

To my beloved family

Örebro Studies in Criminology 3



Rebecca Siponen

**The role of psychiatric diagnoses among youth
offenders**

An investigation of crime and later adverse outcomes

Author: Rebecca Siponen

Title: The role of psychiatric diagnoses among youth offenders: An investigation of crime and later adverse outcomes

Publisher: Örebro University, 2024

www.oru.se/publikationer

Print: Örebro University, Repro 03/2024

ISBN: 978-91-7529-547-3 (print)

ISBN: 978-91-7529-548-0 (pdf)

Abstract

There is a strong tradition in criminological research to uncover risk factors for crime in youth and, more recently, to examine risk factors for subsequent adverse outcomes among youth offenders. This knowledge serves not only for crime prevention but also to mitigate future harm resulting from youth crime. Psychiatric diagnoses are recognized as important risk factors for youth crime, yet questions persist regarding their extent and nature of association with crime and later adverse outcomes in youth offenders.

In this dissertation, the overarching aim was to expand the knowledge about the role of psychiatric diagnoses in the risk of crime in youth and later injuries, mortality, and reoffending among youth offenders. Study I examined the association between psychiatric diagnoses, including comorbidities, and risk of criminal conviction in youth. Study II examined the association between psychiatric diagnoses and risk of unintentional injuries and premature death among non-imprisoned and imprisoned youth offenders. Lastly, study III examined the role of psychiatric diagnoses in the association between violent victimization and reoffending among youth offenders.

The overall findings of the present dissertation suggest that psychiatric diagnoses are important risk factors for crime in youth and later adverse outcomes, but their significance and magnitude vary depending on type of diagnosis, presence of comorbidities, type of crime committed, sex, crime history, and presence of other important risk factors such as violent victimization. This dissertation highlights the heterogeneity in risk patterns among youth offenders, which is highly important to consider in both risk assessments and prevention strategies to better target youth at risk of these outcomes.

Keywords: Crime, Psychiatric Diagnoses, Comorbidities, Youth Offenders, Violent Victimization, Family History, Reoffending, Unintentional Injuries, Premature Death.

Table of Contents

1 Introduction	11
2 Background	13
2.1 Youth offenders	13
2.1.1 Definition	13
2.1.2 Why study youth offenders specifically?	15
2.1.3 Heterogeneity in the youth offender population	17
2.2 Psychiatric diagnoses as risk factors.....	18
2.2.1 What is a risk factor?.....	18
2.2.2 How to measure psychiatric disorders	20
2.3 Psychiatric diagnoses and risk of crime in youth	21
2.3.1 Attention-Deficit/Hyperactivity Disorder	22
2.3.2 Depression, anxiety, and stress-related disorders	23
2.3.3 Substance use disorders.....	25
2.3.4 Intellectual disabilities and autism spectrum disorders	26
2.3.5 Comorbidities of psychiatric diagnoses	28
2.3.6 Summary of knowledge gaps for psychiatric diagnoses and risk of crime in youth	31
2.4 Psychiatric diagnoses and risk for later adverse outcomes among youth offenders.....	32
2.4.1 Psychiatric diagnoses and risk for injuries and premature death	33
2.4.1.1 Family history of crime and psychiatric diagnoses.....	35
2.4.2 The role of psychiatric diagnoses in the association between victimization and reoffending among youth offenders	37
2.4.3 Summary of knowledge gaps for psychiatric diagnoses and risk of later adverse outcomes among youth offenders	39
2.5 Developmental and life-course criminology	40
3 Aim	42
3.1 Overarching aim.....	42
3.2 Specific research aim	42
4 Methods	44

4.1 Data material: Swedish Registers	44
4.1.1 The Total Population Register	45
4.1.2 The National Crime Register.....	46
4.1.3 The National Patient Register	46
4.1.4 The Cause of Death Register	47
4.1.5 The Multi-Generation Register	48
4.1.6 The longitudinal integrated database for health insurance and labour market studies	48
4.2 Overview of study methods.....	49
4.3 Study design	50
4.3.1 Study I.....	51
4.3.1.1 Study Population.....	51
4.3.1.2 Risk factors	52
4.3.1.3 Outcome and follow-up.....	54
4.3.2 Study II.....	54
4.3.2.1 Study Population.....	54
4.3.2.2 Risk factors	55
4.3.2.3 Outcome and follow-up.....	55
4.3.3 Study III.....	57
4.3.3.1 Study Population.....	57
4.3.3.2 Risk factors	57
4.3.3.3 Outcome and follow-up.....	58
4.4 Measures	59
4.4.1 Criminal convictions.....	59
4.4.1.1 Criminal convictions in youth	59
4.4.1.2 Reoffending	59
4.4.1.3 Non-violent and violent crime	59
4.4.1.4 Non-imprisoned and imprisoned youth offenders	60
4.4.2 Psychiatric diagnoses.....	60
4.4.3 Violent victimization	64
4.4.4 Unintentional injury.....	64
4.4.5 Premature death	64
4.4.6 Parental criminal convictions and psychiatric diagnoses	64

4.4.7 Covariates	65
4.5 Statistical analyses	67
4.5.1 Incidence.....	67
4.5.2 Survival analysis	68
4.5.3 Adjustment and stratification	69
4.5.4 Study I	69
4.5.5 Study II	70
4.5.6 Study III	71
4.6 Ethical approval.....	72
5 Results	74
5.1 Study I	74
5.1.1 Specific diagnoses	74
5.1.2 Comorbidities	77
5.1.2.1 Changes in estimates for specific psychiatric diagnoses in the presence of comorbidities	80
5.2 Study II	83
5.3 Study III	85
6 Discussion	88
6.1 The role of psychiatric diagnoses in the risk of crime in youth and subsequent injuries and premature death among youth offenders	89
6.1.1 Diagnoses of externalizing disorders	90
6.1.2 Diagnoses of internalizing disorders.....	93
6.1.3 Diagnoses of neurodevelopmental disorders.....	96
6.1.4 Subgroup differences.....	99
6.1.4.1 Sex differences in association between psychiatric diagnoses and risk of crime in youth.....	99
6.1.4.2 Risk factors for unintentional injury and premature death among non- imprisoned and imprisoned youth offenders	101
6.2 The role of psychiatric diagnoses in the association between violent victimization and reoffending among youth offenders	102
6.2.1 Violent victimization as a risk factor for reoffending among youth ..	104
6.3 Main findings in relation to developmental and life-course criminology	105

6.4 Methodological considerations	108
6.4.1 Misclassification of variables	108
6.4.1.1 Crime	109
6.4.1.2 Psychiatric diagnoses.....	110
6.4.1.3 Violent victimization and unintentional injuries.....	111
6.4.2 Confounders and mediators	111
6.4.3 Generalizability	113
6.5 Ethical considerations	114
6.6 Future directions.....	116
7 Conclusion	120
8 Acknowledgements.....	122
9 References	125

List of papers

This dissertation is based on the following studies, referred to in the text by their Roman numerals.

- I. Siponen, R., Andersson, A., Oskarsson, S., Ångström, A. K., Beckley, A. L., Fazel, S., Larsson, H., Evans, B., & Tuvblad, C. (2023). Psychiatric diagnoses and criminal convictions in youth: A population-based study of comorbidities of diagnoses. *Journal of Criminal Justice*, 88, 102114. <https://doi.org/10.1016/j.jcrimjus.2023.102114>.
- II. Siponen, R., Andersson, A., Oskarsson, S., Garcia-Argibay, M., Beckley, A. L., Långström, N., Fazel, S., Chang, Z., Larsson, H., Evans, B., & Tuvblad, C. (2023). A population-based study of unintentional injury and premature death among non-imprisoned and imprisoned youth offenders. *Journal of criminal justice*, 84, 102009. <https://doi.org/10.1016/j.jcrimjus.2022.102009>.
- III. Siponen, R., Ångström, A. K., Oskarsson, S., Andersson, A., Larsson, H., Evans, B., & Tuvblad, C. A population-based study on violent victimization and risk for reoffending among youth offenders with and without psychiatric diagnoses. *Manuscript, submitted for publication*.

Reprints were made with permission from the respective publishers.

List of abbreviations

ADHD	Attention-Deficit/Hyperactivity Disorder
CDR	Cause of Death Register
CI	Confidence Interval
DSM-5	Diagnostic and Statistical Manual 5 th Edition
HR	Hazard Ratio
ICAP	The Integrated Cognitive Antisocial Potential Theory
ICD	International Statistical Classification of Diseases
LISA	Longitudinal Integration Database for Health Insurance and Labor Market Studies
MGR	Multi-Generation Register
NCR	National Crime Register
NPR	National Patient Register
PIN	Personal Identify Number
PTSD	Post-Traumatic Stress Disorder
SES	Socio-Economic Status
TPR	Total Population Register
WHO	World Health Organization

1 Introduction

A central focus in the criminological research field is youth offenders. One reason for this is that youth is a time when crime is most prevalent compared to other age groups (Farrington et al., 2006; Sampson & Laub, 1993). Youth crime is not only harmful for society in terms of societal costs and harm to other people or property (Hanson et al., 2010; Wickramasekera et al., 2015), but can also be harmful for the youth themselves. Youth is a critical period in human development characterized by cognitive, emotional, and social changes (Elder & Shanahan, 2007). What happens during this age could have a negative influence on the development over the lifespan. Indeed, research has demonstrated that youth offenders have a high risk of facing later adverse consequences such as somatic and mental health problems, unemployment, disrupted relationships, reoffending, and even premature death (Gilman et al., 2015; Lanctot et al., 2007; Petitclerc et al., 2013; Weisner et al., 2010). Thus, studying youth offenders and understanding the links to both crime in youth and subsequent adverse outcomes can not only provide insightful knowledge about how to prevent crime, but also how to reduce potential future harm as a consequence of crime in youth.

To effectively work preventatively against crime in youth and subsequent adverse outcomes, it is important to identify and examine risk factors that contribute to these negative outcomes (Farrington et al., 2016). Risk factors, spanning biological, psychological, and social domains, are important components that shape the vulnerability of youth to engage in crime and to face later adverse outcomes. Notably, individual risk factors associated with mental health, emotion dysregulation, and behavioral disturbances have been shown to be some of the strongest risk factors of crime in youth (Basto-Pereira & Farrington, 2022), often manifested through psychiatric diagnoses. Research has consistently demonstrated that psychiatric diagnoses are associated with an increased risk of crime in youth (Coker et al., 2014; Copeland et al., 2007; Källmen et al., 2023). Research has also suggested that youth offenders with psychiatric diagnoses have a higher risk of future adverse outcomes than youth offenders without psychiatric diagnoses (Ogilvie et al., 2023; Salias et al., 2006). At an

individual level, psychiatric diagnoses represent modifiable risk factors that can be targeted by treatment and interventions to prevent crime in youth and other adverse outcomes among youth offenders. Thus, understanding the role of psychiatric diagnoses among youth offenders is central for both risk assessment and prevention efforts.

Although the association between psychiatric diagnoses and crime in youth is well-established, several questions remain regarding the extent and nature of this association. The association is likely to vary depending on type of psychiatric diagnosis under study (e.g., Heeramun et al., 2017; Latvala et al., 2022; Mohr-Jensen et al., 2016), crime-related factors such as type of crime committed (Anderson et al., 2015; Copeland et al., 2007; Ångström et al., 2024), the individual's sex (Duke et al., 2018; Frisell et al., 2012; Stevens et al., 2015), and the presence of other important risk factors that are linked to both psychiatric diagnoses and crime in youth, such as being victim of crime (Sariaslan et al., 2020; Wylie & Rufino, 2018) or having a family history of crime and/or psychiatric diagnoses (Dean et al., 2012; Frisell et al., 2011; Kofler et al., 2011). Considering these different aspects will contribute to a more nuanced understanding of the association between psychiatric diagnoses, crime in youth, and later adverse outcomes. Beyond contributing to theoretical advancements and academic knowledge, this understanding holds the potential to shape more precisely targeted and tailored intervention and prevention strategies.

The overarching goal with this dissertation was to extend our understanding of the role psychiatric diagnoses play in the risk of crime in youth and subsequent adverse outcomes among youth offenders. More specifically, I have explored the relationships between psychiatric diagnoses and youth crime by delving into various factors such as type of diagnosis, comorbidities of diagnoses, different crime outcomes, type of sentence, sex differences, and other important risk factors such as violent victimization or having a parent that have been convicted of a crime or diagnosed with a psychiatric disorder. The aspiration is to shed some light onto the complexity of how, when, and for whom psychiatric diagnoses may be associated with the risk of crime in youth and future adverse outcomes.

2 Background

2.1 Youth offenders

2.1.1 Definition

To define youth offenders, we must first start by defining what a crime is and who is considered an offender. In criminology, the definition of crime can vary depending on theoretical perspectives (Sarnecki & Carlsson, 2020). For example, there are sociological and psychological definitions that consider deviant or antisocial behaviors beyond the legal definitions to understand crime. Moreover, the definition of crime varies across societies and legal systems and has been subject to evolution and change over time due to historical, political, cultural, and societal changes (Sarnecki & Carlsson, 2020). As a result, there is no universally definitive definition of what constitutes a crime. Despite this complexity, one common way to operationalize and examine the formal aspects of crime involves relying on legal definitions. This approach emphasizes three key elements of criminal acts: (1) legality, meaning that the act should be defined by law; (2) punishment, that the act is associated with a specified penalty or punishment; and (3) harm, that the act has caused harm or could potentially cause harm to individuals, property, or society at large (Newburn, 2017).

In this dissertation, crime is operationalized and defined as a criminal act that has been processed and led to a criminal conviction in a Swedish district court. To simplify, crime is defined as a criminal conviction. In this dissertation, youth who have been convicted of a crime will be referred to as youth offenders.

In the next step to define youth offenders, we must define what youth is, which is not a straightforward task. Youth is a stage between childhood and adulthood and is not always necessarily defined by actual age (Estrada & Flyghed, 2017; Shirtcliff et al., 2009). There are numerous aspects that influence how youth can be perceived and defined. It encompasses physiological changes during puberty, psychological development into adulthood, social independence from

parents, increasing emphasis on friendships, increased responsibilities such as completing education and entering the labor market, and cultural aspects involving behaviors and self-presentation that differs from adults (Estrada & Flyghed, 2017; Shirtcliff et al., 2009). With all these aspects in mind, it is difficult to set a definitive age range for youth. One hint could be the age limits set by governing authorities for certain activities, like voting, purchasing and consuming alcohol, driving a vehicle, and facing criminal charges. These age limits are determined based on the perceived need for a certain level of maturity and responsibility in engaging in these activities (Estrada & Flyghed, 2017). However, these age limits differ across societies, which underscores the idea that there are dynamic and cultural differences in the definition of youth worldwide. With all these complex dimensions considered, determining a precise age range that unequivocally defines youth proves to be challenging.

Not surprisingly, the definition of youth offenders is not universally definitive and varies across countries and criminal justice systems. For example, in the Nordic countries, youth offenders are defined as offenders between 15 and 18 or 20 years of age (Lappi-Seppälä, 2011; Leonardsen & Andrews, 2022), while in the UK, Australia, and the USA, the definition of youth offenders extends to those as young as 10 years old (Casey et al., 2022; Cipriani, 2009). In Sweden, which is where this dissertation takes place, the minimum age of criminal responsibility is 15 years of age and youth offenders are defined as individuals who commit their crimes when they are between 15 to 20 years of age (i.e., before their 21st birthday; Eriksson, 2012; SFS 1964:167)¹. This means that even if the criminal court process takes place after an individual's 21st birthday, but the crime happened before their 21st birthday, they are defined as youth offenders. Given

¹ The 'youth reduction,' entailing reduced sentences for youth offenders, was abolished in 2022 for those aged 18-20 convicted of crimes with a minimum sentence exceeding one year of imprisonment. These changes have not impacted the data in the present dissertation, which covers information up until the year 2013. <https://www.regeringen.se/rattsliga-dokument/proposition/2021/09/prop.-20212217>

that crime in this dissertation is operationalized as criminal convictions, individuals are defined as youth offenders only if their conviction date falls within the span of 15 to 20 years old, ensuring that the criminal act indeed occurred during this specific age range. So, youth offenders in this dissertation are defined as individuals who have been convicted of a crime between 15 and 20 years of age.

2.1.2 Why study youth offenders specifically?

One might ask: why focus on studying youth offenders rather than the entire offender population? Firstly, most criminologists would agree that the prevalence of crime is skewedly distributed in terms of age. A well-known concept in the criminological field is the age-crime curve, which is a universal age-based inverted-U pattern of crime rate (Farrington et al., 2006; Sampson & Laub, 1993). This curve illustrates that crime emerges in adolescence, peaks in late adolescence or early adulthood (around 15-19 years of age), and then declines as individuals get older. This pattern has been consistently observed across different time periods, countries, and data sources, making it a robust empirical concept (DeLisi, 2015). This age-crime curve denotes that adolescents and young adults face the highest risk of engaging in criminality, or in other words, that crime is most prevalent during youth. In Sweden, estimates show that individuals aged 15-20 are responsible for 20% of all criminal convictions, even though this age-group only constitutes 8% of the total population (National Board of Health and Welfare, 2020). Thus, the age-crime curve serves as a motivation for the study of youth offenders because in doing so, we capture a large part of the offender population.

There are also distinct differences between adults and youth which affects the ability to generalize research results conducted on adults to youth. Most of our knowledge about crime, especially within the context of psychiatric diagnoses, has been derived from research employing adult samples. As mentioned earlier, cognitive and emotional development is still ongoing during youth, impacting decision-making, impulse control, and risk perception (Estrada & Flyghed, 2017; Shirtcliff et al., 2009). Consequently, generalizing research findings from adults to youth can be problematic, as the

distinct developmental characteristics of youth may not align with adult patterns (Shirtcliff et al., 2009). Additionally, research has shown that the prevalence of psychiatric diagnoses differs between youth and adults (e.g., Beaudry et al., 2021a), indicating that they therefore may have different treatment needs.

These differences between youth and adult offenders are also recognized within the criminal justice system. In most jurisdictions globally, there is a tradition of treating and handling youth offenders differently than adult offenders (Janson, 2004; Schmidt et al., 2021). One of the central reasons for this special treatment of youth is the recognition of differences in cognitive abilities, particularly in terms of thinking through long-term consequences of behaviors (Cohen & Casey, 2014; Steinberg, 2013). This incomplete cognitive development among youth suggests that they may not be held as accountable as adults, given their potential limitations in making informed decisions. Another reason is that youth are recognized as more vulnerable to both engaging in crime and facing harmful consequences because of the crime. Consequently, they require special consideration compared to adults (Casey et al., 2022). This notion has resulted in most countries shortening the sentences for youth offenders and prioritizing rehabilitation over punishment by using community-based sentences more often than imprisonment (Tonry, 2017). For example, in Sweden, youth offenders under the age of 18 cannot be sentenced to longer than four years in secure youth care (SFS 1964:167). These differences make it difficult to generalize research results conducted on adult prisoners (which is the most studied offender group) onto youth offenders. By focusing on youth-specific studies, we can find age-specific risk factors, interventions, and preventive measures tailored to this crucial developmental stage. This targeted approach not only provides a more accurate representation of youth crime but also informs policies and practices that effectively address the distinct needs and vulnerabilities of youth in the criminal justice system.

2.1.3 Heterogeneity in the youth offender population

Besides studying youth crime in general, it is also important to note that the youth offender population is a heterogeneous group. Most youth only commit one or two crimes in their lives and then desist from further criminal activities (Day & Weisner, 2019; Sivertsson et al., 2024). Instead, research shows that it is a small proportion of the offender population that is responsible for about half of all crimes committed (e.g., Day & Weisner, 2019; Farrington et al., 2006; Sivertsson et al., 2024). For example, a Swedish population-based study demonstrated that it is only 1% of the entire population that is accountable for around 60% of all violent crime convictions (Falk et al., 2014). This small group of offenders are known as chronic offenders, committing many crimes during their youth and continuing their criminal career into adulthood (Moffitt, 1993).

This trend is observable within the youth involved in the criminal justice system. In Sweden, the most common sanctions against youth offenders are community service, mandatory treatment programs, and fines (Estrada & Flyghed, 2017; National Council of Crime Prevention, 2023a). Only a small percentage, usually less than 1%, are sentenced to imprisonment. Youth offenders who are imprisoned have usually committed more severe crimes than youth offenders who receive community-based sentences. This imprisoned group also tends to have higher levels of adversities in general, such as psychiatric diagnoses (Heller et al., 2022), harmful substance use (Ahmad & Mazlan, 2014; Heller et al., 2022), or history of trauma or neglect in the family environment (Ahmad & Mazlan, 2014). Consequently, they may be particularly vulnerable to persist in criminal activities or face other adverse outcomes related to both somatic and mental health (Piquero et al., 2007). Research on youth crime needs to consider this heterogeneity within the youth offender population, as it can influence variations in treatment requirements, the overall susceptibility to continue committing crimes, and the significance of risk factors for subsequent adverse outcomes among youth offenders.

Another important aspect to consider is sex differences. Research has consistently shown that males tend to be overrepresented in the youth offender population and have higher crime rates than females (Bennett et al., 2005; Smith, 2014). About 70-82% of all crimes are committed by males (Campaniello & Gavrilova, 2018; National Council for Crime Prevention, 2023a). Males also tend to commit more serious and violent crimes than females (Bennet et al., 2005; Frisell et al., 2011; Frisell et al., 2012). This highlights that crime in youth varies by sex. Understanding the nuanced ways in which sex differences manifest in the youth offender population is crucial for tailoring interventions that address the distinct needs of male and female youth offenders, contributing to more effective strategies for rehabilitation and prevention.

2.2 Psychiatric diagnoses as risk factors

2.2.1 What is a risk factor?

Risk factors have broadly been defined as characteristics or variables that increase the probability of a certain outcome (Farrington et al., 2016; Shader, 2001). The idea of identifying and examining risk factors in criminology stems from practices in public and medical health, building on the idea of identifying sets of factors that heighten the risk of an outcome, and then implementing treatment and intervention efforts aiming to reduce such risk factors (Farrington et al., 2016; Shader, 2001). Studying risk factors can help inform risk assessments by identifying individuals at greatest risk of a certain outcome (Farrington et al., 2016). By specifically targeting individuals with the highest risk (and thereby in greatest need of treatment or intervention) and focusing on significant risk factors, it ensures a more tailored approach rather than a generalized treatment for all. This will also result in a more efficient allocation of resources. Lastly, it can help evaluate whether a certain treatment or intervention has had a desired effect by assessing whether the risk factors have dissipated or diminished in strength within the individual over time (Farrington et al., 2016; Parisi et al., 2022; Shader, 2001).

It is essential to acknowledge that there is no single risk factor that can account for all the risk of engaging in crime. Instead, the risk for crime is influenced by a complex interplay of various risk factors spanning social, psychological, and biological domains and at individual, familial, and societal levels (Basto-Pereira & Farrington, 2022). Additionally, exposure to multiple risk factors may have a cumulative effect on the risk of engaging in crime (Andershed et al., 2016; Stoddard et al., 2012). Moreover, the impact of risk factors is not uniform across developmental stages. For example, risk factors related to individual traits (e.g., psychiatric diagnoses) and familial factors (e.g., harsh parenting or criminal parents) have been found to have a stronger influence during youth than adulthood (Basto-Pereira & Farrington, 2022), whereas social life events (e.g., employment or marriage) have a greater influence during adulthood (Mulvey et al., 2016; Spruit et al., 2017). This again underscores the necessity of studying youth offenders separately from adults, as the developmental state of the individual significantly shapes how these risk factors contribute to criminality. Notably, although researchers use risk factors to identify individuals at risk of committing crimes, most youth with multiple risk factors will never commit a crime. The presence of a risk factor may increase the probability of crime but does not make crime a certainty. Thus, risk factors are not causes of crime, but merely factors that may heighten the risk of crime.

Psychiatric diagnoses are measurable risk factors and have been linked to crime (Basto-Pereira & Farrington, 2022; Moore et al., 2019; Stevens et al., 2015). They are valuable for risk assessments of crime outcomes, but more importantly, they are informative for treatment and intervention. Psychiatric diagnoses are modifiable risk factors, meaning that targeted interventions can diminish their influence on crime. This inherent adaptability makes psychiatric disorders particularly intriguing when viewed from a criminological perspective.

2.2.2 How to measure psychiatric disorders

Psychiatric disorders are clinical sets of symptoms or behaviors that are characterized by disturbance in an individual's cognition, emotion regulation, interpersonal functioning, and/or behavior (American Psychological Association, 2018; WHO, 2022; World Psychiatric Association, 2011). Globally, it is estimated that around 14% of all individuals aged 10-19 years have experienced a psychiatric disorder (WHO, 2021). The most prevalent psychiatric disorders in this age group are anxiety disorders, depression, attention-deficit/hyperactivity disorder (ADHD), and substance use disorders (GBD 2019 Mental Disorders Collaborators, 2022; WHO, 2021).

In research, psychiatric disorders have been measured using various methods of self-reported symptoms, structured interviews, or medical records of clinical diagnoses (Althubaiti, 2016; Eaton et al., 2000). In the former, disorders are usually measured using a dimensional approach. This approach views disorders as a continuum with individuals falling at different points at that continuum rather than into discrete categories, where the strength/severity of disorders can vary among individuals and within individuals over time. This approach allows for a more flexible and nuanced understanding of psychiatric disorders and enables correlational analyses between symptoms and outcomes. However, this approach can be subject to information bias, particularly when applied to children and youth who might encounter challenges in recalling traits from the past (Althubaiti, 2016).

A clinical approach using medical records, on the other hand, categorize psychiatric disorders based on specific criteria outlined in classification systems such as the Diagnostic and Statistical Manual of Mental Disorders (DSM) or the International Classification of Diseases (ICD) (American Psychiatric Association, 2013; WHO, 2019). This is done by clinicians and in contrast to the dimensional approach, individuals are categorized into discrete categories of either having a diagnosis of the disorder or not. This approach provides a standardized and systematic framework to measure psychiatric disorders which enables comparisons between populations and research studies. It is also suitable for measuring psychiatric disorders

from early childhood since it does not rely on the children themselves to recall or report symptoms.

In the present dissertation, I used Swedish medical records from the National Patient Register to obtain information about clinical diagnoses of psychiatric disorders (see 4.2 in methods section for more details). Thus, I used a clinical approach where individuals are classified as either having a diagnosis of a psychiatric disorder or not. To reflect this type of approach, I will use the term “psychiatric diagnoses” and talk about “individuals with psychiatric diagnoses” or “individuals diagnosed with psychiatric disorders”. Using the term individuals *with* diagnoses instead of for example “disordered individuals” is considered more appropriate terminology to avoid stigmatization associated with mental health conditions (Volkow et al., 2021).

2.3 Psychiatric diagnoses and risk of crime in youth

Research has systematically linked psychiatric diagnoses to criminal behavior in youth. While most large-scale population-based studies examining this association have been conducted on adults (e.g., Moore et al., 2019; Yee et al., 2020; Sariaslan et al., 2020; Stevens et al., 2015), studies on youth specifically demonstrated that youth with psychiatric diagnoses have between two to six times higher risk of committing crimes than youth without psychiatric diagnoses (Coker et al., 2014; Copeland et al., 2007; Källmen et al., 2023). However, the strength and magnitude of the risk between psychiatric diagnoses and crime varies depending on type of diagnosis, presence of multiple diagnoses (i.e., comorbidities), sex, and type of crime committed (e.g., Copeland et al., 2017).

While there are multiple diagnoses that consistently have been linked to crime in general, not all types of diagnoses are necessarily relevant in the context of youth offenders. For example, schizophrenia has been shown to be one of the strongest risk factors for crime among all psychiatric diagnoses (Chang et al., 2015a; Fazel et al., 2009; Sariaslan et al., 2020; Whiting et al., 2021; Yukhnenko et al., 2023a). However, schizophrenia usually has an age of onset in the mid-to late 20s (Solmi et al., 2022; Sun et al., 2019), making it a less relevant

diagnosis to study for crime in youth. Instead, the present dissertation has focused on diagnoses that are relevant in terms of age of onset during childhood or youth (Solmi et al., 2022; Sun et al., 2019) and that have been linked to crime, based on previous research (Beaudry et al., 2021a; Fazel et al., 2008; Heeramun et al., 2017; Latvala et al., 2022; Mohr-Jensen et al., 2019; Paulino et al., 2023).

2.3.1 Attention-Deficit/Hyperactivity Disorder

One diagnosis that typically has an onset in childhood and is robustly related to crime in youth is attention-deficit/hyperactivity disorder (ADHD; Mohr-Jensen et al., 2016; Solmi et al., 2019; Sun et al., 2019). ADHD is characterized by a persistent pattern of inattention, hyperactivity, and impulsivity that can lead to for example cognitive, social, and self-regulation difficulties (American Psychiatric Association, 2013), which in turn can contribute to an increased risk of involvement in crime (Mohr-Jensen et al., 2016). A meta-analysis demonstrated that childhood ADHD was associated with a three-fold increased risk for criminal convictions in youth (Mohr-Jensen et al., 2016). Recent population-based studies found that children and youth diagnosed with ADHD had about two to five times higher risk for criminal convictions in young adulthood than their counterparts without an ADHD diagnosis (Mohr-Jensen et al., 2019; Ångström et al., 2024). From an etiological perspective, ADHD is thought to manifest within individuals from an early age (Faraone et al., 2006). Estimates demonstrate that about 2% to 7% of all children globally are diagnosed with ADHD (Sayal et al., 2018). It is also a diagnosis that can be stable from childhood to adulthood, where about 50% to 90% of all children diagnosed with ADHD experience persistent ADHD symptoms into adulthood (Faraone et al., 2006; Lara et al., 2009; Sibley et al., 2022). This makes ADHD an important psychiatric diagnosis to consider as a risk factor for crime and other outcomes over the life-course.

Although the association between ADHD and crime in youth is well-documented, relatively few large-scale population-based studies have examined differences by crime type and sex. Most studies in this field examined the risk of violent crimes only (e.g., Lundström et al., 2014;

Wojciechowski, 2021). Studies that did examine various types of crime outcomes concluded that youth diagnosed with ADHD had a higher risk of committing all types of crime than youth not diagnosed with ADHD, but that the prevalence of violence and drug-related offences were higher than the prevalence of other crime types (Mohr-Jensen et al., 2019). Similar results have been demonstrated in a recent population-based study, where the association between ADHD and criminal convictions was higher for violent crimes than for non-violent crimes (Ångström et al., 2024).

Regarding sex differences, most previous studies have suffered from the methodological limitation of a limited number of females diagnosed with ADHD in the sample, making it difficult to consider potential sex differences in the association between ADHD and crime. Two population-based studies demonstrated that females diagnosed with ADHD had a higher risk of criminal convictions in youth than males diagnosed with ADHD (Mohr-Jensen et al., 2019; Ångström et al., 2024), whereas one other population-based study did not find such sex differences (Silva et al., 2014). Given this inconclusive evidence, there is a need to further examine the association between ADHD and the risk of crime in youth in relation to crime type and sex.

2.3.2 Depression, anxiety, and stress-related disorders

Depression and anxiety disorder are two of the most common diagnoses among youth (GBD 2019 Mental Disorders Collaborators, 2022; Merikangas et al., 2010; WHO, 2021). It is estimated that about 3% to 5% of all youth globally experience a diagnosis of depression or anxiety (WHO, 2021). Both depression and anxiety disorders have been shown to have an association with crime in youth (Anderson et al., 2015; Cain & Clinkinbeard, 2014; Yu et al., 2017). Research has linked depression and anxiety disorders to violent crimes in youth (Yu et al., 2017), where it is theorized that individuals diagnosed with depression or anxiety have increased levels of aggression, which increases the risk of committing violent crimes (Wolff & Ollendick, 2006). There are inconsistencies in research when it comes to depression and anxiety disorders in relation to non-violent crime.

Some studies found that depression was associated with an increased risk of non-violent crimes such as property crimes (Anderson et al., 2015), while others did not find depression to be linked to non-violent crime (Copeland et al., 2007), or any crime at all (Jolliffe et al., 2019). Thus, further research on these diagnoses in relation to type of crime is warranted.

Research has also demonstrated inconsistent results regarding sex differences in the association between depression and anxiety disorders and crime. Research on both the general population and on youth offenders specifically showed that females had higher prevalence of depression and anxiety than males (Beaudry et al., 2021a; Fazel et al., 2008; Salk et al., 2017). Few studies have explicitly examined sex differences in the association between depression or anxiety and risk of crime in youth. Although research indicate that females diagnosed with depression have a higher risk of crime than males diagnosed with depression (Kofler et al., 2011), some studies have not found this association to vary by sex (Anderson et al., 2015). Further research on depression or anxiety in relation to sex is therefore needed to extend our understanding of how these diagnoses are related to crime in youth.

Post-traumatic stress disorder (PTSD) is another diagnosis that is closely related to depression and anxiety and has not been extensively researched in youth samples. After exposure to shocking, stressful, frightening, or traumatic events, some individuals develop PTSD (American Psychiatric Association, 2013). Individuals diagnosed with PTSD often re-experience the event, resulting in distress, avoidance of certain places or situations related to the event, cognitive deficits, depression, higher levels of anxiety, and increased aggression and destructive behavior (Stein et al., 2011). Research has estimated that between 1% to 8% of youth experience PTSD (Koenen et al., 2017; Lewis et al., 2019; Perkonig et al., 2000; Roberts et al., 2007). Most studies on PTSD and crime have been conducted using samples of military veterans (e.g., Taylor et al., 2020) or small samples of incarcerated youth (Becker & Kerig, 2011; Jäggi et al., 2016). It is not until recently it has been studied using population-based samples from the general population (Paulino et al., 2023; Peltonen et al.,

2020), where only one of them has studied youth offenders specifically (Peltonen et al., 2020). These population-based studies show that individuals diagnosed with PTSD have an increased risk of committing violent crime (Paulino et al., 2023; Peltonen et al., 2020). However, this has to my knowledge not been extensively studied for other crime types such as non-violent crimes. There are also few studies examining potential differences by sex. While there is evidence that the prevalence of PTSD is higher among female youth than male youth (Haag et al., 2020), few studies have considered this when studying the association between PTSD and crime. One previous population-based study on youth diagnosed with PTSD and violent crimes stratified on sex and found that the risk for violent crimes was higher among males than females (Peltonen et al., 2020). This study did not compare males and females per se, so whether there are differences by sex remains unclear. In sum, there is a need to examine the association between PTSD and crime in youth specifically, where both crime type and sex are taken into consideration.

2.3.3 Substance use disorders

Substance use disorder is a psychiatric diagnosis that affects the brain and behavior of individuals, and which results in a reduced ability to control the consumption of substances such as alcohol, illegal drugs, medication, or tobacco (American Psychiatric Association, 2013). Globally, about 13% of all youth aged 15-19 years old have problems with heavy episodic drinking (WHO, 2021), and about 5% of all youth aged 15-16 years old have used cannabis (WHO, 2021).

