional link from neighbourhood disadvantage to crime. This dissertation explored the possibility of the reverse also being true, that criminality predicts future neighbourhood disadvantage, which had not previously been empirically examined. Part One of the study examined the effect of criminality and childhood risk factors on change in neighbourhood disadvantage over time. It was hypothesized that criminality in adulthood would predict future experiences of neighbourhood disadvantage. The results in Part One supported this hypothesis, indicating that increased rates of charges contributed to reduced improvement in future neighbourhood circumstances. Further, known childhood behavioural and social risk factors, including higher aggression and withdrawal and lower likeability, were also found to negatively affect individuals' social and economic mobility over time.

While these results are meaningful in terms of predicting neighbourhood disadvantage from early into middle adulthood, an important next step was to further examine the underlying mechanisms of these associations. As such, the goal for Part Two was to examine potential bidirectional and transactional associations between charges and neighbourhood disadvantage, as well as the influence of important risk and protective factors, as a direct extension of Part One. While the growth curve model in Part One allowed for examination of intraindividual change, it did not allow for the assessment of this new developmental question. The influence of aggression and education were of particular interest given their correlation with subsequent criminal charges.

In Part Two, longitudinal transactional relations were examined between neighbourhood disadvantage, childhood aggression, and crime using a cross-lag model. Education was also investigated as a potential mediator of these transactional links. The results supported the hypothesis that a transactional relationship exists between neighbourhood disadvantage and crime for both males and females. Early disadvantage predicted disadvantage in adolescence which predicted charges in early adulthood. In turn, charges in early adulthood predicted later neighbourhood disadvantage. However, the two specific hypothesized indirect effects involving risk and protective factors were only found to be statistically significant for males in this model. The specified paths included the hypothesis that (1) higher childhood aggression would predict lower level of education, which would predict more criminality in early adulthood which would, in turn, predict higher neighbourhood disadvantage later in adulthood, and (2) higher early neighbourhood disadvantage would predict a lower level of education, which would predict more criminality in early adulthood which, in turn, would predict higher neighbourhood disadvantage later in adulthood. It is possible that these findings were only significant for males because more males than females were charged with offenses in the current sample, thus limiting the variability in this outcome for women. Despite these differences, a number of significant paths were identified for both males and females among education, aggression, charges, and neighbourhood disadvantage.

It is evident from the findings that the interrelations between neighbourhood disadvantage and criminality are complex and multi-faceted. Life circumstances and events, including educational opportunities and attainment, in addition to individual characteristics such as aggression, are factors that influence individuals' life trajectories over time. Consistent with

previous research, education appears to be a protective factor for individuals who grow up in disadvantaged circumstances or who have a proclivity toward behavioural problems, likely offering opportunities for social and economic advancement that may not otherwise be available.

Taken together, results suggest that being charged with a crime is a risk factor for maintaining disadvantaged circumstances and that this is part of a transactional relationship over time. That is, not only does living in disadvantaged neighbourhoods act as a risk factor for future engagement in criminal activity but higher criminal activity also appears to act as a risk factor for continued impediments to social and economic mobility. There are a number of possible explanations for the findings in this dissertation. The following section discusses relevant theoretical positions that may help in interpretation of the results.

Links to Theory

The primary goal of the present dissertation was to examine the hypothesis that having criminal charges would predict higher levels of neighbourhood disadvantage in the future. This predictive relationship was discovered within the current sample. There are a number of reasons why this may be the case, including the limiting effect of a criminal record on prosocial advancement (discussed in further detail below). Specifically, Labelling Theory may provide a basis for understanding the mechanisms underlying the link between criminality and future or sustained neighbourhood disadvantage. Labelling Theory postulates that stigma resulting from being labelled a 'deviant' or a 'criminal' limits individuals' opportunities to advance in society in a prosocial manner (Becker,1963). As discussed in the introduction to this dissertation, this may take the form of impediments to gaining lawful employment, adequate housing, and prosocial contacts (Jacobs, 2015). This is because an individual's criminal record is

typically referenced for important life exploits, such as when applying for legal employment or safe housing, in attempt to assess suitability, reliability, and/or trustworthiness for the setting. Moreover, people are inherently more likely to seek out social contacts who share the same or similar values and beliefs as themselves (e.g., Launay & Dunbar, 2015). Linking this to Sutherland's (1947) Theory of Differential Association, socialization with deviant or criminal peers will likely serve to perpetuate beliefs, values, attitudes, and even techniques that are favourable toward criminal behaviour (Matsueda, 2010). In these ways, individuals are likely to become 'stuck' within the antisocial propensities and behaviours expected of them.

