

*Linn Persson*

# **Mental health problems and youth offending**

Findings from a community-based, longitudinal study

**MENTAL HEALTH PROBLEMS AND YOUTH OFFENDING  
FINDINGS FROM A COMMUNITY-BASED, LONGITUDINAL STUDY**

# **Mental health problems and youth offending Findings from a community-based, longitudinal study**

Thesis for Doctoral (Ph.D.) Degree in Criminology

By Linn Persson

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**LINN PERSSON**

**MENTAL HEALTH PROBLEMS AND  
YOUTH OFFENDING**

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Malmö University  
Department of Criminology

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*“Don't judge each day by the harvest you reap but by the seeds that you plant.”*

- Robert Louis Stevenson



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# ABSTRACT

Criminology has a long tradition of examining risk factors for youth offending. Mental health problems (MHPs) have been recognised as an important risk factor in this context, with externalising problems in particular having been highlighted as highly significant. However, questions remain regarding the nature of the associations between MHPs and youth offending, for example with regard to their development, gender differences, and the role of associations with contextual variables. To better understand the relationship between MHPs and youth offending, further research is needed using a comprehensive perspective that takes into account the multidimensional nature of MHPs, differences between different types of MHPs, developmental changes over time, interactions with contextual factors, and gender differences.

The aim of this thesis has been to extend the knowledge and contribute to a more comprehensive understanding of the associations between MHPs and youth offending by using longitudinal, community-based data from the Malmö Individual and Neighbourhood Development Study (MINDS). *Study I* examines how differences in MHPs are associated with differences in involvement in crime among adolescents, as well as how individual changes in mental health are associated with changes in involvement in crime over time. *Study II* examines girls' offending on the basis of three research questions looking at: (1) whether MHPs are more common among teen girls who report having committed offences compared to those who do not report offending, (2) how different types of MHPs are associated with offending, and (3) whether these associations are affected when we adjusted for the parent-child relationship, parental monitoring, and peer relationships. *Study III* examines the associations between different subtypes of negative life events (NLEs), MHPs, and youth offending, as well as whether the effects of youth NLEs on offending are mediated by a potential association between NLEs and MHPs. *Study IV* examines whether receiving professional

support for mental health problems during adolescence is associated with the likelihood of subsequent offending.

The overall findings from the thesis suggest that there are important associations between MHPs and youth offending, but that these associations are complex and may differ between individuals depending on the types of MHPs in question, gender, comorbidity, and interactions with contextual factors. The thesis highlights the importance of considering the associations between MHPs and youth offending in the context of support and prevention strategies as a means of more effectively hindering negative development, which will both benefit society as a whole and contribute to better health and quality of life for the individuals concerned.

## LIST OF PAPERS

- I. Persson, L., & Ivert, A.-K. (2025). Development of mental health problems and crime involvement in a Swedish adolescent sample. *Nordic Journal of Criminology*, 26(2), 1–16.
- II. Persson, L., & Ivert, A. K. (2025). Girls, mental health problems, and offending: findings from a community sample. *Child and adolescent psychiatry and mental health*, 19(1), 59.
- III. Associations and mediation between exposure to negative life events, mental health problems and offending among youth. (Submitted).
- IV. The association between receiving professional support for mental health problems and subsequent offending: Findings from an adolescent Swedish sample. (Manuscript).

Linn is the first author of all papers. Linn has had primary responsibility for formulating the aims, research questions, study design, and for carrying out the analyses. Linn wrote the initial drafts of each manuscript and subsequently revised them in collaboration with co-authors/supervisors.



# INTRODUCTION

Mental health problems (MHPs) are increasing among youth in Sweden, which can be seen in increases in the extent to which youth report suffering from, for example, anxiety and depression (Region Skåne, 2024; Stockholms stad, 2023), an increase in the prescription of medications for attention deficit disorder (ADHD) (e.g., E-hälsomyndigheten, 2025; Socialstyrelsen, 2021), and in the problems faced by the Swedish child and adolescent psychiatric sector in meeting the needs of a growing number of patients (e.g., Sveriges Kommuner och Regioner, 2024). These trends are not only visible in Sweden, but mirror a global pattern of increases in MHPs among youth (e.g., (Rzeszutek & Wolańczyk, 2025; Wang et al., 2025). Another increasing trend involves the level of offending among some subgroups of youth. While the overall number of youth committing offences is relatively stable in Sweden (Brottsförebyggande rådet, 2024), certain subgroups of youth offenders are becoming more common and increasing in number. For example, an increase in the number of girls committing offences in Sweden has been noted over recent years (Brottsförebyggande rådet, 2025), and there are indications of a significant increase in the number of registered offences linked to suspects under the age of 15, with the government and audit reports highlighting an increase in the number of serious offences committed by children and their links with criminal networks (Brottsförebyggande rådet, 2025; Riksrevisionen, 2024). Additionally, recent data from the Swedish National Board of Health and Welfare show a marked rise in prosecutions of 15–17-year-olds for homicide and attempted homicide compared to previous years, underscoring a concerning increase in severe youth violence (Socialstyrelsen, 2025).

Both MHPs and youth offending constitute major public health and societal challenges and are associated with substantial human and economic costs (Knapp et al., 2015; Scott et al., 2001), as well as long-term individual consequences such

as poorer educational attainment, reduced employment prospects, strained social relationships, and adverse physical health outcomes across the life course (e.g., Almquist & Brännström, 2016; Farrington, 2003; Loeber & Farrington, 2012; Moffitt, 1993; Moffitt et al., 2001; Nilsson & Estrada, 2009). At the same time, associations between MHPs and youth offending have been noted in numerous previous studies (e.g., Almquist & Brännström, 2016; Borschmann et al., 2020; DeLisi & Piquero, 2011; Farrington, 2003; Fazel et al., 2008; Ivert et al., 2017; Laub & Sampson, 2006; Loeber & Farrington, 2012; Moffitt, 1993; Moffitt et al., 2001; Nilsson & Estrada, 2009). Several meta-analyses and systematic reviews have shown that a high number of youths who have committed offences and come into contact with the juvenile justice system present increased levels of MHPs, and of externalising problems in particular (including, for example, conduct problems, hyperactivity, and impulsivity (e.g., Beaudry et al., 2021; Colins et al., 2010; Fazel et al., 2008). The association between externalising problems and youth offending has also been noted in youth populations other than those comprising individuals who have already committed offences, for example in clinical studies based on youth with already established MHPs (e.g., Ivert et al., 2017; Mordre et al., 2011) and general community samples where inclusion has been based on neither pre-existing MHPs nor offending behaviour (e.g., Farrington, 2003; Loeber et al., 2012; Moffitt, 1993; Piquero et al., 2007). For example, studies conducted on the basis of the life course and criminal career perspective have established that externalising problems linked to, for example, neurological deviations are common among individuals with life-long, serious, chronic trajectories of offending (Moffitt, 1993). Internalising problems (e.g., depression and anxiety), have moreover also been found to be associated with youth offending, for example being found among youth in the juvenile justice system, and particularly among girls (e.g., Fazel et al., 2008). However, these findings are not as strong or conclusive as those for the association between externalising problems and youth offending.

Although MHPs have been linked to youth offending, the association appears to be complex, involving interactions between MHPs and both offending and multiple risk factors at the individual and environmental levels (e.g., Almquist & Brännström, 2016; DeLisi & Piquero, 2011; Farrington, 2003; Laub & Sampson, 2006; Loeber & Burke, 2011; Moffitt, 1993). For example, internalising problems have been suggested to be more important for offending when they co-occur with externalising problems (e.g., Ivert et al., 2017; Siponen et al., 2023), and bi-directional associations have been suggested to exist between MHPs and

offending (e.g., Wiesner et al., 2023). Further, exposure to contextual factors such as family dysfunction, abuse, and maltreatment has been found to be associated with an increased risk for the development of both MHPs and offending (e.g., Hoeve et al., 2015; Hoeve et al., 2009). Adding the perspective of age and development further complicates the picture, with youth in particular being a critical developmental period characterised by biological, psychological, and social changes (Casey et al., 2008; Cheng et al., 2024), during which MHPs and behavioural problems, such as offending, may emerge for the first time, or during which existing problems may develop further and worsen (e.g., Farrington, 2005, 2020; Kessler et al., 2005; Moffitt, 1993). Although much is known about the relationship between MHPs and youth offending, these examples illustrate that the associations are multifaceted. To better understand the relationship between MHPs and youth offending, further research is needed that adopts a comprehensive perspective, taking into account the multidimensional nature of MHPs, differences between different types of MHPs, developmental changes over time, interactions with contextual factors, and gender differences.

Our ability to understand the associations between MHPs and youth offending has a major impact on the possibility of preventing these problems, which is particularly important given the negative developments noted in relation to the prevalence of MHPs among young people, both in Sweden and internationally (Region Skåne, 2024; Stockholms stad, 2022; Socialstyrelsen, 2021; Rzeszutek & Wolańczyk, 2025; Wang et al., 2025), the offending of some subgroups of youth in Sweden, such as girls (Brottsförebyggande rådet, 2025), and also the fact that MHPs have been linked to persistent offending trajectories (e.g., Moffitt, 1993; Farrington, 2003). A deeper understanding of these problems could lead to improvements in existing programs and improved conditions for the development of new ones. In order to improve prevention and understand what works, there is also an ongoing need to examine the effects of support and other measures that are currently being implemented, such as those provided by community health care and social services (e.g., Case et al., 2022; SBU, 2023). By developing a comprehensive understanding of the associations between MHPs and youth offending, and how these relate to existing support and prevention efforts, it will become possible to further improve and implement successful interventions.

## Aim of the thesis

This thesis aims to extend the knowledge and contribute to a more comprehensive understanding of the associations between MHPs and youth offending. By examining, for example, development of MHPs and offending, gender specific associations, associations with contextual variables and the effects of support from health care professionals and/or the social services, the present thesis aims to provide knowledge that is of relevance to research, policy, and practice, and ultimately to support more effective support, prevention, and intervention measures that can improve mental health, reduce offending, and result in a better quality of life among youth. The four different studies presented in this thesis are based on detailed and specific aims and research questions, which tap into different aspects of the associations between MHPs and youth offending. These are presented below:

*Study I:* In study one, the aim was to examine how differences in MHPs are associated with differences in criminal involvement among adolescents, as well as to examine how individual changes in mental health are associated with changes in involvement in crime over time. Based on prior research, we hypothesized that there would be an association between MHPs and involvement in crime, and that individual changes in MHPs would be associated with individual changes in criminal involvement; for example, an increase in MHPs would be reflected in an increase in involvement in crime.

*Study II:* In study two, the aim was to examine girls' offending, based on three research questions: (1) are MHPs more common among teen girls who report having committed offences than among girls who do not, (2) how are different types of MHPs associated with offending, and (3) are these associations affected when we adjust for the parent-child relationship, parental monitoring, and peer relationships?

*Study III:* In study three, based on a hypothesis that MHPs may have a mediating effect, the aim was to examine the associations between different subtypes of negative life events (NLEs), MHPs, and youth offending, as well as to examine whether youth MHPs mediated a potential association between NLEs and offending – while also adjusting for previous levels of MHPs and offending.

*Study IV:* In Study four, the aim was to examine whether receiving professional support for mental health problems during adolescence was associated with the likelihood of subsequent offending.

# BACKGROUND

This section provides a framework for the current thesis, in which the thesis findings will then be interpreted and discussed. The section begins with a definition of the most central concept used in the thesis: mental health problems (MHPs), which is followed by a presentation of related criminological perspectives and theory. The section concludes with a summary of prior research on youth offending and MHPs, which includes a discussion about the complexities faced by this research.

## Definition of mental health problems

In this thesis, the concept of mental health problems (MHPs) is broadly defined, drawing on international frameworks such as those from the World Health Organization (2022) and the American Psychiatric Association (2013). Within these frameworks, MHPs are understood to include disabilities and impairments associated with disturbances in brain functioning that affect cognition, emotion, and behaviour, as well as the broader behavioural, emotional, and social difficulties that may arise from these conditions (Insel et al., 2010; Vacca et al., 2025; World Health Organization, 2022). Rather than focusing on discrete psychiatric diagnoses, MHPs are conceptualized on the basis of broader dimensions of functioning and symptomatology, most commonly divided into internalising problems (which include difficulties that are directed inwards towards a person's own feelings, thoughts, and body rather than towards other people or the environment - e.g., anxiety, depression, emotional distress) and externalising problems (which include difficulties that are directed outward, toward other people or the environment rather than inward toward thoughts and feelings - e.g., hyperactivity, impulsivity, conduct-related behaviours). This dimensional distinction is well established in developmental psychopathology

and mental health research and has been shown to capture core patterns of emotional and behavioural difficulties across childhood and adolescence (Achenbach & Edelbrock, 1978; Achenbach et al., 2016; Krueger & Markon, 2006; Lahey et al., 2017).

Adopting a dimensional rather than diagnostic approach offers several methodological advantages. First, it enables the inclusion of subclinical and self-reported MHPs that may not meet full diagnostic criteria but are nonetheless associated with significant impairment and adverse life outcomes (Angold et al., 1999). Such an approach is particularly relevant in community-based samples, where many individuals may experience meaningful symptoms without formal diagnosis or clinical contact (e.g., Costello et al., 2003; Merikangas et al., 2010). Second, dimensional conceptualisations facilitate comparability with previous research that has employed internalising and externalising frameworks, while also allowing findings to be linked to studies focused on specific psychiatric disorders nested within these broader dimensions (Achenbach et al., 2016; Krueger & Markon, 2006). This is especially important in research examining associations between MHPs and youth offending, where different studies may operationalize mental health using varying diagnostic or symptom-based measures (e.g., Fazel et al., 2008).