Substance use disorder is one of the most studied diagnoses as a risk factor for crime. Substance use disorders have also consistently been shown to be most strongly related to the risk for crime among psychiatric diagnoses (Chang et al., 2015a; Elonheimo et al., 2009; Fazel et al., 2018; Sariaslan et al., 2020; Stevens et al., 2015; Yukhnenko et al., 2023a), where one meta-analysis found that individuals diagnosed with substance use disorders had around a seven times higher risk of committing a violent crime than controls (Fazel et al., 2018). However, there are wide variations in risk

estimates, with some studies reporting 3-4 times higher risk (Sariaslan et al., 2020), and some even as low as 1.50 times higher risk for individuals diagnosed with substance use disorder compared to controls (Chang et al., 2015a).

The association between substance use disorder and crime has been demonstrated for all types of crimes, but with a stronger association to violent than non-violent crimes (Bennet et al., 2008; Coker et al., 2014; Duke et al., 2018). Studies have shown inconsistent results regarding sex differences. One previous meta-analysis demonstrated that females diagnosed with substance use disorders had a higher risk of committing crimes than males diagnosed with substance use disorders (Bennet et al., 2008). Contrary, another meta-analysis demonstrated that males diagnosed with substance use disorders had a higher risk of crime than female counterparts (Duke et al., 2018). Even if substance use disorder is evidently an important psychiatric diagnosis to consider in the risk of crime, the association between substance use and crime has mainly been studied in adult samples. Existing studies on youth suffer from methodological limitations such as small sample sizes, a predominant focus on imprisoned youth, and a lack of inclusion of females to explore sex differences (Duke et al., 2018). Previous research shows that the association between substance use disorder and crime may be stronger in adult samples than youth samples (Bennet et al., 2008). Thus, large population-based studies on youth specifically are warranted.

2.3.4 Intellectual disabilities and autism spectrum disorders

Intellectual disabilities and autism spectrum disorders are neurodevelopmental disorders typically manifesting in early years of childhood (Li et al., 2023; Maulki et al., 2011; Ozonoff et al., 2008). Intellectual disabilities are characterized by limited intellectual and adaptive functioning (American Psychiatric Association, 2013; WHO, 2019). This affects learning, language skills, empathy, social skills, and practical skills in everyday life. Estimates show that about 2% of all youth aged 3-17 are diagnosed with an intellectual disability (Maulki et al., 2011). Autism spectrum disorder is characterized by difficulties in social communication, repetitive behaviors, and confined interest

(American Psychiatric Association, 2013; WHO, 2019). This affects social interactions with others, difficulties in adjusting behaviors in social situations, and inhibited understanding of others' emotions. It is estimated that about 2% to 3% of all individuals aged 12-17 years are diagnosed with autism spectrum disorder (Li et al., 2023).

Both intellectual disabilities and autism spectrum disorders have been linked to crime, but not in a similar way as other diagnoses mentioned above. In general, individuals diagnosed with intellectual disabilities or autism spectrum disorders have in multiple studies been linked to an increased risk of crime than controls (Fogden et al., 2016; Heeramun et al., 2017; Im, 2016; Latvala et al., 2022; Moberg et al., 2015; Stevens et al., 2015). However, further investigations of these associations have shown that the associations are largely explained by comorbid psychiatric diagnoses (Heeramun et al., 2017; Latvala et al., 2022; Lundström et al., 2014; Mohr-Jensen et al., 2019; Thomas et al., 2019; Whiting et al., 2021). For example, one population-based study on youth aged 15-17 years found that autism spectrum disorders with comorbid ADHD or conduct disorder had a three times higher risk of violent crime than individuals without psychiatric diagnoses (Heeramun et al., 2017). These results can be compared to the nonsignificant 1.10 increased risk for individuals diagnosed with autism spectrum disorder only (Heeramun et al., 2017). Similar results have been found for intellectual disabilities where individuals diagnosed with intellectual disabilities and other comorbid diagnoses had a significantly higher risk of violent crime than individuals diagnosed with intellectual disabilities only (Fogden et al., 2016; Latvala et al., 2022; Thomas et al., 2019). In addition, studies have shown that individuals diagnosed with both intellectual disabilities and autism spectrum disorder tend to have a *decreased* risk for crime as compared to individuals without psychiatric diagnoses (Heeramun et al., 2017; Latvala et al., 2022). This indicates that different types of comorbidities of diagnoses are highly important to consider when studying the relationship between psychiatric diagnoses and crime.

Although both intellectual disabilities and autism spectrum disorders often have an early onset in childhood, few large population-based

studies have examined this for youth crime specifically (Heeramun et al., 2017). Additionally, most studies focused on violent crimes (Heeramun et al., 2017; Im, 2016; Moberg et al., 2015). One study that did examine violent crimes separately from any type of crime found that the association between intellectual disabilities was stronger for violent crimes than any type of crime (Latvala et al., 2022). There is also a limited number of studies examining potential differences by sex, often due to there being too few females included in the sample (Moberg et al., 2015; Stevens et al., 2015). One study on adults found that the association between intellectual disabilities and crime was stronger among females than males (Fogden et al., 2016), whereas another study examining youth diagnosed with intellectual disabilities found the opposite result where males had a higher risk than females (Heeramun et al., 2017). Taken together, there is a need to study intellectual disabilities and autism spectrum disorders in relation to both violent and non-violent crimes, and potential sex differences, among youth.

2.3.5 Comorbidities of psychiatric diagnoses

Most individuals diagnosed with a psychiatric disorder have more than one diagnosis, or in other words, comorbidities of diagnoses (Kessler et al., 2012; Plana-Ripoll et al., 2019a; Costello et al., 2003). Studies have reported that individuals with a psychiatric diagnosis have between a 30% to 50% risk of developing and receiving another diagnosis (Jozefiak et al., 2016; Plana-Ripoll et al., 2019a). Youth with comorbidities of psychiatric diagnoses have consistently been found to have a higher risk of crime than youth diagnosed with only one disorder (Coker et al., 2014; Copeland et al., 2007; Moore et al., 2019). This risk has furthermore been shown to have a dose-response relationship where the risk for crime increases by the number of diagnoses (Coker et al., 2014; Copeland et al., 2007; Moore et al., 2019). Given this additive risk, it is important to consider comorbidity patterns when studying the association between psychiatric diagnoses and crime in youth.

In criminological research, it is common to categorize psychiatric diagnoses into broader categories such as externalizing disorders,

internalizing disorders, and neurodevelopmental disorders. Externalizing disorders are related to aggression, impulsivity, inattention, and disruptive or risky behaviors and can include diagnoses such as ADHD, substance use disorders, conduct disorders, and oppositional defiant disorders (American Psychiatric Association, 2013). Internalizing disorders are characterized by anxiety, depressive symptoms, increased stress, and isolation and can include diagnoses such as depression, anxiety, PTSD, or eating disorders (American Psychiatric Association, 2013). Lastly, neurodevelopmental disorders are neurological deficits that influence cognitive and adaptive functioning (American Psychiatric Association, 2013), and can be manifested by intellectual disabilities, autism spectrum disorders, or tic disorders (American Psychiatric Association, 2013; Cravedi et al., 2017). By categorizing diagnoses based on commonalities in their underlying characteristics and patterns of manifestation, it is possible to explore the complex nature of psychiatric disorders, making it easier to identify overarching patterns of associations between comorbidities and crime in youth.

Relatively few studies have explored comorbidities in the association between psychiatric diagnoses and crime in youth. The studies that do exist have important methodological limitations. For example, some studies only present prevalence data on comorbid diagnoses among youth offenders rather than examining the role of comorbidity in the risk of crime (Jozefiak et al., 2016; Teplin et al., 2021). This makes it difficult to draw any firm conclusions on overall patterns of comorbidities of psychiatric diagnoses in relation to the risk for crime in youth. Research on comorbidity patterns among offenders in general (i.e., not youth offenders specifically), have found that psychiatric diagnoses comorbid with substance use disorders tend to particularly increase the risk of crime (Copeland et al., 2007; Mohr-Jensen et al., 2019; Stevens et al., 2015). For example, one previous study found that individuals diagnosed with both ADHD and substance use disorders had a higher risk of committing crimes compared to those diagnosed with ADHD only (Mohr-Jensen et al., 2019). Studies have shown that diagnoses comorbid with externalizing disorders or internalizing disorders increase the risk for crime, but that comorbid externalizing disorders tend to increase the

risk to a higher extent than comorbidities of internalizing disorders (Copeland et al., 2007; Mohr-Jensen et al., 2019). For example, as mentioned earlier, the association between intellectual disabilities or autism spectrum disorders and crime are largely explained by comorbid externalizing diagnoses (Heeramun et al., 2017; Latvala et al., 2022). In such studies, neurodevelopmental disorders instead decreased the risk of crime (Heeramun et al., 2017; Latvala et al., 2022). Taken together, it is important in research on psychiatric diagnoses and crime in youth to carefully consider different influences of comorbidities depending on type of diagnoses.

A recent review on psychiatric diagnoses among youth offenders concluded that while psychiatric diagnoses are highly prevalent among youth offenders, comorbidity patterns among these diagnoses need to be further examined (Beaudry et al., 2021a). There is also not sufficient research on potential differences by type of crime or sex in associations between comorbidities and risk of crime in youth. One study indicated that female youth offenders may have different comorbidity patterns than male youth offenders (Teplin et al., 2021), while another study on youth did not find sex differences in associations between comorbidities and risk of crime in youth (Copeland et al., 2007). Furthermore, associations between comorbidities and crime have been shown to be higher for violent crimes than for non-violent crimes (Copeland et al., 2007; Latvala et al., 2022), where comorbid externalizing disorders increased the risk the most (Copeland et al., 2007). Given the limited number of studies exploring multiple diagnoses and comorbidities in the context of youth crime, more research is needed to improve our understanding of how psychiatric diagnoses and comorbidities of diagnoses contribute to the risk of crime in youth. It is also crucial to address type of crime and sex differences in such research, which could provide an even more in-depth and nuanced understanding of these risk patterns.

2.3.6 Summary of knowledge gaps for psychiatric diagnoses and risk of crime in youth

To summarize, there is evidence of the importance of studying psychiatric diagnoses as risk factors for crime in youth, but the nature and magnitude of this association still needs further investigations. Most studies within this research field have studied clinical or incarcerated samples of adults. The prevalence of psychiatric diagnoses among youth offenders has been shown to differ from adult offenders (Beaudry et al., 2021a), which motivates the need to examine youth specifically. In addition, most studies have focused on severe or violent crimes, which only captures a small proportion of the youth offender population. Thus, studying non-violent crimes as well is warranted. Furthermore, few studies have included females and studied differences by sex, and research is inconclusive on potential differences between females and males with psychiatric diagnoses and their risk for crime. Another limitation in previous research is that most studies exploring the association between psychiatric diagnoses and crime among youth have used relatively small samples. The inclusion of longitudinal and population-based samples could therefore significantly add to the existing literature by providing a more comprehensive and representative understanding of the association. Lastly, few studies have explored multiple psychiatric diagnoses and comorbidities and their association with crime in youth. Examining a range of relevant psychiatric diagnoses and comorbidities for youth offenders allows for a more comprehensive exploration of risk-patterns for crime in youth. Considering various psychiatric diagnoses simultaneously can provide insight into the interconnected nature of these diagnoses and their potential cumulative impact on the risk of crime in youth.

2.4 Psychiatric diagnoses and risk for later adverse outcomes among youth offenders

Psychiatric diagnoses are not only risk factors for committing crimes in youth or becoming a youth offender, but they are also risk factors for later adverse outcomes *among* youth offenders. In general, offenders with psychiatric diagnoses have a higher risk of reoffending, mortality, and other health related issues than offenders without psychiatric diagnoses (Chang et al., 2015a, 2015b; Fazel et al., 2016; McReynolds et al., 2010; Ogilvie et al., 2023; Yuhnenko et al., 2023b). This is less studied among youth offenders specifically. Given that the prevalence of psychiatric diagnoses is higher in the youth offender population compared to the general youth population (Heller et al., 2021), studying the role of psychiatric diagnoses for later adverse outcomes can guide treatment efforts within the criminal justice system. In this dissertation, two aspects of adverse outcomes among youth offenders have been studied. First, I examined the role of psychiatric diagnoses in the risk of future injuries and premature death among youth offenders, which are serious harmful outcomes for the youth themselves. Second, I examined the risk of reoffending, thus exploring the role of psychiatric diagnoses for more persistent offending, which is one of the main focuses in crime prevention efforts. By studying these two aspects of outcomes, this dissertation captures both outcomes that directly affect the youth themselves (injuries or premature death) and outcomes that also affect society in terms of safety and crime rates (reoffending). Since psychiatric diagnoses are treatable risk factors, studying their role in the risk of injuries, premature death, and reoffending holds the potential of improving our understanding, prediction, and ultimately prevention of these outcomes.

To further extend our understanding of the role of psychiatric diagnoses among youth offenders, it is essential to delve into understanding the effects of psychiatric diagnoses in relation to other significant factors. Youth offenders often have a high prevalence of adversities, including exposure to violence, dysfunctional family dynamics, socioeconomic challenges, and parental involvement in criminal activities or parental psychiatric diagnoses (Astridge et al.,

2023; Malvaso et al., 2022). These adversities not only contribute to the development of psychiatric diagnoses among the youth themselves but also increase the risk of engaging in crime and experiencing adverse outcomes (Astridge et al., 2023; Björkenstam et al., 2019). Therefore, in this dissertation, I go beyond examining psychiatric diagnoses only, and also explore their connections with family history of crime or psychiatric diagnoses, as well as the influence of violent victimization. By considering these additional risk factors, I aim to provide a more comprehensive and detailed understanding of how psychiatric diagnoses are related to the risk of later adverse outcomes among youth offenders.

2.4.1 Psychiatric diagnoses and risk for injuries and premature death

Youth offenders have an increased risk of injuries and premature death relative to the general youth population (Lindberg et al., 2017; Skinner & Farrington, 2020; Stenbacka & Jansson, 2014; Stenbacka et al., 2019; Teplin et al., 2005; Timonen et al., 2003). Research indicates that youth offenders may experience up to a sixfold higher risk of premature death (Stenbacka & Jansson, 2014) and a threefold higher risk of injuries (Skinner & Farrington, 2020; Timonen et al., 2003) than their non-criminal counterparts. In Sweden, estimates suggest that excess mortality among youth offenders can be as much as 25 times higher than in the general youth population (Westlund & Öberg, 2021). The leading causes of death among youth offenders are by external causes, including injuries, accidents, self-harm, and violence (Lindberg et al., 2017; Stenbacka et al., 2019), all of which may be preventable with appropriate intervention measures.

Studies have shown that youth with psychiatric diagnoses have an increased risk of injuries and premature death (Agnafors et al., 2020; Plana-Ripoll et al., 2019b). The role of psychiatric diagnoses in the risk of premature death among youth offenders is inconclusive in previous research. Some studies found that various psychiatric diagnoses increased the risk of premature death among youth offenders (e.g., Salias et al., 2006), whereas others found that only substance use disorders increased the risk (Chassin et al., 2013), and

some did not find any diagnoses to be associated with premature death among youth offenders (Lindberg et al., 2017). One potential reason for this inconsistency could be due to the selection of samples of youth offenders in previous studies. Most studies have examined the association between psychiatric diagnoses and premature death in samples of youth offenders sentenced to prison (Salas et al., 2006), referred to forensic psychiatric care (Lindberg et al., 2017), or have in general been classified as serious felony offenders (Chassin et al., 2013). The literature often overlooks youth offenders who have committed less serious crimes. Youth offenders that have been sentenced to imprisonment tend to have an overall high risk for future adverse outcomes (e.g., Aalsma et al., 2016; Teplin et al., 2002). Thus, psychiatric diagnoses as risk factors may play a less significant role for injuries and premature death within this group because they already have a high risk for these outcomes due to their criminality. Population-based studies on imprisoned and not imprisoned adult offenders have shown different results of the association between psychiatric diagnoses and risk of premature death. One study on adult prisoners only found substance use disorders, but no other psychiatric diagnosis, to be associated with an increased risk of premature death (Chang et al., 2015b). In contrast, another study on adult offenders given community sentences (i.e., not imprisonment) found that both substance use disorders *and* other psychiatric diagnoses increased the risk for premature death (Yukhnenko et al., 2023b). This indicates that the role of psychiatric diagnoses in the risk of premature death may differ among imprisoned and not imprisoned offenders. This is yet to be studied among youth offenders. Studying the role of psychiatric diagnoses for injuries and premature death within imprisoned and non-imprisoned youth offenders separately would have implications for policies on youth crime, crime prevention, health, and social work. Given that clinicians and criminal justice professionals work with these youth in different parts of the criminal justice system (e.g., residential facilities vs social services), it becomes important to identify the risk within these groups separately.

2.4.1.1 Family history of crime and psychiatric diagnoses

Criminological research and theories have identified family as playing a significant role in shaping the potential of youth to commit crime and face other adverse outcomes. Family has both a biological, heritable, influence as well as an environmental influence on children and youths' behaviors. Genetically informed studies have demonstrated that genes explain between 40% to 60% of variance in criminal behavior (Frisell et al., 2011, 2012; Kendler et al., 2013; Rhee & Waldman, 2002; Tuvblad et al., 2011), suggesting that genetics play an important role in the development of criminal behavior. Thus, having a parent that commits crimes increases the risk that the child also will engage in criminal activities (e.g., Frisell et al., 2011). However, environmental influences are not unimportant. All genetically informed studies also emphasize the importance of familial-environmental risk factors in developing criminal behavior, which has been shown to explain around 20% to 25% of the variance in criminal behavior (Tuvblad et al., 2011; Kendler et al., 2013, 2016). These environmental factors can be related to poor rearing, neglect, family violence, economic hardships, or social learning (Kendler et al., 2013, 2016; Mok et al., 2016; Tuvblad et al., 2011). Thus, both genetic and environmental factors are important in the development of criminal behavior.

Family factors have also been shown to increase the risk of psychiatric diagnoses. Similar to criminal behavior, the risk of developing psychiatric diagnoses transmits over generations (Pettersson et al., 2019). Multiple studies have shown that individuals with a parent who has been diagnosed with a psychiatric diagnosis have an increased risk of also being diagnosed with a psychiatric disorder (Dean et al., 2010; Pettersson et al., 2019). This risk has been found for a wide range of psychiatric diagnoses and is not tied to the specific type of diagnosis that the parent has. Instead, it suggests a higher vulnerability to psychiatric diagnoses in general (Uher et al., 2023). In simplified terms, the increased risk in the children is not about inheriting a particular diagnosis from the parent but rather indicates a broad family tendency for mental health problems (Dean et al., 2010).

The risk of injuries and premature death has been shown to cluster in families. Previous research has shown that individuals whose parents have died during their childhood had around 50% higher risk of premature death than comparison groups (Guldin et al., 2015; Hiyoshi et al., 2021; Oyen et al., 2009; Tidemalm et al., 2011). One of these studies found that the association between parental death and increased risk of premature death among individuals was mediated by criminality (Hiyoshi et al., 2021). Other studies have also found that the risk of premature death is affected by parental crime and parental psychiatric diagnoses. Studies have shown that children whose parents have been convicted of a crime had an increased risk of being injured or dying prematurely (Björkenstam et al., 2018; van der Weijer et al., 2018; Whitten et al., 2019). Studies have also shown that parental psychiatric diagnoses increased the risk of both crime and premature death (Björkenstam et al., 2018; Fazel & Runeson, 2020; Mok et al., 2016). Taken together, parental factors related to crime and psychiatric diagnoses are important to consider when studying the risk of injuries and premature death among youth offenders.

Despite this, most studies on youth offenders and adverse outcomes have not considered family history. Given that youth offenders have high prevalence of parental crime or parental psychiatric diagnoses (Björkenstam et al., 2018, 2019), it is important to examine whether family history adds to the risk of injuries or premature death. In addition, research has shown that family factors may have similar impact on the risk of crime and premature death as individual factors such as psychiatric diagnoses (Basto-Pereira & Farrington, 2022; Björkenstam et al., 2018; Fagan & Benedini, 2019). Thus, studying family history as a risk factor will not only be informative from an intervention perspective, but it will also help us understand the roles that both psychiatric diagnoses and family history have in the risk of injuries and premature death, which can improve the specificity of intervention efforts.

2.4.2 The role of psychiatric diagnoses in the association between victimization and reoffending among youth offenders

Being victimized of a crime can increase the risk of adverse physical, mental, emotional, and behavioral consequences (Hanson et al., 2010). Victimization has been strongly linked to psychiatric diagnoses. Meta-analyses and population-based studies have found that individuals diagnosed with psychiatric disorders have up to a threefold higher risk of being victimized than individuals without psychiatric diagnoses (Cashman & Thomas, 2016; Fogden et al., 2016; Ghirardi et al., 2023; Latvala et al., 2022; Moore et al., 2017; Sariaslan et al., 2020; Schoeler et al., 2018; Thomas et al., 2019). Among specific diagnoses, individuals diagnosed with substance use disorders or ADHD have had the highest risk of being victimized (Ghirardi et al., 2023; Sariaslan et al., 2020), followed by depression and anxiety (Sariaslan et al., 2020). In addition, studies have shown that individuals with psychiatric diagnoses had almost a 10 times higher risk of both being victimized and committing crimes (Ghirardi et al., 2023; Latvala et al., 2023; Sariaslan et al., 2020), suggesting that psychiatric diagnoses are particularly linked to a victim-offender overlap (Beckley et al., 2018).

The victim-offender overlap refers to the phenomenon that individuals who have been victimized of a crime have an increased risk of also committing crimes, and vice versa (Jennings et al., 2012). Although not all crime victims commit crimes, a significant proportion of the offender population has at some point been victimized (Jennings et al., 2012). Studies have shown that one of the most important risk factors for crime in youth is victimization, especially violent victimization (Basto-Pereira & Farrington, 2022; Fazel et al., 2018). Estimates have shown that about 12% of all committed violent crimes could be prevented if victimization is eliminated in the offender population (measured through Population Attributable Fraction; Fazel et al., 2018). However, the association between victimization and crime has been less studied in the context of reoffending (Yukhnenko et al., 2020). Existing studies have demonstrated that youth offenders who have been victimized have approximately a 1.5 times higher risk of reoffending compared to

non-victimized offenders (Bui et al., 2021; Taylor, 2015; Wylie & Rufino, 2018). Most research in this field has studied the broader concept of victimization by examining childhood adversities, abuse and neglect. These studies have found similar risk estimates for reoffending (Cho & Lee, 2022; Fox, et al., 2015; Vitopoulos et al., 2018; Wolff & Baglivio, 2017; Wolff et al., 2017), suggesting that victimization can also be a risk factor for persistent offending.

Multiple potential explanations for the relationship between victimization and crime have been put forth, and common components of these explanations are that victimization can lead to behavioral and emotional dysregulations (Adrian et al., 2019; Jennings et al., 2012). These dysregulations have also been proposed as underlying mechanisms for psychopathology (Adrian et al., 2019; Sloan et al., 2017), suggesting that victimization may have similar properties as psychopathology (Hogg et al., 2023) and thereby can be linked to an increased risk of crime. Thus, victimization can pose as a risk factor for crime in a similar way as psychiatric diagnoses due to the shared vulnerabilities and dysregulations. While some studies have found that both victimization and psychiatric diagnoses predict reoffending among youth offenders (Wiley & Rufino, 2018), there is a gap in the literature specifically investigating the role of psychiatric diagnoses in the association between victimization and reoffending among youth offenders. By studying this association among youth offenders with and without psychiatric diagnoses, it is possible to explore if psychiatric diagnoses together with victimization have an additive effect on the risk of reoffending, and thereby potentially identify youth offenders at a higher risk of reoffending. In addition, this kind of information could offer additional insights into the potential treatment needs of youth offenders. Since psychiatric diagnoses typically serve as primary indicators of treatment requirements for offenders, exploring whether victimization amplifies the risk among those with or without psychiatric diagnoses could address treatment needs of both groups.

2.4.3 Summary of knowledge gaps for psychiatric diagnoses and risk of later adverse outcomes among youth offenders

Research on the association between psychiatric diagnoses and risk of adverse outcomes has been less studied among youth offenders specifically. Previous research on the association between psychiatric diagnoses and the risk for injuries and premature death among youth offenders has been inconclusive, and research has indicated that the association may differ depending on whether we study imprisoned or non-imprisoned samples of offenders. Thus, there is a need to examine the association within non-imprisoned and imprisoned youth offenders separately to elucidate the role of psychiatric diagnoses. In addition, most studies have not considered the role of family history of crime or psychiatric diagnoses, despite the strong evidence of family factors increasing the risk of both psychiatric diagnoses, crime, and premature death.

There is also a need to further examine the role of psychiatric diagnoses in the risk of reoffending among youth offenders. Additionally, while research has suggested that victimization is highly related to both psychiatric diagnoses and crime, there is a gap in the literature specifically investigating the role of psychiatric diagnoses in the association between victimization and reoffending among youth offenders. By examining different adverse outcomes among youth offenders and considering other important risk factors, it is possible to provide an even more nuanced understanding of what role psychiatric diagnoses play among youth offenders.

2.5 Developmental and life-course criminology

The role of psychiatric diagnoses, family factors, and victimization in the development of crime in youth and later adverse outcomes among youth offenders can be understood from developmental and life-course criminological theories. These theories entail both criminological, psychological, biological, and sociological aspects of the development of criminal behavior (Kazemian et al., 2019; Sampson & Laub, 2005). Together, they emphasize risk and protective factors that contribute to onset, persistence, and desistance of criminal behavior, and also the transmission of criminal behavior from one generation to the next. Even if developmental and life-course criminology often is integrated and sometimes used interchangeably, they are distinct from each other in terms of theoretical focus (Kazemian et al., 2019). The developmental perspective focuses on early psychological and individual factors to explain the development of criminal behavior while the life-course perspective focuses on social factors and life events that act like turning points for both onset and desistance from crime. Both developmental and life-course criminology emphasize individuals' developmental contexts, meaning that while some individual factors may be constant over time, contextual and environmental/social factors may vary throughout life. Thus, although some individuals may have early individual factors that puts them at risk of committing crimes, potential environmental triggers are not always present and could thus explain individual variation in criminal behavior (Sampson & Laub, 2005).

While developmental and life-course criminology includes multiple risk factors and developmental stages, one reoccurring theme is the focus on risk factors in youth related to problem behaviors, such as psychiatric diagnoses. For example, Moffitt's (1993) dual taxonomy suggests that there are two pathways to crime; one which is due to neuropsychological deficits in childhood (e.g., psychiatric diagnoses) in combination with adverse environmental factors (e.g., family dysfunction) that contribute to a persistent risk of criminal behavior throughout life. The other one is restricted to criminal behavior in youth and is due to social aspects such as peer influences. While this

theory emphasizes the role of psychiatric diagnoses as risk factor for persistent problems, it also highlights the heterogeneity in the youth offender population. The stability of individual risk factors in youth is also emphasized in Farrington's (2003) Integrated Cognitive Antisocial Potential theory (ICAP), embedded in the developmental and life-course perspectives, which entails that mental and behavioral problems in childhood and youth may interact with criminogenic environments (e.g., adverse family environment or antisocial peers) and continues to do so throughout life, which leads to a persistent risk of crime (Carlsson & Sarnecki, 2015). In addition, researchers have argued that criminal behavior is only one component of antisocial and risky behavior that can be persistent throughout the lifespan (Morizot, 2019), indicating that risk factors related to crime can also be related to other adverse outcomes in life.

In this dissertation, I used the theoretical framework of developmental and life-course criminology to contextualize the examined risk factors, crime, and later adverse outcomes. While this dissertation does not aim to test a specific theory and neither can rely on a single theory to explain all potential pathways to the studied outcomes, the developmental and life-course theoretical framework is used to emphasize the temporal, longitudinal, and dynamic aspect of risk factors and outcomes of the dissertation. In study I, I focus on psychiatric diagnoses (i.e., individual risk factors) and the risk for crime in youth, whereas in studies II and III, I build upon this by examining the role of psychiatric diagnoses and other important risk factors for later adverse outcomes among those who have been convicted of a crime in youth. Thus, this dissertation considers factors from birth to young adulthood to both examine the risk of crime in youth and subsequent consequences of having committed a crime in youth.

3 Aim

3.1 Overarching aim

The overarching aim of this dissertation was to expand the knowledge about the role of psychiatric diagnoses in the risk of crime in youth and later injuries, premature death, and reoffending among youth offenders.

3.2 Specific research aim

Study I: The aim was to examine the associations between psychiatric diagnoses and the risk for non-violent and/or violent criminal convictions in youth, and to examine how different patterns of comorbidities contribute to these associations. More specifically, the aim was to first examine the associations between specific psychiatric diagnoses (substance use disorder, ADHD, depression, PTSD, intellectual disabilities, and autism spectrum disorders) and non-violent or violent criminal convictions in youth. Second, the aim was to examine how different patterns of comorbidities of internalizing (internalizing disorders here consists of depression, PTSD, and/or anxiety), externalizing (externalizing disorders here consists of substance use disorder, ADHD, and/or conduct disorders), or neurodevelopmental diagnoses (that here consists of intellectual disabilities, autism spectrum disorders, and/or tic disorders) contribute to the risk for non-violent or violent criminal convictions in youth among the specific psychiatric diagnoses. An additional aim was to assess any potential differences by sex.

Study II: The aim was to expand on previous research by examining differences in risk for unintentional injury and premature death among youth offenders with and without an imprisonment sentence. More specifically, the aim was first to compare the risk for unintentional injury and premature death among non-convicted youth, non-imprisoned youth offenders, and imprisoned youth offenders. Second, the aim was to examine the role of psychiatric diagnoses, parental criminal convictions, and parental psychiatric

diagnoses in the risk for unintentional injuries and premature death within non-imprisoned and imprisoned youth offenders separately.

Study III: The aim was to examine the role of psychiatric diagnoses in the association between violent victimization and the risk for reoffending (categorized as any reoffending, non-violent reoffending, and violent reoffending) among youth offenders. More specifically, the aim was to examine this association among youth offenders with and without psychiatric diagnoses separately and within different types of psychiatric diagnoses, including substance use disorders, ADHD, depression, and anxiety disorders.

4 Methods

The three studies included in the present dissertation used a quantitative, longitudinal, research design. The decision to employ this method stems from its ability to conduct time-sensitive statistical analyses, enabling exploration of associations between risk factors and outcomes over time (Caruana et al., 2015). Longitudinal studies thereby extend beyond the confines of cross-sectional studies, where information is merely captured at a single moment and is susceptible to recall bias, particularly when individuals are asked about events or factors from childhood (Althubaiti, 2016; Caruana et al., 2015). Instead, longitudinal studies do not only ensure better accuracy of actual events (e.g., that an individual have been diagnosed with a psychiatric diagnosis or been victimized in childhood), but also that the risk factor indeed have preceded the examined outcome (e.g., the psychiatric diagnosis preceding a criminal conviction and not the other way around), which is crucial for accurate interpretations of associations between risk factors and outcomes.

All three included studies in this dissertation were observational birth cohort studies. This means that all individuals born within a specified year-range were included and followed prospectively for data collection over time. The data came from a linkage of Swedish population-based registers, resulting in large study samples from the entire population of Sweden. Using these registers and a longitudinal, time-sensitive, study design ensures a robust exploration of prospective associations between risk factors and outcomes across the lifespan. This approach is therefore the most suitable method to achieve the study aims.

4.1 Data material: Swedish Registers

Starting with the Church of Sweden in the 17th century, Sweden has a strong tradition of keeping registers of the population census (Swedish National Tax Agency, 2015). Today, there are multiple registers that contains information about for example health, criminal justice involvement, and socio-economic status. While the primary aim with these registers is to be a base for government, health care,

and other agencies to make correct decisions (Ludvigsson et al., 2016), the register can be useful for research purposes as well. These registers are in general updated yearly which enables data over a long period of time, i.e., longitudinal data, which makes it possible to study changes over time in a target population.

To maintain structure and to enable linkage of data across register, a unique personal identification number (PIN) is used. The PIN was introduced in 1947 (Ludvigsson et al., 2009) and is a unique number consisting of the birth date along with a four-digit number. This PIN is assigned to every individual upon birth in Sweden or to individuals that have been resided in Sweden on a permanent basis (at least for a year). To be considerate of individuals privacy towards researchers who are using these registers, the PIN numbers are anonymized and replaced with a random number by the National Board of Health and Welfare. Study I, II, and III all used an existing linkage of these nationwide registers, with data available up until 31st December 2013. The following registers were used in study I, II, and III:

4.1.1 The Total Population Register

The Total Population Register (TPR) is maintained by Statistics Sweden and is a population register tracking all Swedish residents, with computerized data since 1968 (Ludvigsson et al., 2016). Using this register, it is possible to identify all individuals that are residing in Sweden at some time each year. This register contains information on demographic factors such as birth date, sex, civil status, family relationships, citizenship, deaths, and migration. The Swedish Tax Agency sends daily updates to the TPR, so the register contains exact dates of each life event. The TPR is of high quality and have high coverage, with nearly 100% coverage of all births and deaths and between 91-95% of all migration in and out of Sweden. For all three studies, the TPR was used to identify all individuals born in Sweden between specific years and to get information about birth date, sex, and dates of migration in and out of Sweden (see section 4.3, study design, for details).

4.1.2 The National Crime Register

The National Crime Register (NCR) contains information about criminal convictions in Swedish lower courts since 1973. It contains information about the offences included in each conviction, date of conviction, and type of sentence. In Sweden, multiple crimes can be processed within the same conviction, where the most severe crime (in terms of sanctioning) is considered the main crime. For example, if one individual has committed multiple thefts, burglaries, and one violent assault, all crimes can be processed within the same conviction but only the violent assault will be reported as the main crime.

The NCR do not include information about potential changes in a conviction if it is appealed to higher courts. Over time, the rate of appeals to higher courts in Sweden has been between 10% to 15% (Swedish National Court Administration, 1995). Of those appeals, only 1% to 2% has had changes in the verdict. Thus, the estimated misclassification of individuals being convicted of a crime in the data due to changes after appeals is estimated to be small. The minimum age of criminal responsibility in Sweden is 15 years of age, so the NCR only contains information about criminal convictions of individuals that are 15 years and older. In all three studies, the NCR was used to identify individuals with criminal convictions. The NCR was also used to identify what type of crime individuals were convicted of (based on the main crime). In study II, the NCR was also used to obtain information about sanctions of the conviction.

4.1.3 The National Patient Register

The National Patient Register (NPR) was established in 1964 and is maintained by the National Board of Health and Welfare (Ludvigsson et al., 2011). It covers somatic inpatient care since 1964, psychiatric inpatient care since 1973, and has complete coverage of all inpatient care of both psychiatric and somatic diseases since 1987. It also covers all outpatient care (specialist care) since 2001, but do not yet cover any visits to primary care. Thus, although it has complete coverage of all inpatient and specialist outpatient care, not all medical data in Sweden is captured by the NPR. Consequently, most individuals

captured in the registers is likely to have more severe forms of certain conditions (e.g., psychiatric diagnoses) since mild or less severe cases are typically managed within primary care.