The second goal of the present dissertation was to illuminate the nuanced nature of the relationship between neighbourhood disadvantage and criminality. A transactional relation was identified between the two variables, demonstrating their influences on each other over time. As described above, education was found to have a protective effect, mediating the relations between early neighbourhood disadvantage and neighbourhood disadvantage in adulthood, between childhood aggression and charges, and between early neighbourhood disadvantage and charges in adulthood (which remain consistent from early- to mid-adulthood). This may relate to notions underlying (General) Strain Theory (Agnew, 1992, 2002, 2006; Merton, 1938, 1968), as individuals growing up in disadvantaged circumstances are less likely to have access or opportunities to advance their education and, therefore, their socioeconomic position in society.

Exploratory variables also shed light on the nuanced nature of the relationship between crime and disadvantage. Findings demonstrating the effects of individual-level characteristics within the context of neighbourhood disadvantage are consistent with Bioecological Systems theory (Bronfenbrenner, 1979, 2005). Specifically, they reinforce the position that developmental

change does not occur in a vacuum. Rather, forces in multiple domains, including micro- (e.g., individual characteristics - aggression, withdrawal, likeability; education) and macro-level (e.g., neighbourhood characteristics – social services, neighbours) factors, interact to shape life-course experiences and development (Bronfenbrenner, 1979, 2005). In the case of the current research, it appears that individual-level risk (e.g., behavioural and social characteristics), contextual risk (e.g., limited access to resources and opportunity for socioeconomic advancement; risk exposure), and life-course experiences (e.g., level of education; criminal charges), influence and interact with each other to determine future neighbourhood circumstances.

Implications

The findings from the present dissertation have the potential to inform the development of targeted prevention and intervention strategies for at-risk individuals. Important risk and protective factors within the context of disadvantaged neighbourhoods and for offenders have been highlighted, including individual characteristics, behaviours, and important life events (e.g., engaging in crime; educational attainment). Early intervention and prevention strategies targeted 'at home' in disadvantaged neighbourhoods are likely to reduce future instances of crime and have the potential to disturb the vicious cycle of neighbourhood disadvantage and criminality. Providing opportunities to youth who are at risk has the potential to mitigate the costs of poverty and crime for Canadians over time. Specific targets should include characteristics of disadvantaged neighbourhoods demonstrated in the literature to impose risk, which may include the provision of accessible after-school programming promoting prosocial peer socialization as well as opportunities for supplementary education. In school or social services within disadvantaged neighbourhoods may also include counselling for witnesses and victims of crime and/or violence.

Interventions targeted within the home may draw on the family structure to further support at-risk children and youth. This may include a caretaker-centred approach, providing parenting interventions and addressing shared family values and positive belief systems regarding crime and deviance. Implementation of programs to assist caretakers in gaining legal employment may also be beneficial in minimizing the risk of modeling criminal offending as a legitimate method of economic advancement. Based on the findings in this dissertation, such an approach has the potential to set future generations up to live in more favourable circumstances in the future.

Individual-level risk characteristics may also be targeted within schools or the home. Provision of interventions for aggressive children, in particular, is likely to be a powerful risk-reduction strategy. Such interventions are likely to be most beneficial when involving both the individual child as well as their primary caretaker(s), in order to foster consistency and modelling of learned strategies and to address the intergenerational nature of the transfer of risk. Targeting other individual characteristics that affect children's socialization behaviours, such as a tendency toward withdrawal, may also be fruitful avenues for prevention of future negative outcomes. High aggression and withdrawal have been associated with poorer learning and academic outcomes (e.g., Stack et al., 2015; Véronneau et al., 2015). It is important to address such difficulties early in life in order to improve academic outcomes and prevent school dropout, thus allowing individuals to benefit from the protective effects of education.

In addition to childhood risk exposure, another important time point for risk exposure highlighted in the current dissertation is that following criminal offending. At this time point, offenders are at risk of falling back into a cycle of neighbourhood disadvantage and crime. As such, one primary implication of the unique findings from the current dissertation is in the

development and evaluation of services targeted toward the reintegration of offenders into prosocial society. Results suggest that it is important to consider the risk posed to the individual simply by having previously offended when attempting to implement effective reintegration strategies. Finally, findings from this dissertation support the utility of programs for offenders that provide aide in locating and securing (1) safe housing in neighbourhoods with access to essential resources and prosocial peers, as well as (2) legal, sustainable employment. Such programs have the potential to pull offenders out of a cycle that causes great costs to the individual (e.g., financial; physical and mental health) and to Canada as a whole.