Additionally, framing MHPs dimensionally rather than diagnostically shifts attention away from categorical labels and towards underlying patterns of emotional and behavioural functioning. This perspective is in line with contemporary critiques of categorical psychiatric classification systems, which argue that strict diagnostic boundaries often fail to reflect the continuous nature of psychopathology (Markon, 2011; Widiger, 2005). The internalising–externalising distinction thus reflects a developmental perspective, acknowledging that MHPs often vary in severity and expression over time, rather than existing as stable or discrete diagnostic entities. Longitudinal research demonstrates that symptom and problem profiles often change across developmental stages, with continuity existing at the level of underlying dimensions rather than specific diagnoses (Caspi et al., 2014; Lahey et al., 2017). This perspective thus accommodates developmental change and individual variability, supporting the view that patterns of MHPs may evolve across the lifespan while still reflecting core vulnerabilities of relevance to later outcomes, including offending (Moffitt, 1993; Murray & Farrington, 2010). Moreover, a dimensional framework may also contribute to stigma reduction by avoiding disorder-specific labels and emphasizing descriptive, person-centred accounts of

psychological problems rather than fixed diagnostic categories (Corrigan, 2004; Hinshaw & Stier, 2008). Overall, the chosen definition captures the complexity of MHPs while remaining sensitive to the methodological challenges inherent in studying their associations with youth offending.

## **Life course criminology, criminal career research, and the risk factor approach**

Life course criminology and criminal career research, with prominent studies having been conducted by researchers such as Laub and Sampson (2006), Farrington (2005), Moffitt (1993), and Piquero et al. (2007), emphasizes the importance of examining, studying, and understanding developmental changes throughout an individual's life course and individuals' criminal behaviour over time. Concepts such as onset, duration, continuity, transitions, turning points, desistance, etc. (DeLisi & Piquero, 2011; Farrington, 2000b; Laub & Sampson, 2006; Moffitt, 1993) are key to explaining a person's trajectory of (and out of) criminal behaviour. Research conducted on the basis of these perspectives has identified different trajectories of criminal behaviour that are common at the group level, such as the adolescent-limited (AL) and life-course-persistent (LCP) offenders described in Moffitt (1993) dual taxonomy theory. Many other studies have also found evidence of other offender groups (e.g., Moffitt et al., 2002; Piquero, 2008), for example adult onset offenders (Andersson & Torstensson Levander, 2013). Many of the AL offenders have been found to follow an age-crime curve that peaks at around age 16/mid-adolescence and thereafter decreases (e.g., Farrington, 1986; Moffitt, 1993), with many adolescents only committing a few less serious offences and then desisting from their criminality as they reach adulthood (e.g., DeLisi & Piquero, 2011; Farrington, 1986, 2005; Laub & Sampson, 2006; Moffitt, 1993). The LCP offenders, also called chronic offenders, are particularly interesting because they tend to engage in antisocial behaviours early in life, continue with criminal activity throughout their lives, and are responsible for a large proportion of all the crimes committed in society (e.g., Moffitt, 1993).

The life course criminology and criminal career research perspectives highlight the importance of risk factor research. A risk factor can be defined as "any measurable individual, social, economic, or environmental characteristic that increases the *probability* that a person will engage in criminal or antisocial behaviour" (e.g., Farrington, 2003; Loeber, 1990). Risk factor research can thus

constitute an important means of identifying individuals who might be at increased risk of developing criminal behaviour compared to others (Farrington, 2000b; Farrington, 2005), and together with knowledge about protective factors this research can help us to identify where to target interventions with the intention of supporting positive development (Farrington, 2000a). Life course criminology and criminal career research specifically claim that biological factors (such as psychopathology and genes), together with the environment of an individual, affect the development of an individual's life and the potential risk of criminality (e.g., Farrington, 2003; Farrington, 2005; Moffitt, 1993; Murray & Farrington, 2010). Research also provides evidence that being exposed to several risk factors over a sustained period of time may have a cumulative effect on the risk of criminality (e.g., Farrington, 2005; Moffitt, 1993; Sampson & Laub, 1995). The combined influence of biological and environmental risk factors, and their cumulative effects, has been described as being particularly important for the life-course-persistent (LCP) offender group. In this group, interactions between biological vulnerabilities and adverse environmental conditions are thought to reinforce one another over time, increasing the likelihood of stable and difficult-to-disrupt trajectories of negative outcomes (e.g., Farrington, 2005, 2020; Moffitt, 1993). It is therefore in relation to this group that researchers have concluded that MHPs are important (Farrington, 2020; Moffitt, 1993), with LCP offenders often presenting with problems linked to a genetic predisposition, prenatal difficulties, and temperament problems that (often in complex interactions with the social environment) can lead to the development of both externalising (Durmaz et al., 2020; Farrington, 2005; Maggi et al., 2010; Moffitt, 1993) and internalising problems (e.g., Comisso et al., 2024). By contrast, among AL offenders the levels, number, and persistence of risk factors are often lower and shorter in comparison to LCP offenders, and they are often linked to associations with antisocial peers and criminogenic environments, peer pressure, and a so called “maturity gap” – which can be described as a gap between biological maturity and limited social possibilities that is based on what one would like to do (based on one’s biological maturity) and what one is actually given the opportunity to do (based on the prevailing social conditions) (Moffitt, 1993).

However, even though it is very valuable to know, for example, how different trajectories of crime and different variables are associated with offending, it is important to remember that these perspectives have also been criticized. Firstly, despite the substantial contributions made by life-course criminology, criminal

career research, and risk factor research, important challenges remain in relation to the need to replicate results across different historical contexts, birth cohorts, countries, and cultural settings (Piquero et al., 2007). Such replication is necessary to assess the generalizability of existing knowledge and to better understand how situational, social, and temporal conditions shape criminal behaviour. However, the major problem is that these perspectives cannot fully explain the causal mechanism that links risk factors to crime (e.g., Farrington, 2000a; Treiber & Wikström, 2025; Wikström & Kroneberg, 2022). For example, it has been suggested that there are too many risk factors to allow for an understanding of how they all interact and which of them actually cause crime (e.g., Murray & Farrington, 2010). Further, drawing on Treiber and Wikström (2025), it can be argued that risk-factor perspectives are limited in their ability to explain the causal mechanisms through which individual and environmental risk factors interact. While these approaches identify associations between multiple risks and offending, they provide less insight into how such factors combine in specific situations to produce criminal action. In other words, life course criminology and criminal career research – including risk factor research – cannot on their own explain specific acts of crime (e.g. Treiber & Wikström, 2025).

To address these limitations, findings from life course criminology, and criminal career and risk factor research need to be combined with criminological theories that have a greater capacity to explain the *situational mechanisms causing criminal acts*, such as Situational Action Theory (SAT) (e.g., Wikström, 2006). While life course, criminal career, and risk factor perspectives are effective in identifying long-term patterns, developmental trajectories, and population-level risk correlates of offending, they are, as noted, less well equipped to explain why a criminal act occurs at a specific moment, in a specific setting, and is committed by a specific individual. Situational Action Theory contributes to bridging this gap by focusing on the interaction between individual characteristics and environmental contexts in concrete situations, thereby explaining how crime can emerge as the outcome of a decision-making process in which both individual and contextual factors are considered as affecting the behavioural outcome (Wikström, 2006). However, and importantly, using the framework of SAT still points to the need for research that explicitly examines the development of individual traits and characteristics relevant to decision-making, such as self-control, moral values, and perceptions of action alternatives, for example, how these traits and characteristics develop over time, how they are shaped by social and environmental influences, and how they affect both the choice to commit a

crime in a given situation and the choice to engage with particular settings and environments – research questions to which the life course and criminal career perspectives can contribute answers. Applying a combined and integrated analytical and theoretical approach and perspective when researching criminal behaviour could therefore be argued to constitute a superior alternative.

## **Prior research on MHPs and youth crime**

This section summarises and reviews previous research findings on MHPs and youth offending. The first part is divided into two sub-sections, which present findings on the associations between externalising and internalising problems and offending. The findings presented in these two sub-sections are organised based on the type of samples used in the studies described: (1) studies of youth who already have established offending behaviours (such as youth in detention), (2) studies of youth who already have established MHPs (such as in clinical samples), and (3), studies of general samples of youth who have not been included in the sample due to either problems with MHPs or offending (such as community-based, cohort studies). Swedish research findings are presented independently in a subsequent section. Key issues related to the complexity of researching MHPs and offending are then addressed, including a potential overlap between internalising and externalising problems, and between externalising problems and criminal behaviour. Finally, the section presents findings on support, prevention, and intervention measures targeting MHPs and youth offending.

### **Externalising problems and youth offending**

Previous research has consistently noted strong associations between externalising problems and youth offending across a wide range of youth samples with different characteristics, which can be exemplified using the findings from a systematic review of meta-analyses conducted by Basto-Pereira and Farrington (2022). This review, whose inclusion criteria included meta-analyses conducted in community or offender samples with specific traits or characteristics (e.g., offenders with mental illness), found that externalising problems were one of the strongest predictors of criminality when examining a range of developmental predictors of offending and persistence in criminality (such as delinquent peers, family/parental dimensions, school/employment problems etc.). Turning to studies conducted on samples of *youth who already have established offending behaviours*, the findings are consistent in showing a strong association between

externalising problems and youth offending, with robust evidence for this association being reported in multiple meta-analyses and systematic reviews (e.g., Beaudry et al., 2021; Colins et al., 2010; Fazel et al., 2008; Vincent et al., 2008). Studies of youth in detention and the juvenile justice system show that a substantial proportion of detained youth meet criteria for externalising MHPs, with prevalence estimates typically ranging between 40 and 60% (Beaudry et al., 2021; Colins et al., 2010). Among these MHPs, conduct disorder (CD) and attention deficit disorder are two of the most frequently identified diagnoses, particularly among boys (e.g., Beaudry et al., 2021). Since the dimension of externalising problems includes problems involving antisocial behaviour and aggression, it is not surprising that youth in detention with externalising problems exhibit higher levels of aggressive and antisocial behaviours than their peers, and this also indicates that that behavioural dysregulation and rule-breaking tendencies are central features of the association between externalising problems and youth offending (Underwood & Washington, 2016; Vincent et al., 2008). This is further discussed in a following part of the background section of the thesis. Further, research indicates that youth with repeated or more extensive involvement in the criminal justice system report higher levels of externalising problems than those with more limited offending histories (Wasserman et al., 2010). Taken together, these findings suggest that externalising problems are not only highly prevalent among justice-involved youth but may also be particularly important for a subgroup of these youth characterised by persistent or more severe offending patterns.

Findings from studies on *youth who already have established MHPs* similarly demonstrate that externalising problems are an important risk factor for youth offending. For example, Mordre et al. (2011) found that childhood CD was significantly associated with later offending in a longitudinal study based on a child psychiatric inpatient sample. At the same time, however, they also found that ADHD in childhood was no more associated with later offending than the rest of the examined disorders in the study population. There are also indications from these types of studies that the age of onset of externalising problems matters for the outcomes, with Johnson et al. (2015), for example, finding that among two groups of boys with CD, a group with childhood-onset CD displayed greater cognitive impairment, more psychiatric symptoms, and that they committed more serious violent offences compare to a group with adolescent onset. The findings of Johnson et al. (2015) are in line with the finding of studies focused on *general, community-based, youth samples*. As mentioned in the previous section on life

course criminology and criminal career and risk factor research, conclusions from community based longitudinal studies stress that early externalising problems increase the risk of future criminal behaviour that continues into adulthood (e.g., Loeber et al., 2012; Moffitt, 1993). Moreover, a synthesis of longitudinal studies primarily based on community samples (Lipsey and Derzon (1999) found that early externalising behaviours, particularly aggression and antisocial behaviour, were among the strongest predictors of serious and violent offending in adolescence and early adulthood. Lipsey and Derzon (ibid.) also showed that the likelihood of later offending increased when several risk factors co-occurred across individual, social, and environmental domains, and that many of these risk factors emerge early in development.

Additionally, even though externalising problems seem to be important for both boys and girls, longitudinal studies in particular have found evidence of gender differences in the way such problems are associated with youth offending. Boys who commit crimes often show higher levels of externalising problems – especially aggression, hyperactivity, and conduct problems – from early childhood onward (Keenan & Shaw, 1997; Moffitt, 1993; Moffitt et al., 2001), and this overt expression of problems has further been suggested to increase the likelihood of detection and justice system involvement (e.g., Odgers et al., 2008). Although girls have been found to generally report lower levels of externalising problems, they may express such problems via relational or indirect aggression (Odgers et al., 2008; Silverthorn & Frick, 1999), which may affect the detection rate and the extent to which they appear in official crime statistics. Research also indicates that girls with externalising problems more frequently exhibit co-occurring internalising difficulties, suggesting that emotional dysregulation and behavioural problems often overlap among girls and women (Keenan & Shaw, 1997; Silverthorn & Frick, 1999) – which will be more thoroughly discussed in the following sections of the thesis. General, community-based studies have further examined specific disorders included in the dimension of externalising problems. For example, a population-based study using nationwide Danish registers, found that ADHD was significantly associated with adolescent convictions and incarcerations, and that crime rates among individuals with ADHD were reduced during periods when they were taking ADHD medication. Further, a Finnish/Swedish study using longitudinal data from two cohort studies examined adult personality and observed childhood behaviours among individuals who had committed offences and individuals who had not, and found higher levels of impulsivity and aggression among offenders in both samples,

with the researchers suggesting that early problem behaviours are precursors of subsequent criminal activity at least in these two cultures (Pulkkinen et al., 2000).