The NPR is updated once a month from all county councils and private caregivers in Sweden. The NPR contains information about date of admission and discharge, whether the admission was planned or unplanned, and medical data of all diagnoses and procedures involved in the admission. All physicians, whether operating privately or funded publicly, are obligated to submit data to the NPR. Diagnoses in the NPR are coded according to the Swedish International Classification of Disease (ICD-SE), which is a Swedish adaptation from the World Health Organizations (WHO) ICD system. Due to updates of diseases and classifications, there are different versions of the ICD-SE. The first ICD version was ICD-7-SE in 1964, followed by ICD-8-SE between 1968 and 1986, and ICD-9-SE between 1987 and 1996. ICD-10-SE was introduced in 1997 and is up to date the current version of ICD used in Swedish health care. The NPR was used to identify individuals with psychiatric diagnoses in all three studies and to identify admissions due to violent victimization in study III.

4.1.4 The Cause of Death Register

The Cause of Death Register (CDR) has virtually 100% coverage of all deaths in Sweden since 1952 (Brooke et al., 2017). It was maintained by Statistics Sweden up until 1993 but the Swedish National Board of Health and Welfare has been responsible of the register since 1994. The deaths are first certified by a physician confirming and reporting the death to the Swedish Tax Agency and then the physician also report a medical death certificate about the cause of death to the National Board of Health and Welfare. The causes of death are reported according to the ICD-SE system. The CDR was used in all three studies to obtain information about date of deaths.

4.1.5 The Multi-Generation Register

Based on information about births and family relations from the TPR, the Multi-Generation Register (MGR) enables identification of relatives. The individuals in the register are individuals that were born in 1932 and onward and are registered as living in Sweden since 1961 (Ekbom, 2011). The register has almost complete coverage of all individuals born in Sweden since 1947 (when the PIN was introduced). Individuals can be linked to their biological and adoptive parents, which in turn enables identifications of full-siblings, half-siblings, cousins, half-cousins, uncles, aunts, grandparents etc. About 95% of all individuals can be linked to their biological father and 97% can be linked to their biological mother (Ekbom, 2011). For individuals born in Sweden since 1968, the register has an almost perfect coverage, but it is less complete for older cohorts, adoptive children, and immigrants. For the studies in the present dissertation, the Multi-Generation Register was used to identify parents of the individuals included in the studies to obtain information about parents' education level, criminal convictions, and psychiatric diagnoses.

4.1.6 The longitudinal integrated database for health insurance and labour market studies

The longitudinal integrated database for health insurance and labour market studies (LISA) started in 1990 and replaced the previous Population and Housing Census data that was collected every five years (Ludvigsson et al., 2019). Maintained by Statistics Sweden, data in LISA is since 1990 collected yearly and contains information about education, income, sick leave, disability pension, unemployment, and occupation to mention a few. LISA was used to obtain information about socio-economic status (SES), measured as the highest education level, of the parents of the study individuals in all three studies.

4.2 Overview of study methods

The study methods, including participants, risk factors, outcomes, and analyses are summarized in Table 1.

Table 1. Summary of study methods of all three included studies.

Study	Participants	Risk factors	Outcomes	Analyses
I	1,411,538 individuals born between 1985-1998.	Individual psychiatric diagnoses: substance use disorder, ADHD, depression, PTSD, intellectual disabilities, and autism spectrum disorder. Comorbidities of internalizing, externalizing, and neurodevelopmental disorders.	Criminal conviction in youth of any crime, non-violent crime, and violent crime.	Cumulative incidence rates. Cox Proportional Hazards Regressions with 95% confidence intervals. Stratifications on sex. Wald's test for potential differences by sex.
II	1,839,711 individuals born between 1978-1996.	Criminal conviction in youth. Two groups of youth offenders: non-imprisoned and imprisoned. Psychiatric diagnoses: internalizing, externalizing, and neurodevelopmental disorders. Family history of criminal convictions and psychiatric diagnoses.	Unintentional injury and premature death.	Incidence rates. Cox Proportional Hazards Regressions with 95% confidence intervals.
III	142,954 youth offenders born between 1984-1996.	Violent victimization (i.e., injuries due to assault). Psychiatric diagnoses: Any diagnosis, substance use disorder, ADHD, depression, and anxiety.	Reoffending (second criminal conviction) of any crime, non-violent crime, and violent crime.	Incidence rates. Cox Proportional Hazards Regressions with 95% confidence intervals. Stratification on psychiatric diagnoses. Wald's test for potential differences.

4.3 Study design

All three studies in the present dissertation were observational studies using a cohort design to follow individuals over time. This means that a birth cohort is defined, often including all individuals born within a specified year-range. These individuals are then followed for a period of time to identify whether they are exposed to a certain risk factor or not (i.e., exposure-time). Individuals are then defined as either exposed or unexposed to a risk factor (i.e., whether they had experienced the risk factor or not). Lastly, all individuals are followed for another period of time to identify whether they experience a specific outcome of interest or not (i.e., follow-up time). The exposed and unexposed group are then compared in the occurrence of this specified outcome (Rothman, 2012; Setia, 2016).

One crucial aspect of cohort designs is that the included individuals have not experienced the outcomes at the start of the follow-up time to ensure that the risk factor precedes the outcome (Rothman, 2012; Sedgwick, 2014). Another important concept in cohort designs is censoring. In cohort studies, some individuals will be lost during the follow-up before experiencing the outcome or before the end of the study period, often due to emigration or death (Rothman, 2012; Sedgwick, 2014; Setia, 2016). They are therefore censored from the study but still contribute with data until censoring, which reduce risk of bias in outcome estimation and enhances the validity of study findings. A summary of the study designs of the three studies included in this dissertation, including exposure time, follow-up time, risk factors, and outcomes are illustrated in Figure 1. The lines below exposure time and follow-up time represent when these aspects were measured in relation to the blue age-line. On the right side of this blue age-line are all risk factors and outcomes, showing approximately when they were measured and the order of risk factors and outcomes.

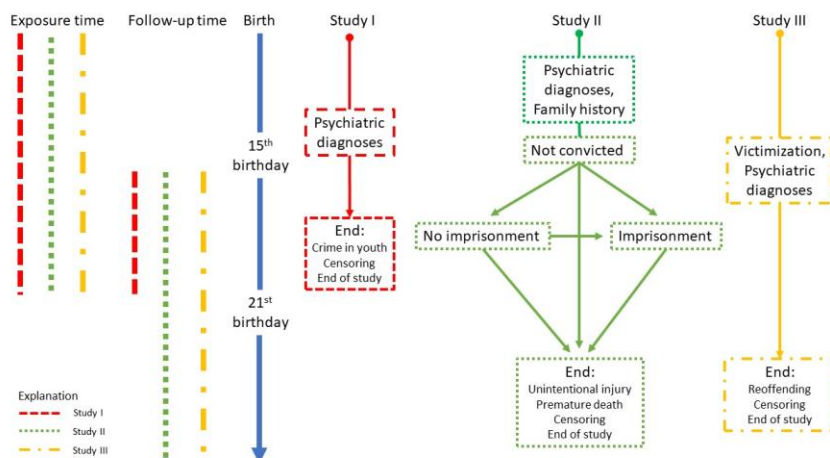


Figure 1. Illustration of study design of all three studies. Red lines= Study I; Green lines= Study II; Yellow lines= Study III.

4.3.1 Study I

In study I, the aim was to examine the associations between psychiatric diagnoses, including comorbidities of diagnosis, and the risk of first criminal conviction in youth among males and females separately.

4.3.1.1 Study Population

In study I, I used the Total Population Register to identify all individuals born between 1985 and 1998 ($N = 1,844,773$). These years were selected for specific reasons. First, it aligns with changes in the legal system regarding youth offenders during the late 1990s, for example with the introduction of new sanctions of youth offenders in 1999 (Prop. 1997/98:96). Individuals born in 1985 turned 15 years old (which is the minimum age of criminal responsibility in Sweden) in the year 2000 when these legal changes were in place. Second, it considers advancements in the accuracy and reliability of psychiatric diagnosis data in Sweden during the 1990s (with introductions of ICD-9 in 1987 and ICD-10 in 1997). Consequently, the year 1985 was

chosen because individuals who were born from this year and onward were children throughout the 1990s and therefore had better data quality of psychiatric diagnoses than older birth cohorts. Lastly, the youngest individuals, born in 1998, were 15 years old at the end of the study period (December 31st, 2013), which allowed them one year of follow-up to experience the outcome (i.e., criminal conviction in youth).

In cohort studies, it is important to avoid differential information bias. This happens when the accuracy of information collected differs between groups within the study population, which could lead to non-random misclassification of study variables and thereby create errors in results (Rothman, 2012; Sedgwick, 2014; Setia, 2016). To avoid information bias due to missing information on important variables (e.g., psychiatric diagnoses and family factors), some exclusions of the study population were made. First, I excluded all individuals who had ever immigrated ($n = 383,897$). Immigration during childhood could cause some individuals to have missing information on childhood factors, such as psychiatric diagnoses. Similarly, inability to link individuals to their biological mother and father could lead to missing information on important family factors (e.g., childhood SES or family history of crime). Thus, I excluded individuals that could not be linked to their biological mother and father ($n = 9,511$). Individuals included in the study also needs to be at risk of the outcomes at the start of the study. I therefore excluded those who had emigrated ($n = 29,089$) or died ($n = 10,738$) before their 15th birthday since this was the minimum age to experience the outcome (criminal conviction in youth). By doing these exclusions, I attained data of high quality with minimal missing values. After these exclusions, the final sample consisted of 1,411,538 individuals, where 49% were females and the captured age range was 15 to 21 years old.

4.3.1.2 Risk factors

In study I, psychiatric diagnoses were the risk factors. The exposure time for risk factors started at the individuals' birth and continued up to the point of conviction of a crime (the outcome) or the end of the study period. Thus, the age range of psychiatric diagnoses captured in

this study was between 0 to 20 years old. Individuals were defined as exposed if they received one of the following diagnoses: substance use disorders, ADHD, depression, PTSD, intellectual disabilities, and autism spectrum disorders. These diagnoses were selected due to their relevance in relation to age of onset (see for example Sun et al., 2019), as this study focused on youth, and due to their associations with criminal offending, as evidenced by previous research (Beaudry et al., 2021a; Fazel et al., 2008; Heeramun et al., 2017; Latvala et al., 2022; Mohr-Jensen et al., 2019; Paulino et al., 2023).

I also examined comorbidities of psychiatric diagnoses, which was defined as having one of the specific diagnoses listed above and at least one diagnosis included in the following categories of diagnoses: internalizing disorders (here consisting of depression, anxiety, and/or PTSD), externalizing disorders (here consisting of substance use disorders, ADHD, and/or conduct disorder/oppositional defiant disorder), and neurodevelopmental disorders (here consisting of intellectual disabilities, autism spectrum disorder, and/or tic disorders). Anxiety and tic disorders were not included as individual diagnoses due to insufficient statistical power. However, due to their relevance to both youth and criminal offending (Beaudry et al., 2021; Copeland et al., 2007; Mataix-Cols et al., 2022), I chose to include them within the broader comorbidity categories. Similarly, conduct disorder was not analyzed independently because it is often considered as a precursor to, and thereby act as a proxy for, criminal behavior. While less informative independently, conduct disorder was still included in comorbidity categories since previous research has shown that psychiatric disorders comorbid with conduct disorder increase the risk for criminal convictions (e.g., Copeland et al., 2007).

The timing of these diagnoses was not taken into consideration, meaning that as long as two of the specified diagnoses were present before the outcome or end of study, irrespective of the order, individuals were defined as having comorbidities of diagnoses. It should also be noted that the same individual could be included in more than one specific diagnosis and/or comorbidity category, so comorbidity groups were not mutually exclusive.

4.3.1.3 Outcome and follow-up

The outcome was the first conviction of a crime in youth (15-20 years of age). I studied *any* criminal conviction and further defined whether the conviction was of a *non-violent* or *violent* crime, resulting in three studied outcomes.

The start of follow-up was at the individual's 15th birthday, which was the youngest possible age to experience the outcome. Individuals that had received a diagnosis before their 15th birthday entered the follow-up period as exposed and remained as exposed until the end of follow-up. Individuals that had not received a diagnosis before their 15th birthday entered the follow-up period as unexposed. They remained as unexposed until they either received a psychiatric diagnosis (and from there on were defined as exposed) or until the end of follow-up.

In this study, individuals were censored if they emigrated or died during the follow-up. Thus, all individuals were followed until they either experienced the outcome, emigrated, died, reached their 21st birthday (which is the oldest age to be defined as youth offenders and thereby experience the outcome), or until the end of the study period (December 31st, 2013), whichever happened first.

4.3.2 Study II

In study II, I examined the role of psychiatric diagnoses and family history of crime or psychiatric diagnoses in the risk for unintentional injuries and premature death among non-imprisoned and imprisoned youth offenders separately.

4.3.2.1 Study Population

The Total Population Register was used to identify all individuals born between 1978 and 1996 ($N = 2,590,861$). I chose an older cohort in this study as compared to study I since one of the outcomes were premature death, which is a rare outcome and thus requires longer time for follow-up. The youngest individuals turned 17 years old at the end of the study period (December 31st, 2013) which allowed them to have at least 1 year of follow-up time for outcomes

(unintentional injuries and premature death). Using the same exclusions as described in study I, I excluded those who had ever immigrated ($n = 683,959$), had missing information on biological parents ($n=12,535$), or had emigrated ($n = 38,593$) or died ($n = 16,063$) before their 15th birthday. The final sample consisted of 1,839,711 individuals. The age range captured in this study was 15 to 35 years of age and 48% were females.

4.3.2.2 Risk factors

In this study, the exposure was criminal convictions in youth. Individuals were defined as exposed if they had a conviction on or after their 15th birthday but before their 21st birthday. Individuals were classified as unexposed if they did not have a conviction between these ages. I also separated the exposure into two levels of exposure depending on the sentencing of the conviction: (1) non-imprisoned youth offenders and (2) imprisoned youth offenders.

This study also examined the following risk factors among non-imprisoned and imprisoned youth offenders: psychiatric diagnoses, parental criminal convictions, and parental psychiatric diagnoses. To have sufficient power, I created the following categories of psychiatric diagnoses to analyze: externalizing disorders (here consisting of substance use disorder, conduct disorder, and oppositional defiant disorder), internalizing disorders (here consisting of depression and anxiety disorders), and neurodevelopmental disorders (here consisting of intellectual disabilities, autism spectrum disorders, ADHD, and tic disorders). These risk factors were measured from birth and up until individuals' 15th birthday.

4.3.2.3 Outcome and follow-up

The outcomes in this study were unintentional injury and premature death before the age of 35. These were analyzed as separate outcomes, meaning that individuals that experienced an unintentional injury were still included in analyses of premature death.

The start of follow-up for outcome was at individual's 15th birthday. Since the exposure in this study was being convicted of a crime in

youth, the exposure time overlapped with the follow-up time during the age 15 to 20 years old. The reason for starting the follow-up time during the exposure time was that youth offenders have a high risk of experiencing negative outcomes during their young adulthood and thereby close in time of conviction (Aalsma et al., 2016; Farrer et al., 2013). Thus, I wanted to capture all outcomes during this time. This resulted in that the exposure was time-varying during the exposure time (15 to 20 years of age).

All individuals entered the follow-up time as unexposed (i.e., not convicted) on their 15th birthday. They remained as unexposed until they experienced the outcomes, were censored due to emigration or death, reached the end of study period (December 31st, 2013), or got convicted of a crime during the exposure time (i.e., before their 21st birthday) and thereby shifted their status to exposed.

Individuals that were defined as exposed could experience both levels of exposures (non-imprisonment sentence and imprisonment sentence) during the exposure-time, as long as the non-imprisonment conviction happened first. That is, the time-varying exposure was considered one directional based on the severity of the sentence, where imprisonment was considered the most severe exposure. This means that individuals who were defined as exposed with a non-imprisonment sentence remained in this group (i.e., non-imprisoned youth offender) until the outcome, censoring, end of study, or until they received another conviction that led to an imprisonment sentence and thus changed their exposure to imprisoned youth offender. Imprisoned youth offenders, considered the most severe exposure, remained in that group until experiencing outcomes, censoring, or reaching the end of the study. Even if they were later convicted with a non-imprisonment sentence, their exposure status did not change to non-imprisoned youth offenders.

4.3.3 Study III

In study III, the aim was to examine the role of psychiatric diagnoses in the association between violent victimization and reoffending among youth offenders.

4.3.3.1 Study Population

In study III, I used a similar birth cohort as in study I with all individuals born between 1986 and 1996 ($N = 1,770,741$) to ensure adequate information on victimization and psychiatric diagnoses (risk factors). These years were also chosen to allow for a minimum of 2 years of follow-up time for reoffending (outcome).

Next, I identified individuals who had been convicted of a crime in youth, i.e., on or after their 15th birthday and before their 21st birthday ($n = 175,400$). I used the same exclusions as in study I and study II of individuals that had ever immigrated ($n = 32,346$), had emigrated ($n = 42$) or died ($n = 20$) before their 15th birthday, and had missing information on biological parents ($n = 38$). The final sample consisted of 142,954 youth offenders. The captured age range was 15 to 29 years old and 30% were females.

4.3.3.2 Risk factors

Exposure in this study was violent victimization. Individuals were defined as exposed if they had received a diagnosis of violent victimization before their first criminal conviction (i.e., before entering the study population).

I also examined psychiatric diagnoses as risk factors. I identified whether individuals had received any life-time psychiatric diagnosis before prison release (for those who had been imprisoned during their first conviction) or before/at the first conviction date (for those not sentenced to imprisonment). In addition to *any* psychiatric diagnosis, I also examined the following diagnoses which are considered to have an early age of onset (Sun et al., 2019), and are related to criminal convictions in youth (Beaudry et al., 2021a; Fazel et al., 2008; Heeramun et al., 2017; Latvala et al., 2022; Mohr-Jensen et al., 2019; Paulino et al., 2023), victimization (Sariaslan et al., 2020;

Latvala et al., 2022), and reoffending (Chang et al., 2015a; Yuhnenko et al., 2023a): substance use disorder, ADHD, depression, and anxiety disorders. It should be noted that the same individual could have multiple diagnoses and thus be included in more than one diagnosis in the analyses.

4.3.3.3 Outcome and follow-up

The outcome in this study was reoffending. I studied *any* reoffending and further defined whether the reoffending was of a *non-violent* or *violent* crime, resulting in three separate outcomes.

The start of follow-up started at either the date of prison-release for youth offenders that were sentenced to imprisonment, or one day after the conviction date for youth offenders not sentenced to imprisonment. The National Crime Register do not contain information on exact date of prison-release. However, it contains information on the duration of sentences for each individual, specifying the number of years, months, and days. For individuals sentenced to adult prisons, I calculated the release date by adding 2/3 of the sentenced time to the conviction date. For individuals sentenced to secure youth care, I added the total sentence duration to the conviction date. This methodology aligns with the standard procedure in Sweden for determining the duration of the sentenced time individuals spend in imprisonment before being released on parole (26 kap. 6 § BrB, SFS 1962:700). All individuals were followed until they experienced the outcome (reoffending), emigration, death, or reached the end of study period (December 31st, 2013).

4.4 Measures

In this section, I describe all measures used in the studies included in this dissertation. These measures are used differently in different studies (e.g., as exposure in one but as an outcome in another), as described in the study design above.

4.4.1 Criminal convictions

Using the National Crime Register, I identified individuals with criminal convictions in Swedish lower courts. The NCR contains information on specific dates of criminal convictions and have almost perfect coverage, which enables adequate data on all criminal convictions in Sweden.

4.4.1.1 Criminal convictions in youth

Criminal convictions in youth were defined as convictions that occurred on or after individuals' 15th birthday and before their 21st birthday. This is the age-range to be defined as a youth offender in Sweden (Eriksson, 2012; SFS 1964:167).

4.4.1.2 Reoffending

Reoffending was studied in study III and was defined as the second criminal conviction of individuals included in the study population (i.e., youth offenders). The reoffending could happen at any time after the first conviction, meaning that there were no age or time constraints.

4.4.1.3 Non-violent and violent crime

In addition to study any criminal convictions in youth or reoffending, I also differentiated on whether the conviction was of a non-violent or violent. Violent crime was defined as convictions of for homicide, manslaughter, assault, kidnapping, illegal confinement, unlawful coercion, gross violation of a person's integrity, unlawful threats, intimidation, robbery, arson, and threats and violence against an officer (Frisell et al., 2011). I also included sexual crimes in the violent-crime definition (Berg et al., 2019), including rape, sexual

abuse, sexual molestation, and sexual crimes against children (non-contact offences such as possession of extreme images were not included in violent crimes). Non-violent crimes were defined as all other crimes not included in the violent crime definition, for example theft, vandalism, drug-related crimes, traffic violations, or fraud (Frisell et al., 2011; Kuja-Halkola et al., 2012).

4.4.1.4 Non-imprisoned and imprisoned youth offenders

Using information on sanctions from the National Crime Register, I identified whether youth offenders were sanctioned to imprisonment or not to examine non-imprisoned and imprisoned youth offenders separately in study II. In Sweden, youth who have been convicted of severe criminal acts such as assault, robbery, murder, rape, or serious drug offences are, just like adults, commonly sanctioned with imprisonment. However, youth offenders that were between 15 and 18 years of age at the crime date are sentenced to secure youth care instead of adult prison. Imprisoned youth offenders were therefore defined as youth convicted of a crime and sentenced with secure youth care or prison. Non-imprisoned youth offenders were defined as youth convicted of a crime but not sentenced to secure youth care or prison.

4.4.2 Psychiatric diagnoses

The National Patient Register was used to identify individuals with psychiatric diagnoses in study I, II, and III. All psychiatric diagnoses included within this dissertation are presented with their ICD-codes in Table 2. Note that not all studies utilized ICD-8 due to that the study population was younger and was not born when ICD-8 was used.

The following psychiatric diagnoses were included as individual risk factors:

Attention-Deficit/Hyperactivity Disorder (ADHD) is characterized by persistent patterns of inattention or hyperactivity/impulsivity, or both (American Psychiatric Association, 2013). ADHD as a diagnostic

code in the ICD was not recognized and developed until ICD-9, so it is only present in ICD-9 and ICD-10, but not in ICD-8.

Anxiety disorders are characterized by excessive and persistent fear, worry, or anxiety that affects every-day life (American Psychiatric Association, 2013). It contains phobias and anxiety syndromes, for example social phobia and generalized anxiety disorder, and obsessive-compulsive disorder.

Autism spectrum disorder is a neurodevelopmental condition characterized by difficulties in social communication and interaction as well as limited and often repetitive patterns of behaviors, interests, and activities (American Psychiatric Association, 2013).

Depression is characterized by persistent emotions of sadness, hopelessness, sleep disturbances, difficulty concentrating, and diminished interest or pleasure in daily activities (American Psychiatric Association, 2013).

Intellectual disabilities are characterized by impaired intellectual functioning and adaptive behavior (American Psychiatric Association, 2013). This affects cognition, language, motor skills and social skills which in turn affects every-day functioning.

Post-Traumatic Stress Disorder (PTSD) is a condition caused by traumatic events. These events could be experienced as life-threatening or catastrophic and affects both psychical and psychological well-being (American Psychiatric Association, 2013). PTSD was not officially recognized and classified until ICD-10, so it is not present in ICD-9 or ICD-8.

Substance Use Disorder was defined as misuse or dependence of alcohol, narcotics, medical drugs, and tobacco (American Psychiatric Association, 2013). It also contains psychosis and psychological or behavioral problems caused by these substances.

The aforementioned diagnoses were also included in broader categories of categories of externalizing, internalizing, or neurodevelopmental disorders. The following diagnoses were

included in these categories but not examined as individual risk factors (see section 4.3 above for details about study design):

Conduct disorder/oppositional defiant disorder are diagnoses characterized by disruptive behaviors, impulsivity, aggression, deceitfulness, and rule-breaking behavior (American Psychiatric Association, 2013).

Tic disorders are classified as neurodevelopmental disorders and are generally characterized by involuntary, sudden, repetitive, and rapid movements or vocalizations known as tics (American Psychiatric Association, 2013).

Table 2. ICD-SE codes for all psychiatric diagnoses included in this dissertation.

Diagnosis	ICD-8-SE codes	ICD-9-SE codes	ICD-10-SE codes	Used in study
ADHD	Not applicable	314	F90	Study I, II, III
Anxiety disorder	300 (excl. 300.4)	298B, 300A-D	F40-F42	Study I, II, III
Autism spectrum disorder	295.80, 299.9	299	F84	Study I, II
Conduct disorder/ Oppositional defiant disorder	308.99	312, 313W-X	F90.1, F91	Study I, II
Depression	296.2, 300.4	296B, 296D, 206W, 298A, 300E-F, 309A-B, 311	F32-34, F38.1, F43.2, F48.8, F53.0	Study I, II, III
Intellectual disabilities	310-315	317-319	F70-F79	Study I, II
PTSD	Not applicable	Not applicable	F43.1	Study I
Substance use disorder	291, 294.1, 303-304	291-292, 303-305	F10-F19	Study I, II, III
Tic disorder	306.2	307C	F95	Study I, II

4.4.3 Violent victimization

Information about violent victimization came from the National Patient Register. Violent victimization was defined as a diagnosis of injuries due to assault, which includes assaults with and without weapons or harmful objects and sexual assaults, using ICD-codes from inpatient or outpatient care (ICD-8-SE: E960-969; ICD-9-SE: E960-E969; ICD-10-SE: X85-Y09).

4.4.4 Unintentional injury

Unintentional injury was defined as inpatient admissions or outpatient care for injuries due to unintentional accidents by external causes through the National Patient Register using ICD-codes (ICD-8-SE: E800-E929; ICD-9-SE: E800-E869, E880-E928; ICD-10-SE: V01-X59). These injuries are caused by transport accidents (e.g., car accidents) or other external causes for accidents, for example falls, fires, or force of nature (Latvala et al., 2015; Sariaslan, et al., 2016a, 2016b).

4.4.5 Premature death

Premature death is usually defined as death before the average life-expectancy in a population, which according to the World Health Organization is death before the age of 70 years (see Mazzucco et al., 2021 for review). Premature death was one of the outcomes in study II, and it was defined as any death before the age of 35 years, which was the oldest possible age at the end of study period.

4.4.6 Parental criminal convictions and psychiatric diagnoses

The Multi-Generation Register was used to link the individuals included in the studies to their biological mother and father. Next, the National Crime Register was used to identify whether the mother or father had any criminal conviction prior to the study individuals' 15th birthday. If one or both parents had a criminal conviction within this time period, the study individuals were defined as exposed to parental criminal convictions. Similarly, the National Patient Register was used to identify whether the individuals included in the studies biological mother and/or father had received any life-time psychiatric

diagnosis prior to the individuals' 15th birthday to measure whether they were exposed or unexposed to parental psychiatric diagnoses.

4.4.7 Covariates

All three studies adjusted for various covariates. Some of the measures mentioned above were utilized as covariates as well. In addition, I also obtained information about sex, birth year, childhood socio-economic status (SES) and criminal history. All covariates included in each of the three studies are summarized in Table 3.

Birth year was included as a covariate to account for cohort effects. Cohort effects refers to the possibility that individuals from different birth cohorts may have distinct experiences, exposures, or characteristics due to historical and societal events (Askari, et al., 2022; Keyes et al., 2014; Parkinson et al., 2017). These events could include economic downturns or shift in medical health care or criminal justice systems. Adjusting for birth year, helps minimize the potential errors introduced by cohort effects.

Low SES can be a potential confounder in associations between psychiatric diagnoses, crime, and other adverse outcomes (Galloway & Skardhamar, 2010; Sariaslan et al., 2021; Trumbetta et al., 2010). It is a multidimensional construct usually consisting of income, education level, occupation, and wealth. In all three studies included in this dissertation, I adjusted for childhood SES since the study populations were young. Childhood SES was measured as the highest education level of either the mother or the father (whoever had the highest level) before the year the study individuals turned 15 years old (Andersson et al., 2020; Li et al., 2022). This information was obtained from LISA. The education levels were categorized as ≤ 9 years (primary or lower secondary), 10–12 years (upper secondary), and 12 < years (post-secondary or postgraduate) of education.

In study III, I adjusted for crime history, here consisting of index violent crime and prison status. This was adjusted for since the outcome was reoffending and previous crime history is a strong predictor of future crimes (Chang et al., 2015a; Witt et al., 2015). Index violent crime was defined as whether the first conviction was of

a violent crime or not. Prison status was defined as whether the first conviction had led to imprisonment sentence or not.

Table 3. Summary of covariates and in which study they were used.

Measure	Definition	Register	Used as covariate in study
Sex	Males, females	TPR	Study II, III
Birth year	Birth year	TPR	Study I, II, III
Childhood SES	Parents highest education level before index persons 15 th birthday	LISA	Study I, II, III
Parental criminal convictions	Mother and/or father criminal conviction before index persons 15 th birthday	MGR and NCR	Study I, III
Parental psychiatric diagnoses	Mother and/or father psychiatric diagnosis before index persons 15 th birthday	MGR and NPR	Study I, III
Index violent crime	Whether the first criminal conviction was of a violent crime or not	NCR	Study III
Prison status	Whether the first criminal conviction led to an imprisonment sentence or not	NCR	Study III
Index persons psychiatric diagnosis	Any life-time psychiatric diagnosis of the index person	NPR	Study III

4.5 Statistical analyses

All data management and analyses were performed using SAS software version 9.4 (SAS Institute Inc, 2013) and R 4.63.1 (R Development Core Team, 2023).

4.5.1 Incidence

Incidence² is a measure of how many new cases (in this dissertation: individuals) that experience a specific outcome in a population over a specified time period (Noordzij et al., 2010; Rothman, 2012; Tenny & Boktor, 2023). It is therefore a measure of *absolute risk* of an outcome. While prevalence, which is the total number of existing cases in a population at a specific time point, provides information on the overall proportion of individuals experiencing a certain outcome, incidence is more appropriate to use when we examine predictors and outcomes dynamically where individuals enter and leaves the study population over time (Noordzij et al., 2010; Rothman, 2012; Tenny & Boktor, 2023). There are two commonly used measures of incidence: cumulative incidence and incidence rate.

Cumulative incidence refers to the *proportion* of new cases of an outcome over a specified period of time (Noordzij et al., 2010; Rothman, 2012; Tenny & Boktor, 2023). It is calculated by dividing the number of new cases during the time period by the total number of individuals at risk at the start of that time period. This measure is suitable when we want to be able to express the proportion of new cases over a set period of time that is the same for all included individuals. In study I, all individuals had the same age-range for start and end of follow-up (15-21 years old). Thus, using cumulative incidence, I was able to express the proportion of individuals that received a criminal conviction up until at age 21.

Incidence rate is a measure of the *rate* of new cases of a certain outcome over a specified period of time (Noordzij et al., 2010; Rothman, 2012; Tenny & Boktor, 2023). The numerator is the same

² Incidence is not reported in the results section of this dissertation but can be found in the papers included within this dissertation.

as for cumulative incidence with number of new cases over a specified time period. What differs incidence rate from cumulative incidence is the denominator used in the calculation, which is person-years at risk during the same time period. Person-years at risk is a concept that accounts for the total time a person contributes with as exposed or unexposed in a cohort study. The sum of the person-time for all individuals in each group is then used as the denominator. This is suitable when the follow-up time varies, as in study II and III. The use of person-years at risk also enables a standardized measure of rate of outcomes which can enable comparisons across different populations. Incidence rate is often expressed as the rate per 10,000 person-years.

4.5.2 Survival analysis

Survival analysis is a branch of statistical methods used to analyze time to an event/outcome (Rothman, 2012). As the name states, it is used to measure how long an individual “survives” over a period of time before reaching the outcome. In contrast to incidence, survival analyses are usually used to estimate *relative risk* of an outcome by comparing survival time between exposed and unexposed individuals and thereby obtain a measure of *probability* of experiencing an outcome (Rothman, 2012).

Cox proportional hazard regression is a widely used statistical method in survival analysis. Hazard refers to the probability of an event occurring at a specific moment, given that the individual has survived up until that time (Fox & Weisberg, 2011). Thus, the hazard function enables modelling how the risk of an outcome changes over time, often illustrated with Kaplan-Meier curves. By comparing hazards between exposed and unexposed groups of individuals, we can estimate the hazard ratios (HRs) and 95% confidence intervals (CIs) of outcomes which is the relative risk of an outcome. If the HR and the CI does not contain the value 1, the association between a predictor and an outcome is considered as statistically significant. Cox proportional hazard regression is a semi-parametric model by making no assumptions about the baseline hazards, but as the name states, assumes that the hazards in exposed and unexposed groups are

proportional over time. This assumption was through visual inspection of the Schoenfeld residuals (Fox & Weisberg, 2011).

4.5.3 Adjustment and stratification

Adjustment and stratification are two important concepts in survival analysis. Adjustment refers to including a covariate in a regression model to control for its confounding effect. This is used when the goal is to estimate an association as accurate as possible, free from confounding effects.

Stratification involves subdividing the study population into separate strata (from here on referred to as groups) based on individuals value on a certain variable. Subsequent analyses are then conducted separately within each group to estimate the associations between risk factors and outcomes. By inspecting the estimations for each group, this approach enables identification of potential risk patterns across different groups in the study population. Thus, it is different from adjustment by instead of removing the effect of the variable, the goal is to estimate whether the associations differ across different groups.

4.5.4 Study I

In study I, the aim was to examine the associations between psychiatric diagnoses, including comorbidities of diagnosis, and the risk of first criminal conviction in youth among males and females separately.

Cumulative incidence was calculated for each psychiatric diagnosis (risk factors) and for non-violent and violent crime separately (outcomes) to estimate absolute risk. This was also done for males and females separately.

To estimate the association between each psychiatric diagnosis, comorbidities of diagnoses, and non-violent and violent crimes, Cox proportional hazard regression models were used to estimate hazard ratios (HRs) with 95% confidence intervals (CIs), with age as the underlying time scale. In these analyzes, individuals with specific psychiatric diagnoses and comorbidities were compared to individuals without those diagnoses and comorbidities. To explore

potential patterns of associations across diagnoses, I compared HR and CIs for each group. Non-overlapping CIs between different HR indicates that they differ from each other.

In addition to unadjusted estimates (crude models), I adjusted for birth year and childhood SES (model 1) and subsequently for parental criminal convictions and parental psychiatric diagnoses (model 2). All these analyses were stratified by sex, and I conducted Wald's test to examine if the HR for males and females were statistically different to explore potential sex-specific associations.

To address potential issues of multiple comparisons due to many estimations of associations containing the same individuals, I utilized the Benjamini-Hochberg procedure to control the False Discovery Rate (FDR; Benjamini & Hochberg, 1995). This procedure quantifies the proportion of false positives within the set of test results and is based on ranking the p-values for each test and then only selecting tests that surpass a specified threshold. Using a 5% FDR, the likelihood of false positives among findings is 5%.

4.5.5 Study II

In study II, the aim was to examine the role of psychiatric diagnoses and family history of crime or psychiatric diagnoses in the risk for unintentional injuries and premature death among non-imprisoned and imprisoned youth offenders separately.

Incidence rate (IR) with 95% CI was used to estimate the absolute risk for unintentional injuries and premature death among non-convicted (unexposed) youth, non-imprisoned youth offenders (exposed), and imprisoned youth offenders (exposed) separately.

Cox proportional hazard regression models were used to estimate HR with 95% CI, with age as underlying time scale. I compared non-imprisoned youth offenders and imprisoned youth offenders to non-convicted youth and treated unintentional injuries and premature death as separate outcomes. In addition to crude models, I adjusted for sex, birth year, and childhood SES.