Future Directions

Findings from the present dissertation highlight important areas for future research. First and foremost, replication of our longitudinal designs with samples derived from other at-risk neighbourhoods outside of Montréal is important to determine the generalizability of results herein. Likewise, it would be valuable for future research to examine these questions within samples that have a higher number of female offenders, as the present sample had a low rate of charges among women and, therefore, lacked variability in the number of offenses for women. It is important to determine whether or not the same pattern of results hold within a more diverse sample. Specifically, it would be valuable to know if the significant indirect effects found for males in the current sample indicating early environmental and individual risk factors, as well as the protective effect of education, would also be found to be significant for females. If the results within the current studies can be replicated within a larger sample with more female offenders, this would indicate true sex differences important for the development of effective intervention strategies.

Similarly, replication of the current studies with different age cohorts of individuals within different time periods, as these become available, will be important to determine if patterns found herein hold true. Of note, the current study covers a time period over which there were steady improvements in education and economic conditions and, as such, it is unclear if the current findings would be replicated in another context or period. For example, it would be relevant to know if such societal patterns hold in the context of improving societal wealth and presumed declines in crime rates or, conversely, in the context of a reversal of economic progress and presumed increases in crime (e.g., inflation, recession, civil disruption). Finally, the present analyses did not account for racial, ethnic, or cultural disparities that may exist between neighbourhoods of differing levels of socioeconomic advantage or geographic locales. These are important considerations for future research, given the disproportionate rates of racial and ethnic minorities living in disadvantaged circumstances (e.g., Gillum, 2019) and engaged with the criminal justice system (e.g., Maynard, 2017).

A thorough understanding of the complex, interlinked facets contributing to individual and societal risk for disadvantage and crime affords researchers and clinicians the opportunity to develop targeted primary and secondary prevention strategies for at-risk individuals. The current studies not only illuminated early predictors of poor outcomes, but also those that persist through the lifespan. Moreover, education was once again highlighted as a protective factor for at-risk individuals. The development of primary prevention strategies designed to circumvent poor outcomes before they occur (Australian Institute of Criminology, 2003), where possible, is likely to be the most cost-effective and ethical approach for intervention. Social prevention strategies should aim to address risks faced by the individual, such as poverty, unemployment, and low educational attainment. Based on the findings from the current studies, these should target

existing and identifiable risk factors, including early social and behavioural difficulties (i.e., mitigate aggression, strengthen positive socialization skills), educational opportunities and success, and, ideally, neighbourhood circumstances (e.g., decrease criminal opportunity and fortify beneficial community services and resources). These goals may be achieved through implementation of school- or community-based programming (Australian Institute of Criminology, 2003).

Secondary prevention is intended to mitigate risk for those who are already engaged in risky circumstances, such as living in high-risk neighbourhoods or involved in delinquent behaviour (Australian Institute of Criminology, 2003). This may include the provision of community-based resources within at-risk neighbourhoods, such as conflict resolution centres and/or intensive youth programming. However, providing stability to individuals in disadvantaged circumstances through adequate housing seems to be an important first step toward upward mobility and reduced societal costs, in contrast to requiring individuals in at-risk situations to first meet specified treatment goals through other services (i.e., a 'staircase' approach; Shinn & Khadduri, 2020). For example, the Housing First initiative adopted in Finland has demonstrated great success in the reduction and prevention of homelessness and poverty-related costs and consequences (Foley, 2023). It is plausible that adopting similar housing policies across Canada would provide at-risk individuals with necessary support to foster social and economic progression. In fact, a national housing study conducted by the Mental Health Commission of Canada demonstrated that each $10 invested into supportive housing equated to over twice that amount in savings (i.e., an average cost reduction of $21.72; Goering et al., 2014). According to Atkinson and Bourguignon (2019), "changes in the level of poverty depend on both economic growth and changes in the distribution of living standards" (p. 219).