Overall, previous research based on different types of samples strongly indicates that externalising problems may play an important role in youth offending. There are a number of possible explanations for these associations, with biosocial criminological studies suggesting, for example, that externalising problems, antisocial behaviour, and criminal behaviour share both genetic markers and underlying psychopathological structures (e.g., Caspi et al., 2014; Caspi et al., 2002; DeLisi & Piquero, 2011), while other studies have shown that these problems can co-develop over time (Farrington, 2005, 2020; Moffitt, 1993) and possibly affect each other in a bidirectional manner (Wiesner et al., 2023). The complexity of the associations means that more research is needed. From a theoretical perspective, the link between externalising problems and youth offending might in part be explained by the role played by problems associated with impulsivity and self-regulation/self-control, a prominent feature of the explanation of criminality in, for example, Situational Action Theory (Wikström, 2006) and Gottfredson and Hirschi (1990) General Theory of Crime.

### Internalising problems and youth offending

Previous research on the association between internalising problems and youth offending presents an overall more complex picture than for the association between externalising problems and youth offending. Studies focusing on *youth who already have established offending behaviours* indicate that internalising problems may be particularly relevant for certain subgroups of offenders. Studies on samples of youths of this kind have reported the existence of internalising problems among detained youth, but with differences between samples and genders. For example, Sailas et al. (2005) examined mental disorders among male prisoners aged 15-21 and found that around 3.5% had depression, while a combined study on three prisoner cohorts, the youngest aged 19, found that 8.8%-17.1% suffered from stress disorders and 8.1%-17.5% suffered from depression (Bukten et al., 2024). Further, a systematic review by Fazel et al. (2008) found that approximately 10% of boys and 30% of girls in detention and correctional facilities met the criteria for major depression. The higher percentage of girls with depression is in line with some research indicating that internalising problems seem to be of particular importance among girls involved in offending (Jung et al., 2017). For instance, besides depression, up to 70% of detained girls report anxiety-related problems (Beaudry et al., 2021; Teplin et al., 2002). It should be

noted, however, that this is in line with general patterns showing internalising problems to be more common among girls than boys (e.g., Gutman & Codioli McMaster, 2020; Stewart et al., 2022). Imbach et al. (2013) found further that youth offenders involved in serious weapon-related crimes reported higher levels of depression than other youth offenders, highlighting the heterogeneous role of internalising problems across different groups of young offenders.

Research findings *from general, community-based, youth samples* emphasise the importance of associated and co-occurring risk factors in relation to internalising problems and youth offending. For example, previous exposure to trauma and stress – which may manifest in internalising problems - has been associated with an elevated risk for later violent criminal pathways, especially among women (Webb et al., 2017) and when combined with drug use and externalising problems (Peltonen et al., 2020). Longitudinal and cohort studies have further found that internalising problems are associated with different types of crime, with depression and anxiety both predicting property crime (Anderson et al., 2015), and being associated with violence (Yu et al., 2017). Community-based longitudinal studies further suggest that the relationship between internalising problems and youth offending may have a developmental aspect. Some research indicates that changes in anxiety and depression co-occur with changes in offending behaviour over time, such that improvements in mental health are linked to reductions in offending and vice versa (Baker et al., 2023). Other longitudinal findings suggest that early depressive symptoms may predict later changes in delinquency, particularly among girls (Kofler et al., 2011). However, results are mixed, as some studies have found no evidence that internalising problems precede offending; instead, offending has been associated with subsequent increases in anxiety (Jolliffe et al., 2019).

However, across studies examining internalising problems and youth offending, and independent of sample characteristics, the importance of comorbidity with externalising problems is frequently highlighted. For example, in a study among incarcerated youth, a substantial proportion who met the criteria for externalising disorders also met the criteria for internalising disorders, indicating marked comorbidity, and youth with both types of disorders also had had an earlier onset and more extensive offending histories than those with externalising problems alone (Wasserman et al., 2003). Regarding girls in detention in particular, van der Molen et al. (2013) emphasize that internalising problems can be related to, or co-occur or interact with, other variables and risk factors such as trauma and stress, and they also highlighted a comorbidity with

externalising problems among detained girls. Further, a meta-analysis of studies using both register data and self-reported recidivism found that both externalising problems and the comorbidity of internalising and externalising problems were associated with an increased risk of reoffending, whereas internalising problems alone were not (Wibbelink et al., 2017). However, these authors found no evidence that youths with co-occurring disorders experienced more negative developmental outcomes than those with only externalising disorders (Wibbelink et al., 2017). Similar associations have also been noted in a sample of *youth with clinical psychiatric difficulties*, where it was found that the co-occurrence of externalising problems, internalising problems, and substance abuse increased the risk of recidivist offending (Tolou-Shams et al., 2023). Finally, findings from studies based on *general, community-based, youth samples* also arrive at similar conclusions on comorbidity between internalising and externalising problems. For example, a cohort study by (Sourander et al., 2007) showed that boys with combined conduct and internalising problems exhibited the poorest outcomes among boys in the general sample, which included presenting the highest risk of subsequent psychiatric disorders, criminal offending, and self-reported difficulties at follow-up.

Overall, although research on internalising problems has produced mixed results, such problems appear to be significant among some youth offenders and seem to be particularly relevant to an understanding girls' offending behaviours. It is important to note that these problems often appear to constitute part of a broader set of vulnerabilities and frequently co-occur with other issues that contribute to criminal activity (e.g., Farrington, 2005; Ivert et al., 2017; Moffitt et al., 2001; Peltonen et al., 2020; Siponen et al., 2023) rather than influencing the risk of offending on their own. One explanation for this seemingly complex association suggests that the internalising problems associated with offending may be an expression of or reaction to other issues, such as externalising problems (Quinn & Madhoo, 2014). Internalising problems have also been linked to an increased risk of alcohol and drug abuse (e.g., Hussong et al., 2011), which might partly explain their association with offending behaviours. Given evidence of bidirectional relationships between internalising problems and youth offending (e.g., Björkenstam et al., 2011; Jolliffe et al., 2019), further research is necessary to better understand these associations, particularly among offending girls.

## Externalising and internalising problems and youth offending in a Swedish context

Studies from Sweden show results similar to those from international studies with regard to both externalising and internalising problems, and across different types of samples. Starting with externalising problems among youth with established offending behaviours, a recent report mapping psychiatric needs among children and youth at the detention and compulsory care homes administered by the Swedish National Board of Institutional Care (SiS) showed that the level of MHPs among these children and youth was high, with the most common diagnosis being ADHD/ADD (Jalling et al., 2025). The criteria for this disorder were met by 60% of all youth, and between 55 and 93% also had comorbid diagnoses, with post traumatic stress syndrome being common among these (Jalling et al., 2025). Karlén (2020) found that young violent offenders with early-onset externalising problems (specifically CD and ADHD) had a more varied history of violent crime, a broader history of aggressive behaviours in general, more psychiatric comorbidity, and a pattern of greater problem accumulation over time compared to offenders with no externalising problems. Moreover, a recent doctoral thesis by Tärnhäll (2024) showed that in a cohort of young male offenders sentenced for violent crime, the majority of the cohort had been given a psychiatric or neuropsychiatric diagnosis at some point in their lives, with a very high frequency of externalising problems (including diagnoses of CD and ADHD). Similarly, in a follow-up study of youth with ADHD who had been committed to juvenile institutions, Ståhlberg et al. (2017) found that criminal recidivism was much higher than among an age-matched group from the general population. The Swedish Prion and Probation Services (2022) has further concluded that a high number of detained youth have problems with MHPs, particularly externalising problems such as rule-breaking and aggression.

As regards Swedish research based on samples of *youth with established MHPs*, register studies have concluded that youth with conduct disorders, or combinations of different externalising problems, have an elevated risk of both violent and non-violent criminal convictions compared to matched controls, and compared to those without MHPs (Ivert et al., 2017; Siponen et al., 2023). Important associations between externalising problems and youth offending have also been identified in general, community-based cohort studies. Longitudinal evidence from a 30-year follow-up of an urban Swedish cohort showed that childhood externalising problems predicted a range of adverse outcomes, including criminal behaviour across the life course (Bergman & Andershed,

2009), and findings from the Stockholm Birth Cohort Study have similarly demonstrated that early behavioural and social problems predict later experience of criminal sanctions, among other adverse life outcomes (Nilsson, 2008).

Also in line with international research, internalising problems have been found among youth with established offending behaviours, a conclusion drawn by The Swedish Prison and Probation Services (2022) when it found that 28% of youth suffered from anxiety or depression before or at the time of their arrests. Swedish studies based on both clinical and/or register samples and general, community-based samples have also found associations between internalising problems and offending. First, in a study that compared outpatients diagnosed with depression with matched general population controls, depressive symptoms were associated with an increased risk of violent crime, with little difference in the size of the estimate when all crimes (violent and non-violent) were used as the outcome variable (Fazel et al., 2015). Further, a study among Swedish school pupils (Källmen et al. (2023) found that anxiety and depression were associated with criminal behaviour, even after adjusting for SES, school grades, and criminal friends. Swedish research has also often highlighted the increased risk of offending in cases of comorbidity involving both internalising and externalising problems. Using a national population-based register, for example, Siponen et al. (2023) found that internalising problems substantially increase the risk of later criminality when they co-occur with externalising problems. This is consistent with findings by Ivert et al. (2017), who, in a follow-up of child and adolescent psychiatric patients, found that internalising problems were associated with criminal outcomes only when combined with externalising problems. Findings from the previously mentioned Stockholm Birth Cohort Study further highlight the importance of comorbidity. Specifically, childhood adversity was associated with long-term trajectories of disadvantage characterised by both internalising and externalising problems (Almquist & Brännström, 2016). Although internalising problems alone, in contrast to externalising problems, were not strong independent predictors of criminal behaviour, the co-occurrence of internalising problems, externalising behaviour, and social disadvantage was associated with an increased risk of offending across the life course (Almquist & Brännström, 2016).

## The complexity of researching MHPs and offending among youth: shared risk factors, gender differences, and overlapping problems

Findings from previous research have demonstrated the complexity of the associations between MHPs and youth offending, with externalising and internalising problems showing different and/or mixed results. It is therefore important to emphasise that, as previously discussed in relation to internalising problems in particular, MHPs often co-occur with other risk factors for youth offending and interact with these factors in ways that can both increase or decrease the risk of crime, as well as influencing mental health outcomes (e.g., Farrington, 2003; Farrington, 2005, 2020; Loeber & Keenan, 1994; Maggi et al., 2010; Moffitt, 1993; Murray & Farrington, 2010; Pessoa & Almeida)

One such a risk factor that needs to be addressed is substance abuse. Research has found that youth offending is associated with elevated rates of substance use and co-occurring MHPs (e.g., Proctor & Kopak, 2021; Schubert et al., 2011; Stanley et al., 2025; Tolou-Shams et al., 2023), and that youth involved in the juvenile justice system show a significantly higher prevalence of substance use disorders compared with general youth populations, with many meeting clinical criteria for problematic alcohol or drug use (e.g., Goldman et al., 2023; Schubert et al., 2011; Seker et al., 2021). Substance use among justice-involved youth often co-exists with internalising and/or externalising problems (e.g., Seker et al., 2021)), which complicates treatment needs (e.g., Richert et al., 2020) and increases the risk of recidivism (Tolou-Shamns et al., 2023). Early substance use has been linked to a heightened risk of both juvenile delinquency and the persistence of MHPs, for example, by affecting neurobiological development (Simon et al., 2022). Family, peer, and environmental influences further exacerbate risk, as associations with deviant peers and pro-drug attitudes increase both drug use and criminal behaviours (Zapolski et al., 2019).

Moreover, as already mentioned in several parts of the background, exposure to negative life events (NLEs) – such as family conflict, abuse, neglect, and other forms of childhood adversity – is consistently associated with both youth MHPs offending (Baglivio et al., 2014; Fox et al., 2015; Thornberry et al., 2010; Zahn et al., 2010). For example, studies of justice-involved youth show that adverse childhood experiences are highly prevalent among juvenile offenders, and that higher levels of exposure are associated with an increased risk for serious, violent, and chronic offending (Baglivio et al., 2014; Fox et al., 2015). Longitudinal research further indicates that childhood maltreatment predicts adolescent offending even after accounting for other risk factors (Thornberry et al., 2010).

With regard to NLEs, it is also important to emphasise that it is not only severe traumatic events that have been found to be associated with offending, but also less severe ones such as negative emotions linked to bullying or a low quality of friendships (e.g., Galehan, 2019; Jackson et al., 2013). Additionally, much research, including systematic reviews and meta-analyses, has found that negative life events are strongly linked to the development of both internalising and externalising problems (Hughes et al., 2017; Pessoa & Almeida; Turner et al., 2021). Together, these findings suggest that NLEs contribute to interconnected and complex pathways between MHPs and youth offending.

Social relationships, particularly with parents and peers, have also been shown to be important for both MHPs and youth offending (e.g., Farrington, 2003; Farrington, 2005; Hoeve et al., 2009; Moffitt, 1993). High-quality parent-child relationships, characterised by support, warmth, attentive communication, and consistent parenting, are associated with better adolescent mental health and lower levels of behavioural problems (Dishion & McMahon, 1998; Loeber & Burke, 2011). In contrast, abusive, neglectful, or critical parenting has been linked to elevated emotional and behavioural difficulties, which are themselves associated with an increased risk of delinquency and later offending (Farrington, 2005; Moffitt, 1993). Furthermore, low parental attachment and inadequate parental monitoring have repeatedly been identified as predictors of delinquent behaviour (Dishion & McMahon, 1998; Hoeve et al., 2009), with some evidence suggesting that weak parental attachment may be particularly predictive of violent offending among females (e.g., Heimer & De Coster, 2006; Hubbard & Pratt, 2002).