I stratified on categories of psychiatric diagnoses (externalizing, internalizing, and neurodevelopmental disorders), parental criminal convictions, and parental psychiatric diagnoses to examine whether individuals with these risk factors had a higher risk for the outcomes compared to individuals without these risk factors. This was done within non-imprisoned and imprisoned youth offenders separately to explore if risk patterns are different within the two groups by inspecting the HR and potential overlapping of CIs. Due to insufficient statistical power, I excluded neurodevelopmental disorders and internalizing disorders in the analysis of premature death among imprisoned youth offenders.

4.5.6 Study III

In study III, the aim was to examine the role of psychiatric diagnoses in the association between violent victimization and reoffending among youth offenders.

Incidence rates (IR) with 95% confidence intervals (CI) were calculated to estimate the absolute risk for any reoffending, and violent and non-violent reoffending, for victimized and not victimized youth offenders.

To examine the association between violent victimization and reoffending (any reoffending, non-violent reoffending, and violent reoffending) among youth offenders, I used Cox proportional hazard regression models to estimate hazard ratios (HR) with 95% CI, with age as the underlying time scale. I compared youth offenders who had been victimized with youth offenders who had not been victimized. In addition to crude models, I adjusted for sex, birth year, childhood SES, index violent crime, and prison status (model 1), and subsequently for parental criminal convictions and parental psychiatric disorders as covariates (model 2), and lastly psychiatric diagnoses among the study individuals (model 3).

I stratified on psychiatric diagnoses to examine the association between victimization and reoffending among youth offenders with and without psychiatric diagnoses separately. I additionally conducted Wald's test to examine if the HR estimates for youth

offenders without psychiatric diagnoses and youth offenders with psychiatric diagnoses were significantly different from each other. I also stratified on specific psychiatric diagnoses (substance use disorder, ADHD, depression, and anxiety) to examine the association between victimization and reoffending across these diagnoses.

As in study I, I used the Benjamini-Hochberg procedure to control the False Discovery Rate (FDR; Benjamini & Hochberg, 1995). This was set to a 5% FDR.

4.6 Ethical approval

The data in the registries have been collected for other purposes than research, so no informed consent have been obtained from any of the research subjects. The registers contain sensitive personal data as described in the Personal Data Act in Sweden (PUL) and the European General Data Protection Regulation (GDPR). To handle this delicate situation, the Statistics Sweden removes the personal identification number from the registers and replaces it with a random id-number that do not reflect any personal information.

Nevertheless, the lack of informed consent conflicts one of the principles in the Declaration of Helsinki that protects individuals from exploitation (Swedish Research Council, 2017). However, there are situations where informed consent is not needed. Such situations are when it is impossible or when it would be unreasonable time consuming and costly to obtain consent (Swedish Research Council, 2017). Given the large number of individuals included in the registers (estimated to be around 15 million in total) and that many individuals have deceased, emigrated, or would be difficult to contact (for example due to homelessness), it would be impossible to obtain informed consent from all individuals included in the registers. One could argue for excluding individuals that are unable to give informed consent. However, doing large scale research is of great importance for the society (Ludvigsson et al., 2015). Using large samples enables better statistical power, reduces selection bias of study individuals, and provides the ability to conduct longitudinal studies with long follow-up periods. This contributes to heightened result reliability, subsequently advancing our comprehension of the

phenomenon. Such enhanced understanding paves the way for more effective interventions that will benefit both individuals at risk and the whole society.

To handle this conflict of lack of informed consent versus the benefits of register-based research, ethical committees are ought to represent the population and be responsible for approval of the research (Ludvigsson et al., 2015). Register based research therefore assumes that if the research is approved by the ethics committees, the research subjects (i.e., the individuals in the registers) do not object to the research being conducted. The linkage of registers used in the studies included in this dissertation have been approved by the Regional Ethics Review Board in Stockholm (2013/862–31/5).

5 Results

5.1 Study I

The aim in study I was to examine the associations between individual psychiatric diagnoses (substance use disorder, ADHD, depression, PTSD, intellectual disabilities, and autism spectrum disorder) and the risk for non-violent and violent criminal convictions in youth. I also examined how comorbidities of internalizing diagnoses (here consisting of depression, anxiety, and/or PTSD), externalizing diagnoses (here consisting of substance use disorders, ADHD, and/or conduct disorder/oppositional defiant disorder), and neurodevelopmental diagnoses (here consisting of intellectual disabilities, autism spectrum disorder, and/or tic disorders) contributes to these associations. This was stratified on sex to explore potential differences by sex.

5.1.1 Specific diagnoses

Results revealed that several individual diagnoses were associated with an increased risk for both non-violent and violent criminal convictions among both males and females. Results with HR and 95% CI are presented in Table 4.

Substance use disorder and ADHD were associated with an increased risk for both non-violent and violent crime in youth, among both males and females. These risks were higher for violent crimes (HR range: 2.86-4.83) than non-violent crimes (HR range: 1.70-2.26). Significant sex differences were found for violent crimes (but not non-violent crimes), where females with these diagnoses had a higher risk than males with these diagnoses.

Depression and PTSD were associated with non-violent crimes among females (HR range: 1.17-1.66), but not among males (CI overlap 1 so the estimates are not significant). Both diagnoses were associated with increased risk for violent crime in both sexes (HR range: 1.57-3.39). Significant sex differences were found for depression, where females diagnosed with depression had a higher risk for both non-violent and violent crimes compared to males. There were also sex differences

among youth diagnosed with PTSD, where females had a higher risk for non-violent crimes, but not violent crimes, than males diagnosed with PTSD.

Intellectual disabilities were associated with a reduced risk of non-violent crimes among both sexes (HR range: 0.56-0.57). Autism spectrum disorder exhibited a similar pattern among males (HR: 0.62), but among females which was non-significant. Conversely, both intellectual disabilities and autism spectrum disorder were associated with increased risks for violent crimes (HR range: 1.19-2.87), except for intellectual disabilities among males which was non-significant. Sex differences were found for intellectual disabilities and violent crimes, where females diagnosed with intellectual disabilities had a higher risk for violent crimes than males. There were also significant sex differences in autism spectrum disorder for both crime outcomes, where females diagnosed with autism spectrum disorder had a higher risk of both non-violent and violent crimes than males.

Table 4. Hazard Ratios with 95% CI from Cox proportional hazard regression models for each diagnosis and non-violent and violent crimes in males and females separately. P-values from Wald's test for differences by sex.

Diagnosis	Non-violent crimes			Violent crimes		
	Males HR (95% CI)	Females HR (95% CI)	P-values sex diff.	Males HR (95% CI)	Females HR (95% CI)	P-values sex diff.
Substance use disorder	2.16 (2.10; 2.23)	2.26 (2.17; 2.34)	.09	2.86 (2.71; 3.03)	4.57 (4.21; 4.95)	<.001
ADHD	1.70 (1.65; 1.75)	1.81 (1.71; 1.91)	.06	2.90 (2.75; 3.06)	4.83 (4.37; 5.34)	<.001
Depression	1.03 (0.99; 1.08)	1.17 (1.12; 1.22)	<.001	1.57 (1.45; 1.70)	2.14 (1.96; 2.36)	<.001
PTSD	1.16 (0.93; 1.45)	1.66 (1.47; 1.88)	<.01	2.69 (2.02; 3.58)	3.39 (2.69; 4.27)	.21
Intellectual disabilities	0.56 (0.52; 0.61)	0.57 (0.50; 0.66)	.82	1.03 (0.91; 1.16)	1.60 (1.29; 1.98)	<.001
Autism spectrum disorder	0.62 (0.58; 0.67)	0.90 (0.80; 1.01)	<.001	1.19 (1.07; 1.32)	2.87 (2.41; 3.42)	<.001

5.1.2 Comorbidities

The results for associations for each diagnosis in relation to each category of comorbidity, for non-violent and violent crimes, and males and females separately are presented in Table 5.

When individual psychiatric diagnoses were comorbid with internalizing disorders, all diagnoses were associated with an increased risk for both non-violent and violent crimes among both sexes (HR range: 1.14-5.89), except intellectual disabilities for non-violent crimes among males which was non-significant, and autism spectrum disorders which was associated with a decreased risk for non-violent crimes among males (HR: 0.89). Wald's test for differences by sex revealed that females had higher risk than males, except for substance use disorder and non-violent crime and PTSD for both crime outcomes.

When comorbid with externalizing disorders, all individual psychiatric diagnoses were associated with an increased risk for both non-violent and violent crime among both sexes (HR range: 1.17-11.77). Test for sex differences demonstrated that females had higher risk for violent crimes than males (except for PTSD), whereas only depression and autism spectrum showed sex differences for non-violent crimes, where females had higher risk than males.

When comorbid with neurodevelopmental disorders, substance use disorders, ADHD, depression, and PTSD had an increased risk for both crime outcomes (HR range: 1.21-10.05), except for depression and PTSD and non-violent crimes among males which were non-significant. Intellectual disabilities and autism spectrum disorders were associated with a decreased risk for non-violent crimes for both sexes (HR range: 0.37-0.52), whereas they were associated with an increased risk for violent crimes among females (HR range: 1.62-1.72) and were non-significant for violent crimes among males. Wald's test for sex differences showed that females had higher risk for violent crimes than males (except for PTSD), whereas only ADHD and depression showed sex differences for non-violent crimes, where females again had higher risk than males.

Table 5. Hazard Ratios with 95% CI from Cox proportional hazard regression models for each diagnosis in relation to each category of comorbidity, for non-violent and violent crimes, and males and females separately. P-values from Wald's test for differences by sex.

Comorbidity	Non-violent crimes			Violent crimes		
	Males HR (95% CI)	Females HR (95% CI)	P- values sex diff.	Males HR (95% CI)	Females HR (95% CI)	P- values sex diff.
Comorbidity: Internalizing disorders						
Substance use disorder	2.97 (2.81; 3.15)	2.98 (2.82; 3.15)	.93	3.95 (3.57; 4.37)	5.89 (5.28; 6.57)	<.001
ADHD	1.85 (1.75; 1.97)	2.23 (2.07; 2.39)	<.001	3.34 (3.05; 3.65)	5.57 (4.93; 6.31)	<.001
Depression	1.14 (1.05; 1.22)	1.40 (1.32; 1.49)	<.001	1.68 (1.48; 1.92)	2.61 (2.31; 2.95)	<.001
PTSD	1.38 (1.07; 1.79)	1.80 (1.57; 2.06)	.07	2.64 (1.82; 3.82)	3.68 (2.86; 4.74)	.14
Intellectual disabilities	1.00 (0.84; 1.19)	1.48 (1.22; 1.81)	<.01	2.05 (1.62; 2.60)	4.01 (3.04; 5.52)	<.001
Autism spectrum disorder	0.89 (0.80; 0.98)	1.32 (1.15; 1.51)	<.001	1.68 (1.43; 1.97)	3.75 (2.99; 4.70)	<.001
Comorbidity: Externalizing disorders						
Substance use disorder	4.76 (4.50; 5.03)	4.47 (4.13; 4.84)	.20	8.05 (7.38; 8.79)	11.77 (10.33; 13.40)	<.001

ADHD	3.81 (3.63; 4.01)	3.97 (3.67; 4.29)	.40	7.11 (6.60; 7.66)	11.30 (9.97; 12.81)	<.001
Depression	2.00 (1.89; 2.12)	2.40 (2.26; 2.54)	<.001	3.16 (2.88; 3.46)	5.16 (4.62; 5.75)	<.001
PTSD	2.08 (1.59; 2.71)	2.80 (2.40; 3.27)	.06	4.33 (3.04; 6.16)	6.53 (5.03; 8.46)	.07
Intellectual disabilities	1.17 (1.06; 1.30)	1.50 (1.25; 1.80)	.02	2.27 (1.96; 2.62)	4.32 (3.32; 5.63)	<.001
Autism spectrum disorder	1.18 (1.09; 1.28)	1.56 (1.37; 1.78)	<.001	2.20 (1.96; 2.48)	5.20 (4.27; 6.32)	<.001
Comorbidity: Neurodevel- opmental disorders						
Substance use disorder	3.50 (3.16; 3.88)	3.78 (3.26; 4.37)	.40	5.69 (4.84; 6.67)	10.05 (7.98; 12.67)	<.001
ADHD	1.21 (1.13; 1.29)	1.45 (1.28; 1.64)	.01	2.32 (2.11; 2.55)	4.54 (3.77; 5.47)	<.001
Depression	1.05 (0.95; 1.17)	1.52 (1.33; 1.73)	<.001	2.00 (1.70; 2.35)	4.04 (3.24; 5.04)	<.001
PTSD	1.52 (0.93; 2.49)	1.65 (1.09; 2.49)	.80	3.48 (1.87; 6.48)	4.99 (2.76; 9.02)	.41
Intellectual disabilities	0.37 (0.31; 0.44)	0.52 (0.37; 0.71)	.08	0.82 (0.64; 1.04)	1.62 (1.01; 2.61)	.01
Autism spectrum disorder	0.47 (0.41; 0.55)	0.50 (0.36; 0.68)	.76	1.04 (0.85; 1.27)	1.72 (1.10; 2.70)	.05

5.1.2.1 Changes in estimates for specific psychiatric diagnoses in the presence of comorbidities

To assess how comorbidities contributed to the risks for criminal convictions among specific psychiatric diagnoses, all estimates for males and females separately are illustrated in Figure 2 together with the estimates for diagnoses without comorbidities for reference. In Figure 2, there are the risk estimates for diagnoses without comorbidities (i.e., the estimates from Table 4), where the dark blue is for non-violent crimes and the dark red is for violent crimes. Next, there are the risk estimates for when diagnoses were comorbid with each comorbidity category (i.e., the estimates from Table 5), where the light blue is for non-violent crimes and the pink is for violent crimes. To assess how the estimates for diagnoses without comorbidities potentially change when they are comorbid with the different comorbidities, I inspected whether the confidence intervals overlap or not. The differences marked with the different arrows, where the red arrow indicates that the risk increased when comorbid with the specific comorbidity category, the green indicates that the risk decreased, and the yellow indicates that there was no difference in estimates without and with comorbidities.

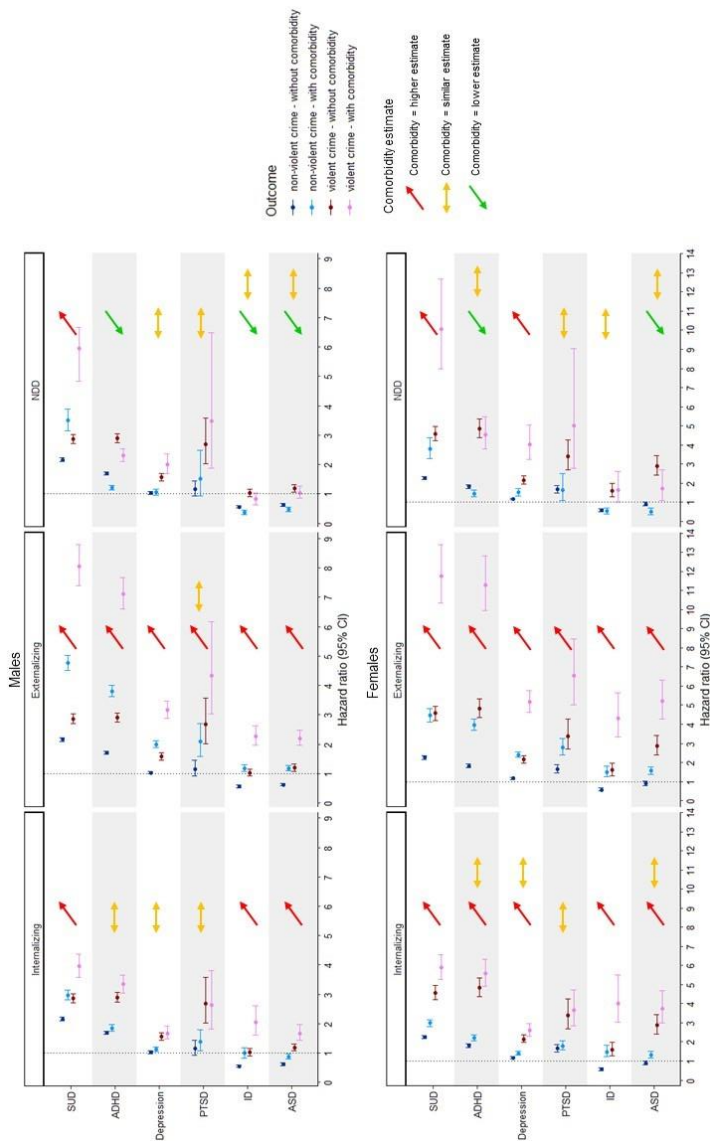


Figure 2: Forest plot with results from Cox proportional hazard regression models for each individual diagnosis in relation to each comorbid category and non-violent and violent crimes among males and females separately. SUD= substance use disorder; ID= intellectual disabilities; ASD= autism spectrum disorder; NDD= neurodevelopmental diagnoses.

Figure 2 demonstrates that in males, substance use disorder, intellectual disabilities, and autism spectrum disorder increased in risk for both non-violent and violent crime when comorbid with internalizing disorders. Estimates for ADHD, depression, and PTSD were similar, with overlapping CIs. For females, all diagnoses increased in risk for non-violent crimes when comorbid internalizing disorders (except PTSD). This pattern was observed only for substance use disorder and intellectual disabilities for violent crimes among females. Notably, I observed a change of direction among females with intellectual disabilities and autism spectrum disorder when comorbid with internalizing disorders, transitioning from a decreased risk to an increased risk for non-violent crimes.

Comorbidities with externalizing disorders showed a consisted pattern where all psychiatric diagnoses increased in risk when comorbid with eternalizing disorder, for both non-violent and violent crime, for both sexes, as compared to associations of individual diagnoses without comorbidities (except for PTSD and violent crime among males where CIs were overlapping).

Comorbidities with neurodevelopmental disorders demonstrated the most varying results. Only substance use disorder increased in risk for both crime outcomes and both sexes when comorbid with neurodevelopmental disorders. Similar results were found for females diagnosed with depression and comorbid neurodevelopmental disorders. In contrary to the other two comorbidity categories, ADHD, intellectual disabilities (males only), and autism spectrum disorder with comorbid neurodevelopmental disorders had a decreased magnitude for non-violent crimes than estimates for these diagnoses alone. This was also the comorbidity category with most overlapping CIs, indicating that many diagnoses did not change in risk when comorbid with neurodevelopmental disorders.

5.2 Study II

The aim in study II was to examine role of psychiatric diagnoses, categorized as externalizing disorders (here consisting of substance use disorder, conduct disorder, and oppositional defiant disorder), internalizing disorders (here consisting of depression and anxiety disorders), and neurodevelopmental disorders (here consisting of intellectual disabilities, autism spectrum disorders, ADHD, and tic disorders), as well as parental criminal convictions, and parental psychiatric disorders in the risk for unintentional injuries and premature death within non-imprisoned and imprisoned youth offenders separately.

Results from Cox proportional hazard models adjusted for sex, birth year, and childhood SES showed that imprisoned youth offenders had the highest risk for both unintentional injury (HR: 2.29, 95% CI: 2.19-2.40) and premature death (HR: 10.76, 95% CI: 9.52-12.16), followed by non-imprisoned youth offenders (HR: 1.52, 95% CI: 1.51-1.54, and HR: 3.02 95% CI: 2.87-3.17, respectively), compared to non-convicted youth.

Next, I analyzed how psychiatric diagnoses, parental criminal convictions, and parental psychiatric disorders influence the risk of injury and premature death among non-imprisoned and imprisoned youth separately. Results from Cox proportional hazard regression models (with 95% CI) are illustrated in Figure 3.

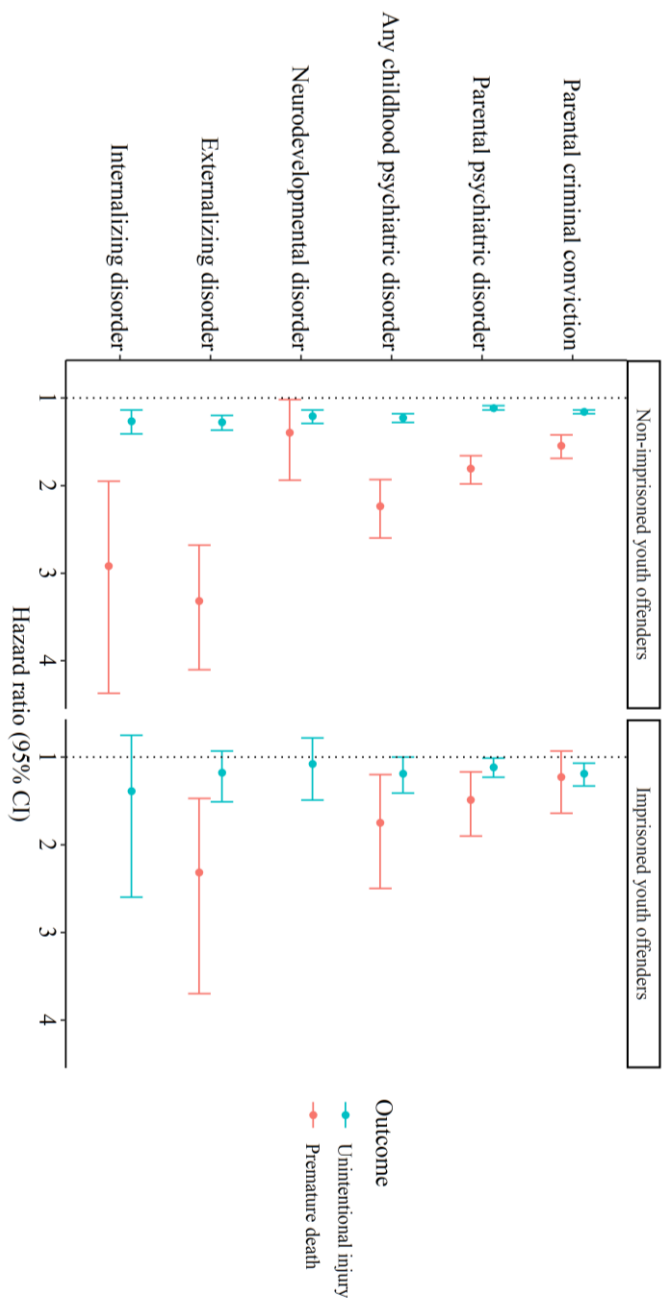


Figure 3. Forest plot with HR and 95% CIs from Cox proportional hazard regression models for each risk factor and outcome within non-imprisoned and imprisoned youth separately.

Among non-imprisoned youth offenders, all risk factors increased the risk for both outcomes. For unintentional injury and premature death, any psychiatric disorder increased the risk the most (HR unintentional injury: 1.23, CI:1.18-1.28; HR premature death: 2.24, CI:1.93-2.60), where specifically externalizing disorders posed the highest risk (HR unintentional injury: 1.28, CI:1.20-1.37; HR premature death: 3.32, CI: 2.68-4.10), followed by internalizing disorders (HR unintentional injury: 1.27, CI: 1.14-1.41; HR premature death: 2.92, CI: 1.95-4.37), and lastly neurodevelopmental disorders (HR unintentional injury:1.21, CI: 1.14-1.29; HR premature death: 1.40, CI: 1.02-1.94). Both parental criminal convictions (HR unintentional injury:1.17, CI:1.15-1.19; HR premature death: 1.54, CI: 1.41-1.68) and parental psychiatric disorders (HR unintentional injury:1.12, CI: 1.09-1.14; HR premature death:1.81, CI: 1.66-1.98) increased the risk for both outcomes. Notably, the estimates were higher for premature death than for unintentional injury.

Among imprisoned youth offenders, only parental criminal convictions (HR:1.18, CI: 1.06-1.33) and parental psychiatric disorders (HR: 1.12, CI: 1.01-1.23) increased the risk for unintentional injury, where parental criminal convictions had the highest estimate. For premature death, any parental psychiatric disorder (HR: 1.49, CI: 1.17-1.90), any psychiatric disorder (HR: 1.75, CI: 1.20-2.50), and externalizing disorders (HR: 2.32, CI:1.47-3.70) increased the risk. No significant increase in risk for premature death was found for parental criminal convictions (neurodevelopmental and internalizing disorders were not included in the analyses due to insufficient power). Similar to non-imprisoned youth offenders, the estimates were higher for premature death than for unintentional injury.

5.3 Study III

In study III, the aim was to examine the role of psychiatric diagnoses in the association between victimization and the risk for reoffending (categorized as any reoffending, non-violent reoffending, and violent reoffending) among youth offenders. I examined this association among youth offenders with and without psychiatric diagnoses

separately and within different types of psychiatric diagnoses: substance use disorders, ADHD, depression, and anxiety disorders.

Results from cox proportional hazard regression models (with 95% CI) showed that in models adjusted for covariates (model 2: sex, birth year, childhood SES, index violent crime, prison status, parental criminal convictions, and parental psychiatric diagnoses), youth offenders that had been victimized had 1.38 (CI: 1.30-1.46) times higher risk of reoffending with any crime than not victimized youth offenders. This association was also found for non-violent and violent reoffending; however, the association was higher for violent reoffending (HR: 1.66, CI: 1.48-1.85) than for non-violent reoffending (HR: 1.30, CI: 1.21-1.39).

Next, I stratified on psychiatric diagnoses and examined the association between victimization and reoffending among youth offenders with and without psychiatric diagnoses separately. Results from these analyses are presented in Table 6. Among youth offenders with psychiatric diagnoses, the HR between victimization and any reoffending was 1.37 (CI: 1.24-1.51). Similar associations were found among youth offenders without psychiatric diagnoses, where the HR between victimization and any reoffending was 1.39 (CI: 1.29-1.50). Again, the association was stronger for violent reoffending than non-violent reoffending among both groups. Wald's tests revealed no significant differences between youth offenders with and without psychiatric diagnoses.

Analyses within different psychiatric diagnoses showed a consistent association between victimization and any reoffending within all specific psychiatric diagnoses. However, the estimates were again similar for individuals without psychiatric diagnoses. The estimates were highest among individuals with anxiety disorders (HR: 1.55, CI: 1.24-1.96) and depression (HR: 1.49, CI: 1.20-1.85), followed by individuals with ADHD (HR: 1.26, CI: 1.05-1.51) and substance use disorder (HR: 1.23, CI: 1.06-1.42). However, CIs between these diagnoses are overlapping, indicating that there were no significant differences between these diagnoses.

Table 6. HR with 95% CI from Cox proportional hazard regression models for association between victimization and any reoffending, non-violent reoffending, and violent reoffending stratified on psychiatric diagnoses.

	Any reoffending			Non-violent reoffending			Violent reoffending		
	Crude	Model 1	Model 2	Crude	Model 1	Model 2	Crude	Model 1	Model 2
No psychiatric disorder	1.69 (1.57; 1.81)	1.45 (1.35; 1.56)	1.39 (1.29; 1.50)	1.53 (1.41; 1.67)	1.37 (1.26; 1.49)	1.31 (1.21; 1.43)	2.31 (2.01; 2.65)	1.75 (1.53; 2.02)	1.66 (1.45; 1.91)
Any psychiatric disorder	1.41 (1.27; 1.55)	1.40 (1.26; 1.54)	1.37 (1.24; 1.51)	1.26 (1.12; 1.42)	1.29 (1.15; 1.46)	1.27 (1.12; 1.43)	1.90 (1.59; 2.27)	1.71 (1.43; 2.05)	1.67 (1.39; 2.00)
Substance use disorder	1.28 (1.10; 1.48)	1.24 (1.07; 1.43)	1.23 (1.06; 1.42)	-	-	-	-	-	-
ADHD	1.22 (1.01; 1.46)	1.28 (1.07; 1.53)	1.26 (1.05; 1.51)	-	-	-	-	-	-
Depression	1.59 (1.29; 1.98)	1.52 (1.22; 1.88)	1.49 (1.20; 1.85)	-	-	-	-	-	-
Anxiety disorders	1.58 (1.26; 1.98)	1.59 (1.26; 2.00)	1.55 (1.24; 1.96)	-	-	-	-	-	-

6 Discussion

The overarching aim with the present dissertation was to expand the knowledge about the role of psychiatric diagnoses in the risk of crime in youth and later injuries, premature death, and reoffending among youth offenders. This was achieved through three cohort studies, all addressing this overarching aim in different ways. The main finding from the present dissertation is that psychiatric diagnoses are important risk factors to consider among youth offenders, but their influence varies depending on a number of related factors. Psychiatric diagnoses, particularly comorbidities of diagnoses, are significant risk factors for criminal convictions in youth, but with variations depending on type of diagnosis, comorbidities, type of crime, and sex. Psychiatric diagnoses are also important risk factors for injuries and premature death among youth offenders, but their significance varies between non-imprisoned and imprisoned youth offenders. Lastly, psychiatric diagnoses play less of a role in the association between violent victimization and reoffending among youth offenders, suggesting that violent victimization pose as a significant risk factor irrespective of psychiatric diagnoses. Taken together, this dissertation demonstrates that the role of psychiatric diagnoses varies among youth offenders, which highlights the heterogeneity in the youth offender population. All these nuances which will be discussed in detail below.

While these discussions will be on psychiatric diagnoses as risk factors for crime and other adverse outcomes, it is important to note that 80% of all youth with a psychiatric diagnosis in study I did *not* get convicted of a crime in youth. Thus, to avoid stigmatization of youth with psychiatric diagnoses, it is crucial to emphasize that these discussions are only applicable to a small proportion of the youth population. Furthermore, the aim of these discussions is solely to enhance our understanding of these associations and, ultimately, improve prediction and prevention to minimize future harm among these youths.

6.1 The role of psychiatric diagnoses in the risk of crime in youth and subsequent injuries and premature death among youth offenders

The role of psychiatric diagnoses was examined in all three studies included in the present dissertation. In this section, I will discuss the results from study I and II: the role of psychiatric diagnoses in the risk of crime in youth (study I) and subsequent risk of injuries and premature death among youth offenders (study II). Even if the role of psychiatric diagnoses was also studied in the association between victimization and reoffending in study III, findings revealed that psychiatric diagnoses did not in particular add to the risk for reoffending over and above victimization since both youth offenders with and without psychiatric diagnoses had similar associations between victimization and reoffending. Thus, results from study III will be discussed separately in section 6.2 below.

In study II, I studied categories of externalizing, internalizing, and neurodevelopmental psychiatric diagnoses instead of individual diagnoses. This was also done in study I when I examined comorbidities of diagnoses. Study I also examined the association of specific diagnoses (substance use disorder, ADHD, depression, PTSD, intellectual disabilities, and autism spectrum disorders), which contributes to a more detailed understanding of different diagnoses than does broader categories. However, specific diagnoses that fall within each of these broader categories exhibited comparable risk patterns. For instance, intellectual disabilities and autism spectrum disorders, both categorized as neurodevelopmental disorders, demonstrated similar trends in relation to crime in youth. As a result, this discussion is organized into themes focusing on externalizing, internalizing, and neurodevelopmental psychiatric disorders, aiming to comprehend the overarching patterns of risk revealed in study I and study II.

6.1.1 Diagnoses of externalizing disorders

The objective of study I was to examine the associations between psychiatric diagnoses, including comorbidities of diagnoses, and the risk of non-violent and violent criminal convictions in youth. Out of all individual psychiatric diagnoses examined, substance use disorder and ADHD exhibited the highest risk estimates for both non-violent and violent crimes, ranging between 2 to 5 times higher risk than youth without psychiatric diagnoses, depending on type of crime and sex. This suggests that youth diagnosed with externalizing disorders have the highest risk of crime as in comparison to other psychiatric diagnoses. Notably, the risk was more pronounced for violent crimes as compared to non-violent crimes. While this has not been extensively studied among youth specifically in a sample of such magnitude as in study I, these results of differences in type of crime are in line with previous population-based studies on young adults (Mohr-Jensen et al., 2019; Ångström et al., 2024). Therefore, study I adds to the literature by revealing that youths diagnosed with substance use disorders or ADHD face a comparable risk of different types of crimes as adults. One potential explanation of the higher risk of violent crimes than non-violent crimes may be attributed to the inherent characteristics of these diagnoses. Research suggests that both substance use disorder and ADHD in children and youth are linked to heightened impulsivity, low self-control, and emotion dysregulations due to neurological impairments (Arseneault et al., 2000; Sinha, 2008). This heightened impulsivity and emotion dysregulation in these diagnoses are associated with increased levels of aggression or other outward-directed behaviors (Arseneault et al., 2000;), which may specifically increase the risk of violence.

One of the main findings from study I was that comorbid externalizing disorders seems to drive the association between psychiatric diagnoses and increased risk of criminal convictions in youth. All psychiatric diagnoses increased in risk for both non-violent and violent crimes when they were comorbid with externalizing disorders as compared to the diagnoses on their own without comorbidities. The highest risk of criminal convictions in youth across all psychiatric diagnoses and comorbidities was found for

youth diagnosed with multiple externalizing disorders (e.g., substance use disorders or ADHD with comorbid externalizing disorders) who had between 7 to 12 times higher risk of violent criminal conviction than youth without these diagnoses. While this specificity of different comorbidities has not been extensively researched on youth offenders specifically, this is in line with research showing that comorbid externalizing disorder, and in particular comorbid substance use disorders, increase the risk of crime in general as compared to diagnoses without such comorbidities (Chang et al., 2015a; Copeland et al., 2007; Mohr-Jensen et al., 2019; Stevens et al., 2015; Yukhnenko et al., 2023a). The observation that the risk is highest for multiple externalizing disorders aligns with research indicating that the most prevalent comorbidity among youth offenders is, indeed, a combination of substance use disorder and ADHD (Abram et al., 2003, 2015; Teplin et al., 2021). Additionally, diagnoses such as intellectual disabilities and autism spectrum disorders even had a change in direction of the association where they went from having a decreased risk of non-violent crimes on their own but an increased risk when comorbid with externalizing disorders. This finding aligns with prior studies suggesting that the heightened risk of criminal convictions in individuals with intellectual disabilities or autism spectrum disorders is likely influenced by comorbid externalizing disorders (Heeramun et al., 2017; Latvala et al., 2022). Taken together, study I supports the notion that externalizing disorders are strong risk factors for crime in youth and that these diagnoses contribute to the heightened risk of crime in youth observed in other diagnoses as well.