Next steps may include provision of more targeted services for individuals living in disadvantage. More specifically, programs offering assistance to residents of disadvantaged neighbourhoods in locating and procuring job opportunities that offer consistency and security are also likely to mitigate risk associated with living in such neighbourhoods. This may be particularly relevant in the current climate, given the ongoing housing crisis Canadians are facing, amplified by the onset of the COVID-19 pandemic, forcing many individuals and families to live in sub-standard conditions in major cities. The importance of neighbourhood quality has strong implications for policy regarding housing at federal, provincial, and local levels. Not only could assistance programs decrease the potential need of some individuals to turn to criminal means of advancement, but it could also allow the opportunity to move to a neighbourhood of more affluence with more services, resources, and opportunities to individuals who may not otherwise have had the chance. To a similar end, improving the quality of neighbourhoods, including access to better housing and resources for rehabilitation, are likely to be fruitful. Such interventions are likely to benefit not only the individual receiving assistance, but also future generations who may grow up under more favourable circumstances.

Evaluation of assistance programs for job finding for previous criminal offenders is likely to have similar benefits and could possibly mitigate stereotyping resulting from the ‘criminal’ label. Similarly, education is an important protective factor that should be integrated into prevention planning. Development and evaluation of supplementary educational programs that can be subsidized for children and youth in disadvantaged neighbourhoods, and potentially for offenders reintegrating into society, is called for. Efficacy and effectiveness studies of potential interventions with at risk youth and/or offenders should examine the utility of such interventions with a diverse range of subjects, in order to account for ethnic, racial, gender, and geographical

considerations. Possible differences in efficacy according to variability in type and severity of charges should also be examined. These constitute important areas for further investigation.

Intervention science literature will be an important aid in informing the development and evaluation of effective programming for at-risk individuals (e.g., Leff, 2005). In efforts to translate findings from the present work to practical applications, program development, outcome, and evaluation research will be essential. Programs should be developed targeting well known risk factors and incorporating protective factors, as discussed above, in order to interrupt the identified cycle of risk involving neighbourhood disadvantage and criminal offending.

Finally, such research has the potential to guide public policy and practice with an ongoing emphasis on knowledge mobilization. Researchers have a responsibility to promote, synthesize, and exchange knowledge accumulated through research in the social sciences in order to facilitate consistent progression of theory, methodology, and research, and to effect change in real-world outcomes (Social Sciences and Humanities Research Council, 2019; 2021). The Social Sciences and Humanities Research Council (2019) guidelines for knowledge mobilization encourage adopting a multi-faceted approach, including strategies such as connection-building across organizational tiers (e.g., front-line workers, executives, etc.) as well as the use of knowledge brokers and multiple dissemination platforms. The current findings have the potential to influence research, policy, and practice related to the impacts of disadvantaged neighbourhoods and criminality.

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Appendix A

Fit Statistics for Final Models, Parts I and II

Table A.1. *Fit Statistics for Final Models.*

Final Model	Akaike (AIC)	Bayesian (BIC)	Sample-Size Adjusted BIC	CFI	TLI	RMSEA	
						RMSEA (90% CI)	Prob. Close Fit (<.05)
LGCM	87786.58	87891.97	87837.96	-	-	-	-
ARCL	158514.806	159266.962	158885.657	0.996	0.988	0.031 (0.024, 0.039)	1.000

Appendix B

Missing Data Procedures

By nature of the Concordia Project, there was very little missing data at each time point. Data on childhood characteristics was collected from each participant in person in 1976. For each subsequent time point, data for participants were collected from official government records with a very high retrieval rate. As such, attrition was not an issue for the current sample. There was no reason to suspect that participants with missing data differed in any meaningful way from those without. As an extra precaution, mean difference comparisons were conducted between participants with missing data and those without based on sex, a demographic variable for which all participants in the sample had data. Bonferroni correction was applied to the t-test results to guard Type I errors. Participants with missing data did not differ from those without. In order to account for the small amounts of missing data, Robust Maximum Likelihood estimation (MLR) was used in MPlus 7 (Muthén & Muthén, 1998-2011).

Appendix C

Intercept Statistics, Part I

Table A.2. *Variance of Intercept and Slope Factors for Growth Curve.*

Factor	Variance
Intercept	13.157
Slope	0.034

Note. Correlation between intercept and slope, r = -.21 (SE = .02).

Table A.3. *Standardized Coefficients for Predictors of Intercept.*

Predictor	β
Aggression	-.03
Withdrawal	.02
Likeability	.04*
Education	-.25**
Gender	.01

Appendix D

Means and Variances of Predictors, Part I

Table A.4. *Means and Variances of Part I Predictors.*

Factor	Mean	Variance
Childhood Aggression (z-score)	-0.020	0.909
Childhood Withdrawal (z-score)	0.011	0.943
Childhood Likeability (z-score)	0.026	0.928
Gender (female = 2)	1.520	0.250
Charges	0.442	3.821
Education (years)	11.787	2.860