Peer relationships also share associations with both MHPs and youth offending. Positive peer involvement has been shown to protect against emotional distress, including anxiety and depression (Prinstein, 2008), while youth with externalising problems have been found to be more likely to be rejected by prosocial peers and to instead affiliate with peers with similar problems (Chen et al., 2015; Laird et al., 2001). These deviant affiliations often contribute to an escalation of problems since associations with deviant and antisocial peers have been found to substantially increase the likelihood that adolescents will adopt similar behaviours and attitudes, including rule-breaking and offending behaviours (e.g., DeLisi & Piquero, 2011; Farrington, 2003; Farrington, 2005; Moffitt, 1993; Warr, 2002). Moreover, peer influence is widely recognised within criminology as one of the most robust predictors of youth offending (Chen et al., 2015; Farrington, 2005; Moffitt, 1993; Warr, 2002) and developmental research suggests that peer effects are especially salient during adolescence, when

sensitivity to peer approval is heightened (Prinstein, 2008; Steinberg, 2008). Although findings regarding gender differences vary, deviant peer affiliations have been shown to increase the risk for offending among both boys and girls (Hoeve et al., 2009; Hubbard & Pratt, 2002; Moffitt et al., 2001; Prinstein, 2008; Vitaro et al., 2000). Taken together, these findings indicate that family and peer contexts contribute to youth offending both directly and indirectly through their influence on mental health, behavioural regulation, and social acceptance. The interplay between social relationships and young people's psychological and behavioural development thus underscores the importance of considering broader social environments when explaining pathways into youth offending (e.g., Farrington, 2005; Wikström et al., 2012).

Another problem related to the complexity of researching associations between MHPs and youth offending relates to differences between boys and girls, since there are indications of sex-differences in the importance of and interactions between risk factors and developmental processes. Although previous research has found important evidence related to girls' offending in both mixed-gender samples and girl-only samples (e.g., Carlén et al., 2022; Henneberger et al., 2014; Hubbard & Pratt, 2002; Keenan & Shaw, 1997) there is a growing recognition that girls' offending behaviours remains under-examined and insufficiently understood (e.g., Andersson, 2013). As a result, important gender-specific risk factors, developmental pathways, and mechanisms may be overlooked. For example, as mentioned in the sections above in relation to both externalising and internalising problems, research suggests that girls who offend often differ from boys in terms of their exposure to NLEs, MHPs, and relational contexts, which includes their having higher rates of internalising problems, victimisation, and family-related stressors (e.g., Abram et al., 2015; Andersson, 2013; Beaudry et al., 2021; van der Molen et al., 2013). Moreover, some evidence indicates that factors such as parental attachment, trauma exposure, and mental health may be more strongly associated with offending among girls than boys, pointing to potentially distinct developmental processes (Hubbard & Pratt, 2002; Zahn et al., 2010). The relative scarcity of gender-specific research limits both the understanding of offending and theoretical development, which may affect the effectiveness of prevention and intervention strategies. Addressing these knowledge gaps is therefore essential for developing a more comprehensive and inclusive understanding of youth offending.

There are also two other specific problems related to research on youth MHPs and offending that make it more difficult to draw conclusions: 1. An overlap

between externalising problems and youth offending and 2. An overlap between externalising and internalising problems. These two problems will be discussed in the following paragraphs.

*Overlap between externalising problems and youth offending: a conceptual overlap*

Research on externalising problems and youth offending is methodologically challenging due to a substantial overlap in their behavioural manifestations and the measures employed to capture them (e.g., Liu, 2004). However, although Lui (2004) has argued that “externalising problems” and “antisocial problems” are almost synonymous, distinctions can be drawn between them. Shaw and Winslow (1997) argue that externalising problems are often used to describe less severe behavioural disruptions in children, while antisocial problems often refer to more persistent, norm-violating behaviours that involve aggression and rule-breaking and that may develop into conduct disorder or later criminal behaviour. In addition, externalising problems also include hyperactivity problems, which are not a common feature of antisocial problems (Lui, 2004). Nonetheless, externalising problems include problems involving both physical and verbal aggression (American Psychiatric Association, 2013) and a range of other antisocial behaviours such as lying, fighting, stealing, cheating, etc. (Lui, 2004). Thus, some of these behaviours are clearly rule-breaking and criminal behaviours and they overlap conceptually with delinquency. This can further be exemplified by the diagnosis of conduct disorder, which includes the diagnostic symptoms of aggression towards people and animals, theft, and rule-breaking, with the diagnosis thus in part including examples of delinquent behaviour (American Psychiatric Association, 2013). This further indicates that some externalising behaviours may share risk factors and possible genetic underpinnings with criminal behaviour.

When conducting research in which externalising problems are positioned as a predictor or risk factor for criminality, the predictor also measures the criminality outcome variable, which is problematic. It is therefore important to be aware of this problem when analysing and interpreting study results, as it may, for example, yield misleading estimates of the strength of associations. It is also important to continue to research how to best classify, define, and measure different MHPs (e.g., Caspi et al., 2014) so that the most accurate representation of the problems can be conceptualised and used, for example when examining their associations with criminality. However, because these problems – such as conduct disorder – are formally classified as MHPs (e.g., in the DSM-IV), they should not only be conceptualised or treated as a criminological phenomenon but

also as psychiatric/psychological problems. Doing so allows the possibility of adding knowledge and building on established research, concepts, and validated dimensions of MHPs.

*Overlap between externalising and internalising problems: an overlap in comorbidity and possible shared origins*

There is also a problem related to an overlap between the dimensions of internalising problems and externalising problems. Here the problem is not conceptual, but instead relates to comorbidity and possible shared origins. Studies have found that these problems often co-occur (Cosgrove et al., 2011; Willner et al., 2016), that the symptoms may overlap (Essau & de la Torre-Luque, 2023), that the problems share risk factors and predictors (Yang et al., 2022), and that they may have related or shared psychopathological structures and origins (Caspi et al., 2014; Cosgrove et al., 2011; Sánchez-Hernández, 2023). For example, a symptom classified as an externalising or internalising problem may be an expression of a problem originating in the other problem group (Sánchez-Hernández et al., 2023), which has been proposed to be more common among girls. While girls more often present with internalising symptoms, research suggests that this may, in some cases, reflect underlying externalising problems or developmental shifts in the way underlying problems present over time (Quinn & Madhoo, 2014). Clinical reviews of ADHD and related externalising disorders note that girls may show subtler, internally expressed problems (e.g., inattentiveness, anxiety, depressive symptoms) that mask underlying impulsivity or conduct-related vulnerabilities, increasing the risk of missed or delayed detection of externalising pathology (Quinn & Madhoo, 2014).

Developmental and longitudinal research has also highlighted the dynamic and reciprocal relationship between internalising and externalising problems over time. For example, studies show that early externalising problems can increase the risk of later internalising problems (Loth et al., 2014), in part via pathways such as peer rejection, academic difficulties, and harsh disciplinary practices (e.g., Burt & Roisman, 2010). These findings highlight the importance of considering bidirectional associations, while also challenging the assumption that internalising and externalising problems constitute independent domains (e.g., Krueger & Markon, 2006). When conducting research on MHPs and youth offending, it is essential to be aware of this overlap, since conducting research on only one dimension may for example lead to a failure to detect co-occurring problems and shared effects, and may result in an oversimplified representation

of the associations. Awareness of this overlap is important even when the research includes a focus on both externalising and internalising problems, since there is still a need to consider how the overlap may influence the interpretation of study results and their implications for treatment and prevention (Caspi et al., 2014).

### Prevention and intervention measures targeting MHPs and youth offending

Based on the well-established associations between MHPs and youth offending, a range of evidence-based prevention and intervention strategies have been developed to target these interconnected problems. Some of these interventions also recognize and use findings from life course criminology, criminal career research, and risk factor research, since adding knowledge about trajectories, offender groups, and risk and protective factors can give further guidance on where, when, and for what interventions should be implemented (van der Stouwe et al., 2014; Wasserman, Keenan, et al., 2003). Different interventions target youth on different levels, using different strategies, and among different groups. Many preventive interventions are aimed at *youth who already exhibit antisocial or criminal behaviour* and who are involved in the justice system, i.e. *indicated prevention*. A substantial body of research indicates that evidence-based interventions that incorporate mental health components, such as multisystemic therapy (MST), Functional Family Therapy (FFT), trauma-informed approaches, and cognitive-behavioural interventions, can reduce reoffending in this group of youth (e.g., Baldwin et al., 2012; Pappas & Dent, 2023; Schaeffer & Borduin, 2005). Meta-reviews further suggest that interventions addressing multiple domains of young people's lives, particularly family-based and systemic approaches, are among the most effective strategies for reducing recidivism (Olsson et al., 2021; Pappas & Dent, 2023). Interventions that target *parents directly* have also shown promising effects on child outcomes, including early, family-focused programs that support parenting skills and early child development (e.g., Sanders et al., 2012; Sanders et al., 2014), as well as home-visiting programs for first-time, low-income mothers (Olds, 2006).

Additionally, interventions given at a more *universal* level, and thus not targeting specific individuals, for example in school or community settings, have demonstrated positive effects on a range of behavioural and psychosocial outcomes, particularly when programs are multi-component and implemented across multiple settings and agencies (e.g., Durlak & DuPre, 2008; Durlak et al., 2011; Russel et al., 2019). Findings from meta-analyses and reviews suggest that interventions

incorporating cognitive–behavioural and social–emotional learning components are associated with reductions in aggressive and antisocial behaviour, as well as improvements in emotional regulation, social skills, and overall functioning among children and adolescents (Durlak et al., 2011; Russel et al., 2019).

However, while many evaluations and studies show positive effects, findings on the effectiveness of interventions are inconsistent, and outcomes appear to vary across target groups, settings, and levels of implementation. For example, a randomized controlled trial by Humayun et al. (2017) found that FFT did not lead to greater reductions in antisocial behaviour or offending compared with treatment as usual, nor did it improve parenting or parent–child relationships. The authors noted that these results may reflect limitations related to implementation quality, study design, or the characteristics of the study population (Human et al., 2017). In line with this, a recent meta-analysis reported limited evidence that MST and FFT outperform usual care in reducing delinquent and antisocial behaviour, with MST showing no clinically important effects across several outcomes and FFT demonstrating only possible effects (Hunkin et al., 2025). Mixed findings are also evident in evaluations of broader community-based prevention programs. While the previously presented findings on multi-component interventions have shown more positive effects (Durlak et al., 2011; Russel et al., 2019), other reviews report null or inconsistent impacts on violence, substance use, and related outcomes (Melendez-Torres et al., 2016).

Based on these mixed findings, it is evident that more research is needed to understand what works, and why, with regard to support, prevention, and interventions targeting MHPs. However, a substantial body of implementation research shows that the effectiveness of preventive and intervention programs depends heavily on implementation quality, including fidelity to the model, sufficient dosage, practitioner competence, and contextual fit (Durlak & DuPre, 2008; Naoom et al., 2005). Even evidence-based interventions may fail when these conditions are not met, whereas well-implemented programs are far more likely to achieve positive and sustained outcomes (Durlak & DuPre, 2008; Naoom et al., 2005). Continued progress in support, prevention, and intervention thus requires not only refining existing programs but also investing in high-quality implementation and the development of well-adapted new approaches. Expanding the empirical knowledge base on MHPs and youth offending – including their development, co-occurrence, and interactions with other risk factors – is therefore essential for designing theoretically grounded and practically effective interventions (Durlak, 2016; Durlak & DuPre, 2008; Fixsen, 2005; Naoom et al., 2005).

# METHOD

## The Malmö Individual and Neighbourhood Study

The current thesis is based on data from the Malmö Individual and Neighbourhood Development Study (MINDS). MINDS is a longitudinal study, modelled on the Peterborough Adolescent and Young Adult Development Study (PADS) (e.g., Wikström et al., 2012) with some modifications to better meet the specific aims of the MINDS project and a Swedish context. Important for this thesis was the addition of measures of MHPs, specifically the Strengths and Difficulties Questionnaire (Goodman et al., 1998) and a measure of state negative affect. Both MINDS and PADS were designed in line with the theoretical assumptions of SAT, allowing for the analysis of people, settings, and their interactions. The longitudinal design, which includes situational data, enables the analysis of both individual development and change, which is especially useful for the current thesis in relation to, for example, the developmental aspects of MHPs and youth offending. The study follows a sample of 526 randomly selected adolescent boys and girls born in Malmö, Sweden, in 1995 (about 20% of the total cohort) and living there in 2007 (when the project was initiated). Three waves of data collection (excluding a pilot study with a smaller subsample) have been completed, when the adolescents were approximately 16, 17, and 19 years old. Data were collected using a self-report questionnaire and structured interviews, usually in small groups at the participants' schools. Adolescents with a foreign background and adolescents from more disadvantaged neighbourhoods are somewhat underrepresented (e.g., Engström, 2018; Nilsson et al., 2021).

Malmö is Sweden's third-largest city, home to around 360,000 people (Malmö Stad, 2026a). Roughly one in three residents was born abroad, a higher proportion than in Sweden's two other major cities and than the national average of 20%.

The city also has a relatively young population, with nearly 20% aged under 18 (Malmö Stad, 2026a). While Malmö exceeds the national average in the share of residents with higher education degrees, it also has higher-than-average unemployment (Malmö Stad, 2026b). Like other major urban areas in Sweden, Malmö features a mix of wealthy districts and neighbourhoods facing socioeconomic challenges.