Previous research has suggested that externalizing disorders tend to drive the associations between psychiatric diagnoses and crime due to inclusions of diagnoses such as substance use disorder or conduct disorder in this category (e.g., Chang et al., 2015a; Copeland et al., 2007; Mohr-Jensen et al., 2017). While study I did not examine exact mechanisms behind the additive risk of externalizing disorders, potential explanations for this have been put forth in previous research. First, as demonstrated by results in study I, substance use disorder itself is a strong risk factor for crime. Second, substance use disorders is a highly prevalent comorbid diagnosis in populations of individuals with other psychiatric diagnoses (Abram et al., 2003,

2015; Teplin et al., 2021) and thereby could explain the additive effect on the risk of crime in youth. For example, alcohol, drugs, and tobacco are often used to self-medicate symptoms of psychiatric diagnoses, such as depressive symptoms or inattention (e.g., Alsheikh et al., 2020; Zulauf et al., 2014), which could lead to a cumulative risk of crime. It can also be that certain trait of psychiatric diagnoses, such as impulsivity, increases the risk of using substances (de Wit, 2009) and thereby also commit impulsive crimes, which is most common among youth specifically (Vogel et al., 2018). Studies have also shown that there is a shared heritability of both psychiatric diagnoses and substance use disorders, indicating that there could be a genetic underlying liability of both (e.g., Skoglund et al., 2015; Wang et al., 2022). In addition, including conduct disorder could also be a potential explanation for the additive risk of externalizing disorders. Conduct disorder, which was included in externalizing disorders in both study I and study II, is often seen as a proxy for criminality due to its similar characteristics of aggression, reckless and rule-breaking behavior, deceitfulness, and antisocial behaviors (Mordre et al., 2011). Given its strong link to crime, and that it often occurs comorbidly with other psychiatric diagnoses (Choi et al., 2017; Teplin et al., 2021), it is thought to drive the risk between other observed psychiatric diagnoses and risk of crime (Copeland et al., 2007).

Externalizing disorders were also associated with an increased risk of injuries and premature death among youth offenders in study II. This is in line with previous research showing that psychiatric diagnoses are associated with an increased risk of injuries and premature death among youth offenders (Lindberg et al., 2017; Skinner & Farrington, 2020; Salias et al., 2006; Stenbacka & Jansson, 2014; Stenbacka et al., 2019; Teplin et al., 2005; Timonen et al., 2003). However, few studies have examined different diagnoses and risk of injuries and premature death among youth offenders. Results from study II indicates that youth offenders diagnosed with externalizing disorders had about 2-4 times higher risk of dying prematurely, which is in line previous studies showing similar risk of premature death among youth offenders diagnosed with substance use disorder (Salias et al., 2006; Klinteberg et al., 2011). Thus, study II in the present dissertation is one of the largest studies conducted within this research field and one

of the first to explore different categories of psychiatric diagnoses and risk of injuries and premature death among youth offenders. These results thereby corroborate earlier findings that psychiatric diagnoses are associated with injuries and premature death among youth offenders and extends previous research by demonstrating that externalizing disorders (which is broader than substance use disorder only) are significant risk factors for these outcomes.

There are likely multiple potential links between externalizing disorder and injuries and premature death. Individuals diagnosed with ADHD or conduct disorder (included in externalizing disorders) have high prevalence of comorbid substance use disorder (Abram et al., 2003, 2015; Teplin et al., 2021). Usage of drugs, alcohol or tobacco can affect both somatic and mental health that leads to premature death of both natural causes and external causes such as suicide, injuries, and overdose (Björkenstam et al., 2012; de Mooij et al., 2019). In addition, the high impulsivity and recklessness associated with these diagnoses could lead to engagement in risky behaviors overall and thereby put youth at risk of situations leading to injuries or death. Nevertheless, given the age range of psychiatric diagnoses within this dissertation (age 0-15/20), the results where externalizing disorders showed consistent patterns of risk for both crime in youth and subsequent injuries and premature death indicates that there can be a stable influence of these diagnoses over time (Kuja-Halkola et al., 2015). This highlights that that early externalizing disorders are important risk factors over the life-course of youth offenders,

6.1.2 Diagnoses of internalizing disorders

In study I and II, internalizing disorders (i.e., depression, PTSD, or anxiety) showed similar risk patterns for crime in youth, injuries, and premature death as externalizing disorders, but with smaller magnitudes of estimates. In study I, almost all psychiatric diagnoses increased in risk of criminal convictions when comorbid with internalizing disorders as compared to diagnoses without comorbidities. Results also showed that depression and PTSD were in particular associated with an increased risk of violent crimes, which is in line with previous work on both youth and adults (e.g., Donley et

al., 2012; Fazel et al., 2015; Paulino et al., 2023; Peltonen et al., 2020; Sariaslan et al., 2020; Yu et al., 2017). Similar to externalizing disorders, previous studies have linked internalizing disorders with an increased level of aggression (Fazel et al., 2015; Wojciechowski, 2020; Yu et al., 2017). Individuals that experience depressive or anxiety symptoms may have trouble with affect regulation, impulsivity, or heightened agitation, which could affect decision-making, cognitive abilities, and aggressive reactivity (Wojciechowski, 2020; Yu et al., 2017). This could in turn lead to an increased risk of violent crime.

Internalizing disorders have been less studied in context of non-violent crimes, and results from previous studies are inconsistent (e.g., Anderson et al., 2015; Copeland et al., 2017). In study I, results showed that there was an association between depression and PTSD with non-violent crimes, but only for females. Given the limited research on PTSD and crime among youth specifically and the inconsistencies in research on depression and non-violent crimes in youth, the results from study I contribute to the literature by demonstrating an association between depression and PTSD with non-violent crimes specifically in females. This suggests that the association between internalizing disorders and crime may vary depending on type of crime and sex. Few explanations have been presented in previous work on the potential mechanisms for internalizing disorders and non-violent crimes. While some of the explanations provided for violent crimes such as impulsivity, cognitive abilities, and decision-making could also be potential explanations for non-violent crimes, results from study I rather reflects sex-specific differences. Although differences by sex will be discussed in more detail in section 6.1.4.1 below, one simple potential explanation for these results is that among youth offenders convicted of a non-violent crime, females had higher prevalence of depression (5%) and PTSD (8%) than males diagnosed with these disorders (4% and 3%, respectively). These were the only two diagnoses where convicted females had higher prevalence than convicted males as compared to other diagnoses. This aligns with prior studies indicating a higher prevalence of internalizing disorders among females (McLean et al., 2011; Olff, 2017; Salk et al., 2017). Additionally, research suggest that female offenders generally engage in less violent

criminal behavior than males (Estrada et al., 2016; Frisell et al., 2011). This may reflect a dual influence, with higher internalizing disorder rates among females and a propensity for female offenders to predominantly commit non-violent crimes compared to males. Nonetheless, more research is needed to confirm these associations between depression or PTSD and non-violent crimes among both males and females, and to indicate any underlying mechanisms to the observed findings in this dissertation.

In study II, youth offenders diagnosed with internalizing disorders had between a 1.3 to 2.9 times higher risk of being injured or dying prematurely than youth offenders without these diagnoses. Thus, study II demonstrates an association between internalizing disorders and increased risk of injuries and premature death among youth offenders. Although few studies have examined the role of internalizing disorders in the risk of these outcomes, these results are in line with previous research showing a heightened risk of premature death among youth offenders diagnosed with depression (Salias et al., 2006). As for externalizing disorders, the increased risk for these outcomes among youth offenders diagnosed with internalizing disorders could potentially be explained by heightened impulsivity which could put youth in risky situations which increase the risk of these outcomes. Additionally, internalizing disorders among youth offenders are associated with self-harm behaviors and suicide (Stokes et al., 2015), which also could explain the high risk of premature death among youth offenders with internalizing disorders. Given the heightened comorbidity between internalizing disorders and substance use (O'Neil et al., 2011), the usage of substances could also lead to health issues and thereby premature death.

In the criminological research field and theories, there has traditionally been a large emphasis on the role of externalizing disorders in youth and risk for future criminal and risky behaviors (e.g., Farrington, 2003; Moffitt, 1993). The results in the present dissertation show that youth diagnosed with internalizing disorders may have similar risk for crime and other adverse outcomes as youth diagnosed with externalizing disorders do. Although the risk patterns between internalizing disorder and crime in youth were not as robust

and strong as externalizing disorders, the results imply that it is important to recognize the similar influence of internalizing disorders on crime and other adverse outcomes among youth offenders.

6.1.3 Diagnoses of neurodevelopmental disorders

Compared to externalizing and internalizing disorders, neurodevelopmental disorders showed the most inconsistent and varying risk pattern of crime in youth and the lowest risk estimates for premature death among youth offenders. In study I, intellectual disabilities and autism spectrum disorders were associated with reduced risk for non-violent crime but were associated with an increased risk for violent crimes. Thus, although these results align with previous population-based studies on adults regarding violent crimes (Heeramun et al., 2017; Latvala et al., 2022), these results contribute to the literature by showing that the association between neurodevelopmental disorders and crime in youth differs depending on the type of crime. In addition, few diagnoses increased in risk when comorbid with neurodevelopmental disorders compared to their risk without comorbidities. Instead, there were multiple diagnoses that reduced in risk when they were comorbid with neurodevelopmental disorders. This was particularly true for youth diagnosed with multiple neurodevelopmental disorders. For example, autism spectrum disorders comorbid with another neurodevelopmental disorder had lower magnitude of decreased risk of crime than autism spectrum disorder alone. This is in line with previous research which has shown that the observed increased risk of criminal convictions among individuals diagnosed with intellectual disabilities or autism spectrum disorders is most likely attributable to comorbid psychiatric diagnoses of internalizing or externalizing disorders (Heeramun et al., 2017; Im, 2016; Latvala et al., 2022; Stevens et al., 2015). This has to my knowledge not previously been established among youth specifically in a study of such magnitude as study I.

A potential explanation for the varied results among neurodevelopmental disorders could lie in the features and severity of

symptoms of these disorders (King & Murphy, 2014; Latvala et al., 2022). On the one hand, one feature of these diagnoses is literal adherence to legal norms, making individuals less likely to commit crimes (King & Murphy, 2014). On the other hand, some individuals diagnosed with these disorders tend to have impaired empathy or comprehension of others' emotions, which may increase the risk of conflict and crime (King & Murphy, 2014). It is also likely that more severe forms of these diagnoses are linked to heavy supervision and thereby restrict the opportunities of engaging in activities that could lead to crime (King & Murphy, 2014). While severity of these diagnoses were not considered in any study within the present dissertation, previous research has found that it is rather milder forms of these diagnoses that are associated with an increased risk of crime, whereas more severe forms are associated with a decreased risk, most likely due to heavy supervision and restricted life-style (Heeramun et al., 2017; King & Murphy, 2014; Latvala et al., 2022). Thus, the observed reduced risk of crime among individuals diagnosed with multiple neurodevelopmental disorders in study I probably reflect the influence of severity of these diagnoses on the association with criminal convictions. Taken together, results from study I indicate that comorbidities in general increased the risk for criminal convictions, but that comorbidities with neurodevelopmental disorders could reflect more severe symptoms that in turn reduces the risk of criminal convictions. Nevertheless, more research is necessary to fully understand the different associations between these diagnoses and various types of crime in youth.

In study II, neurodevelopmental disorders showed similar risk of unintentional injuries as internalizing and externalizing disorders. Youth offenders diagnosed with neurodevelopmental disorders also had a higher risk of premature death than youth offenders without these diagnoses. However, the risk estimate for neurodevelopmental disorders was smaller than externalizing or internalizing disorders. The exploration of neurodevelopmental disorders as potential risk factors for injuries and premature death among offenders, especially youth offenders, is notably absent in existing studies. Nevertheless, previous research has demonstrated that individuals with autism spectrum disorder (Forsyth et al., 2023; Hirvikoski et al., 2016) or

intellectual disabilities (Hirvikoski et al., 2021) have higher risk of premature death than the general population. Study II within this dissertation therefore contributes to the literature by demonstrating that this increased risk can be found in a youth offender sample as well.

Similar to the discussion about severity of neurodevelopmental disorders and the risk of crime, previous research has also shown that severity of these diagnoses influences the risk of premature death (Forsyth et al., 2023; Hirvikoski et al., 2016, 2021). However, contrary to the association with mild forms and increased risk of crime, research has suggested that more severe, low-functioning, forms of neurodevelopmental disorders are linked with higher mortality rates than mild forms of neurodevelopmental disorders (Forsyth et al., 2023; Hirvikoski et al., 2016, 2021). One potential explanation for this could be that individuals diagnosed with severe forms of neurodevelopmental disorders have a higher prevalence of underlying adverse health conditions than the general population, and thus have a higher risk of death than the general population (Forsyth et al., 2023; Hirvikoski et al., 2016, 2021).

Taken together, even though the studies in this dissertation did not account for the severity of intellectual disabilities or autism spectrum disorder, earlier research indicates that mild forms of neurodevelopmental disorders may increase the risk of crime, while more severe forms are linked to heightened mortality rates. In light of these considerations, although neurodevelopmental disorders showed an association with an increased risk of premature death among youth offenders in study II, this risk exhibited a significantly smaller magnitude compared to externalizing or internalizing disorders. This difference could potentially be attributed to the fact that less severe forms of neurodevelopmental disorders may increase the risk of crime but may not exert the same level of influence on elevated mortality as observed in the other categories. Future research of these different mechanisms is warranted to make any firm conclusions.

6.1.4 Subgroup differences

In study I and study II, analyses between risk factors and outcomes were stratified on sex or on imprisonment-status. In study I, multiple sex differences in associations between psychiatric diagnoses and risk of crime in youth emerged. Similarly, the role of psychiatric diagnoses in the risk of injuries and premature death were analyzed within non-imprisoned and imprisoned youth offenders separately in study II and demonstrated that the significance of psychiatric diagnoses may vary between these two groups.

6.1.4.1 Sex differences in association between psychiatric diagnoses and risk of crime in youth

Previous research has been inconclusive on whether females or males with psychiatric diagnoses have a higher risk for crime. Some studies have found similar risks among both sexes (Anderson et al., 2012; Silva et al., 2014). Others have found males to have higher risk estimates than females (Duke et al., 2018; Heeramun et al., 2017; Peltonen et al., 2020), and some studies have found females to have higher risk than males (Bennet et al., 2008; Fogden et al., 2016; Kofler et al., 2011; Mohr-Jensen et al., 2019; Stevens, et al., 2015). In study I, there were several sex differences observed. These differences were mainly found for violent criminal convictions, where females with all psychiatric diagnoses (i.e., substance use disorders, ADHD, depression, intellectual disabilities, or autism spectrum disorders), except PTSD, had higher risk of violent crimes than males with these psychiatric diagnoses. Fewer sex differences were observed when the outcome was non-violent crimes, with only females diagnosed with depression, PTSD, or autism spectrum disorders displaying a higher risk than males with these diagnoses. When considering comorbidities, comorbid internalizing disorders exhibited the most notable sex differences, followed by externalizing disorders, and, lastly, comorbid neurodevelopmental disorders where sex differences were only observed for depression. These sex differences again demonstrated that females with psychiatric diagnoses had a higher risk of criminal convictions than males with psychiatric diagnoses.

Taken together, the results from study I show that females with psychiatric diagnoses have a higher risk of criminal convictions than males with psychiatric diagnoses. The results from study I therefore supports and extends previous research findings showing that psychiatric diagnoses may play a more significant role among females in risk of crime in youth than males. Given that males have much higher crime rates than females in general (e.g., Bennett et al., 2005), the role of psychiatric diagnoses may be more likely to have a direct impact on crime in youth among females than among males (Stevens et al., 2015). Another possible reason for the noted sex differences may be that, for certain psychiatric diagnoses, females might require more severe symptoms to receive a diagnosis (e.g., ADHD; Quinn, & Madhoo, 2014). Consequently, the observed sex differences could be due to differences in levels of severity of diagnoses among males and females, which could affect the associations with criminal convictions (Mohr-Jensen et al., 2019).

The sex differences were more pronounced for violent crimes as compared to non-violent crimes, which is in line with previous research showing that female offenders engaging in more severe criminal activities exhibit higher rates of psychiatric diagnoses compared to their male counterparts (Beaudry et al., 2021a). Given the relative rarity of females committing violent crimes compared to males, the association between psychiatric diagnoses and violent crimes might be more pronounced among females than males (Hodgins, 2022). This suggests that females may necessitate more severe psychopathology to engage in violent criminal behavior, contributing to the observed sex differences in violent crimes. Given that many risk assessments and treatment efforts do not directly consider sex differences (Stevens et al., 2015), this underscores that females diagnosed with psychiatric disorders may be particularly vulnerable of future crime, especially for violent crimes.

6.1.4.2 Risk factors for unintentional injury and premature death among non-imprisoned and imprisoned youth offenders

In study II, results showed that in general, imprisoned youth offenders had a higher risk of both unintentional injuries and premature death than non-imprisoned youth offenders. While incarceration per se has been shown to be a stressor that negatively affect both mental and somatic health and thus could increase risk of injuries and premature death (Massoglia & Pridemore, 2015), these findings are more likely to reflect the severity of criminal activity. Previous research suggested that individuals who commit multiple crimes or violent crimes tend to have a more antisocial and riskier lifestyle in general that puts them at risk for severe adverse outcomes such as injuries or death (Farrer et al., 2013; Kjelsberg & Laake, 2010; Stenbacka et al., 2019; Zlodre & Fazel, 2012). Thus, the group of imprisoned youth offenders in study II is likely to have an overall high risk for risky behaviors which thereby can explain the high rates of injuries and premature death as compared to non-imprisoned youth offenders. This has also been supported in criminological theories, where more chronic and serious offenders have a high risk of facing adverse outcomes such as premature death (Moffitt, 2018; Piquero et al., 2007, 2011).

Considering psychiatric diagnoses, the results showed that among non-imprisoned youth offenders, those who were diagnosed with a psychiatric disorder had a higher risk for both unintentional injury and premature death compared to those without psychiatric diagnoses. Among imprisoned youth offenders, individuals with psychiatric diagnoses had an increased risk for premature death but not for unintentional injuries. To my knowledge, this is the first study to examine the role of psychiatric diagnoses in the risk of unintentional injuries among non-imprisoned and imprisoned youth offenders.

The increased risk for premature death among youth offenders with psychiatric diagnoses is in line with previous work (Chassin et al., 2013; Salias et al., 2006). However, study II extends on previous research by demonstrating that the role of psychiatric diagnoses may

differ between subgroups of youth offenders. In study II, the risk estimates for psychiatric diagnoses and injuries and mortality were higher among non-imprisoned youth offenders than among imprisoned youth offenders. This suggests that although imprisoned youth offenders had a higher risk of injuries and mortality than non-imprisoned youth offenders, psychiatric diagnoses may play a more significant role for injuries and mortality among non-imprisoned youth offenders. This indicates that imprisoned youth offenders have an overall high risk of these outcomes, whereas non-imprisoned youth offenders are a more heterogeneous group where psychiatric diagnoses contribute to the risk of injuries and mortality to a higher extent. Even if psychiatric diagnoses were associated with an increased risk of premature death among imprisoned youth offenders in study II, the lower risk estimates are somewhat in line with prior research conducted on adults, where psychiatric diagnoses increased the risk for mortality among adult offenders given community-based sentences (i.e., not-imprisoned; Yukhnenko et al., 2023b), whereas only substance use disorders, but no other psychiatric diagnosis increased the risk of mortality among adult prisoners (Chang et al., 2015b). Thus, results from study II add to the literature by demonstrating that these contrasting results may be applicable among youth offenders as well. Given the limited research examining this among youth offenders, and the issues with statistical power to explore the role of psychiatric diagnoses among imprisoned youth offenders in study II, more research is needed to make any firm conclusions about this.

6.2 The role of psychiatric diagnoses in the association between violent victimization and reoffending among youth offenders

In study III, the aim was to examine the role of psychiatric diagnoses in the association between violent victimization and reoffending among youth offenders. Overall, results from study III showed that youth offenders who have been victimized had about 1.4 times higher risk to reoffend than not victimized youth offenders. Notably, findings from study III revealed a consistency in the association between violent victimization and reoffending among youth offenders, irrespective of whether they had psychiatric diagnoses or

not. In other words, similar associations between violent victimization and reoffending were found for youth offenders with and without psychiatric diagnoses. This suggests that violent victimization could represent a psychosocial challenge on its own, potentially leading to adverse psychological impacts and problem behaviors (Hanson et al., 2010; Hogg et al., 2023), over and above the effects of psychiatric diagnoses.

Results from study III deviate from previous research that has established that psychiatric diagnoses are strongly linked to the victim-offender overlap (Ghirardi et al., 2023; Latvala et al., 2023; Sariaslan et al., 2020), which indicates that there should be an additive risk of both being diagnosed with a psychiatric disorder and being victimized. Instead, results from study III are in line with previous studies showing that victimization may have a direct effect on reoffending over and above psychiatric diagnoses or negative emotions such as anxiety, negative coping, and frustration (Bui et al., 2021; Cho & Lee, 2022; Wolff & Baglivio, 2017). One potential explanation for this could be that victimization in study III was due to violence, which has been shown to be a strong risk factor for reoffending in general (Basto-Pereira & Farrington, 2022).

On a similar note, the mean age of first violent victimization among youth offenders was low (6 years of age). This suggests the possibility of early exposure to violence within the family environment, which is one of the strongest risk factors for crime among youth (Basto-Pereira & Farrington, 2022). Taken together, victimization in study III could reflect severe exposure to violence in young ages and thus be a strong risk factor on its own and thereby diminishing the role of psychiatric diagnoses in the risk of reoffending. Given that victimization can result in mental, emotional, and behavioral problems (Hanson et al., 2010), this indicates that victimization can be an important therapeutic target for rehabilitation, even for youth offenders who do not have a diagnosed psychiatric disorder. In light of the limited research on the role of psychiatric diagnoses in reoffending among youth offenders specifically, study III contributes to the literature by underscoring the importance to explore the interplay between psychiatric diagnoses and other significant risk factors. This approach

will enhance our comprehension of the nuanced influence of psychiatric diagnoses in the broader context of reoffending among youth offenders.

6.2.1 Violent victimization as a risk factor for reoffending among youth

Since psychiatric diagnoses did not play a significant role in the association between violent victimization and reoffending, violent victimization is suggested to be an important risk factor on its own. The magnitude of the association between violent victimization and any reoffending (HR: 1.4) was comparable to estimates from other studies on adult prisoners (Taylor, 2015), youth offenders (Bui et al., 2021; Wylie & Rufino, 2018) and for studies using broader definitions of childhood adversities, abuse, and neglect (Cho & Lee, 2022; Fox et al., 2015; Vitopoulos et al., 2018; Wolff & Baglivio, 2017; Wolff et al., 2017). However, few studies have examined various forms of reoffending. Findings from study III revealed that violent victimization posed a higher risk for violent reoffending (HR: 1.66, CI:1.48-1.85) compared to non-violent reoffending (HR: 1.30, CI: 1.21-1.39). Previous research on the victim-offender overlap, albeit not specifically focused on reoffending, have indicated that while victimization is related to crime in general, there can be specificity in the overlap (Cops & Pleysier, 2014; McGloin et al., 2011; Miley et al., 2020; Posick, 2013; Silver et al., 2011). These studies have found that violent victimization is in particular associated with violent criminality. In a large-scale study on youth offenders (Miley et al., 2020), it was found that violent victimization exhibited the strongest association with an increased risk of violent offending as compared to sexual or drug-related offending. This could potentially explain why study III within the present dissertation found a stronger association for violent reoffending than non-violent reoffending since the exposure was violent victimization. One suggested explanation of this specificity is related to social learning theory, where individuals may learn behaviors such as violence by experiencing the violence themselves (Akers, 2017). Nevertheless, findings from study III extends on previous research demonstrating that violent victimization

is associated with both non-violent and violent reoffending among youth offenders.

6.3 Main findings in relation to developmental and life-course criminology

The risk factors and outcomes studied within this dissertation can be understood within the context of developmental and life-course criminological theories. Results within the present dissertation shows that individual risk factors related to mental, emotional, and behavioral dysregulations in youth are associated with crime, which are central factors in these theories. Given the age range of psychiatric diagnoses in study I, the role of psychiatric diagnoses in the risk of crime can partly be understood from Moffitt's dual taxonomy (1993). The theory posits that there is a group of individuals who have neuropsychological deficits in childhood which induce negative interactions with others, especially parents, due to problematic behaviors and temperament which makes the surrounding environment react negatively to the child. This in turn contribute to a growing and persistent repertoire of antisocial behaviors (Moffitt 1993, 2018). Not only could this explain the strong associations observed in study I, where psychiatric diagnoses related to impulsivity, hyperactivity, and low self-control increased the risk of crime in youth, but also why these diagnoses were associated with later adverse outcomes such as injuries and premature death in study II. Thus, the results from study I and study II are consistent with the idea that these mental, emotional, and behavioral dysregulations from a relative early age can be stable within individuals and thereby be associated with a persistent increased risk of crime and risky behaviors leading to these outcomes.

Moffitt (1993) also presents another group characterized by a delayed onset of antisocial behaviors, primarily influenced by maturity and peer socialization. Although this group is anticipated to desist from criminal activities as they mature, evidence suggests that engaging in antisocial behaviors may lead to subsequent challenges, including substance use disorders, internalizing issues such as anxiety and stress, imprisonment, or academic failure (McGee & Moffitt, 2019). These

complications may contribute to a sustained pattern of crime and other adverse outcomes. While the present dissertation did consider the temporal aspects by only including psychiatric diagnoses that were registered before the criminal conviction, it is essential to acknowledge that not all criminal activities result in convictions or are recorded in official registers. This raises the possibility that some youths may have engaged in criminal behaviors before receiving a psychiatric diagnosis, a scenario discussed in more detail in section 6.4.1.1. Consequently, while the results from this dissertation align with the concept of the first group characterized by early neuropsychological deficits, it is possible that some youths developed psychiatric diagnoses due to prior involvement in antisocial or criminal behavior and therefore have a stability and continuity of crime and other adverse outcomes.

Moffitt's dual taxonomy (1993) and Farrington's Integrated Cognitive Antisocial Potential theory (ICAP; Farrington, 2003) also emphasize on the role of family factors in shaping criminal behavior. As mentioned, the dual taxonomy theory suggest that neuropsychological deficits (such as psychiatric diagnoses) in children are thought to have a negative influence on parent-child relations and thereby increase the risk of crime (Moffitt, 1993, 2018). Similarly, ICAP proposes that having criminal parents can serve as antisocial role models, influencing children to adopt criminal behaviors (Farrington, 2033). While the explicit testing of these theories was not conducted within this dissertation, the results from study II revealed parental criminal convictions and parental psychiatric diagnoses emerged as significant risk factors for injuries and premature death among youth offenders. Although family history is likely to have a heritable influence of committing crimes, developing psychiatric diagnoses, and dying prematurely, these theories highlight the role of family history as an environmental factor. Parents with a history of crime or psychiatric diagnoses may contribute to problematic parent-child relationships, thereby enhancing the risk of criminality (Kamis, 2021; Kjellstrand & Eddy, 2011). It could also indeed be that the child learns certain behaviors from their parents which puts them at risk of committing crimes or engage in risky behaviors in general (Akers, 2011). Despite meta-analyses suggesting that family factors are

traditionally the most robust risk factors for crime and adverse outcomes, with a purported larger role than individual risk factors (Basto-Pereira & Farrington, 2022), results from study II present a nuanced perspective. Although family history was associated with an increased risk of injuries and premature death, psychiatric diagnoses showed a higher risk estimate. This finding could be interpreted through the lens of developmental and life-course theories, which propose that the strength of specific risk factors varies across different life stages (Kazemian et al., 2019). While family factors may be strong risk factors among children and youth, study II examined outcomes in young adulthood up to age 35. It is likely that the influence of family factors diminish as individuals grow older with more independence from the family. This aligns with theories positing that the environmental impact of family history becomes less pronounced in adulthood, with individual risk factors assuming greater importance (Fagan & Benedini, 2019). This interpretation offers insights into the observed higher risk associated with psychiatric diagnoses compared to family history in study II, emphasizing the dynamic nature of risk factors throughout the life course.

While victimization is not included in developmental and life-course theories as a risk factor per se, it could be viewed as an individual risk factor related to mental, emotional, and behavioral factors. Thus, victimization could potentially have a similar pathway to crime and persistent crime as psychiatric diagnoses, as observed in study III. However, considering that the mean age of first violent victimization in study III was 6 years old, it can be argued that violent victimization in study III potentially extends to be a family factor as well. Crime surveys have shown that when children are victimized, it is likely that the perpetrator is someone within the family (Office for National Statistics, 2016; Westfelt, & Sellgren Karlsson, 2023). This can reflect an unstable and dysregulated family situation, which has been shown to be a significant risk factor for crime (Basto-Pereira & Farrington, 2022). In addition, descriptive statistics from study III shows that about 72% of all victimized youth offenders had parents that have been convicted of a crime, which also could be an indication of adverse family environment. Studies have shown that both psychiatric diagnoses and family factors (both environmental and heritable)

contribute to the victim-offender overlap (Beckley et al., 2018). However, given the strong association between violent victimization and persistent criminal offending above psychiatric diagnoses and family history as observed in study III, developmental and life-course criminology theories could potentially be refined by also including victimization in their models.

Taken together, developmental and life-course theories comprehensively incorporate individual, familial, and other environmental risk factors to explain the development of criminal behaviors, and also other risky behaviors that in turn can lead to outcomes such as injuries or death. The present dissertation aligns with these theories, revealing that both individual and familial risk factors significantly increase the risk of criminal involvement and subsequent adverse outcomes among youth offenders. While there may be a temptation to contrast these risk factors against each other, it is important to recognize that no singular, universal mechanism entirely accounts for these outcomes. Instead, as demonstrated by the aforementioned theories, it is a constant interaction between individual risk factors and environmental risk factors that shapes the initiation, persistence, and, for some individuals, the cessation of criminal and other risky behaviors.

6.4 Methodological considerations

6.4.1 Misclassification of variables

One of the central methodological considerations in observational and register studies is misclassification of studied variables. Misclassification refers to incorrectly assigning an individual into a category of a variable. This could lead to incorrect estimation of associations between exposure and outcomes. There are two types of misclassifications: (1) non-differential misclassification where the probability of individuals being misclassified is random and thus equal across all individuals in the study, and (2) differential misclassification which is when the misclassification is not random and the probability of being misclassified differs between groups in the study (Porta, 2014; Rothman, 2012). The non-differential

misclassification is thought to not affect the estimates in a significant way, whereas differential misclassification could lead to biased results.

6.4.1.1 Crime

In this dissertation, criminal convictions were used to measure crime, which do not capture all actual crimes committed. First, not all crimes are reported to the polices or other authorities. Estimations have shown that only around 15% to 40% of all violent crimes are reported to the police in Sweden (National Council for Crime Prevention, 2023b, 2023c). Second, not all reported crimes lead to a conviction. Estimates show that only about 8% of all reported crimes in Sweden leads to a conviction (National Council for Crime Prevention, 2023a). Thus, the prevalence of crime is largely underestimated in the studies included in this dissertation, leading to a large proportion of false negatives. This misclassification of individuals as non-offenders is differential where certain groups of individuals are more likely to be misclassified than others. For example, some types of crimes (e.g., serious violent crimes or certain property crimes due to insurance matters) are reported and leads to a conviction to a higher extent than others. In addition, research has shown that although courts are ought to be objective in sentencing, there are sentencing disparities related to demographical factors such as ethnicity or sex (Mustard, 2001; Topaz et al., 2023;). Thus, although the studies in this dissertation have high proportion of true positives, future studies could combine other sources of data to measure crime in order to balance out the proportion of false negatives and thereby reduce this misclassification bias.

In study I and III, criminal convictions were separated into non-violent and violent crimes and studied as separate outcomes. However, few youth offenders are so called “specialist” that only commits one type of crime (Mazerolle & McPhedran, 2019). It is rather likely that youth offenders commit a variety of crimes. In Sweden, multiple crimes can be processed within the same conviction, where the most severe crime is usually marked as the main crime. So, it could be that those who were defined as violent offenders have also committed non-violent crimes. However, given

the theoretical nature of crime that is thought to be captured by studying non-violent and violent crimes (i.e., the severity of criminality), defining offenders as violent even if they have committed non-violent crimes is justifiable. Related to the problem with dark figures, it is also possible that offenders defined as non-violent within these studies have committed violent crimes in the past but not been convicted of it. Another issue related to this is that in study I, where first criminal conviction in youth was the outcome, it is not possible to fully ensure that individuals were free of the outcome prior to exposure. In other words, it is possible that individuals had committed crimes, but not received a criminal conviction, prior to being diagnosed with a psychiatric diagnosis. In that case, there is a risk of overestimating the association between psychiatric diagnoses and criminal convictions since research has shown that prior criminal offending is the most important risk factor for future offending, thus putting individuals at an overall heightened risk of convictions.

6.4.1.2 Psychiatric diagnoses

To define and measure psychiatric diagnoses, I relied on data from patient registers based on ICD-codes. The data in the registers only covers inpatient data, and specialist outpatient data since 2001. Thus, diagnoses are ascribed by a treating psychiatrist who can use other forms of assessment systems than ICD. In practice, most psychiatrists use DSM to evaluate diagnoses, but then code it in the charts using the ICD-system. Although there could be some disparities between DSM and ICD, the Swedish inpatient register has been shown to have a positive predictive value of 85-95% for all diagnoses (Ludvigsson et al., 2011). In addition, reliance on clinically determined diagnoses enables results to be more readily generalized to clinical settings where structured diagnostic interviews are utilized infrequently and enables comparisons between studies.

ICD-based diagnoses only capture the most severe cases, particularly within registers limited to inpatient or specialist outpatient data, excluding primary care information. Treatment-seeking behaviors, varying among different groups of individuals, introduce non-

random patterns and thus non-differential misclassification, leading to an increased likelihood of false negatives. Conversely, the registers are more likely to capture true positives, thereby mitigating the bias of false positives. The prevalence of psychiatric diagnoses is underestimated due to the bias of false negatives. The impact this has on associations remains unclear; on one hand, the inclusion of only the most severe cases may lead to potential overestimation by limiting variation in exposure data. On the other hand, the exclusion of less severe cases may result in underestimation due to lower prevalence.

6.4.1.3 Violent victimization and unintentional injuries

Information about violent victimization (in this dissertation defined as injuries due to assault) and unintentional injuries was obtained from the National Patient Register. Since only injuries that led to hospitalization are registered, it is likely that only the most severe cases are captured by the registers. Thus, the prevalence of injuries is likely to be underestimated. In addition, both victimization and unintentional injuries are measured with concern of the intent or nature of the injuries. For example, there is a possibility that some injuries that are diagnosed to be due to assault (i.e., victimization) could be due to other circumstances than assault. Similarly, unintentional injuries are diagnosed based on intent, where some injuries could be intentional but misdiagnosed as unintentional. One potential explanation of this misclassification is that the intent or nature is not necessarily relevant for the health care services (Socialstyrelsen 2022). However, this type of misclassification is estimated to be small (Ludvigsson et al., 2011).

6.4.2 Confounders and mediators

Even if the studies included in this dissertation adjusted for multiple confounders that most studies in the criminological research field have not addressed (e.g., family history), there are some factors related to confounding and mediation that have not been addressed. Although some of the most relevant psychiatric diagnoses have been studied, not all potential diseases and conditions have been included. For example, multiple studies have emphasized on traumatic brain

injury as a risk factor of both psychiatric diagnoses, aggression, crime, and premature mortality (Schwarzbald et al., 2008; Sariaslan et al., 2016a, 2016b). Thus, traumatic brain injury could be a potential confounder for associations between psychiatric diagnoses, crime, and mortality. It could also be a consequence of violent victimization as measured in study III, and thus be a mediator between victimization and reoffending, something future studies should consider. In addition, I did not consider more environmental factors such as antisocial peers or lack of social support which has been linked to risk of criminality (Basto-Pereira & Farrington, 2022). This kind of information is not available in the registers but could contribute to the heightened risk observed in the studies and thus be unmeasured confounders.

Most individuals who receive a psychiatric diagnosis within inpatient or specialist outpatient care also receives some kind of treatment. This is also offered to youth offenders from either social services or within secure youth care or prison facilities. The registers do not contain information about therapeutic or behavioral interventions or treatments, which could counteract potential risk of future outcomes and make individuals desist from future crime (Beaudry et al., 2021b). In addition, some individuals may also receive pharmacological treatment, which is common for certain diagnoses such as ADHD or depression (e.g., Lichtenstein). Studies have shown that risk of crime differs within individuals when they are on versus when they are off medication treatment (Holloway et al., 2006; Lichtenstein et al., 2012). Thus, medication of certain conditions could also work buffering against risk of crime and other outcomes, something the studies included in the present dissertation did not include in analyses. However, given the time-varying effect of medication, simple adjustment would not be as informative as specific within-individual analyses, something future studies should continue to explore.

Lastly, I did not examine potential mediating risk factors between criminal conviction in youth and injuries and mortality (study II) or reoffending (study III). Psychiatric diagnoses were only measured up until age 15 in study II. Given that many youth offenders receive a

psychiatric diagnosis during or after their first conviction, there is a possibility that future psychiatric diagnoses could mediate the risk for injuries and premature death. I also did not consider crime trajectories which could affect risk of injuries and mortality. Studies have shown a dose-response relationship between number of crimes and future adverse outcomes (e.g., Stenbacka et al., 2012). Thus, certain youth offenders in study II have most likely committed multiple crimes in their adulthood as well and thus be at a higher risk of injuries and mortality. Similarly, due to the known overlap between victimization, crime and psychiatric diagnoses, there is a possibility that youth offenders in study III were victimized or received a psychiatric diagnosis between the first and second conviction, which could mediate the association to reoffending. In addition, I did not consider other life event such as unemployment that also could be a mediating risk factor to both reoffending, injuries, and mortality among youth offenders.

6.4.3 Generalizability

All studies included in this dissertation have been conducted within a Swedish context. As mentioned in the background, the definition of youth offenders varies across countries and jurisdictions. Sweden have one of the wider age ranges of youth offenders, spanning from 15 to 20 years old. This age range is slightly higher than other countries where age of criminal responsibility can be from age 10 (Casey et al., 2022; Cipriani, 2009). The mean age of the youth offenders included within this dissertation was around 16 years old, which is in line with the general age-crime curve and thus suggests that the results within this dissertation should be representative for a youth offender population. However, research has shown that younger age at first conviction is related with higher risk of adverse outcomes such as mortality (Kjelsberg & Laake, 2010; Zlodre & Fazel, 2012), so age of individuals should still be considered when interpreting and generalizing results.

The Swedish health care and criminal justice system may also be different from other countries. For example, health care in Sweden is free which could influence help-seeking behaviors and treatment-

plans that is different from other countries. There is also likely to be differences in health care policies that affect treatment of individuals, which in turn can influence risk of certain outcomes (e.g., crime and other adverse outcomes). Youth offenders are also handled in a specific way within the criminal justice system in Sweden in terms of less severe sentences and a higher focus on rehabilitation than punishment which can affect both interventions and treatments as well as possibilities of reintegration into the society (Janson, 2004). This could affect the generalizability to other societies since these aspects can result in youth offender groups across different countries are not equivalent in terms of initial risk of future adverse outcomes. There are also differences across countries in laws and practices within the criminal justice system that can result in differences of which behaviors are considered criminal acts and how they are punished (The National Audit Office, 2012), also resulting in different initial risk among offenders. The results may therefore not be generalizable to other countries with less comprehensive welfare systems and more punitive criminal justice systems. Thus, generalizing results to other countries should be done cautiously.

Lastly, immigrants were excluded in all three studies within this dissertation. The reason for exclusion was to avoid information bias of factors during childhood. Additionally, immigrants can also differ on several factors from non-immigrants (e.g., SES, psychiatric disorders, general health; Elshahat et al., 2022), so results in the present dissertation should not be generalized to immigrant populations.

6.5 Ethical considerations

One ethical concern in research on psychiatric diagnoses, victimization, family history, and crime, is stigmatization of certain groups of individuals. The studies included in this dissertation focus on children and youth that have psychiatric diagnoses, been victimized, been convicted of a crime, have parents with psychiatric diagnoses or have been convicted of a crime, and youth offenders that are at risk of reoffending, injuries, and mortality. There is a risk that results highlighted in this dissertation reinforce stigmatization,

negative stereotyping attitudes, and labeling of these individuals. This could lead to unnecessary harm and problems with integration to the society (Millum et al., 2019). In addition, discussion about heritability of behaviors and genetics could label entire families in a negative way, for example as offenders. It is therefore important to be clear in interpretations of results and not use deterministic language but to emphasize on the complexity of crime and other adverse outcomes and that “risk” within this context is only *potential* risk and not determined outcomes.

Another related question concerns the direction of associations and causality among risk factors and outcomes. The studies included in the present dissertation have not aimed at establishing causality but rather explore risk patterns that could extend our knowledge about the dynamic relationship between for example psychiatric diagnoses and crime. It is unclear whether psychiatric diagnoses have a causal impact on crime or if there are other unobserved risk factors that explains the risk. While specific traits have been proposed to have a strong influence on crime (Tharshini et al., 2021), it is important to acknowledge that no single factor comprehensively accounts for the entirety of the risk associated with committing crimes. Thus, assumptions about psychiatric diagnoses as causes of crime and other adverse behaviors can create unsubstantiated criminalization of psychiatric diagnoses. This could potentially inhibit individuals to seek help and create social isolation due to fear of stigmatization Millum et al., 2019. This could in turn worsen the situation and thereby lead to a heightened risk of crime and other negative behaviors or outcomes (Millum et al., 2019). Due to this, it is important to note that this dissertation by no means suggests that those who have a psychiatric diagnosis will become offenders or that all youth offenders will continue with crime or die prematurely. Instead, the take home message of this dissertation is that the included studies have explored patterns of risk factors that are treatable and thereby can prevent future harm of children and youth that experience adversities.

6.6 Future directions

As highlighted throughout the discussion of the present dissertation, there is still a need to further examine various aspects of the association between psychiatric diagnoses, crime, and later adverse outcomes among youth offenders. Although this dissertation has considered multiple aspects regarding different types of psychiatric diagnoses, types of crimes, sex differences, and other risk factors, future research should examine different types of victimization, more detailed categories of crimes, or different causes of death to extend the knowledge obtained by this dissertation even further. For example, research has indicated that specific psychiatric diagnoses may exhibit varying degrees of association with different types of causes of death (Momen et al., 2022; Yukhnenko et al., 2023b), which provides valuable understanding of potential underlying mechanisms of risk for premature death among youth offenders. In addition, given the limited number of large population-based studies examining the role of psychiatric diagnoses and outcomes among youth offenders, cohort studies from different countries using comparable measures are required to adequately estimate the role, and potentially the effect, of psychiatric diagnoses on crime in youth and later outcomes among youth offenders. This should also be studied using different study designs, such as genetically informed designs, in order to make better causal inferences of the influence of psychiatric diagnoses and these outcomes among youth.

The present dissertation has demonstrated that the association between psychiatric diagnoses and outcomes among youth offenders may vary depending on type of diagnosis. Research has also indicated that symptoms or severity of certain diagnoses (e.g., intellectual disabilities) may be differently associated with crime (Latvala et al., 2022). In light of this, there is an emerging consensus that psychiatric and mental health may be better understood from a transdiagnostic process instead of the existing classifications of diagnoses (Dalglish et al., 2022). A transdiagnostic process refers to a psychological or biological mechanism that is relevant across multiple psychiatric disorders (Dalglish et al., 2022). Unlike processes that are specific to a particular disorder, transdiagnostic processes are shared

vulnerabilities or mechanisms that cut across different diagnostic categories. These processes are thought to contribute to the development, maintenance, or exacerbation of various mental health conditions. Identifying and targeting transdiagnostic processes in treatment interventions may offer a more comprehensive and efficient approach, as it addresses common factors underlying multiple disorders rather than focusing on disorder-specific features. Research has also proposed that victimization or childhood trauma are transdiagnostic risk factors for psychopathology (Hogg et al., 2023; McLaughlin et al., 2020), which could indicate that studying the underlying traits associated with both victimization and psychiatric diagnoses could offer an insight of underlying mechanisms behind the observed association to crime and reoffending among youth offenders. This approach is not new to the criminological research field which has a longstanding tradition of identifying specific traits that are related to increased risk of crime (i.e., risk factors such as personality traits) (Tharshini et al., 2021). However, identifying traits within the classification of psychiatric diagnoses that are associated with an increased risk of crime and other adverse outcomes among youth offenders could help guide health care professionals, who generally operate based on clinical diagnoses, to develop better targeted treatments for these outcomes among youth who demonstrate specific traits rather than specific diagnoses.

Future research should examine the temporal aspect of risk factors and outcomes in more detail. Research has demonstrated that some risk factors (e.g., violent victimization, unintentional injuries, self-harm, or substance intoxication) may be related to an acute heightened risk of crime outcomes (Sariaslan et al., 2016). To discern whether a particular risk factor represents a general or acute influence holds significant implications for treatment and prevention strategies. While various psychiatric diagnoses have been shown to be associated with a general risk of criminal behavior and other adverse outcomes (as evidenced in study I and study II within this dissertation), it is imperative for both risk assessment and treatment planning to consider the current presence or absence of symptoms related to these diagnoses. For example, depressive and anxiety symptoms, which we know are risk factors for crime, may not persist consistently

throughout an individual's life. Thus, determining whether these symptoms are active or only present in the past could guide healthcare professionals to discern whether these symptoms constitute acute risk factors necessitating targeted intervention in treatment or not. This information also holds the potential to improve accuracy and applicability of risk assessment tools for crime among youth.

One of the main findings within this dissertation is the identification of risk factors in childhood and youth that are associated with both crime and later adverse outcomes among youth offenders. Although this next recommendation is nowhere novel, this highlights the need of early detection and interventions of youth at risk of these outcomes. With a growing problem of youth engaging in serious violent crimes (Tollin, Angerbrandt, & Jonsson, 2023), it is important to work both preventative against youth who are already involved in crime to prevent future outcomes, but also to work preventatively among youth at risk but not yet involved in crime. The present dissertation has identified both psychiatric diagnoses, parental crime and psychiatric diagnoses, and violent victimization in youth as risk factors that persist to be associated with risk even into young adulthood. Evaluations of interventions aiming at reducing crime among youth offenders have shown that interventions involving cognitive and behavioral therapy (Beaudry et al., 2021b; Jewell et al., 2015; May et al., 2014; Pardini, 2016), youth offender diversion programs (Schwalbe et al., 2012; Wilson et al., 2013; Wong et al., 2016), family interventions (Farrington & Welsh, 2003), and after school-based programs (Taheri & Welsh, 2016) all holds the potential of reducing reoffending among youth already involved in crime. However, most evaluation studies suffer from methodological limitations such as small-sample sizes and short follow-up time (Beaudry et al., 2021b). Since the results within this dissertation demonstrates that the risk for crime and other adverse outcomes may vary significantly across diagnoses, crime outcomes, sex, and other subgroups of youth offenders such as non-imprisoned and imprisoned youth offenders, large evaluation studies with sufficient follow-up is needed to better establish what works and for whom. Additionally, future research should also examine whether the effect

of such interventions also can reduce other future outcomes such as injuries and premature death. Nevertheless, the results from the present dissertation points towards the need for both social support and therapy among children and youth who experience mental illness and/or adverse family environment related to violence, crime, and mental illness. By proactively addressing these concerns early in the lives of these youths, we have the potential not only to decrease crime rates but also to enhance their prospects for better future outcomes.

7 Conclusion

So, what role do psychiatric diagnoses play for crime in youth, reoffending, injuries, and mortality among youth offenders? Well, the simple answer is: an important role, but it is complex. In the present dissertation, the collective results suggest that the association between psychiatric diagnoses and crime and later adverse outcomes among youth offenders vary in magnitude and significance depending on type of diagnosis, presence of comorbidities, type of crime committed, sex, crime history, and presence of other important risk factors such as violent victimization. More specifically, the work presented within this dissertation suggest that youth diagnosed with externalizing disorders have the highest risk of being convicted of a crime in youth and subsequently be injured or die prematurely. Youth diagnosed with internalizing disorder may face a similar risk, but with lower risk magnitudes. Associations between neurodevelopmental disorders and crime and later adverse outcomes are likely driven by comorbidities of other psychiatric diagnoses.

The role of psychiatric diagnoses in risk of crime in youth also depends on type of crime studied, where the risk is higher for violent crimes than non-violent crimes. There are also differences by sex, where females with psychiatric diagnoses have a higher risk of being convicted of a crime than males. The role of psychiatric diagnoses in the risk of injuries and premature death also differs among non-imprisoned and imprisoned youth offenders, where risk factors in general play less of a role among imprisoned youth offenders. Lastly, the role of psychiatric diagnoses is less relevant in the association between violent victimization and reoffending among youth offenders, suggesting that the role of psychiatric diagnoses may diminish in presence of other important risk factors.

Taken together, the present dissertation suggests that there is likely no single universal mechanism that links psychiatric diagnoses to crime and other adverse outcomes among youth offenders. Given the varied behavioral tendencies associated with different psychiatric diagnoses, it is reasonable to suggest the existence of numerous potential symptom- and syndrome-specific pathways that forms the link

between psychiatric diagnoses, crime, injuries, and premature death. Nevertheless, exploring risk patterns among youth offenders shed lights on the complex pathways to certain outcomes, which helps us understand youth offenders and the potential risk of adverse outcomes they may face. This knowledge is much needed in order to provide better help for youth at risk, which is not only beneficial for the society as a whole, but more importantly, for the youth themselves.

8 Acknowledgements

As this journey concludes, looking back, it's been quite a ride starting from my days as a bachelor student in criminology at Örebro University. It is safe to say that I have learned a lot. This journey would not have been possible without all the people involved in my studies and in my life in general. Acknowledging that it is an impossible task to rightfully thank everyone, I have a lot of people to be thankful for.

Catherine Tuvblad. Thank you for giving me the opportunity to embark on this journey and for the many opportunities that have come along during this time. Most of all, thank you for always believing in me.

Henrik Larsson. Thank you for all your invaluable advice, expertise, inspiration, and support.

Brittany Evans. Thank you for always reading my work, providing valuable input, having answers to my questions, and for your incredible support.

Anna-Karin Ångström. Thank you for always being by my side on this journey since day one. Thank you for all shared experiences, both ups and downs. Thank you for being my go-to person for everything. Most importantly – thank you for being my friend.

Sofi Oskarsson. Thank you for taking me under your wings since our journey began in the lab. I would not have been able to do this without you. Thank you for all our support and for being my friend.

Anneli Andersson. Thank you for being a supporting colleague and friend, and for all the discussions about work and life in general.

Anna Hellertz. Thank you for being a leader, for always finding time for me, and for all your help with everything.

Karin Hellfeldt. Thank you for always being a great teacher and colleague. Thank you for your invaluable input on this dissertation; your insights played a crucial role in bringing it all together.

All colleagues in criminology. Most of you were also my teachers when I started my criminology journey, so thank you for all you've taught me and for always challenging me to become better. Thank you for all your support over the years.

Frida Bood and Johan Stjernqvist. Thank you for being my classmates, colleagues, fellow PhD-students, and friends since our first day at Örebro University in 2015. Thank you for all your support.

Nilo Tayebi, Emma Källvik, Maria Camacho Doyle, Carmen Solares Canal, Maja Dobrosavljevic, Rickard Ahlberg, Lin Li, Nadezhda Golovchanova. Thank you for being fellow PhD-students during this journey and sharing great discussions and experiences.

All my co-authors, **Amber Beckley, Seena Fazel, Zheng Chang, Niklas Långström, and Miguel Garcia-Argibay.** Thank you for all your work and for challenging me to become a better researcher.

My friends from “back home”. Thank you for always being there for me, for making life fun and for your immense support and invaluable friendship. Thank you all for being my closest friends for all these years and for the many years to come. I love you all.

My friends from Örebro. Thank you all for your endless support. Thank you for making me feel at home and for making some of the best memories. I will always hold on to you dearly. I love you all.

Mormor, morfar, farmor. Tack för all ni gjort och allt ni gör. Ord räcker inte till för att beskriva min tacksamhet för er. Jag älskar er.

My dearest family. **Mamma** och **Pappa**. Thank you for being my lifelong teachers and supporters. Everything I am and have achieved is thanks to you. This dissertation is dedicated to you. Thank you for always helping me with *everything*. I am forever proud to be your daughter. I love you.

Kajsa. Thank you for the happiness and brightness you bring into my life. Thank you for your constant reminder that there is more to life than work and achievements. Thank you and **Hannes** for always being of great support, no matter the hour. Thank you for being my sister, I love you.

9 References

- Aalsma, M. C., Lau, K. S. L., Perkins, A. J., Schwartz, K., Tu, W., Wiehe, S. E., & Rosenman, M. B. (2016). Mortality of youth offenders along a continuum of justice system involvement. *American Journal of Preventive Medicine*, 50, 303–310. <https://doi.org/10.1016/j.amepre.2015.08.030>
- Abram, K. M., Teplin, L. A., McClelland, G. M., & Dulcan, M. K. (2003). Comorbid psychiatric disorders in youth in juvenile detention. *Archives of general psychiatry*, 60(11), 1097–1108. <https://doi.org/10.1001/archpsyc.60.11.1097>
- Abram, K. M., Zwecker, N. A., Welty, L. J., Hershfield, J. A., Dulcan, M. K., & Teplin, L. A. (2015). Comorbidity and continuity of psychiatric disorders in youth after detention: a prospective longitudinal study. *JAMA psychiatry*, 72(1), 84–93. <https://doi.org/10.1001/jamapsychiatry.2014.1375>
- Adrian, M., Jenness, J. L., Kuehn, K. S., Smith, M. R., & McLaughlin, K. A. (2019). Emotion regulation processes linking peer victimization to anxiety and depression symptoms in adolescence. *Development and psychopathology*, 31(3), 999–1009. <https://doi.org/10.1017/S0954579419000543>
- Agnafors, S., Torgerson, J., Rusner, M., & Kjellström, A. N. (2020). Injuries in children and adolescents with psychiatric disorders. *BMC public health*, 20(1), 1273. <https://doi.org/10.1186/s12889-020-09283-3>
- Ahmad, A., & Mazlan, N. H. (2014). Substance abuse and childhood trauma experiences: Comparison between incarcerated and non-incarcerated youth. *Procedia, Social and Behavioral Sciences*, 113, 161–170. <https://doi.org/10.1016/j.sbspro.2014.01.023>
- Akers, R. (2017). *Social learning and social structure: A general theory of crime and deviance*. Routledge.

- Alsheikh, A. M., Elemam, M. O., & El-Bahnasawi, M. (2020). Treatment of depression with alcohol and substance dependence: A systematic review. *Cureus*, 12(10), e11168. <https://doi.org/10.7759/cureus.11168>
- Althubaiti, A. (2016). Information bias in health research: Definition, pitfalls, and adjustment methods. *Journal of multidisciplinary healthcare*, 211-217. <https://doi.org/10.2147/JMDH.S104807>
- American Psychiatric Association. (2013). *Diagnostic and statistical manual of mental disorders* (5th ed.). <https://doi.org/10.1176/appi.books.9780890425596>
- Andershed, A.-K., Gibson, C. L., & Andershed, H. (2016). The role of cumulative risk and protection for violent offending. *Journal of Criminal Justice*, 45, 78–84. <https://doi.org/10.1016/j.jcrimjus.2016.02.006>
- Anderson, D. M., Cesur, R., & Tekin, E. (2015). Youth Depression and Future Criminal Behavior. *Economic Inquiry*, 53(1), 294–317. <https://doi.org/10.1111/ecin.12145>
- Andersson, A., Hegvik, T. A., Chen, Q., Rosenqvist, M. A., Kvalvik, L. G., Almqvist, C., D’Onofrio, B. M., Hartman, C., Klungsoyr, K., Haavik, J., Tuvblad, C., & Larsson, H. (2020). Attention-deficit/hyperactivity disorder and smoking habits in pregnant women. *PloS One*, 15(6), e0234561–e0234561. <https://doi.org/10.1371/journal.pone.0234561>
- Arseneault, L., Moffitt, T. E., Caspi, A., Taylor, P. J., & Silva, P. A. (2000). Mental disorders and violence in a total birth cohort: results from the Dunedin Study. *Archives of general psychiatry*, 57(10), 979–986. <https://doi.org/10.1001/archpsyc.57.10.979>
- Astridge, B., Li, W. W., McDermott, B., & Longhitano, C. (2023). A systematic review and meta-analysis on adverse childhood experiences: Prevalence in youth offenders and their effects on youth recidivism. *Child abuse & neglect*, 140, 106055. <https://doi.org/10.1016/j.chiabu.2023.106055>

- Basto-Pereira, M., & Farrington, D. P. (2022). Developmental predictors of offending and persistence in crime: A systematic review of meta-analyses. *Aggression and Violent Behavior*, 65, 101761. <https://doi.org/10.1016/j.avb.2022.101761>
- Beaudry, G., Yu, R., Långström, N., & Fazel, S. (2021a). An Updated Systematic Review and Meta-regression Analysis: Mental Disorders Among Adolescents in Juvenile Detention and Correctional Facilities. *Journal of the American Academy of Child and Adolescent Psychiatry*, 60(1), 46–60. <https://doi.org/10.1016/j.jaac.2020.01.015>
- Beaudry, G., Yu, R., Perry, A. E., & Fazel, S. (2021b). Effectiveness of psychological interventions in prison to reduce recidivism: a systematic review and meta-analysis of randomised controlled trials. *The lancet. Psychiatry*, 8(9), 759–773. [https://doi.org/10.1016/S2215-0366\(21\)00170-X](https://doi.org/10.1016/S2215-0366(21)00170-X)
- Becker, S. P., & Kerig, P. K. (2011). Posttraumatic stress symptoms are associated with the frequency and severity of delinquency among detained boys. *Journal of clinical child and adolescent psychology: the official journal for the Society of Clinical Child and Adolescent Psychology, American Psychological Association, Division 53*, 40(5), 765–771. <https://doi.org/10.1080/15374416.2011.597091>
- Beckley, A. L., Caspi, A., Arseneault, L., Barnes, J. C., Fisher, H. L., Harrington, H., Houts, R., Morgan, N., Odgers, C. L., Wertz, J., & Moffitt, T. E. (2018). The Developmental Nature of the Victim-Offender Overlap. *Journal of developmental and life-course criminology*, 4(1), 24–49. <https://doi.org/10.1007/s40865-017-0068-3>
- Benjamini, Y., & Hochberg, Y. (1995). Controlling the false discovery rate: A practical and powerful approach to multiple testing. *Journal of the Royal Statistical Society. Series B, Methodological*, 57(1), 289–300. <https://doi.org/10.1111/j.2517-6161.1995.tb02031.x>
- Bennett, S., Farrington, D. P., & Huesmann, L. R. (2005). Explaining gender differences in crime and violence: The importance of social cognitive skills. *Aggression and Violent Behavior*, 10(3), 263–288. <https://doi.org/10.1016/j.avb.2004.07.001>

- Bennett, T., Holloway, K., & Farrington, D. (2008). The statistical association between drug misuse and crime: A meta-analysis. *Aggression and Violent Behavior*, 13(2), 107–118.
<https://doi.org/10.1016/j.avb.2008.02.001>
- Berg, L., Rostila, M., Arat, A., & Hjern, A. (2019). Parental death during childhood and violent crime in late adolescence to early adulthood: A Swedish national cohort study. *Palgrave Commun*, 5, 74. <https://doi.org/10.1057/s41599-019-0285-y>
- Björkenstam, E., Burström, B., Hjern, A., Vinnerljung, B., Kosidou, K., & Berg, L. (2019). Cumulative childhood adversity, adolescent psychiatric disorder and violent offending in young adulthood. *European journal of public health*, 29(5), 855–861.
<https://doi.org/10.1093/eurpub/ckz089>
- Björkenstam, E., Hjern, A., Björkenstam, C., & Kosidou, K. (2018). Association of cumulative childhood adversity and adolescent violent offending with suicide in early adulthood. *JAMA psychiatry*, 75(2), 185–193.
<https://doi.org/10.1001/jamapsychiatry.2017.3788>
- Björkenstam, E., Ljung, R., Burström, B., Mittendorfer-Rutz, E., Hallqvist, J., & Weitoft, G. R. (2012). Quality of medical care and excess mortality in psychiatric patients—a nationwide register-based study in Sweden. *BMJ open*, 2(1), e000778.
<https://doi.org/10.1136/bmjopen-2011-000778>
- Brooke, H. L., Talbäck, M., Hörnblad, J., Johansson, L. A., Ludvigsson, J. F., Druid, H., & Ljung, R. (2017). The Swedish cause of death register. *European Journal of Epidemiology*, 32, 765–773. <https://doi.org/10.1007/s10654-017-0316-1>
- Bui, L., Mori, T., Furukawa, A., & Tasaka, A. (2021). Maladaptive coping, victimization, and recidivism among Japanese adolescents and emerging adults. *Child Abuse & Neglect*, 115, 104980–104980.
<https://doi.org/10.1016/j.chiabu.2021.104980>
- Cain, C.M., & Clinkinbeard, S.S. (2014). Depression and Crime. In: *The Encyclopedia of Theoretical Criminology*, J.M. Miller (Ed.). <https://doi.org/10.1002/9781118517390.wbetc164>

- Campaniello, N., & Gavrilova, E. (2018). Uncovering the gender participation gap in crime. *European Economic Review*, 109, 289–304. <https://doi.org/10.1016/j.eurocorev.2018.03.014>
- Carlsson, C., & Sarnecki, J. (2015). *An Introduction to Life-course Criminology*. Sage.
- Caruana, E. J., Roman, M., Hernández-Sánchez, J., & Solli, P. (2015). Longitudinal studies. *Journal of thoracic disease*, 7(11), E537–E540. <https://doi.org/10.3978/j.issn.2072-1439.2015.10.63>
- Casey, B.J., Simmons, C., Somerville, L.H., & Baskin-Sommers, A. (2022). Making the sentencing case: Psychological and neuroscientific evidence for expanding the age of youthful offenders. *Annual Review of Criminology*, 5(1), 321–343. <http://doi.org/10.1146/annurev-criminol-030920-113250>
- Cashman, E. L., & Thomas, S. D. (2016). Does mental illness impact the incidence of crime and victimisation among young people? *Psychiatry, psychology, and law: An interdisciplinary journal of the Australian and New Zealand Association of Psychiatry, Psychology and Law*, 24(1), 33–46. <https://doi.org/10.1080/13218719.2016.1195476>
- Chang, Z., Larsson, H., Lichtenstein, P., & Fazel, S. (2015a). Psychiatric disorders and violent reoffending: A national cohort study of convicted prisoners in Sweden. *The lancet. Psychiatry*, 2(10), 891–900. [https://doi.org/10.1016/S2215-0366\(15\)00234-5](https://doi.org/10.1016/S2215-0366(15)00234-5)
- Chang, Z., Lichtenstein, P., Larsson, H., & Fazel, S. (2015b). Substance use disorders, psychiatric disorders, and mortality after release from prison: A nationwide longitudinal cohort study. *The lancet. Psychiatry*, 2(5), 422–430. [https://doi.org/10.1016/S2215-0366\(15\)00088-7](https://doi.org/10.1016/S2215-0366(15)00088-7)
- Chassin, L., Piquero, A. R., Losoya, S. H., Mansion, A. D., & Schubert, C. A. (2013). Joint Consideration of Distal and Proximal Predictors of Premature Mortality Among Serious Juvenile Offenders. *Journal of Adolescent Health*, 52(6), 689–696. <https://doi.org/10.1016/j.jadohealth.2012.11.018>

- Cho, M., & Lee, C. H. (2022). Childhood maltreatment and repeat offending in juvenile delinquents: A propensity score matched-control study. *Youth & Society*, 54(7), 1178-1199.
<https://doi.org/10.1177/0044118X211001090>
- Choi, B. S., Kim, J. I., Kim, B. N., & Kim, B. (2017). Comorbidities and correlates of conduct disorder among male juvenile detainees in South Korea. *Child and Adolescent Psychiatry and Mental Health*, 11(1), 44-44. <https://doi.org/10.1186/s13034-017-0182-3>
- Cipriani, D. (2009). *Children's Rights and the Minimum Age of Criminal Responsibility: A Global Perspective* (1st ed.). Routledge.
<https://doi.org/10.4324/9781315571584>
- Cohen, A. O., & Casey, B. J. (2014). Rewiring juvenile justice: The intersection of developmental neuroscience and legal policy. *Trends in Cognitive Sciences*, 18(2), 63-65. <https://doi.org/10.1016/j.tics.2013.11.002>
- Coker, K.L., Smith, P.H., Westphal, A., Zonana, H.V., & McKee, S.A. (2014). Crime and psychiatric disorders among youth in the US population: An analysis of the National Comorbidity Survey-Adolescent Supplement. *Journal of the American Academy of Child and Adolescent Psychiatry*, 53(8), 888-898.
<https://doi.org/10.1016/j.jaac.2014.05.007>
- Copeland, W. E., Miller-Johnson, S., Keeler, G., Angold, A., & Costello, E. J. (2007). Childhood psychiatric disorders and young adult crime: A prospective, population-based study. *The American Journal of Psychiatry*, 164(11), 1668-1675.
<https://doi.org/10.1176/appi.ajp.2007.06122026>
- Cops, D., & Pleysier, S. (2014). Usual suspects, ideal victims and vice versa: The relationship between youth offending and victimization and the mediating influence of risky lifestyles. *European Journal of Criminology*, 11(3), 361-378.
<https://doi.org/10.1177/1477370813500886>

- Costello, E. J., Mustillo, S., Erkanli, A., Keeler, G., & Angold, A. (2003). Prevalence and Development of Psychiatric Disorders in Childhood and Adolescence. *Arch Gen Psychiatry*, 60(8):837–844. <https://doi.org/10.1001/archpsyc.60.8.837>
- Cravedi, E., Deniau, E., Giannitelli, M., Xavier, J., Hartmann, A., & Cohen, D. (2017). Tourette syndrome and other neurodevelopmental disorders: a comprehensive review. *Child and adolescent psychiatry and mental health*, 11, 59. <https://doi.org/10.1186/s13034-017-0196-x>
- Dalgleish, T., Black, M., Johnston, D., & Bevan, A. (2020). Transdiagnostic approaches to mental health problems: Current status and future directions. *Journal of consulting and clinical psychology*, 88(3), 179–195. <https://doi.org/10.1037/ccp0000482>
- Day, D. M., & Wiesner, M. (2019). *Criminal Trajectories: A Developmental Perspective* (Vol. 2). NYU Press. <http://www.jstor.org/stable/j.ctv12fw68d>
- de Mooij, L. D., Kikkert, M., Theunissen, J., Beekman, A. T. F., de Haan, L., Duurkoop, P. W. R. A., Van, H. L., & Dekker, J. J. M. (2019). Dying too soon: Excess mortality in severe mental illness. *Frontiers in psychiatry*, 10, 855. <https://doi.org/10.3389/fpsyt.2019.00855>
- de Wit, H. (2009). Impulsivity as a determinant and consequence of drug use: a review of underlying processes. *Addiction biology*, 14(1), 22–31. <https://doi.org/10.1111/j.1369-1600.2008.00129.x>
- Dean, K., Mortensen, P. B., Stevens, H., Murray, R. M., Walsh, E., & Agerbo, E. (2012). Criminal conviction among offspring with parental history of mental disorder. *Psychological medicine*, 42(3), 571–581. <https://doi.org/10.1017/S0033291711001395>
- Dean, K., Stevens, H., Mortensen, P. B., Murray, R. M., Walsh, E., & Pedersen, C. B. (2010). Full spectrum of psychiatric outcomes among offspring with parental history of mental disorder. *Archives of general psychiatry*, 67(8), 822–829. <https://doi.org/10.1001/archgenpsychiatry.2010.86>

- DeLisi, M. (2015). Age-crime curve and criminal career patterns. In: Morizot, J., Kazemian, L. (Eds.). *The Development of Criminal and Antisocial Behavior*. (pp. 51-63). Springer.
https://doi.org/10.1007/978-3-319-08720-7_4
- Donley, S., Habib, L., Jovanovic, T., Kamkwala, A., Evces, M., Egan, G., Bradley, B., & Ressler, K. J. (2012). Civilian PTSD symptoms and risk for involvement in the criminal justice system. *The journal of the American Academy of Psychiatry and the Law*, 40(4), 522–529.
- Duke, A. A., Smith, K. M. Z., Oberleitner, L. M. S., Westphal, A., & McKee, S. A. (2018). Alcohol, drugs, and violence: A meta-meta-analysis. *Psychology of Violence*, 8(2), 238–249.
<https://doi.org/10.1037/vio0000106>
- Eaton, W. W., Neufeld, K., Chen, L. S., & Cai, G. (2000). A comparison of self-report and clinical diagnostic interviews for depression: diagnostic interview schedule and schedules for clinical assessment in neuropsychiatry in the Baltimore epidemiologic catchment area follow-up. *Archives of general psychiatry*, 57(3), 217–222.
<https://doi.org/10.1001/archpsyc.57.3.217>
- Ekbom A. (2011). The Swedish Multi-Generation Register. *Methods in molecular biology (Clifton, N.J.)*, 675, 215–220.
https://doi.org/10.1007/978-1-59745-423-0_10
- Elder, G.H., Jr. & Shanahan, M.J. (2007). The Life Course and Human Development. In W. Damon, R.M. Lerner and R.M. (Eds.) *Handbook of Child Psychology*.
<https://doi.org/10.1002/9780470147658.chpsy0112>
- Elonheimo, H., Sourander, A., Niemelä, S., Nuutila, A.-M., Helenius, H., Sillanmäki, L., Ristkari, T., & Parkkola, K. (2009). Psychosocial correlates of police-registered youth crime. A Finnish population-based study. *Nordic Journal of Psychiatry*, 63(4), 292–300.
<https://doi.org/10.1080/08039480902727058>