## Study samples

Across the four studies in this thesis, different waves of data from the MINDS project have been used based on the studies' aims and research questions. *Studies I, III and IV* included the 386 boys and girls who participated in all three waves of data collection (except the smaller pilot study). In *Study I*, this allowed us to examine development in MHPs and offending over time. In *Study III*, it allowed us to examine the temporal associations between NLEs and offending, as well as the mediating role of MHPs, with certain knowledge that NLEs occurred first, MHPs followed, and offending came last. In *Study IV*, it allowed us to investigate how receiving professional support for MHPs from health care or social services at ages 17 and 19 affected the likelihood of future offending, with baseline levels of prior MHPs adjusted for between groups of support and non-support receivers. In *Study II*, we used data from waves two and three, focusing only on the 240 girls who participated in both these waves. Combining these waves provided more statistical power for our analyses, since there were relatively few girls who had committed offences.

**Table 1. Data from waves/participant age used in the different studies included in the current thesis**

Study	Wave/participant age/number of participants
Study I: Development of mental health problems and crime involvement in a Swedish adolescent sample	Wave 2, 3, 4/ age 16, 17, 19/ n=386
Study II: Girls, mental health problems, and offending: findings from a community sample	Wave 3, 4/ age 17, 19/ n= 230
Study III: Associations and mediation between exposure to negative life events, mental health problems, and offending among youth	Wave 2, 3, 4/ age 16, 17, 19/ n=386
Study IV: The association between receiving professional support for mental health problems and subsequent offending: findings from an adolescent Swedish sample	Wave 2, 3, 4/ age 16, 17, 19/ n=386

Adolescents who participated in all three waves of data collection differed significantly in relation to sex, as fewer boys participated over all three waves (51% at age 16; 47% at age 19). In relation to MHPs, adolescents who participated in all three waves reported higher levels of internalising problems, state negative affect, and lower levels of externalising problems at age 16, compared to those who dropped out. Examining boys and girls separately showed that the observed difference in state negative affect was evident only among boys, whereas the difference in externalising problems was evident only among girls. No gender-specific differences were found with respect to offending.

## **Data and measures**

All data in the studies in this thesis were collected using the MINDS self-report questionnaires. Besides questions about MHPs and offending, the questionnaire included questions about the neighbourhood in which the adolescent lived, their school environment, morality, self-control, drug use, and relationships with family and friends. Self-reports are a widely used and well-established source in research on crime, and the method has been substantially developed since the first systematic and important self-report studies were performed in the mid 20th century (e.g., Short Jr & Nye, 1957). Self-report studies have been of major importance to criminology and have shaped much of our current understanding of the correlates and causes of crime (e.g., Piquero et al., 2002). The method has further been argued to be particularly valuable for measuring both MHPs and youth offending, since official records capture only a small proportion of actual problems (e.g., Farrington, 2003; Thornberry & Krohn, 2000). An additional advantage of self-report data is their ability to assess the co-occurrence of MHPs and offending within the same individual, without risking that either has gone undetected in official records. Given the overlap between internalising and externalising problems, self-report measures also allow for the examination of different problems within the same individual, while avoiding discrepancies between informants when secondary or observational data are used (Krueger & Markon, 2006; Lahey et al., 2017), since when confidentiality is ensured, young people are more likely to disclose sensitive information (Tourangeau & Yan, 2007).

However, alongside the advantages of self-report data, there are also risks and limitations that need to be addressed, for example, the risks of bias and over- and underrepresentation (e.g., Durmaz et al., 2020; Latkin et al., 2017). Self-

report data may be affected by social desirability bias, particularly when young people are asked about sensitive topics such as offending or substance use, which can lead to underreporting or selective disclosure (Tourangeau & Yan, 2007). Self-report data can also be influenced by current mood or situational factors, which may affect the validity of the data (Podsakoff et al., 2003). Recall bias may further affect accuracy, especially when respondents are asked to report behaviours or symptoms over extended time periods (Hardt & Rutter, 2004). It is further important to be aware that using other types of data comes with benefits that self-report data do not provide. For example, register data give a high level of objectivity, as the data are not influenced by respondents' recall, social desirability, or current emotional state, and they can also provide information about clinically diagnosed MHPs and officially recorded offending. Moreover, it can also be useful for increasing statistical power in analyses, since some register based studies include entire birth cohorts, e.g., the Stockholm Birth Cohort (e.g., Sivertsson et al., 2024) or nationwide populations (e.g., Siponen et al., 2023). Other examples of useful data sources that could be used on their own or as a complement to self-report data include informant reports/observational data, which can provide information that the participants themselves may not recognise or report (De Los Reyes et al., 2015), and qualitative data, which can provide deep, subjective insights into specific questions of interest (Braun & Clarke, 2006). When researching MHPs and youth offending, it is thus important to be aware of the strengths and limitations of the data employed, while also addressing their potential effects on analyses, interpretations of results, and implications for society.

Below follows a presentation of the measures used in this thesis and the four included studies. Overall, few missing values were observed across all measures.

### Self-reported offending

The outcome measure used in all four studies in this thesis is self-reported offending. Self-reported offending was measured using 9 or 10 items (depending on the data collection wave). These included both property crimes (e.g. burglary and vandalism) and violent crimes (e.g. assault and arson). Committing property crime was most common throughout all waves of data collection (e.g., wave two = 21,2%), while violent crimes were less common (e.g., wave two = 7,8%). The items were processed differently across studies, depending on the sample and the analyses used. However, in all studies, the items were initially (or only) added together into a variety scale, which, for example, has the benefits of being easy

to construct, having high validity and reliability, and reducing effects of recall bias (Sweeten, 2012). In *Study I*, nine items were included to produce a variety scale counting the number of crime types the adolescent had committed over the 12 months preceding the data collection, and offending was thus treated as a continuous outcome variable. In *Study II*, ten items were included in a similar variety scale, which was then dichotomised and treated as a dichotomous outcome variable. This scale, however, also included drug crimes. In *Study III*, nine items were again included to produce a variety scale counting the number of crime types the adolescent had committed over the 12 months preceding the data collection, and offending was thus again treated as a continuous outcome variable in this study. Lastly, in *Study IV*, a similar variety scale of nine items was computed, and then dichotomized, and the outcome variable was thus treated as a dichotomous variable.

## Self-reported mental health problems

### *The Strengths and Difficulties Questionnaire*

Self-reported MHPs were measured using the Swedish version (Svedin & Priebe, 2008) of the self-report version of the Strength and Difficulties Questionnaire (SDQ) (Goodman et al., 1998). It consists of 25 items, and the total difficulties sum has been suggested to be a psychometrically sound measure of overall child and youth MHPs in studies from around the world (Goodman et al., 2010) as well as being frequently used as a clinical tool when diagnosing, for example, ADHD (Hall et al., 2019) and different types of emotional disorders (Socialstyrelsen, 2026). The SDQ can be divided into five subscales, which include five items each, with the intention of tapping into different dimensions of mental health: peer problems, conduct problems, emotional problems, hyperactivity, prosocial behaviour (Sdqinfo, 2023). Prosocial behaviour stands out from the rest of the four subscales, since it is the only one that measures variables that can have positive effects on mental health (Barrett et al., 2006). Four of these subscales can further be used to create two broader subscales: emotional problems and peer problems are combined to create the internalising problems scale, and hyperactivity and conduct problems are combined to create the externalising problems scale (Goodman et al., 2010). Subscale values range from 1 to 20, with a high score indicating a higher level of MHPs. These broader subscales have been suggested to be suitable for low-risk community samples because they capture milder symptoms and problems rather than clinical disorders, which are more common in these samples (Goodman et al., 2010).

Although the SDQ has been widely validated and used internationally (Goodman et al., 1998; Vugteveen et al., 2021), it has also been subject to criticism (Duijnhof et al., 2019; Hall et al., 2019; Kankaanpää et al., 2023; Kersten et al., 2015). Much of this criticism concerns the psychometric properties of the full scale and the factor structure of the subscales (e.g., Hall et al., 2019; Kankaanpää et al., 2023). In particular, questions have been raised about the validity of the subscales and their sometimes-low internal consistency, which suggests heterogeneity among the items and the possibility that the subscales may capture multiple constructs rather than a single coherent concept. This may complicate interpretations as individuals with similar subscale scores can present with different problem profiles.

Besides tapping into different dimensions, the SDQ can also be described as assessing personality-like traits, rather than clearly defined mental health disorders, given its design as a brief multidimensional screening instrument that captures broad behavioural and emotional difficulties rather than diagnostic categories (Goodman & Goodman, 2009; Stolk et al., 2017; Vugteveen et al., 2021). Nevertheless, although the focus of the current thesis is on problems rather than traits, the SDQ is considered appropriate because the symptoms it measures, such as emotional symptoms related to anxiety and depression, are meaningfully associated with concurrent mental health difficulties and often align with clinical symptom profiles (Bryant et al., 2020).

Moreover, the SDQ has been treated and used differently across the four studies included in the current thesis, based on their unique aims and research questions. In *Studies I* and *III*, we have used only the two broader subscales measuring internalising and externalising problems, whereas *Study II* employs both the five subscales and the two broader subscales. In *Study IV*, we use none of the subscales; instead, we use single items, with the exception of items related to the prosocial subscale. In relation to some of the criticisms levelled against the SDQ, the use of the broader internalising and externalising subscales in the current thesis may enhance measurement validity, since these subscales have been suggested as better suited to low-risk community samples (Goodman et al., 2010), and they show acceptable alpha values across all waves of data collection (internalising problems age 16  $\alpha = 0.65$ ; age 17  $\alpha = 0.67$ ; age 19  $\alpha = 0.64$  and externalising problems age 16  $\alpha = 0.74$ ; age 17  $\alpha = 0.71$ ; age 19  $\alpha = 0.73$ ). However, as can be seen in *Table 2*, there was a significant overlap between participants reporting high levels of internalising and externalising problems, indicating comorbidity of problems from these dimensions among participants. While this

is well in line with previously presented findings of an overlap between externalising and internalising problems, it is important to consider this comorbidity when discussing the implications and conclusions of the current thesis.

**Table 2. Crosstabulation showing the percentage of youth in the overlap between internalising and externalising problems at low, medium, and high levels**

		Externalising problems		
		Low	Medium	High
Internalising problems	Low	33,7%	20,9%	23,6%
	Medim	44,9%	43,6%	33,5%
	High	21,4%	35,6%	42,9%

### *State negative affect*

In *Study I*, another measure of MHPs was also employed. A scale comprising eight questions about the past months (e.g., difficulties with sleep, high stress) was used to measure the present level of *state negative affect*. In contrast to the SDQ, which can be said to measure trait MHPs, state negative affect can be said to measure a reaction to stressful events in the adolescent's life (Schmukle et al., 2002). Using this scale thus provided important information about the role of current stress reactions that cannot be provided by the SDQ, adding nuance to the evidence and knowledge base on how different types of MHPs and offending are associated among youth.

### Parent-child relationship, parental monitoring, and associations with deviant peers

In *Study II*, three additional variables were included to assess: (1) the parent-child relationship, (2), parental monitoring, and (3), associations with deviant peers. The *parent-child relationship* was assessed using two items measuring communication with parents about personal problems and school or peer relations. Responses were combined into a mean index and higher scores indicated a weaker relationship. Although this measure only included two items, as no additional relevant items were available, it showed acceptable internal consistency with a Cronbach's  $\alpha$  of around 0.60. *Parental monitoring*, defined as adolescents' perceptions of the extent to which their parents were aware of their activities, whereabouts, and peers, was based on three items combined into a mean index and coded so that higher scores indicated lower levels of parental monitoring. The scale showed good internal consistency with a Cronbach's  $\alpha$  of

around 0.80. *Associations with deviant peers* were assessed using a mean index based on six items assessing whether the adolescent's peers engaged in various antisocial behaviours. Participants rated the frequency of these behaviours on a scale ranging from never (0) to very often (3). Higher scores indicated more association with deviant peers. The scale showed good internal consistency with a Cronbach's  $\alpha$  of around 0.78

### Negative life events

In *Study III*, three variables were constructed to assess different subtypes of NLEs. NLEs were assessed at age 16 using seven items capturing experiences related to school, family conflict, and victimisation. These included feeling unsafe at school, being bullied by peers, frequent conflicts with parents, experiences of physical punishment by parents, unfair treatment by teachers, physical assault by others, and experiences of theft or robbery during eighth grade. Principal component analysis (PCA) was applied to reduce dimensionality and to identify conceptually related groupings of NLEs (Jolliffe, 2002), which resulted in three composite variables reflecting (1) School-related NLEs, (2) Conflict-related NLEs, and (3) Victimisation-related NLEs. All composite measures were coded so that higher scores indicated greater exposure to negative life events.

### Professional support from health care and/or social services

In *Study IV*, two measures of whether a participant had received professional support from health care and/or social services were used. At ages 17 and 19, participants reported whether they had ever received professional support for emotional, behavioural, or psychological difficulties. At age 17, support was assessed using three items with the question, "Have you ever met a counsellor/psychologist/psychiatrist due to" problems with either aggression, behaviour, or concentration. At age 19, fifteen items were used, using the same question, but covering contacts with child and adolescent psychiatric care, counsellors, psychologists, and social workers as a result of problems related to both internalising problems (such as depression and anxiety) and externalising problems (such as restlessness/hyperactivity and anger issues), as well as alcohol or drug problems. For each age group, the items were combined into scales and then dichotomised for analysis (1 = received support; 0 = no support).