- Elshahat, S., Moffat, T., & Newbold, K. B. (2022). Understanding the healthy immigrant effect in the context of mental health challenges: A systematic critical review. *Journal of immigrant and minority health*, 24(6), 1564–1579. <https://doi.org/10.1007/s10903-021-01313-5>
- Eriksson, A. (2012). *Särbehandling av lagöverträdare 18–20 år*. Stockholm: The Swedish National Council for Crime Prevention. Retrieved from: <https://bra.se/publikationer/arkiv/publikationer/2012-03-22-sarbehandling-av-lagovertradare-18-20-ar.html>.
- Estrada, F., Bäckman, O., & Nilsson, A. (2016). The darker side of equality? The declining gender gap in crime: Historical trends and an enhanced analysis of staggered birth cohorts. *British Journal of Criminology*, 56(6), 1272–1290. <https://doi.org/10.1093/bjc/azv114>
- Estrada, F., & Flyghed, J. (2017). *Den svenska ungdomsbrottsligheten* (Fjärde upplagan). Studentlitteratur.
- Fagan, A. A., & Benedini, K. M. (2019). Family influences on youth offending. In D. P. Farrington, L. Kazemian, & A. R. Piquero (Eds.), *The Oxford handbook of developmental and life-course criminology* (pp. 378–403). New York, NY: Oxford University Press.
- Falk, Ö., Wallinius, M., Lundström, S., Frisell, T., Anckarsäter, H., & Kerekes, N. (2014). The 1% of the population accountable for 63% of all violent crime convictions. *Social psychiatry and psychiatric epidemiology*, 49(4), 559–571. <https://doi.org/10.1007/s00127-013-0783-y>
- Faraone, S. V., Biederman, J., & Mick, E. (2006). The age-dependent decline of attention deficit hyperactivity disorder: A meta-analysis of follow-up studies. *Psychological Medicine*, 36(2), 159–165. PMID: 16420712. <https://doi.org/10.1017/S003329170500471X>
- Farrer, T. J., Frost, R. B., & Hedges, D. W. (2013). Prevalence of traumatic brain injury in juvenile offenders: A meta-analysis. *Child Neuropsychology*, 19, 225–234. <https://doi.org/10.1080/09297049.2011.647901>

- Farrington, D. P. (2003). Developmental and life-course criminology: Key theoretical and empirical issues – The 2002 Sutherland award address. *Criminology*, 42, 211–255. <https://doi.org/10.1111/j.1745-9125.2003.tb00987.x>
- Farrington, D. P., & Welsh, B. C. (2003). Family-based prevention of offending: A meta-analysis. *Australian & New Zealand Journal of Criminology*, 36(2), 127–151. <https://doi.org/10.1375/acri.36.2.127>
- Farrington, D. P., Coid, J. W., Harnett, L., Jolliffe, D., Soteriou, N., Turner, R., & West, D. J. (2006). *Criminal careers up to age 50 and life success up to age 48: New findings from the Cambridge Study in Delinquent Development* (Vol. 94). London, UK: Home Office Research, Development and Statistics Directorate.
- Farrington, D. P., Ttofi, M. M., & Piquero, A. R. (2016). Risk, promotive, and protective factors in youth offending: Results from the Cambridge study in delinquent development. *Journal of Criminal Justice*, 45, 63–70. <https://doi.org/10.1016/j.jcrimjus.2016.02.014>
- Fazel, S., & Runeson, B. (2020). Suicide. *The New England Journal of Medicine*, 382, 266–274. <https://doi.org/10.1056/NEJMr1902944>
- Fazel, S., Doll, H., & Långström, N. (2008). Mental disorders among adolescents in juvenile detention and correctional facilities: a systematic review and metaregression analysis of 25 surveys. *Journal of the American Academy of Child and Adolescent Psychiatry*, 47(9), 1010–1019. <https://doi.org/10.1097/CHI.ObO13e31817eecf3>
- Fazel, S., Hayes, A. J., Bartellas, K., Clerici, M., & Trestman, R. (2016). Mental health of prisoners: prevalence, adverse outcomes, and interventions. *The lancet. Psychiatry*, 3(9), 871–881. [https://doi.org/10.1016/S2215-0366\(16\)30142-0](https://doi.org/10.1016/S2215-0366(16)30142-0)
- Fazel, S., Långström, N., Hjern, A., Grann, M., & Lichtenstein, P. (2009). Schizophrenia, substance abuse, and violent crime. *JAMA*, 301(19), 2016–2023. <https://doi.org/10.1001/jama.2009.675>

- Fazel, S., Smith, E. N., Chang, Z., & Geddes, J. R. (2018). Risk factors for interpersonal violence: An umbrella review of meta-analyses. *The British journal of psychiatry: The journal of mental science*, 213(4), 609–614. <https://doi.org/10.1192/bjp.2018.145>
- Fogden, B. C., Thomas, S. D., Daffern, M., & Ogloff, J. R. (2016). Crime and victimisation in people with intellectual disability: A case linkage study. *BMC psychiatry*, 16, 170. <https://doi.org/10.1186/s12888-016-0869-7>
- Forsyth, L., McSorley, M., & Rydzewska, E. (2023). All-cause and cause-specific mortality in people with autism spectrum disorder: A systematic review. *Research in Autism Spectrum Disorders*, 105, 102165-. <https://doi.org/10.1016/j.rasd.2023.102165>
- Fox, B. H., Perez, N., Cass, E., Baglivio, M. T., & Epps, N. (2015). Trauma changes everything: examining the relationship between adverse childhood experiences and serious, violent and chronic juvenile offenders. *Child abuse & neglect*, 46, 163–173. <https://doi.org/10.1016/j.chiabu.2015.01.011>
- Fox, J., & Weisberg, S. (2011). Cox Proportional-Hazards Regression for survival data in R. In J. Fox & S. Weisberg (Eds.), *An R companion to applied regression* (Vol. 2). SAGE.
- Frisell, T., Lichtenstein, P., & Långström, N. (2011). Violent crime runs in families: a total population study of 12.5 million individuals. *Psychological medicine*, 41(1), 97–105. <https://doi.org/10.1017/S0033291710000462>
- Frisell, T., Pawitan, Y., Långström, N., & Lichtenstein, P. (2012). Heritability, assortative mating and gender differences in violent crime: results from a total population sample using twin, adoption, and sibling models. *Behavior genetics*, 42(1), 3–18. <https://doi.org/10.1007/s10519-011-9483-0>
- Galloway, T. A., & Skardhamar, T. (2010). Does parental income matter for onset of offending? *European Journal of Criminology*, 7(6), 424–441. <https://doi.org/10.1177/1477370810376569>

- GBD 2019 Mental Disorders Collaborators (2022). Global, regional, and national burden of 12 mental disorders in 204 countries and territories, 1990-2019: a systematic analysis for the Global Burden of Disease Study 2019. *The lancet. Psychiatry*, 9(2), 137–150. [https://doi.org/10.1016/S2215-0366\(21\)00395-3](https://doi.org/10.1016/S2215-0366(21)00395-3)
- Ghirardi, L., Kuja-Halkola, R., Pettersson, E., Sariaslan, A., Arseneault, L., Fazel, S., D’Onofrio, B. M., Lichtenstein, P., & Larsson, H. (2023). Neurodevelopmental disorders and subsequent risk of violent victimization: exploring sex differences and mechanisms. *Psychological Medicine*, 53(4), 1510–1517. <https://doi.org/10.1017/S0033291721003093>
- Gilman, A. B., Hill, K. G., & Hawkins, J. D. (2015). When is youths' debt to society paid off? Examining the long-term consequences of juvenile incarceration for adult functioning. *Journal of developmental and life-course criminology*, 1(1), 33–47. <https://doi.org/10.1007/s40865-015-0002-5>
- Guldin, M. B., Li, J., Pedersen, H. S., Obel, C., Agerbo, E., Gissler, M., Cnattingius, S., Olsen, J., & Vestergaard, M. (2015). Incidence of suicide among persons who had a parent who died during their childhood: A population-based cohort study. *JAMA psychiatry*, 72(12), 1227–1234. <https://doi.org/10.1001/jamapsychiatry.2015.2094>
- Haag, K., Fraser, A., Hiller, R., Seedat, S., Zimmerman, A., & Halligan, S. L. (2020). The emergence of sex differences in PTSD symptoms across development: evidence from the ALSPAC cohort. *Psychological medicine*, 50(10), 1755–1760. <https://doi.org/10.1017/S0033291719001971>
- Hanson, R. F., Sawyer, G. K., Begle, A. M., & Hubel, G. S. (2010). The impact of crime victimization on quality of life. *Journal of traumatic stress*, 23(2), 189–197. <https://doi.org/10.1002/jts.20508>

- Heeramun, R., Magnusson, C., Gumpert, C. H., Granath, S., Lundberg, M., Dalman, C., & Rai, D. (2017). Autism and convictions for violent crimes: Population-based cohort study in Sweden. *Journal of the American Academy of Child and Adolescent Psychiatry*, 56(6), 491-497.
<https://doi.org/10.1016/j.jaac.2017.03.011>
- Heller, P., Morosan, L., Badoud, D., Laubscher, M., Jimenez Olariaga, L., Debbané, M., Wolff, H., & Baggio, S. (2022). Prevalence Rates and Evolution of Psychiatric Disorders Among Incarcerated Youths in Comparison With Non-incarcerated Youths. *Frontiers in psychiatry*, 12, 784954. <https://doi.org/10.3389/fpsy.2021.784954>
- Hirvikoski, T., Boman, M., Tideman, M., Lichtenstein, P., & Butwicki, A. (2021). Association of intellectual disability with all-cause and cause-specific mortality in Sweden. *JAMA network open*, 4(6), e2113014.
<https://doi.org/10.1001/jamanetworkopen.2021.13014>
- Hirvikoski, T., Mittendorfer-Rutz, E., Boman, M., Larsson, H., Lichtenstein, P., & Bölte, S. (2016). Premature mortality in autism spectrum disorder. *British Journal of Psychiatry*, 208(3), 232-238.
<https://doi.org/10.1192/bjp.bp.114.160192>
- Hiyoshi, A., Berg, L., Grotta, A., Almquist, Y., & Rostila, M. (2021). Parental death in childhood and pathways to increased mortality across the life course in Stockholm, Sweden: A cohort study. *PLoS medicine*, 18(3), e1003549.
<https://doi.org/10.1371/journal.pmed.1003549>
- Hodgins, S. (2022). Female forensic patients may be an atypical sub-type of females presenting aggressive and antisocial behavior. *Frontiers in Psychiatry*, 13, 809901.
<https://doi.org/10.3389/fpsy.2022.809901>
- Hogg, B., Gardoki-Souto, I., Valiente-Gómez, A., Rosa, A. R., Fortea, L., Radua, J., Amann, B. L., & Moreno-Alcázar, A. (2023). Psychological trauma as a transdiagnostic risk factor for mental disorder: an umbrella meta-analysis. *European archives of psychiatry and clinical neuroscience*, 273(2), 397-410.
<https://doi.org/10.1007/s00406-022-01495-5>

- Holloway, K. R., Bennett, T. H., & Farrington, D. P. (2006). The effectiveness of drug treatment programs in reducing criminal behavior: a meta-analysis. *Psicothema*, 18(3), 620–629.
- Im, D. S. (2016). Template to perpetrate: An update on violence in Autism Spectrum Disorder. *Harvard Review of Psychiatry*, 24(1), 14–35. <https://doi.org/10.1097/HRP.0000000000000087>
- Jäggi, L. J., Mezuk, B., Watkins, D. C., & Jackson, J. S. (2016). The relationship between trauma, arrest, and incarceration history among black Americans: Findings from the national survey of American life. *Society and mental health*, 6(3), 187–206. <https://doi.org/10.1177/2156869316641730>
- Janson, C.-G. (2004). Youth Justice in Sweden. *Crime and Justice*, 31, 391–441. <https://doi.org/10.1086/655345>
- Jennings W.G., Piquero, A. R., & Reingle, J. M. (2012). On the overlap between victimization and offending: A review of the literature. *Aggression and Violent Behavior*, 17(1), 16–26. <https://doi.org/10.1016/j.avb.2011.09.003>
- Jewell, J. D., Malone, M. D., Rose, P., Sturgeon, D., & Owens, S. (2015). A multiyear follow-up study examining the effectiveness of a cognitive behavioral group therapy program on the recidivism of juveniles on probation. *International journal of offender therapy and comparative criminology*, 59(3), 259–272. <https://doi.org/10.1177/0306624X13509065>
- Jolliffe, D., Farrington, D. P., Brunton-Smith, I., Loeber, R., Ahonen, L., & Palacios, A. P. (2019). Depression, anxiety and delinquency: Results from the Pittsburgh Youth Study. *Journal of Criminal Justice*, 62, 42-49. <https://doi.org/10.1016/j.jcrimjus.2018.08.004>
- Jozefiak, T., Kayed, N. S., Rimehaug, T., Wormdal, A. K., Brubakk, A. M., & Wichstrøm, L. (2016). Prevalence and comorbidity of mental disorders among adolescents living in residential youth care. *European child & adolescent psychiatry*, 25(1), 33–47. <https://doi.org/10.1007/s00787-015-0700-x>

- Källmen, H., Israelsson, M., Wennberg, P., & Berman, A. H. (2023). Criminal behavior and mental health problems among adolescents: A cross-sectional study and description of prevention policy in Sweden. *Criminal Justice Ethics*, 42 (2), 158-177, <https://doi.org/10.1080/0731129x.2023.2241765>
- Kamis, C. (2021). The long-term impact of parental mental health on children's distress trajectories in adulthood. *Society and Mental Health*, 11(1), 54-68. <https://doi.org/10.1177/2156869320912520>
- Kazemian, L., Farrington, D. P., & Piquero, A. R. (2019). Developmental and Life-course Criminology. In D. P. Farrington, L. Kazemian, & A. R. Piquero (Eds.), *The Oxford Handbook of Developmental and Life-Course Criminology* (pp. 3-12). Oxford University Press.
- Kendler, K. S., Morris, N. A., Ohlsson, H., Lönn, S. L., Sundquist, J., & Sundquist, K. (2016). Criminal offending and the family environment: Swedish national high-risk home-reared and adopted-away co-sibling control study. *British Journal of Psychiatry*, 209(4), 294-299. <https://doi.org/10.1192/bjp.bp.114.159558>
- Kendler, K. S., Patrick, C. J., Larsson, H., Gardner, C. O., & Lichtenstein, P. (2013). Genetic and environmental risk factors in males for self-report externalizing traits in mid-adolescence and criminal behavior through young adulthood. *Psychological Medicine*, 43(10), 2161-2168. <https://doi.org/10.1017/S003329171300007X>
- Kessler, R. C., Avenevoli, S., McLaughlin, K. A., Green, J. G., Lakoma, M. D., Petukhova, M., Pine, D. S., Sampson, N. A., Zaslavsky, A. M., & Merikangas, K. R. (2012). Lifetime comorbidity of DSM-IV disorders in the US National Comorbidity Survey Replication Adolescent Supplement (NCS-A). *Psychological medicine*, 42(9), 1997-2010. <https://doi.org/10.1017/S0033291712000025>

- King, C., & Murphy, G. H. (2014). A systematic review of people with autism spectrum disorder and the criminal justice system. *Journal of autism and developmental disorders*, 44(11), 2717–2733. <https://doi.org/10.1007/s10803-014-2046-5>
- Kjellstrand, J. M., & Eddy, J. M. (2011). Parental incarceration during childhood, family context, and youth problem behavior across adolescence. *Journal of offender rehabilitation*, 50(1), 18–36. <https://doi.org/10.1080/10509674.2011.536720>
- Kjelsberg, E., & Laake, P. (2010). Is the high mortality risk in sentenced offenders independent of previous imprisonment? *European Journal of Epidemiology*, 25, 237–243. <https://doi.org/10.1007/s10654-010-9436-6>
- Klinteberg, B., Almquist, Y., Beijer, U., & Rydelius, P. A. (2011). Family psychosocial characteristics influencing criminal behaviour and mortality—possible mediating factors: a longitudinal study of male and female subjects in the Stockholm Birth Cohort. *BMC Public Health*, 11(1), 756–756. <https://doi.org/10.1186/1471-2458-11-756>
- Koenen, K. C., Ratanatharathorn, A., Ng, L., McLaughlin, K. A., Bromet, E. J., Stein, D. J., Karam, E. G., Meron Ruscio, A., Benjet, C., Scott, K., Atwoli, L., Petukhova, M., Lim, C. C. W., Aguilar-Gaxiola, S., Al-Hamzawi, A., Alonso, J., Bunting, B., Ciutan, M., de Girolamo, G., Degenhardt, L., ... Kessler, R. C. (2017). Posttraumatic stress disorder in the World Mental Health Surveys. *Psychological medicine*, 47(13), 2260–2274. <https://doi.org/10.1017/S0033291717000708>
- Kofler, M. J., McCart, M. R., Zajac, K., Ruggiero, K. J., Saunders, B. E., & Kilpatrick, D. G. (2011). Depression and delinquency covariation in an accelerated longitudinal sample of adolescents. *Journal of consulting and clinical psychology*, 79(4), 458–469. <https://doi.org/10.1037/a0024108>
- Kuja-Halkola, R., Lichtenstein, P., D'Onofrio, B. M., & Larsson, H. (2015). Codevelopment of ADHD and externalizing behavior from childhood to adulthood. *Journal of child psychology and psychiatry*,

- and allied disciplines*, 56(6), 640–647.
<https://doi.org/10.1111/jcpp.12340>
- Kuja-Halkola, R., Pawitan, Y., D'Onofrio, B. M., Långström, N., & Lichtenstein, P. (2012). Advancing paternal age and offspring violent offending: A sibling-comparison study. *Development and psychopathology*, 24(3), 739–753.
<https://doi.org/10.1017/S095457941200034X>
- Lanctot, N., Cernkovich, S.A., & Giordano, P.C. (2007). Delinquent behavior, official delinquency, and gender: Consequences for adulthood functioning and well-being. *Criminology*, 45(1), 131–157. <https://doi.org/10.1111/j.1745-9125.2007.00074.x>
- Lappi-Seppälä, T. (2011). Nordic Youth Justice. *Crime and Justice*, 40(1), 199–264. <https://doi.org/10.1086/661113>
- Lara, C., Fayyad, J., de Graaf, R., Kessler, R. C., Aguilar-Gaxiola, S., Angermeyer, M., Demyttenaere, K., de Girolamo, G., Haro, J. M., Jin, R., Karam, E. G., Lépine, J. P., Mora, M. E., Ormel, J., Posada-Villa, J., & Sampson, N. (2009). Childhood predictors of adult attention-deficit/hyperactivity disorder: Results from the World Health Organization World Mental Health Survey Initiative. *Biological psychiatry*, 65(1), 46–54.
<https://doi.org/10.1016/j.biopsych.2008.10.005>
- Latvala, A., Kuja-Halkola, R., Almqvist, C., Larsson, H., & Lichtenstein, P. (2015). A longitudinal study of resting heart rate and violent criminality in more than 700 000 men. *JAMA psychiatry*, 72(10), 971–978.
<https://doi.org/10.1001/jamapsychiatry.2015.1165>
- Latvala, A., Tideman, M., Søndena, E., Larsson, H., Butwicki, A., Fazel, S., & Lichtenstein, P. (2023). Association of intellectual disability with violent and sexual crime and victimization: A population-based cohort study. *Psychological medicine*, 53(9), 3817–3825. <https://doi.org/10.1017/S0033291722000460>
- Leonardsen, D., & Andrews, T. (2022). Youth justice reforms in Norway: Professional support for the panopticon society? *Youth Justice*, 22(1), 85–100. <https://doi.org/10.1177/1473225421995265>

- Lewis, S. J., Arseneault, L., Caspi, A., Fisher, H. L., Matthews, T., Moffitt, T. E., Odgers, C. L., Stahl, D., Teng, J. Y., & Danese, A. (2019). The epidemiology of trauma and post-traumatic stress disorder in a representative cohort of young people in England and Wales. *The lancet. Psychiatry*, 6(3), 247–256.
[https://doi.org/10.1016/S2215-0366\(19\)30031-8](https://doi.org/10.1016/S2215-0366(19)30031-8)
- Li, L., Chang, Z., Sun, J., Garcia-Argibay, M., Du Rietz, E., Dobrosavljevic, M., Brikell, I., Jernberg, T., Solmi, M., Cortese, S., & Larsson, H. (2022). Attention-deficit/hyperactivity disorder as a risk factor for cardiovascular diseases: a nationwide population-based cohort study. *World psychiatry : official journal of the World Psychiatric Association (WPA)*, 21(3), 452–459.
<https://doi.org/10.1002/wps.21020>
- Li, Q., Li, Y., Zheng, J., Yan, X., Huang, J., Xu, Y., Zeng, X., Shen, T., Xing, X., Chen, Q., & Yang, W. (2023). Prevalence and trends of developmental disabilities among US children and adolescents aged 3 to 17 years, 2018–2021. *Scientific reports*, 13(1), 17254.
<https://doi.org/10.1038/s41598-023-44472-1>
- Lichtenstein, P., Halldner, L., Zetterqvist, J., Sjölander, A., Serlachius, E., Fazel, S., Långström, N., & Larsson, H. (2012). Medication for attention deficit-hyperactivity disorder and criminality. *The New England journal of medicine*, 367(21), 2006–2014.
<https://doi.org/10.1056/NEJMoa1203241>
- Lindberg, N., Miettunen, J., Heiskala, A., & Kaltiala-Heino, R. (2017). Mortality of young offenders: A national register-based follow-up study of 15- to 19-year-old Finnish delinquents referred for forensic psychiatric examination between 1980 and 2010. *Child and adolescent psychiatry and mental health*, 11, 37.
<https://doi.org/10.1186/s13034-017-0174-3>
- Ludvigsson, J. F., Almqvist, C., Bonamy, A.-K. E., Ljung, R., Michaëlsson, K., Neovius, M., Stephansson, O., & Ye, W. (2016). Registers of the Swedish total population and their use in medical research. *European Journal of Epidemiology*, 31(2), 125–136.
<https://doi.org/10.1007/s10654-016-0117-y>

- Ludvigsson, J. F., Andersson, E., Ekbom, A., Feychting, M., Kim, J.-L., Reuterwall, C., & Olausson, P. O. (2011). External review and validation of the Swedish national inpatient register. *BMC Public Health*, 11, 450. <https://doi.org/10.1186/1471-2458-11-450>
- Ludvigsson, J. F., Håberg, S. E., Knudsen, G. P., Lafolie, P., Zoega, H., Sarkkola, C., von Kraemer, S., Weiderpass, E., & Nørgaard, M. (2015). Ethical aspects of registry-based research in the Nordic countries. *Clinical Epidemiology*, 7, 491–508. <https://doi.org/10.2147/CLEP.S90589>
- Ludvigsson, J. F., Otterblad-Olausson, P., Pettersson, B. U., & Ekbom, A. (2009). Swedish personal identity number: possibilities and pitfalls in healthcare and medical research. *European Journal of Epidemiology*, 24(11), 659–667. <https://doi.org/10.1007/s10654-009-9350-y>
- Ludvigsson, J. F., Svedberg, P., Olén, O., Bruze, G., & Neovius, M. (2019). The longitudinal integrated database for health insurance and labour market studies (LISA) and its use in medical research. *European Journal of Epidemiology*, 34(4), 423–437. <https://doi.org/10.1007/s10654-019-00511-8>
- Lundström, S., Forsman, M., Larsson, H., Kerekes, N., Serlachius, E., Långström, N., & Lichtenstein, P. (2014). Childhood neurodevelopmental disorders and violent criminality: A sibling control study. *Journal of Autism and Developmental Disorders*, 44(11), 2707–2716. <https://doi.org/10.1007/s10803-013-1873-0>
- Malvaso, C. G., Cale, J., Whitten, T., Day, A., Singh, S., Hackett, L., Delfabbro, P. H., & Ross, S. (2022). Associations between adverse childhood experiences and trauma among young people who offend: A systematic literature review. *Trauma, violence & abuse*, 23(5), 1677–1694. <https://doi.org/10.1177/15248380211013132>
- Massoglia, M., & Pridemore, W. A. (2015). Incarceration and health. *Annual Review of Sociology*, 41, 291–310. <https://doi.org/10.1146/annurev-soc-073014-112326>

- Mataix-Cols, D., Virtanen, S., Sidorchuk, A., Fernández de la Cruz, L., Larsson, H., Lichtenstein, P., & Latvala, A. (2022). Association of Tourette syndrome and chronic Tic disorder with violent assault and criminal convictions. *JAMA neurology*, 79(5), 459–467. <https://doi.org/10.1001/jamaneurol.2022.0167>
- Maulik, P. K., Mascarenhas, M. N., Mathers, C. D., Dua, T., & Saxena, S. (2011). Prevalence of intellectual disability: a meta-analysis of population-based studies. *Research in developmental disabilities*, 32(2), 419–436. <https://doi.org/10.1016/j.ridd.2010.12.018>
- May, J., Osmond, K., & Billick, S. (2014). Juvenile delinquency treatment and prevention: A literature review. *The Psychiatric quarterly*, 85(3), 295–301. <https://doi.org/10.1007/s11126-014-9296-4>
- Mazerolle, P., & McPhedran, S. (2019). Specialization and Versatility in Offending. In D. P. Farrington, L. Kazemian, & A. R. Piquero (Eds.), *The Oxford Handbook of Developmental and Life-Course Criminology* (pp. 49-69). Oxford University Press.
- Mazzucco, S., Suhrcke, M. & Zanotto, L (2021). How to measure premature mortality? A proposal combining “relative” and “absolute” approaches. *Popul Health Metrics* 19, 41. <https://doi.org/10.1186/s12963-021-00267-y>
- McGee, T.R., & Moffitt, T. E. (2019) The Developmental Taxonomy, L. In D. P. Farrington, L. Kazemian, & A. R. Piquero (Eds.), *The Oxford Handbook of Developmental and Life-Course Criminology* (pp. 149-158). Oxford University Press.
- McGloin, J. M., Schreck, C. J., Stewart, E. A., & Ousey, G. C. (2011). Predicting the violent offender: The discriminant validity of the subculture of violence. *Criminology*, 49(3), 767-794. <https://doi.org/10.1111/j.1745-9125.2011.00235.x>

- McLaughlin, K. A., Colich, N. L., Rodman, A. M., & Weissman, D. G. (2020). Mechanisms linking childhood trauma exposure and psychopathology: a transdiagnostic model of risk and resilience. *BMC medicine*, 18(1), 96. <https://doi.org/10.1186/s12916-020-01561-6>
- McLean, C. P., Asnaani, A., Litz, B. T., & Hofmann, S. G. (2011). Gender differences in anxiety disorders: prevalence, course of illness, comorbidity and burden of illness. *Journal of psychiatric research*, 45(8), 1027–1035. <https://doi.org/10.1016/j.jpsychires.2011.03.006>
- McReynolds, L. S., Schwalbe, C. S., & Wasserman, G. A. (2010). The contribution of psychiatric disorder to juvenile recidivism. *Criminal Justice and Behavior*, 37(2), 204–216. <https://doi.org/10.1177/0093854809354961>
- Merikangas, K. R., He, J. P., Burstein, M., Swanson, S. A., Avenevoli, S., Cui, L., Benjet, C., Georgiades, K., & Swendsen, J. (2010). Lifetime prevalence of mental disorders in U.S. adolescents: results from the National Comorbidity Survey Replication–Adolescent Supplement (NCS-A). *Journal of the American Academy of Child and Adolescent Psychiatry*, 49(10), 980–989. <https://doi.org/10.1016/j.jaac.2010.05.017>
- Miley, L. N., Fox, B., Muniz, C. N., Perkins, R., & DeLisi, M. (2020). Does childhood victimization predict specific adolescent offending? An analysis of generality versus specificity in the victim-offender overlap. *Child Abuse & Neglect*, 101, 104328. <https://doi.org/10.1016/j.chiabu.2019.104328>
- Millum, J., Campbell, M., Luna, F., Malekzadeh, A., & Karim, Q. A. (2019). Ethical challenges in global health-related stigma research. *BMC Medicine*, 17(1), 84–84. <https://doi.org/10.1186/s12916-019-1317-6>
- Moberg, T., Stenbacka, M., Tengström, A., Jönsson, E. G., Nordström, P., & Jokinen, J. (2015). Psychiatric and neurological disorders in late adolescence and risk of convictions for violent crime in men. *BMC psychiatry*, 15, 299. <https://doi.org/10.1186/s12888-015-0683-7>

- Moffitt T. E. (1993). Adolescence-limited and life-course-persistent antisocial behavior: a developmental taxonomy. *Psychological review*, 100(4), 674–701.
- Moffitt, T. E. (2018). Male antisocial behaviour in adolescence and beyond. *Nature Human Behaviour*, 2(3), 177–186. <https://doi.org/10.1038/s41562-018-0309-4>
- Mohr-Jensen, C., & Steinhausen, H. C. (2016). A meta-analysis and systematic review of the risks associated with childhood attention-deficit hyperactivity disorder on long-term outcome of arrests, convictions, and incarcerations. *Clinical psychology review*, 48, 32–42. <https://doi.org/10.1016/j.cpr.2016.05.002>
- Mohr-Jensen, C., Müller Bisgaard, C., Boldsen, S. K., & Steinhausen, H. C. (2019). Attention-deficit/hyperactivity disorder in childhood and adolescence and the risk of crime in young adulthood in a Danish nationwide study. *Journal of the American Academy of Child and Adolescent Psychiatry*, 58(4), 443–452. <https://doi.org/10.1016/j.jaac.2018.11.016>
- Mok, P. L., Pedersen, C. B., Springate, D., Astrup, A., Kapur, N., Antonsen, S., ... Webb, R. T. (2016). Parental psychiatric disease and risks of attempted suicide and violent criminal offending in offspring: A population-based cohort study. *JAMA Psychiatry*, 73, 1015–1022. <https://doi.org/10.1001/jamapsychiatry.2016.1728>
- Momen, N. C., Plana-Ripoll, O., Agerbo, E., Christensen, M. K., Iburg, K. M., Laursen, T. M., Mortensen, P. B., Pedersen, C. B., Prior, A., Weye, N., & McGrath, J. J. (2022). Mortality associated with mental disorders and comorbid general medical conditions. *JAMA psychiatry*, 79(5), 444–453. <https://doi.org/10.1001/jamapsychiatry.2022.0347>
- Moore, K. E., Oberleitner, L. M. S., Zonana, H. V., Buchanan, A. W., Pittman, B. P., Verplaetse, T. L., Angarita, G. A., Roberts, W., & McKee, S. A. (2019). Psychiatric disorders and crime in the US population: Results from the National Epidemiologic Survey on Alcohol and Related Conditions Wave III. *The Journal of clinical psychiatry*, 80(2). <https://doi.org/10.4088/JCP.18m12317>

- Moore, K. E., Oberleitner, L. M. S., Zonana, H. V., Buchanan, A. W., Pittman, B. P., Verplaetse, T. L., Angarita, G. A., Roberts, W., & McKee, S. A. (2019). Psychiatric disorders and crime in the US population: Results from the National Epidemiologic Survey on Alcohol and Related Conditions Wave III. *The Journal of clinical psychiatry*, 80(2). <https://doi.org/10.4088/JCP.18m12317>
- Moore, S. E., Norman, R. E., Suetani, S., Thomas, H. J., Sly, P. D., & Scott, J. G. (2017). Consequences of bullying victimization in childhood and adolescence: A systematic review and meta-analysis. *World journal of psychiatry*, 7(1), 60–76. <https://doi.org/10.5498/wjp.v7.i1.60>
- Mordre, M., Groholt, B., Kjelsberg, E., Sandstad, B., & Myhre, A. M. (2011). The impact of ADHD and conduct disorder in childhood on adult delinquency: A 30 years follow-up study using official crime records. *BMC psychiatry*, 11, 57. <https://doi.org/10.1186/1471-244X-11-57>
- Morizot, J. (2019). Trajectories of criminal behavior across the life course. In D. P. Farrington, L. Kazemian, & A. R. Piquero (Eds.), *The Oxford Handbook of Developmental and Life-Course Criminology* (pp. 97-125). Oxford University Press.
- Mulvey, E. P., Schubert, C. A., Pitzer, L., Hawes, S., Piquero, A., & Cardwell, S. (2016). An examination of change in dynamic risk of offending over time among serious juvenile offenders. *Journal of criminal justice*, 45, 48–53. <https://doi.org/10.1016/j.jcrimjus.2016.02.008>
- Mustard, D. B. (2001). Racial, Ethnic, and Gender Disparities in Sentencing: Evidence from the U.S. Federal Courts. *The Journal of Law & Economics*, 44(1), 285–314. <https://doi.org/10.1086/320276>

- National Board of Health and Welfare. (2020). Bedöma risk och behov för barn och unga som begår brott eller har annat normbrytande beteende [Assessing the risk and needs of children and young people who commit crimes or have other norm-breaking behavior]. Stockholm: The National Board of Health and Welfare (Socialstyrelsen).
<https://www.socialstyrelsen.se/globalassets/sharepoint-dokument/artikelkatalog/kunskapsstod/2020-2-6597.pdf>
- National Council for Crime Prevention. (2023a). Personer lagförda för brott 2022: Slutgiltig statistik. Available at:
https://bra.se/download/18.7b3ce00418851b7150b70e0/1685442856565/Statistikrapport_lagforda_2022.pdf
- National Council for Crime Prevention. (2023b). Nationella trygghetsundersökningen 2023: Om utsatthet, otrygghet och förtroende. Available at:
https://bra.se/download/18.126e8d3a18afe99a9721d6c/1696837149983/2023_Nationella_trygghetsundersokningen_2023.pdf
- National Council for Crime Prevention. (2023c). Nationella trygghetsundersökningen – uppföljningsintervjuer 2022: En redovisning av omständigheter kring rapporterade brottsändelser. Available at:
https://bra.se/download/18.18ce9f518721cb19db84/1681453338832/2023_Nationella_trygghetsundersokningen_uppfoljningsintervjuer_2022.pdf
- Newburn, T. (2017). *Criminology* (Third edition). London: Routledge.
- Noordzij, M., Dekker, F. W., Zoccali, C., & Jager, K. J. (2010). Measures of disease frequency: Prevalence and incidence. *Nephron. Clinical practice*, 115(1), c17–c20.
<https://doi.org/10.1159/000286345>
- Office for National Statistics. (2016). Abuse during childhood: Findings from the Crime Survey for England and Wales, year ending March 2016.
<https://www.ons.gov.uk/peoplepopulationandcommunity/crimeandjustice/articles/abuseduringchildhood/findingsfromtheyearendin gmarch2016crimesurveyforenglandandwales>

- Ogilvie, J. M., Tzoumakis, S., Thompson, C., Allard, T., Dennison, S., Kisely, S., & Stewart, A. (2023). Psychiatric illness and the risk of reoffending: recurrent event analysis for an Australian birth cohort. *BMC psychiatry*, 23(1), 355. <https://doi.org/10.1186/s12888-023-04839-0>
- Olf M. (2017). Sex and gender differences in post-traumatic stress disorder: an update. *European Journal of Psychotraumatology*, 8(sup4), 1351204. <https://doi.org/10.1080/20008198.2017.1351204>
- O'Neil, K. A., Conner, B. T., & Kendall, P. C. (2011). Internalizing disorders and substance use disorders in youth: comorbidity, risk, temporal order, and implications for intervention. *Clinical psychology review*, 31(1), 104–112. <https://doi.org/10.1016/j.cpr.2010.08.002>
- Oyen, N., Boyd, H. A., Poulsen, G., Wohlfahrt, J., & Melbye, M. (2009). The clustering of premature deaths in families. *Epidemiology*, 20, 757–765. <https://doi.org/10.1097/EDE.0b013e3181ad5444>
- Ozonoff, S., Heung, K., Byrd, R., Hansen, R., & Hertz-Picciotto, I. (2008). The onset of autism: patterns of symptom emergence in the first years of life. *Autism research : official journal of the International Society for Autism Research*, 1(6), 320–328. <https://doi.org/10.1002/aur.53>
- Pardini D. (2016). Empirically based strategies for preventing juvenile delinquency. *Child and adolescent psychiatric clinics of North America*, 25(2), 257–268. <https://doi.org/10.1016/j.chc.2015.11.009>
- Parisi, A., Wilson, A. B., Villodas, M., Phillips, J., & Dohler, E. (2022). A systematic review of interventions targeting criminogenic risk factors among persons with serious mental illness. *Psychiatric services (Washington, D.C.)*, 73(8), 897–909. <https://doi.org/10.1176/appi.ps.202000928>

- Paulino, A., Kuja-Halkola, R., Fazel, S., Sariaslan, A., Rietz, E. D., Lichtenstein, P., & Brikell, I. (2023). Post-traumatic stress disorder and the risk of violent crime conviction in Sweden: A nationwide, register-based cohort study. *The Lancet. Public health*, 8(6), e432–e441. [https://doi.org/10.1016/S2468-2667\(23\)00075-0](https://doi.org/10.1016/S2468-2667(23)00075-0)
- Peltonen, K., Ellonen, N., Pitkänen, J., Aaltonen, M., & Martikainen, P. (2020). Trauma and violent offending among adolescents: a birth cohort study. *Journal of Epidemiology and Community Health*, 74(10), 845–850. <https://doi.org/10.1136/jech-2020-214188>
- Perkonig, A., Kessler, R. C., Storz, S., & Wittchen, H.-U. (2000). Traumatic events and post-traumatic stress disorder in the community: Prevalence, risk factors and comorbidity. *Acta psychiatrica Scandinavica*, 101(1), 46–59. <https://doi.org/10.1034/j.1600-0447.2000.101001046.x>
- Petitclerc, A., Gatti, U., Vitaro, F. and Tremblay, R.E. (2013). Effects of juvenile court exposure on crime in young adulthood. *Journal of Child Psychology and Psychiatry*, 54, 291–297. <https://doi.org/10.1111/j.1469-7610.2012.02616.x>
- Pettersson, E., Lichtenstein, P., Larsson, H., Song, J., Agrawal, A., Børglum, A. D., & Polderman, T. J. C. (2019). Genetic influences on eight psychiatric disorders based on family data of 4 408 646 full and half-siblings, and genetic data of 333 748 cases and controls. *Psychological Medicine*, 49, 1166–1173. <https://doi.org/10.1017/s0033291718002039>
- Piquero, A. R., Daigle, L. E., Gibson, C., Piquero, N. L., & Tibbetts, S. G. (2007). Are life-course-persistent offenders at risk for adverse health outcomes? *The Journal of Research in Crime and Delinquency*, 44(2), 185–207. <https://doi.org/10.1177/0022427806297739>
- Piquero, A. R., Shepherd, I., Shepherd, J. P., & Farrington, D. P. (2011). Impact of offending trajectories on health: disability, hospitalisation and death in middle-aged men in the Cambridge Study in Delinquent Development. *Criminal Behaviour and Mental Health*, 21(3), 189–201. <https://doi.org/10.1002/cbm.810>

- Plana-Ripoll, O., Pedersen, C. B., Holtz, Y., Benros, M. E., Dalsgaard, S., de Jonge, P., Fan, C. C., Degenhardt, L., Ganna, A., Greve, A. N., Gunn, J., Iburg, K. M., Kessing, L. V., Lee, B. K., Lim, C. C. W., Mors, O., Nordentoft, M., Prior, A., Roest, A. M., Saha, S., ... McGrath, J. J. (2019a). Exploring comorbidity within mental disorders among a Danish national population. *JAMA psychiatry*, 76(3), 259–270. <https://doi.org/10.1001/jamapsychiatry.2018.3658>
- Plana-Ripoll, O., Pedersen, C. B., Agerbo, E., Holtz, Y., Erlangsen, A., Canudas-Romo, V., Andersen, P. K., Charlson, F. J., Christensen, M. K., Erskine, H. E., Ferrari, A. J., Iburg, K. M., Momen, N., Mortensen, P. B., Nordentoft, M., Santomauro, D. F., Scott, J. G., Whiteford, H. A., Weyerer, N., McGrath, J. J., ... Laursen, T. M. (2019b). A comprehensive analysis of mortality-related health metrics associated with mental disorders: A nationwide, register-based cohort study. *Lancet (London, England)*, 394(10211), 1827–1835. [https://doi.org/10.1016/S0140-6736\(19\)32316-5](https://doi.org/10.1016/S0140-6736(19)32316-5)
- Porta, M. (2014). *A Dictionary of Epidemiology* (Six edition). Oxford University Press.
- Posick, C. (2013). The overlap between offending and victimization among adolescents: Results from the second international self-report delinquency study. *Journal of Contemporary Criminal Justice*, 29(1), 106-124. <https://doi.org/10.1177/1043986212471250>
- Prop. 1997/98:96. Vissa reformer av påföljdssystemet. <https://www.regeringen.se/rattsliga-dokument/proposition/1998/01/prop.-19979896>
- Quinn, P. O., & Madhoo, M. (2014). A review of attention-deficit/hyperactivity disorder in women and girls: Uncovering this hidden diagnosis. *The primary care companion for CNS disorders*, 16(3), PCC.13r01596. <https://doi.org/10.4088/PCC.13r01596>
- R Development Core Team. (2023). R: A language and environment for statistical computing. <http://www.R-project.org>.