## Statistical analyses

Statistical analyses for the four studies included in the thesis were selected based on a fundamental question: which analysis is best suited to answering the research question? However, questions related to the samples and statistical power have also been critical in deciding which analyses to use in the studies. With these questions in mind, the following statistical analyses were conducted:

### Study I

In order to examine how differences in MHPs were associated with differences between adolescents in involvement in crime, as well as to examine how individual changes in mental health were associated with changes in involvement in crime over time, we first assessed absolute and relative stability from ages 16 to 19. Absolute stability was examined using paired-sample t-tests, while relative stability was evaluated via Spearman correlations to determine rank-order consistency over time. Next, given the nature of the outcome variable (skewed, overdispersed count data), we applied negative binomial longitudinal multilevel analysis (Hilbe, 2011). This approach allowed us to capture within-person changes and between-person differences over time, while accounting for individual-level time-invariant factors. By nesting time within individuals, the models examined whether within-person changes in MHPs were associated with corresponding changes in involvement in crime, independent of initial levels. The fixed-effects approach controlled for all time-stable individual characteristics, while level-2 analyses captured between-person differences, assessing whether adolescents with higher levels of externalising problems reported higher levels of involvement in crime than their peers. Two models were estimated: the first examined the influence of internalising and externalising problems on offending, while the second included state negative affect to account for current mental health status. Models were adjusted for sex and time, and estimated separately for girls and boys. To estimate the effect of the different measures of mental health on offending, the incidence rate ratio (IRR) and corresponding confidence intervals (CI) were calculated.

### Study II

In order to examine girls offending, based on three research questions: (1) whether MHPs were more common among teen girls who reported that they had committed offences compared to those who did not report offending, (2) how different types of MHPs were associated with offending, and (3) whether these

associations were affected when we adjusted for the parent–child relationship, parental monitoring, and peer relationships, we first calculated descriptive statistics, followed by independent-samples t-tests to compare MHP levels between individuals who had and had not committed an offence. Pearson’s correlations and VIF values were used to assess associations and multicollinearity among study variables. Next, three logistic regression models were estimated. The first model included all five SDQ subscales, providing knowledge of their odds ratios and associations with offending when compared to each other. In the second model, the parent-child relationship, parental monitoring, and deviant peers were added to assess whether these factors influenced the associations between MHPs and offending. In the third and final model the five smaller SDQ subscales were replaced with the broader scales measuring externalising and internalising problems. The broader subscales were tested in their own model because they were computed from the smaller subscales, and there would be an overlap in measurement if all scales were added in the same model. Lastly, sensitivity analyses were conducted using OLS and negative binomial regressions with offending as a count variable.

### Study III

In order to examine the associations between different subtypes of NLEs, MHPs and youth offending, as well as to examine whether youth MHPs mediated a potential association between NLEs and offending, while also adjusting for previous levels of MHPs and offending, we conducted mediation analyses using the bootstrap method via Hayes' PROCESS macro in SPSS. This approach was chosen for its robustness in small to medium-sized samples and for its ability to estimate direct, indirect, and total effects, along with corresponding effect sizes, and to adjust for prior MHPs and offending (e.g., Mackinnon et al., 2004; Preacher & Hayes, 2004). All analyses used NLE data from when participants were 16 years old, MHP data from when they were 17, and offending data from when they were 19, thereby enabling a temporal assessment of mediation. In total, 18 bootstrap models were estimated, all using 5,000 bootstrap samples and 95% confidence intervals. First, six models were conducted testing (1) School-related NLEs, (2) Conflict-related NLEs, and (3) Victimization-related NLEs with internalising and externalising problems as mediators. Secondly, the same models were re-run while adjusting for prior offending at age 16. Third, the same models were re-run again, this time adjusting for previous internalising and externalising problems at age 16 instead of previous offending. Lastly, although the bootstrap method was the primary analytical strategy, linear regressions and Sobel tests

were also conducted for comparison. These used the same temporal structure as the bootstrap models, assessing associations between NLEs (age 16), MHPs (age 17), and offending (age 19).

## Study IV

In order to examine whether receiving professional support for mental health problems during adolescence was associated with the likelihood of subsequent offending, we conducted inverse probability of treatment weighting (IPTW) and logistic regressions. This method was chosen because it allows for accounting for pre-existing differences in baseline levels of MHPs and prior offending among support and non-support receivers through balancing groups by the inverse probability of treatment. Thus, it allows for the isolation of the effect of receiving support beyond what can be explained by pre-existing differences. The following analytical procedure was conducted twice, using the support variables measured at age 17 and 19:

First of all, standardized mean differences (SMDs) for all baseline MHP and offending covariates were calculated, which indicated large differences between the unbalanced support and non-support groups, with values above the typically acceptable difference of 0.10 (Chesnaye et al., 2022). Propensity scores representing the probability of receiving support were then estimated using logistic regression, before conducting and applying IPTW to balance baseline levels of MHPs and offending between groups. After, SMDs were again calculated, however, some remaining large SMDs indicated extreme weights. To address these, weights were stabilized and truncated at the 3rd–97th percentiles, resulting in acceptable covariate balance ( $SMD \leq 0.10$ ).

After applying IPTW, logistic regressions were conducted. Two different models examined the association between support received at ages 17 and 19, and offending at age 19, while adjusting for prior offending at age 16. At age 17, covariates that after IPTW still had an SMD above 0.20 were additionally adjusted for.

## Ethical considerations

The MINDS project complies with the requirements and guidelines for ethically responsible research (Swedish Research Council, 2017) and has been reviewed and approved by the Regional Ethical Review Board in Lund (MINDS: Dnr. 2007/201 and 2014/821; MCS: Dnr. 2014/826). To protect the participating

adolescents, various measures were implemented during project design. For example, participants were informed about the project, that their participation was fully voluntary, and that they could withdraw at any time. Alongside their caregivers, the adolescents also provided informed written consent at each data collection. At the coding stage, participants were given a project ID, which did not include any identifiable information. The quantitative research design of the studies in this thesis also ensures that no adolescent is singled out or identified. Some of the questions in the self-report questionnaire may be considered to come with a risk of emotional strain when answered by adolescents, for example, those measuring offending, victimisation, and other traumatic life events. This risk was reduced by the design of the project and the questionnaire, for example by ensuring that participation was voluntary and led by a research assistant, and by providing information about where to turn for support if one felt emotionally unwell.

Given the main topic of this thesis, MHPs and youth offending, it is also necessary to address ethical issues and risks related to conducting research on MHPs among youth. One of the most prominent risks is stigmatisation. Directing a focus at MHPs and discussing them as a risk factor for offending may increase the risk of negative stigmatisation of youth with MHPs, for example, by contributing to a view of individuals with MHPs as being dangerous or different. For youth, there is also a risk of negative labelling and self-stigmatisation (e.g., Moses, 2009; Rüscher et al., 2005). When researching youth MHPs and criminality, it is therefore important to be aware of this risk and to be careful about how the associations between MHPs and criminality are discussed and presented. For example, it is important to have clear interpretations of results, as well as to highlight the complexity of the associations between MHPs and offending, and while associating MHPs with offending, to emphasise that there are no deterministic or causal links between the variables. However, if research is conducted well and ethically, more nuanced research and increased knowledge about the actual and existing associations between MHPs and youth offending may contribute to presenting a more accurate picture of the relationships, which can help interventions to prevent stigma and increase the chances of reducing it (e.g., Corrigan et al., 2012; Thornicroft et al., 2016). Moreover, when we know more about which types of MHPs are associated with offending, and how, this may also increase the likelihood of providing better help, support, and prevention interventions for those at risk of both MHPs and offending and, over time, may lead to decreased problems and reduced stigmatization.

# MAIN RESULTS

The four studies presented in the thesis are intended to expand the knowledge and contribute to a more comprehensive understanding of the associations between youth MHPs and youth offending, with each study contributing with new knowledge about different aspects of the associations between MHPs and youth offending. The main findings from each study are presented below:

## Study I

In study I, descriptive analyses showed that externalising problems were relatively stable between ages 16 and 19, whereas internalising problems and state negative affect increased with age. Involvement in crime increased from age 16 to age 17 and then decreased again at age 19. Girls reported higher levels of internalising problems and state negative affect than boys across all three waves, while no sex differences were found for externalising problems. Boys reported higher levels of involvement in crime than girls at ages 17 and 19.

Analyses of relative stability indicated significant stability coefficients for all variables over time. Externalising problems showed the highest stability, followed by state negative affect and internalising problems. These findings thus indicated that participants reporting higher levels of externalising problems, internalising problems, or offending, continued to report relatively higher levels over time. Involvement in crime showed lower stability, particularly between ages 16 and 19, although adolescents reporting higher levels of involvement in crime tended to remain relatively high over time compared to others.

Negative binomial multilevel regression analyses demonstrated that, at the between-person level, adolescents with higher levels of externalising problems were more likely to report involvement in crime. This association remained

robust after adjusting for state negative affect. However, when state negative affect was included in the model, higher levels of internalising problems were associated with a lower likelihood of involvement in crime. State negative affect was positively associated with involvement in crime when externalising and internalising problems were held constant. Within-person analyses showed that changes in externalising problems were associated with changes in involvement in crime over time, such that an individual increase in externalising problems was associated with an individual increase in involvement in crime. This association remained after adjusting for state negative affect. Changes in internalising problems were not conclusively associated with changes in involvement in crime once adjustments were applied.

Fitting separate models for girls and boys yielded partially different results. Among girls, higher levels of externalising problems were associated with higher levels of involvement in crime at the between-person level, while internalising problems were not associated with involvement in crime. State negative affect was positively associated with involvement in crime among girls. Among boys, higher levels of externalising problems were associated with higher levels of involvement in crime, whereas higher levels of internalising problems were associated with lower levels of involvement in crime. At the within-person level, changes in externalising problems were associated with changes in involvement in crime for both girls and boys, while changes in internalising problems were initially positively associated with a change in involvement in crime among boys, but after adjusting for change in state negative affect, this association disappeared. Lastly, sensitivity analyses using OLS and negative binomial regressions yielded consistent results, supporting the validity of the findings.

Overall, the results show that MHPs, particularly externalising problems, are associated with involvement in crime among adolescents, and that both differences between adolescents and individual changes over time in externalising problems are linked to corresponding differences and changes in involvement in crime, with some differences noted in the patterns found for girls and boys respectively.

## **Study II**

In study II, independent samples t-tests showed that girls who reported having committed any offence had significantly higher levels of MHPs than girls who had not offended. Offending girls reported higher levels of emotional symptoms,

hyperactivity, and conduct problems, as well as lower levels of prosocial behaviour. Consequently, they also scored higher on the broader subscales of internalising and externalising problems. Among the five SDQ subscales, the largest difference in mean values between offending and non-offending girls was found for hyperactivity, indicating that hyperactivity was the most pronounced MHP among offending girls in the sample. In addition, offending girls reported weaker parent-child relationships, lower levels of parental monitoring, and higher levels of associating with deviant peers.

Bivariate correlation analyses showed that offending was most strongly associated with externalising problems, hyperactivity, and conduct problems. Internalising problems, emotional symptoms, and peer problems showed weaker positive correlations with offending, while prosocial behaviour was negatively correlated with offending. No multicollinearity was detected among the independent variables.

Logistic regression analyses showed associations similar to the bivariate findings. When all five SDQ subscales were entered simultaneously, conduct problems and hyperactivity showed the strongest positive associations with offending, but emotional symptoms were also positively associated with offending. After controlling for the parent-child relationship, parental monitoring, and associating with deviant peers, the association between hyperactivity and offending, and also that between conduct problems and offending, remained, although the association with conduct problems was attenuated. The association between emotional symptoms and offending was no longer statistically significant after adjustment for the control variables. In the final model, which included the broader subscales of externalising and internalising problems, externalising problems were positively associated with offending, even after controlling for the parent-child relationship, parental monitoring, and associations with deviant peers. Internalising problems were not significantly associated with offending in this adjusted model, although the estimate approached statistical significance. Associating with deviant peers remained strongly associated with offending, indicating that girls who associated with deviant peers were more likely to have committed an offence.

Overall, the results indicate that externalising problems are consistently associated with offending among adolescent girls in a community sample, independent of family-related factors and peer associations, whereas the

association between internalising problems and offending appears weaker and more sensitive to the inclusion of control variables.

### **Study III**

In study III, across the mediation models that did not adjust for any covariates, the total effect of NLEs at age 16 on offending at age 19 was statistically significant only for conflict-related NLEs. No significant total effects were found for school-related or victimisation-related NLEs. When mediation was examined, significant indirect effects were observed through externalising problems. Specifically, externalising problems mediated the association between conflict-related NLEs and offending, and between victimisation-related NLEs and offending. In these models, the direct effect of NLEs on offending was no longer statistically significant when externalising problems were included, indicating full mediation. Internalising problems did not mediate any associations between NLEs and offending.

When prior offending at age 16 was included as a covariate, no significant total effects of any NLE subtype on offending were observed. However, a significant indirect effect through externalising problems remained for conflict-related NLEs. Neither school-related nor victimisation-related NLEs showed significant indirect or direct effects in these adjusted models. No mediation through internalising problems was found.

In the models that adjusted for prior levels of internalising and externalising problems at age 16, no significant total effects of NLE subtypes on offending were observed. Nonetheless, conflict-related NLEs continued to show a significant indirect effect on offending through externalising problems. As in the previous models, the direct effect was not statistically significant following the inclusion of the mediator, indicating full mediation. Internalising problems did not mediate any associations between NLEs and offending in these models.

Sensitivity analyses using linear regressions and Sobel tests yielded results consistent with the bootstrap mediation analyses. Only conflict-related NLEs were directly associated with offending, and only externalising problems mediated this association. No evidence was found for mediation through internalising problems in any of the analytical approaches employed.

Overall, the results consistently indicate that among the examined subtypes of NLEs, conflict-related NLEs are those that are most strongly linked to later

offending, and that this association operates through externalising problems rather than internalising problems. These findings were robust across models with and without adjustment for prior offending and prior MHPs.

## **Study IV**

In study IV, standardised mean differences (SMDs) showed significant baseline imbalance of covariates of MHPs and prior offending at age 16 between youth who had received professional support and those who had not, particularly for items reflecting externalising problems. These findings indicated pronounced differences between support and non-support receivers, with youth who had received support generally reporting higher levels of MHPs and offending. After applying stabilised and truncated IPTW, covariate balance improved markedly. For support measured at age 17, most SMDs were reduced to below or close to the acceptable threshold of 0.10, although some moderate imbalance remained for a small number of items related to externalising problem. For support measured at age 19, balance was generally good following IPTW, with nearly all covariates demonstrating acceptable SMDs. Overall, IPTW substantially reduced baseline differences between groups, indicating that subsequent logistic regression analyses would estimate associations beyond what could be explained by pre-existing differences in MHPs and prior offending.

The first logistic regression model showed that having received support before or at age 17 was significantly associated with a higher likelihood of offending at age 19. Prior offending at age 16 was also significantly associated with offending at age 19, as was the SDQ item “I think before I do things” and being a boy. The second logistic regression model showed similar results. Having received support before or at age 19 was significantly associated with a higher likelihood of offending at age 19, as well as offending at age 16, and being a boy.

Overall, the results indicate that receiving professional support for MHPs during adolescence is associated with a higher likelihood of subsequent offending, even after accounting for pre-existing differences in baseline levels of MHPs and prior offending.



## DISCUSSION

The overall aim of this thesis has been to expand the knowledge and to contribute to a more comprehensive understanding of associations between MHPs and youth offending. Taken together, the four studies provide a developmental account of MHPs associated with youth offending in a Swedish community sample, with the overall results from the four studies being consistent with previous research (e.g., Basto-Pereira & Farrington, 2022; Beaudry et al., 2021; Borschmann et al., 2020; Farrington, 2005; Fazel et al., 2008; Loeber et al., 2012; Moffitt, 1993; Siponen et al., 2023) while also contributing with new evidence and knowledge given the distinct aims, questions, and designs of these studies. Across the designs used in the different studies, for example, cross-sectional, longitudinal, and mediation, the findings highlight three core findings. First, *externalising problems* show the most consistent and robust associations with youth offending. Second, *internalising problems* seem not to be irrelevant, but their association with offending is not as strong or conclusive as that found between externalising problems and offending. Third, even though the associations between externalising problems and offending appear to be robust, the findings highlight that *associations between MHPs and youth offending are complex*, not least showing that these associations vary between types of problems, that they may include interactions with other variables, and that they differ between genders – a complexity that could possibly also affect the results of support, prevention, and intervention measures.

A more detailed discussion of the findings related to externalising and internalising problems is presented below, and this is followed by a discussion of findings in relation to methodology and theory, implications for support, prevention, and intervention, and finally, methodological considerations.

## Findings related to externalising problems

Across all four studies, externalising problems emerged as the most consistent and robust correlate of youth offending, supporting previous research that has highlighted their role in developmental pathways to youth offending (e.g., Moffitt, 1993; Farrington, 2003; Farrington, 2005; DeLisi & Piquero, 2011). Despite this overall consistency, the findings also indicate that the association between externalising problems and offending may be linked to developmental timing, individual change, gender, and contextual factors, thus underscoring that it is a complex rather than a simple association.

In *Study I*, adolescents with higher levels of externalising MHPs had higher levels of self-reported involvement in crime, and, crucially, within-person changes in externalising problems were associated with within-person increases in offending over time. This finding aligns closely with previous findings that highlight the importance of early-emerging neurodevelopmental and behavioural problems, such as hyperactivity and impulsivity, in the development of criminal behaviour (e.g., Moffitt, 1993; Farrington, 2005; Loeber, 2012; Lipsey & Derzon, 1999). However, the findings also provide an important within-individual perspective, going beyond findings from, for example, comparisons between groups (such as AL and LCP offenders). This within-person association indicates that the relationship between externalising problems and youth offending is not solely due to stable differences across youth groups, but may also reflect dynamic developmental processes in which changes in externalising problems may be important to understand changes in offending behaviour. Findings from *Study III*, in which externalising problems were found to mediate the associations between certain NLEs and offending, and particularly conflict- and victimization-related NLEs, add further evidence of the developmental aspects of the association between externalising problems and youth offending, while also emphasizing the complexity of these associations, since they provide evidence of the existence of important relationships with other variables in the social environments of youth. In this sense, externalising problems can be understood not merely as correlates of offending, but as possible developmental outcomes, through which adverse social experiences may be translated into rule-breaking behaviour. The robustness of this mediation across models, when adjusting for prior offending and prior mental health problems, further underscores the developmental significance of externalising problems as a proximal mechanism in offending pathways.

Moreover, *Study II* showed that girls who engaged in offending reported substantially higher levels of externalising problems than non-offending girls, and that externalising problems were associated with offending even when parental relationships, parental monitoring, and deviant peers were adjusted for. The persistence of these associations suggests that externalising problems represent an independently important variable for girls' offending, rather than merely being a product of adverse family or peer environments. These results are in line with previous research (e.g., Moffitt et al., 2001), but are particularly important because they add knowledge about a less well-studied group of offenders. Together with the results from Studies I and II, these findings further imply that girls' offending pathways are not fundamentally different from those of boys in terms of the role of externalising problems, even though girls may also experience higher levels of internalising distress and relational stress. Externalising problems therefore constitute an important developmental risk factor for youth offending across genders, and overlooking these problems in girls may contribute to an under-identification and under-treatment of girls at risk of developing offending behaviour.

*Study IV* provided additional insight into the severity and persistence of the risk related to externalising problems when examining the effect that receiving professional support for MHPs has on future offending. Although the support received was not limited to support for externalising problems, covariates related to externalising problems were the ones showing the largest SMDs, thus being more prevalent among youth who had received support. Moreover, youth who had received support showed substantially higher odds of later offending, even after balancing the support and non-support groups on baseline levels of MHPs and prior offending. Since the support groups were balanced, it is difficult to draw conclusions about the role of externalising problems; however, the findings may reflect the complexity of these problems, and also of covariates that were not assessed. In this sample, professional intervention may therefore function more as a marker of an elevated underlying risk of vulnerabilities that had not been accounted for than as a protective factor in itself.

Taken together, the findings demonstrate that externalising problems are strongly associated with youth offending, including in a developmental way. At the same time, the results caution against viewing externalising problems as a uniform or deterministic predictor. Their impact unfolds over time, interacts with environmental stressors and the social environment, and may vary in its expression and consequences across individuals and genders.

## Findings related to internalising problems

Across all four studies, internalising problems showed a markedly more complex and less consistent association with youth offending than externalising problems, underscoring the importance of distinguishing among the different dimensions of MHPs when examining these associations. In *Study I*, higher levels of internalising problems were associated with a lower likelihood of involvement in crime at the between-person level among boys, once state negative affect was accounted for, while changes in internalising problems were not associated with changes in offending at the within-person level after adjustment. Together, these findings suggest that internalising problems may, in certain contexts — and particularly among boys in this sample — function as a protective or inhibiting factor rather than a risk factor for offending. This pattern may reflect processes such as social withdrawal, risk aversion, or reduced engagement in peer-based delinquent activities.

In *Study II*, focusing exclusively on girls, internalising problems were higher among those who reported offending, and emotional symptoms showed weak positive bivariate associations with offending. However, these associations were not statistically significant in logistic regression analyses after controlling for parental relationships, parental monitoring, and associations with deviant peers. In contrast to externalising problems, internalising problems thus appeared sensitive to contextual controls, indicating that their association with offending may be indirect and contingent on broader social and relational factors rather than reflecting an independent relationship. This supports previous research suggesting that girls' offending may be more sensitive to and dependent on interactions with other risk factors, especially in relation to the role of internalising problems (e.g., Abram et al., 2015; van der Molen et al., 2013). *Study III* further reinforced the limited explanatory role of internalising problems alone for the development of offending. Across multiple mediation models, including those adjusting for prior offending and prior MHPs, no evidence was found that internalising problems mediated the association between NLEs and offending. This can be suggested to constitute further support for previous research findings that internalising problems alone are not important for offending behaviour unless, for example, they co-occur with externalising problems (e.g., Siponen et al., 2023; Ivert et al., 2017), and that NLEs leading to internalising problems may not be associated with future offending.

Finally, *Study IV* provided an important contextual perspective by examining the effect of professional support for MHPs on future offending. The receipt of support, regardless of problem type, was associated with a higher likelihood of later offending. Besides possibly reflecting associations with unaccounted underlying vulnerabilities, this association could reflect selection effects, whereby receiving support functions as a marker of risk. However, because the observed SMDs and associations with offending were more strongly linked to covariates of externalising problems than to internalising problems, this further highlights the potentially more indirect role played by internalising problems in relation to offending.

Taken together, the findings across all four studies indicate that there is no straightforward positive association between internalising problems and youth offending. Instead, the role of internalising problems appears to be complex, heterogeneous, gender-specific, and highly dependent on co-occurring problems and social context. In some cases, internalising problems may even be associated with a reduced risk of offending, while in others their apparent link to offending is attenuated once externalising problems and environmental factors are taken into account. These results underscore the importance of moving beyond simple risk factor models and adopting a more nuanced, multidimensional, and analytical understanding of how different MHPs are associated with youth offending.

## **Main findings in relation to methodology and theory**

The findings in this thesis can be understood within the framework of life-course criminology and criminal career research, including risk factor research, even though they cover only a short period of adolescence. The current findings show that MHPs among youth, and particularly externalising problems, are associated with crime, which is central to these perspectives and their research. The findings align closely with, for example, Moffitt's (1993) research, making the current findings interesting in relation to LCP offenders, who develop chronic criminality due to early problematic behaviours (e.g., impulsivity, hyperactivity, and low self-control), which induce negative reactions from the surrounding social environment, leading to persistence in antisocial behaviour. Findings from *Study I* in particular, which presents evidence of stable co-developing externalising problems and involvement in crime, provide support for the existence of the LCP trajectory. However, findings from *Studies II, III and IV* are also consistent with, while also adding evidence for, these perspectives in that they provide further

developmental knowledge about the role of especially externalising problems for offending in girls, the role of MHPs in relation to previous exposure to NLEs and offending, and the effectiveness of support for MHPs. It can thus be concluded that findings from all four studies in the current thesis provide support for the previously highlighted importance of externalising problems within life course criminology and criminal career research, and in a seemingly complex interaction with the social environment, for our understanding of the development of persistent offending trajectories (e.g., Moffitt, 1993; Farrington, 2003). Based on the current findings, it can therefore also be concluded that MHPs, or at least externalising problems, constitute an important risk factor for subsequent youth offending.

However, the previously presented and discussed criticism of the explanatory value of life-course criminology and criminal career and risk factor research (e.g., Treiber & Wikström, 2025; Wikström, 2020; Wikström & Kroneberg, 2022) must also be considered in relation to the current findings. To make the best use of current findings in understanding the causes of crime, it is necessary to integrate them into a more analytical criminological framework and theory. Applying the findings within the framework of Situational Action Theory constitutes one way of including the current findings in such a framework and approaching causality (Wikström, 2006). The findings fit into the area of SAT that addresses individual traits and characteristics relevant to decision-making, which include self-control and moral values. Externalising problems in particular, including impulsivity, hyperactivity, and self-regulation, can therefore be hypothesised to be relevant to the development of decision-making, which then explains, at least in part, their strong association with offending. Increases in hyperactivity, impulsivity, and conduct problems are likely to reduce adolescents' capacity to regulate emotions and behaviour, making young people more prone to respond to provocation, peer pressure, or opportunities for crime with rule-breaking behaviour rather than restraint. When externalising problems intensify, young people may therefore become more susceptible to criminogenic situations; when these problems diminish, their offending likewise declines. Moreover, externalising problems may influence the development of morality through their association with impulsivity, behavioural dysregulation, and difficulties in emotional regulation. Because moral behaviour requires the capacity to inhibit impulses, consider consequences, and experience moral emotions such as guilt and empathy, persistent externalising problems may interfere with the internalisation of moral norms (e.g., Schütz & Bäker, 2023;

Shek & Zhu, 2019). In addition, as was discussed in the background section, youth with externalising problems are more likely to affiliate with peers with similar problems (Chen et al., 2015; Laird et al., 2001) and to spend time in social contexts in which rule-breaking is normalised (Dishion et al., 1999), potentially shaping deviant moral beliefs over time.

However, even if the findings present a good fit with both the life-course criminology perspective and SAT, the current thesis highlights some methodological challenges that can not be overlooked and that need to be addressed in relation to theoretical implications. Firstly, the previously identified conceptual overlap between externalising problems and criminal behaviour needs to be considered when interpreting and drawing conclusions from both prior research and the findings in the current thesis. In the discussion of this overlap in the background section, it was concluded that externalising problems and offending conceptually overlap and share risk factors (Caspi et al., 2014; Liu, 2004), which must be considered when discussing externalising problems as a *risk* factor for future offending. Given the overlap, one hypothesis might be that externalising problems function more as a marker of an elevated risk for co-occurring criminal behaviour than as an actual risk factor contributing to the development of such behaviour. However, some of the studies included in the current thesis adjusted for prior offending when examining associations between externalising problems and offending, strengthening the interpretation of externalising problems as a risk factor of future offending. Further, applying SAT to the understanding of externalising problems constrains this interpretation, since their relevance can be explained by the way they affect an individual's decision-making capacity, rather than by assuming a direct link to the development of offending. Nonetheless, more research is needed to understand the overlap between externalising problems and offending, preferably using research designs and methods that can examine temporal aspects of the development of these two variables, their interactions, and causal ordering – possibly on the basis of existing analytical, theoretical frameworks.