- Rees, S., Watkins, A., Keauffling, J., & John, A. (2022). Incidence, mortality and survival in young people with co-occurring mental disorders and substance use: A retrospective linked routine data study in Wales. *Clinical epidemiology*, 14, 21–38.
<https://doi.org/10.2147/CLEP.S325235>
- Rhee, S. H., & Waldman, I. D. (2002). Genetic and environmental influences on antisocial behavior: a meta-analysis of twin and adoption studies. *Psychological bulletin*, 128(3), 490.
<https://doi.org/10.1037//0033-2909.128.3.490>
- Roberts, R. E., Roberts, C. R., & Xing, Y. (2007). Rates of DSM-IV psychiatric disorders among adolescents in a large metropolitan area. *Journal of psychiatric research*, 41(11), 959–967.
<https://doi.org/10.1016/j.jpsychires.2006.09.006>
- Rothman, K. J. (2012). *Epidemiology: An introduction* (2. ed.). Oxford University Press.
- Sadeh, N., & McNiel, D. E. (2015). Posttraumatic Stress Disorder increases risk of criminal recidivism among justice-involved persons with mental disorders. *Criminal Justice and Behavior*, 42(6), 573–586. <https://doi.org/10.1177/0093854814556880>
- Sailas, E. S., Feodoroff, B., Lindberg, N. C., Virkkunen, M. E., Sund, R., & Wahlbeck, K. (2006). The mortality of young offenders sentenced to prison and its association with psychiatric disorders: A register study. *European Journal of Public Health*, 16, 193–197.
<https://doi.org/10.1093/eurpub/cki169>
- Salk, R. H., Hyde, J. S., & Abramson, L. Y. (2017). Gender differences in depression in representative national samples: Meta-analyses of diagnoses and symptoms. *Psychological bulletin*, 143(8), 783–822.
<https://doi.org/10.1037/bul0000102>
- Salk, R. H., Hyde, J. S., & Abramson, L. Y. (2017). Gender differences in depression in representative national samples: Meta-analyses of diagnoses and symptoms. *Psychological bulletin*, 143(8), 783–822.
<https://doi.org/10.1037/bul0000102>

- Sampson, R. J., & Laub, J. H. (1993). Crime in the making: Pathways and turning points through life. *Crime & Delinquency*, 39(3), 396-396. <https://doi.org/10.1177/0011128793039003010>
- Sampson, R. J., & Laub, J. H. (2005). A life-course view of the development of crime. *The ANNALS of the American Academy of Political and Social Science*, 602(1), 12-45. <https://doi.org/10.1177/0002716205280075>
- Sariaslan, A., Arseneault, L., Larsson, H., Lichtenstein, P., & Fazel, S. (2020). Risk of subjection to violence and perpetration of violence in persons with psychiatric disorders in Sweden. *JAMA psychiatry*, 77(4), 359–367. <https://doi.org/10.1001/jamapsychiatry.2019.4275>
- Sariaslan, A., Lichtenstein, P., Larsson, H., & Fazel, S. (2016a). Triggers for violent criminality in patients with psychotic disorders. *JAMA Psychiatry*, 73, 796–803. <https://doi.org/10.1001/jamapsychiatry.2016.1349>
- Sariaslan, A., Mikkonen, J., Aaltonen, M., Hiilamo, H., Martikainen, P., & Fazel, S. (2021). No causal associations between childhood family income and subsequent psychiatric disorders, substance misuse and violent crime arrests: A nationwide Finnish study of >650 000 individuals and their siblings. *International Journal of Epidemiology*, 50(5), 1628–1638. <https://doi.org/10.1093/ije/dyab099>
- Sariaslan, A., Sharp, D. J., D'Onofrio, B. M., Larsson, H., & Fazel, S. (2016b). Long-Term Outcomes Associated with Traumatic Brain Injury in Childhood and Adolescence: A Nationwide Swedish Cohort Study of a Wide Range of Medical and Social Outcomes. *PLoS medicine*, 13(8), e1002103. <https://doi.org/10.1371/journal.pmed.1002103>
- Sarnecki, J., & Carlsson, C. (2020). *Introduktion till Kriminologi Volym 1 Brottslighetens Omfattning, Karaktär och Orsaker* (Upplaga 2). Lund: Studentlitteratur.
- SAS Institute Inc. (2013). SAS/ACCESS® 9.4 Interface to ADABAS: Reference. Cary, NC: SAS Institute inc.

- Sayal, K., Prasad, V., Daley, D., Ford, T., & Coghill, D. (2018). ADHD in children and young people: prevalence, care pathways, and service provision. *The lancet. Psychiatry*, 5(2), 175–186.
[https://doi.org/10.1016/S2215-0366\(17\)30167-0](https://doi.org/10.1016/S2215-0366(17)30167-0)
- Schmidt, E. P., Rap, S. E., & Liefwaard, T. (2021). Young adults in the justice system: The interplay between scientific insights, legal reform and implementation in practice in the Netherlands. *Youth Justice*, 21, 172–191. <https://doi.org/10.1177/1473225419897316>
- Schoeler, T., Duncan, L., Cecil, C. M., Ploubidis, G. B., & Pingault, J.-B. (2018). Quasi-experimental evidence on short- and long-term consequences of bullying victimization: a meta-analysis. *Psychological Bulletin*, 144(12), 1229–1246. <https://doi.org/10.1037/bul0000171>
- Schwalbe, C. S., Gearing, R. E., MacKenzie, M. J., Brewer, K. B., & Ibrahim, R. (2012). A meta-analysis of experimental studies of diversion programs for juvenile offenders. *Clinical psychology review*, 32(1), 26–33. <https://doi.org/10.1016/j.cpr.2011.10.002>
- Schwarzbold, M., Diaz, A., Martins, E. T., Rufino, A., Amante, L. N., Thais, M. E., Quevedo, J., Hohl, A., Linhares, M. N., & Walz, R. (2008). Psychiatric disorders and traumatic brain injury. *Neuropsychiatric disease and treatment*, 4(4), 797–816. <https://doi.org/10.2147/NDT.S2653>
- Sedgwick, P. (2014). Bias in observational study designs: prospective cohort studies. *BMJ (Online)*, 349(dec19 2), g7731–g7731. <https://doi.org/10.1136/bmj.g7731>
- Setia M. S. (2016). Methodology Series Module 1: Cohort Studies. *Indian journal of dermatology*, 61(1), 21–25. <https://doi.org/10.4103/0019-5154.174011>
- SFS 1962:700. Brottsbalken. Stockholm: Justitiedepartementet. Retrived from: https://www.riksdagen.se/sv/dokument-och-lagar/dokument/svensk-forfattningssamling/brottsbalk-1962700_sfs-1962-700/#K26

- SFS 1964:167. Lag med särskilda bestämmelser om unga lagöverträdare. Stockholm: Justitiedepartementet. Retrived from: https://www.riksdagen.se/sv/dokument-och-lagar/dokument/svensk-forfattningssamling/lag-1964167-med-sarskilda-bestammelser-om-unga_sfs-1964-167/
- Shader, M. (2001). *Risk factors for delinquency: An overview*. Washington, DC: US Department of Justice, Office of Justice Programs, Office of Juvenile Justice and Delinquency Prevention.
- Shirtcliff, E. A., Dahl, R. E., & Pollak, S. D. (2009). Pubertal development: correspondence between hormonal and physical development. *Child development*, 80(2), 327–337. <https://doi.org/10.1111/j.1467-8624.2009.01263.x>
- Sibley, M. H., Arnold, L. E., Swanson, J. M., Hechtman, L. T., Kennedy, T. M., Owens, E., Molina, B. S. G., Jensen, P. S., Hinshaw, S. P., Roy, A., Chronis-Tuscano, A., Newcorn, J. H., & Rohde, L. A., & MTA Cooperative Group. (2022). Variable patterns of remission from ADHD in the multimodal treatment study of ADHD. *American Journal of Psychiatry*, 179(2), 142–151. <https://doi.org/10.1176/appi.ajp.2021.21010032>
- Silva, D., Colvin, L., Glauert, R., & Bower, C. (2014). Contact with the juvenile justice sys-tem in children treated with stimulant medication for attention deficit hyperactivity disorder: A population study. *The Lancet Psychiatry*, 1(4), 278–285. [https://doi.org/10.1016/S2215-0366\(14\)70302-5](https://doi.org/10.1016/S2215-0366(14)70302-5)
- Silver, E., Piquero, A. R., Jennings, W. G., Piquero, N. L., & Leiber, M. (2011). Assessing the violent offending and violent victimization overlap among discharged psychiatric patients. *Law and human behavior*, 35(1), 49-59. <https://doi.org/10.1007/s10979-009-9206-8>
- Sinha R. (2008). Chronic stress, drug use, and vulnerability to addiction. *Annals of the New York Academy of Sciences*, 1141, 105–130. <https://doi.org/10.1196/annals.1441.030>

- Sivertsson, F., Carlsson, C., Almquist, Y., & Brännström, L. (2024). Offending trajectories from childhood to retirement age: Findings from the Stockholm birth cohort study. *Journal of Criminal Justice*, 91, 102155. <https://doi.org/10.1016/j.jcrimjus.2024.102155>
- Skinner, G. C. M., & Farrington, D. P. (2020). A systematic review and meta-analysis of premature mortality in offenders. *Aggression and Violent Behavior*, 53, 101431–12. <https://doi.org/10.1016/j.avb.2020.101431>
- Skoglund, C., Chen, Q., Franck, J., Lichtenstein, P., & Larsson, H. (2015). Attention-deficit/hyperactivity disorder and risk for substance use disorders in relatives. *Biological psychiatry*, 77(10), 880–886. <https://doi.org/10.1016/j.biopsych.2014.10.006>
- Sloan, E., Hall, K., Moulding, R., Bryce, S., Mildred, H., & Staiger, P. K. (2017). Emotion regulation as a transdiagnostic treatment construct across anxiety, depression, substance, eating and borderline personality disorders: A systematic review. *Clinical psychology review*, 57, 141–163. <https://doi.org/10.1016/j.cpr.2017.09.002>
- Smith G . (2014), ‘Long-Term Trends in Female and Male Involvement in Crime’, in R. Gartner and B. McCarhty (Eds.), *The Oxford Handbook of Gender, Sex, and Crime*, (pp 139–57). Oxford University Press.
- Smith, K. R., Hanson, H. A., Norton, M. C., Hollingshaus, M. S., & Mineau, G. P. (2014). Survival of offspring who experience early parental death: Early life conditions and later-life mortality. *Social science & medicine* (1982), 119, 180–190. <https://doi.org/10.1016/j.socscimed.2013.11.054>
- Solmi, M., Radua, J., Olivola, M., Croce, E., Soardo, L., Salazar de Pablo, G., Il Shin, J., Kirkbride, J. B., Jones, P., Kim, J. H., Kim, J. Y., Carvalho, A. F., Seeman, M. V., Correll, C. U., & Fusar-Poli, P. (2022). Age at onset of mental disorders worldwide: large-scale meta-analysis of 192 epidemiological studies. *Molecular psychiatry*, 27(1), 281–295. <https://doi.org/10.1038/s41380-021-01161-7>

- Spruit, A., van der Put, C., Gubbels, J., & Bindels, A. (2017). Age differences in the severity, impact and relative importance of dynamic risk factors for recidivism. *Journal of Criminal Justice*, 50, 69–77. <https://doi.org/10.1016/j.jcrimjus.2017.04.006>
- Stein, D. J., Friedman, M. J., & Blanco, C. (2011). *Post-traumatic stress disorder*. John Wiley & Sons.
- Steinberg, L. (2013). The influence of neuroscience on US Supreme Court decisions about adolescents' criminal culpability. *Nature reviews. Neuroscience*, 14(7), 513–518. <https://doi.org/10.1038/nrn3509>
- Stenbacka, M., & Jansson, B. (2014). Unintentional injury mortality - The role of criminal offending. A Swedish longitudinal population based study. *International Journal of Injury Control and Safety Promotion*, 21(2), 127–135. <https://doi.org/10.1080/17457300.2013.792281>
- Stenbacka, M., Moberg, T., & Jokinen, J. (2019). Adolescent criminality: Multiple adverse health outcomes and mortality pattern in Swedish men. *BMC public health*, 19(1), 400. <https://doi.org/10.1186/s12889-019-6662-z>
- Stenbacka, M., Moberg, T., Romelsjö, A., & Jokinen, J. (2012). Mortality and causes of death among violent offenders and victims—a Swedish population based longitudinal study. *BMC public health*, 12, 38. <https://doi.org/10.1186/1471-2458-12-38>
- Stevens, H., Laursen, T. M., Mortensen, P. B., Agerbo, E., & Dean, K. (2015). Post-illness-onset risk of offending across the full spectrum of psychiatric disorders. *Psychological Medicine*, 45(11), 2447–2457. <https://doi.org/10.1017/S0033291715000458>
- Stoddard, S. A., Zimmerman, M. A., & Bauermeister, J. A. (2012). A longitudinal analysis of cumulative risks, cumulative promotive factors, and adolescent violent behavior. *Journal of research on adolescence: the official journal of the Society for Research on Adolescence*, 22(3), 542–555. <https://doi.org/10.1111/j.1532-7795.2012.00786.x>

- Stokes, M. L., McCoy, K. P., Abram, K. M., Byck, G. R., & Teplin, L. A. (2015). Suicidal Ideation and Behavior in Youth in the Juvenile Justice System: A Review of the Literature. *Journal of correctional health care: the official journal of the National Commission on Correctional Health Care*, 21(3), 222–242.
<https://doi.org/10.1177/1078345815587001>
- Sun, S., Kuja-Halkola, R., Faraone, S. V., D'Onofrio, B. M., Dalsgaard, S., Chang, Z., & Larsson, H. (2019). Association of psychiatric comorbidity with the risk of premature death among children and adults with Attention-Deficit/Hyperactivity Disorder. *JAMA psychiatry*, 76(11), 1141–1149.
<https://doi.org/10.1001/jamapsychiatry.2019.1944>
- Swedish National Court Administration, Överklagande och ändring. Rapport 1995:3., 1995, Domstolsverket: Jönköping.
https://www.domstol.se/globalassets/filer/domstol/svea_hovratt/undersokning_av_andringsfrekvensen_brottmal_2015.pdf
- Swedish National Tax Agency. (2015). Den svenska folkbokföringens historia under tre sekler [English: The Swedish national population registration - history of the last 300 years],
<https://skatteverket.se/privat/folkbokforing/attvarafolkbokford/folkbokforingenshistoria/densvenskafolkbokforingenshistoriaundertresekler.4.18e1b10334ebe8bc80004141.html>
- Swedish Research Council. (2017). *Good research practice*. Stockholm, Sweden: Swedish Research Council.
https://www.vr.se/download/18.5639980c162791bbfe697882/1555334908942/Good-Research-Practice_VR_2017.pdf
- Taheri, S. A., & Welsh, B. C. (2016). After-school programs for delinquency prevention: A systematic review and meta-analysis. *Youth Violence and Juvenile Justice*, 14(3), 272-290.
<https://doi.org/10.1177/1541204014567542>
- Taylor C. J. (2015). Recent victimization and recidivism: the potential moderating effects of family support. *Violence and victims*, 30(2), 342–360. <https://doi.org/10.1891/0886-6708.vv-d-13-00139>

- Taylor, E. N., Timko, C., Nash, A., Owens, M. D., Harris, A. H. S., & Finlay, A. K. (2020). Posttraumatic Stress Disorder and justice involvement among military veterans: A systematic review and meta-analysis. *Journal of traumatic stress*, 33(5), 804–812. <https://doi.org/10.1002/jts.22526>
- Tenny S., & Boktor S.W. Incidence (2023). [Updated 2023 Apr 10]. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2024 Jan-. Available from: <https://www.ncbi.nlm.nih.gov/books/NBK430746/>
- Teplin, L. A., Abram, K. M., McClelland, G. M., Dulcan, M. K., & Mericle, A. A. (2002). Psychiatric disorders in youth in juvenile detention. *Archives of general psychiatry*, 59(12), 1133–1143. <https://doi.org/10.1001/archpsyc.59.12.1133>
- Teplin, L. A., McClelland, G. M., Abram, K. M., & Mileusnic, D. (2005). Early violent death among delinquent youth: A prospective longitudinal study. *Pediatrics*, 115(6), 1586–1593. <https://doi.org/10.1542/peds.2004-1459>
- Teplin, L. A., Potthoff, L. M., Aaby, D. A., Welty, L. J., Dulcan, M. K., & Abram, K. M. (2021). Prevalence, comorbidity, and continuity of psychiatric disorders in a 15-year longitudinal study of youths involved in the juvenile justice system. *JAMA pediatrics*, 175(7), e205807. <https://doi.org/10.1001/jamapediatrics.2020.5807>
- Tharshini, N. K., Ibrahim, F., Kamaluddin, M. R., Rathakrishnan, B., & Che Mohd Nasir, N. (2021). The link between individual personality traits and criminality: A systematic review. *International journal of environmental research and public health*, 18(16), 8663. <https://doi.org/10.3390/ijerph18168663>
- The National Audit Office. (2012). Comparing International Criminal Justice Systems. Minisrty of Justice. https://www.nao.org.uk/wp-content/uploads/2012/03/NAO_Briefing_Comparing_International_Criminal_Justice.pdf

- Thomas, S. D. M., Nixon, M., Ogloff, J. R. P., & Daffern, M. (2019). Crime and victimization among people with intellectual disability with and without comorbid mental illness. *Journal of Applied Research in Intellectual Disabilities*, 32(5), 1088–1095.
<https://doi.org/10.1111/jar.12598>
- Tidemalm, D., Runeson, B., Waern, M., Frisell, T., Carlström, E., Lichtenstein, P., & Långström, N. (2011). Familial clustering of suicide risk: a total population study of 11.4 million individuals. *Psychological Medicine*, 41(12), 2527–2534.
<https://doi.org/10.1017/S0033291711000833>
- Timonen, M., Mäkiyö, T., Miettunen, J., Hakko, H., Zitting, P., Kinnunen, J., & Räsänen, P. (2003). Somatic morbidity and criminality: the Northern Finland 1966 Birth Cohort Study. *Forensic Science International*, 132(1), 68–75.
[https://doi.org/10.1016/S0379-0738\(02\)00456-5](https://doi.org/10.1016/S0379-0738(02)00456-5)
- Tollin, K., Angerbrandt, H., & Jonsson, A. (2023). Barn och unga i kriminella nätverk. (Rapport 2023:13). The Swedish National Council for Crime Prevention.
https://bra.se/download/18.5b53d7018b6ae31d242030/1705409912071/2023_13-Barn-och-unga-i-kriminella-natverk.pdf
- Tonry, M. (2017). Community punishments. *Reforming criminal justice: A report of the Academy for Justice on bridging the gap between scholarship and reform*, 4, 187–204.
https://law.asu.edu/sites/default/files/pdf/academy_for_justice/10_Criminal_Justice_Reform_Vol_4_Community-Punishments.pdf
- Topaz, C. M., Ning, S., Ciocanel, M.-V., & Bushway, S. (2023). Federal criminal sentencing: race-based disparate impact and differential treatment in judicial districts. *Humanities & Social Sciences Communications*, 10(1), 366–10.
<https://doi.org/10.1057/s41599-023-01879-5>

- Trumbetta, S. L., Seltzer, B. K., Gottesman, I. I., & McIntyre, K. M. (2010). Mortality predictors in a 60-year follow-up of adolescent males: exploring delinquency, socioeconomic status, IQ, high-school drop-out status, and personality. *Psychosomatic medicine*, 72(1), 46–52.
<https://doi.org/10.1097/PSY.0b013e3181bfd7d8>
- Tuvblad, C., Narusyte, J., Grann, M., Sarnecki, J., & Lichtenstein, P. (2011). The Genetic and Environmental Etiology of Antisocial Behavior from Childhood to Emerging Adulthood. *Behavior Genetics*, 41(5), 629–640. <https://doi.org/10.1007/s10519-011-9463-4>
- Uher, R., Pavlova, B., Radua, J., Provenzani, U., Najafi, S., Fortea, L., Ortuño, M., Nazarova, A., Perroud, N., Palaniyappan, L., Domschke, K., Cortese, S., Arnold, P. D., Austin, J. C., Vanyukov, M. M., Weissman, M. M., Young, A. H., Hillegers, M. H. J., Danese, A., Nordentoft, M., ... Fusar-Poli, P. (2023). Transdiagnostic risk of mental disorders in offspring of affected parents: a meta-analysis of family high-risk and registry studies. *World psychiatry : official journal of the World Psychiatric Association (WPA)*, 22(3), 433–448.
<https://doi.org/10.1002/wps.21147>
- van de Weijer, S. G. A., Smallbone, H. S., & Bouwman, V. (2018). Parental Imprisonment and Premature Mortality in Adulthood. *Journal of Developmental and Life-Course Criminology*, 4(2), 148–161. <https://doi.org/10.1007/s40865-017-0078-1>
- Vitopoulos, N. A., Peterson-Badali, M., Brown, S., & Skilling, T. A. (2019). The relationship between trauma, recidivism risk, and reoffending in male and female juvenile offenders. *Journal of Child & Adolescent Trauma*, 12(3), 351–364.
<https://doi.org/10.1007/s40653-018-0238-4>
- Vogel, M., & Van Ham, M. (2018). Unpacking the relationships between impulsivity, neighborhood disadvantage, and adolescent violence: An application of a neighborhood-based group decomposition. *Journal of youth and adolescence*, 47(4), 859–871.
<https://doi.org/10.1007/s10964-017-0695-3>

- Volkow, N. D., Gordon, J. A., & Koob, G. F. (2021). Choosing appropriate language to reduce the stigma around mental illness and substance use disorders. *Neuropsychopharmacology: Official publication of the American College of Neuropsychopharmacology*, 46(13), 2230–2232. <https://doi.org/10.1038/s41386-021-01069-4>
- Wang, R., Snieder, H., & Hartman, C.A. (2022). Familial co-aggregation and shared heritability between depression, anxiety, obesity and substance use. *Transl Psychiatry* 12, 108. <https://doi.org/10.1038/s41398-022-01868-3>
- Westfelt, L. & Sellgren Karlsson, M. (2023). Polisanmälda brott mot barn i åldern 7–15 år. (Rapport 2023:8). The Swedish National Council for Crime Prevention. https://bra.se/download/18.889aab4188bda3f4495639/1687174584845/2023_8-Polisanmalda-brott-mot-barn-i-aldern-7-15-ar.pdf
- Westlund, O., & Öberg, J., (2021). Strategic offences among youth in the 2010s. (Report 2021:5). The Swedish National Council for Crime Prevention. https://bra.se/download/18.161d181f17db3c8d91d3f32/1646905267664/2021_5_Strategic_offences_among_youth_in_the_2010s.pdf
- Whiting, D., Lichtenstein, P., & Fazel, S. (2021). Violence and mental disorders: a structured review of associations by individual diagnoses, risk factors, and risk assessment. *The lancet. Psychiatry*, 8(2), 150–161. [https://doi.org/10.1016/S2215-0366\(20\)30262-5](https://doi.org/10.1016/S2215-0366(20)30262-5)
- Whitten, T., Green, M. J., Laurens, K. R., Tzoumakis, S., Harrs, F., Carr, V., & Dean, K. (2019). Parental offending and children's emergency department presentations in New South Wales, Australia. *Journal of epidemiology and community health*, 73(9), 832–838. <https://doi.org/10.1136/jech-2019-212392>
- Wickramasekera, N., Wright, J., Elsey, H., Murray, J., & Tubeuf, S. (2015). Cost of crime: A systematic review. *Journal of Criminal Justice*, 43(3), 218–228. <https://doi.org/10.1016/j.jcrimjus.2015.04.009>

- Wiesner, M., Kim, H. K., & Capaldi, D. M. (2010). History of juvenile arrests and vocational career outcomes for at-risk young men. *The Journal of research in crime and delinquency*, 47(1), 91–117.
<https://doi.org/10.1177/0022427809348906>
- Wilson, H. A., & Hoge, R. D. (2013). The effect of youth diversion programs on recidivism: A meta-analytic review. *Criminal Justice and Behavior*, 40(5), 497–518.
<https://doi.org/10.1177/0093854812451089>
- Witt, K., Lichtenstein, P., & Fazel, S. (2015). Improving risk assessment in schizophrenia: epidemiological investigation of criminal history factors. *The British journal of psychiatry: the journal of mental science*, 206(5), 424–430.
<https://doi.org/10.1192/bjp.bp.114.144485>
- Wojciechowski, T. W. (2020). PTSD as a risk factor for the development of violence among juvenile offenders: A group-based trajectory modeling approach. *Journal of Interpersonal Violence*, 35(13-14), 2511–2535. <https://doi.org/10.1177/0886260517704231>
- Wojciechowski, T. W. (2021). The Role of ADHD in Predicting the development of violent behavior among juvenile offenders: Participation versus frequency. *Journal of Interpersonal Violence*, 36(1-2), NP625–NP642. <https://doi.org/10.1177/0886260517734225>
- Wolff, J. C., & Ollendick, T. H. (2006). The comorbidity of conduct problems and depression in childhood and adolescence. *Clinical child and family psychology review*, 9(3-4), 201–220.
<https://doi.org/10.1007/s10567-006-0011-3>
- Wolff, K. T., & Baglivio, M. T. (2017). Adverse childhood experiences, negative emotionality, and pathways to juvenile recidivism. *Crime & Delinquency*, 63(12), 1495–1521.
<https://doi.org/10.1177/0011128715627469>

- Wolff, K. T., Baglivio, M. T., & Piquero, A. R. (2017). The relationship between adverse childhood experiences and recidivism in a sample of juvenile offenders in community-based treatment. *International Journal of Offender Therapy and Comparative Criminology*, 61(11), 1210-1242. <https://doi.org/10.1177/0306624X15613992>
- Wong, J. S., Bouchard, J., Gravel, J., Bouchard, M., & Morselli, C. (2016). Can at-risk youth be diverted from crime?: A meta-analysis of restorative diversion programs. *Criminal Justice and Behavior*, 43(10), 1310-1329. <https://doi.org/10.1177/0093854816640835>
- World Health Organization. (2019). *International statistical classification of diseases and related health problems* (11th ed.). <https://icd.who.int/>
- World Health Organization. (2021, November 17). Mental health of adolescents. WHO. <https://www.who.int/news-room/fact-sheets/detail/adolescent-mental-health>
- World Health Organization. (2022, June 8). *Mental disorders*. WHO. <https://www.who.int/news-room/fact-sheets/detail/mental-disorders>
- World Psychiatric Association. (2011). A conceptual framework for the revision of the ICD-10 classification of mental and behavioural disorders. *World Psychiatry: Official Journal of the World Psychiatric Association (WPA)*, 10(2), 86-92. <https://doi.org/10.1002/j.2051-5545.2011.tb00022.x>
- Wylie, L. E., & Rufino, K. A. (2018). The impact of victimization and mental health symptoms on recidivism for early system-involved juvenile offenders. *Law and Human Behavior*, 42(6), 558-569. <https://doi.org/10.1037/lhb0000311>
- Yee, N., Matheson, S., Korobanova, D., Large, M., Nielssen, O., Carr, V., & Dean, K. (2020). A meta-analysis of the relationship between psychosis and any type of criminal offending, in both men and women. *Schizophrenia Research*, 220, 16-24. <https://doi.org/10.1016/j.schres.2020.04.009>

- Yu, R., Aaltonen, M., Branje, S., Ristikari, T., Meeus, W., Salmela-Aro, K., Goodwin, G. M., & Fazel, S. (2017). Depression and violence in adolescence and young adults: Findings from three longitudinal cohorts. *Journal of the American Academy of Child and Adolescent Psychiatry*, 56(8), 652–658.
<https://doi.org/10.1016/j.jaac.2017.05.016>
- Yukhnenko, D., Blackwood, N., Lichtenstein, P., & Fazel, S. (2023a). Psychiatric disorders and reoffending risk in individuals with community sentences in Sweden: A national cohort study. *The Lancet. Public Health*, 8(2), e119–e129.
[https://doi.org/10.1016/S2468-2667\(22\)00312-7](https://doi.org/10.1016/S2468-2667(22)00312-7)
- Yukhnenko, D., Blackwood, N., Lichtenstein, P., & Fazel, S. (2023b). Association of substance use and other psychiatric disorders with all-cause and external-cause mortality in individuals given community sentences in Sweden: a national cohort study. *The Lancet regional health. Europe*, 33, 100703.
<https://doi.org/10.1016/j.lanepe.2023.100703>
- Yukhnenko, D., Sridhar, S., & Fazel, S. (2020). A systematic review of criminal recidivism rates worldwide: 3-year update. *Wellcome open research*, 4, 28. <https://doi.org/10.12688/wellcomeopenres.14970.3>
- Zlodre, J., & Fazel, S. (2012). All-cause and external mortality in released prisoners: Systematic review and meta-analysis. *American Journal of Public Health*, 102, e67–e75.
<https://doi.org/10.2105/ajph.2012.300764>
- Zulauf, C. A., Sprich, S. E., Safren, S. A., & Wilens, T. E. (2014). The complicated relationship between attention deficit/hyperactivity disorder and substance use disorders. *Current psychiatry reports*, 16(3), 436. <https://doi.org/10.1007/s11920-013-0436-6>
- Ångström, A-K., Andersson, A., Garcia-Argibay, M., Chang, Z., Lichtenstein, P., D’Onofrio, B. M., Tuvblad, C., Ghirardi, L., & Larsson, H. (2024). Criminal convictions in males and females diagnosed with attention deficit hyperactivity disorder: A Swedish national registry study. *JCPP Advances*, e12217.
<https://doi.org/10.1002/jcv2.12217>

PUBLICATIONS *in the series*
ÖREBRO STUDIES IN CRIMINOLOGY

1. Oskarsson, Sofi (2022). *Biological Risk Factors for Crime: Adverse Perinatal Events and Psychophysiology.*
2. Camacho Doyle, Maria (2023): *Forecast: Crime with a chance of feeling unsafe. Examining unsafety (crime and fear of crime) within the context of the surrounding environment.*
3. Siponen, Rebecca (2024): *The role of psychiatric diagnoses among youth offenders: An investigation of crime and later adverse outcomes.*