Additionally, a related issue concerns the previously noted potential overlap between internalising and externalising problems (Caspi et al., 2014). Although the findings presented in the thesis do not show clear associations between internalising problems and youth offending, interpretations of these results should be made with caution, not only as a result of the seemingly complex interplay between such problems and other variables, but also because internalising and externalising problems frequently co-occur, and research suggests that they share

genetic influences, underlying psychopathological structures (e.g., Caspi et al., 2014), and that there is a possibility that some internalising problems are manifestations or causes of underlying externalising problems (Quinn & Madhoo, 2014). Consequently, the absence of a direct association between internalising problems and offending does not necessarily imply that internalising problems are unrelated to offending outcomes. Rather, it is possible that some internalising problems may function as secondary manifestations of broader externalising difficulties or emerge as a response to behavioural dysregulation and associated adverse experiences, which may in turn be more directly linked to offending. These overlaps could also help explain some of the mixed findings on internalising problems and offending in previous studies. However, the study design employed in the current thesis has not allowed for the possibility of examining this hypothesis, for which reason it is to be recommended that future research should employ designs and methodologies that allow for a better examination and understanding of this overlap.

## **Implications for support, prevention and interventions**

The findings presented in the thesis have the potential to provide important guidance for support, prevention and interventions targeting both MHPs and youth offending. In addition to previous research, the findings strongly indicate that targeting and improving MHPs, especially externalising problems, could produce positive effects not only for an individual's mental health but also for the risk of ongoing or future offending - especially in relation to the fact that these problems have been found to co-develop over time and to be linked to LCP offenders and chronic criminality (e.g., Moffitt, 1993; Farrington, 2005; DeLisi & Piquero, 2011). Although the findings regarding internalising problems are less consistent and conclusive, and while further research is needed to clarify their more complex associations with youth offending, these problems should nevertheless be regarded as important targets for prevention and intervention. This is particularly relevant given indications that internalising problems may play a more prominent role among girls (e.g., Siponen et al., 2023; Beaudry et al., 2021) and when they co-occur with externalising problems (e.g., Siponen et al., 2023; Ivert et al., 2017).

Based on the important associations between MHPs and youth offending, however, when focusing on the issue of support, prevention and interventions, it

is crucial to point to the problematic fact that more young people in Sweden are having problems with both internalising problems (e.g., Region Skåne, 2024; Stockholms stad, 2023) and externalising problems (e.g., Socialstyrelsen, 2021), while the number of patients is increasing along with the length of queues for the services provided by the Swedish child and adolescent psychiatric sector (e.g., Sveriges Kommuner och Regioner, 2024). Even though the observed increase possibly might reflect a higher tendency to both report MHPs and seek help, it needs to be regarded as a serious issue, especially given the fact that we are also witnessing increases in crime among certain subgroups of young offenders who engage in serious forms of crime (Brottsförebyggande rådet, 2025; Riksrevisionen, 2024; Socialstyrelsen, 2025). There is thus an urgent need to extend existing support, prevention, and intervention measures to meet the needs and demands of an increase in mental health problems among youth, especially in particularly problematic subgroups of serious youth offenders. Additionally, to have the best chances of preventing negative development, there is a need for interventions that can detect problems early, before they become more serious and more difficult to treat or prevent.

Moreover, findings from *Study IV* are particularly interesting in relation to the support and interventions currently being provided, since they show that youth who had received professional support from MHPs did not have a lower risk of future offending, even after accounting for baseline levels of MHPs and offending. These findings underscore the importance of continuing to study the effect of support measures and interventions. However, when responding to the growing demand for support, prevention, and intervention, it is important to acknowledge the mixed findings noted with regard to existing programs (e.g., Humayun et al., 2017; Hunkin et al., 2025) and to consider how they can be further developed. Although many interventions are informed by life-course and criminal career research – which provide valuable insights into which individuals are at elevated risk – these perspectives offer more limited explanations of the causal mechanisms underlying crime and, consequently, about why some interventions succeed while others do not. Without a clear understanding of how individual traits, environmental contexts, and situational processes interact to produce criminal behaviour, preventive efforts risk targeting correlates rather than causes. From this perspective, it is important to include a more analytical and theoretically driven approach, in which causal theory and empirical evidence are jointly used to identify criminogenic mechanisms, target individuals at risk, and interrupt harmful developmental pathways before criminal behaviour becomes established.

## Methodological limitation and considerations

A number of methodological limitations and considerations need to be addressed. Several sample-related limitations should be considered when interpreting the findings of this thesis. First, the generalisability of the results is limited by the context-specific nature of the rather small MINDS sample. All participants lived in Malmö in 2007, a large and socioeconomically diverse urban setting. Developmental processes, exposure to risk factors, and patterns of offending in Malmö may differ from those in rural areas, smaller municipalities, or other national contexts, which calls for caution when extending the findings beyond similar urban environments. Second, the sample covers a relatively narrow developmental period, spanning mid to late adolescence and the transition into early adulthood. Although this is a key phase for the emergence of offending behaviour, the findings do not capture earlier childhood processes or longer-term adult trajectories, limiting conclusions about early onset problems, developmental continuity and long-term outcomes. Third, the cohort represents a specific historical context. Participants born in 1995 experienced adolescence during a period of rapid social and technological change (Elder, 1998), which included increased digitalisation and shifts in youth socialisation patterns. These contextual factors may influence both offending behaviour and self-reported measures, which may reduce the applicability of the findings to both earlier and more recent cohorts. Finally, adolescents with a foreign background and those from more disadvantaged neighbourhoods are somewhat underrepresented in the sample, which may create bias. However, the sample also provides substantial benefits and some of its limitations can be alleviated by means of methodological choices. For example, the problems associated with the relatively small sample size can be mitigated by combining multiple data waves to create a larger sample (as in *Study II*). The MINDS sample also offers several advantages due to its longitudinal design, which enables the establishment of appropriate time sequences for predictors and outcomes and allows us to track the development of various variables. Additionally, its community-based design enables the collection of information on variables that may not be reported in official records or registers – such as undiagnosed MHPs and undetected youth offending.

There are also limitations related to the use of the SDQ. As mentioned in the method section, even though the SDQ is widely used and has been shown to have good validity (Vugteveen et al., 2021), it has also been the subject of criticism. First, it has been suggested that the SDQ is not optimized for community samples, and more research is needed to understand how the five subscales relate to each

other and to the overall score of the full scale (Vaz et al., 2016). However, primarily using the broader subscales mitigates some of these problems, since both these subscales have been suggested to provide a better fit for community samples (Goodman et al., 2010), while also having acceptable alpha-values. Furthermore, longitudinal research has shown that elevated total difficulties scores on the SDQ predict later psychiatric diagnoses, educational difficulties, and adverse social outcomes, providing further evidence of its utility and validity in longitudinal studies (Goodman et al., 2002; Silva et al., 2015). As regards the overlap between internalising and externalising problems, the SDQ subscales are known to exhibit substantial overlap and comorbidity, as was also evident in the current sample. This overlap may, as already noted, complicate the interpretative and explanatory validity of findings, since associations attributed to one problem domain may partly reflect underlying shared psychopathological processes rather than distinct effects. None of the studies in the current thesis have examined comorbidity between internalising and externalising problems, but it is recommended that future studies do so, given that a substantial amount of existing research indicates this to be an important issue (Ivert et al., 2017; Siponen et al., 2023; Sourander et al., 2007). In the current thesis, the SDQ measures have also relied on self-reported data, which may be subject to reporting biases, such as social desirability (Van de Mortel, 2008). These biases may be particularly salient for internalising problems, which are less observable and more difficult for adolescents to accurately self-assess, leading to a potential underestimation of internalising problems (e.g., Booth et al., 2023; Chan, 2009). Lastly, in addition to the SDQ, there are other instruments that are commonly used to assess mental health problems that could have been employed in the current thesis, including the Youth Self-Report (YSR), which measures broad internalising and externalising problems in children and adolescents (Carlén et al., 2022) and the General Health Questionnaire-12 (GHQ-12), a brief measure of psychological distress (Lundin et al., 2016). Both instruments have demonstrated good validity and sensitivity (Carlén et al., 2022; Lundin et al., 2016) and could have been suitable alternatives to the SDQ in the studies presented in this thesis. However, the SDQ was chosen due to its established validity and its ability to capture a wide range of mental health problems across a broader spectrum than some of the alternatives, such as the GHQ-12 (Goodman, 1998). Meta-analyses further show that the SDQ performs well across community, clinical, and high-risk samples, with adequate reliability and concurrent validity (Goodman et al., 1998; Silva et al., 2015; Stone et al., 2010), supporting it as a well-justified choice.

A further limitation of the present thesis is the absence of the use of background variables as statistical controls in the analyses; only *Study II* adjusted for parental relationships, parental monitoring, and associations with deviant peers. Otherwise, factors such as family structure, socioeconomic conditions, and substance use are commonly examined in criminological research, as they are associated with both MHPs and youth offending (e.g., Loeber & Farrington, 2012; Maggi et al., 2010; Moffitt, 1993; Murray & Farrington, 2010; Sampson & Laub, 1995; Thornberry et al., 2010; Tolou-Shams et al., 2023). The lack of such controls limits the ability to assess the extent to which the observed associations between MHPs and offending are independent of broader social, familial, and behavioural contexts. However, this limitation should be understood in relation to the thesis's overall aim, which was to expand knowledge and contribute to a more comprehensive understanding of the associations between MHPs and youth offending, rather than to estimate fully adjusted causal effects. Within this framework, the analyses were intended to explore patterns and relationships rather than to isolate the unique contribution of MHPs net of all potential confounders. Nevertheless, the absence of background controls means that some of the observed associations may partly reflect shared underlying risk factors, and this should be considered when interpreting the findings. Future research could build on these results by incorporating key background variables to further clarify how MHPs relate to youth offending within broader social and behavioural contexts.

Another limitation is related to the measures used to capture NLEs, which were constructed of relatively few items, which means that they do not cover a large range of different types of events, especially of a more severe nature. Including more items in the NLE variables might thus yield different results, possibly showing stronger associations if more severe events, such as childhood maltreatment and abuse, were included, given their associations with offending noted in previous research (e.g., Baglivio et al., 2014; Thornberry et al., 2010).

Lastly, there are also some limitations that need to be mentioned regarding the use of a variety scale to measure offending. Although variety scales are useful for reducing skewness and capturing a variety of different crime types, they involve a loss of information about the frequency of offences: a youth who commits one offence and a youth who commits 50 offences of the same crime type receive the same score for that crime type. This may lead to an underestimation of the severity or persistence of offending. Moreover, variety scales also provide little information about the seriousness of the offences committed, little indication of

specialization patterns, and they are sensitive to the nature of the items included; the score depends heavily on which crime types are included. A broader list increases the maximum possible score, while a narrower list may underestimate the diversity of involvement in crime (Sweeten, 2012). Overall, these limitations may also make variety scales less sensitive to developmental changes in offending over time.



## CONCLUSIONS

This thesis set out to expand the knowledge on and contribute to a more comprehensive understanding of the associations between MHPs and youth offending using longitudinal, community-based data from the Malmö Individual and Neighbourhood Development Study (MINDS). By examining developmental changes, gender-specific associations, contextual risk factors, and the effect of professional support, this thesis can conclude that MHPs have important associations with youth offending, but that these associations are complex. Associations vary between different problems, ages, genders, in relation to other risk factors, and possibly in how they are affected by support and interventions. In particular, the findings presented in the thesis suggest that externalising problems have the strongest and most important associations with offending, as these associations were robust in all four studies, while the associations between internalising problems and offending were weaker and less conclusive. However, considering findings from previous research, the importance of internalising problems for youth offending may increase when they co-occur with certain contextual risk factors and in comorbidity with externalising problems, and they should not be overlooked in relation to offending.

The findings presented in the thesis can be understood within the life-course criminology and criminal career perspectives, and they align well with evidence that externalising problems may be important in the development of pathways related to more persistent offending, and support the view that MHPs and offending should not be understood in isolation, but as interconnected processes that develop over time. At the same time, the findings can also be integrated into a more theoretical and analytical framework, using, for example, Situational Action Theory, to explain how externalising problems in particular might affect the decision-making capacity of youth offenders. From a prevention perspective, the findings underscore the importance of early identification and intervention,

particularly in relation to youth with externalising problems and those with co-occurring experiences of adversity and risk factors.

Looking forward, several directions for future research emerge, with the goal of better understanding the complexity of the associations between MHPs and youth offending, including potential bidirectional associations, the role of different MHPs, gender-specific associations, and interactions with other risk factors and contextual variables.

Taken together, the findings from this thesis suggests that there is no single explanation of how MHPs and youth offending are associated; nevertheless, an understanding of the complexity of the association is greatly needed in order to meet the needs of a growing group of youth that is having problems with mental health, since this will both benefit society as a whole and contribute to better health and quality of life for the individuals concerned.

# POPULÄRVETENSKAPLIG SAMMANFATTNING

Inom kriminologin har psykisk ohälsa länge betraktats som en riskfaktor för brott. Särskilt så kallade externaliserande problem, såsom impulsivitet, aggressivitet och normbrytande beteenden har kopplats till ökad risk för kriminalitet. Samtidigt finns det forskning som visar att även internaliserande problem, såsom ångest och depression, kan ha betydelse, särskilt i kombination med andra svårigheter och riskfaktorer. Psykisk ohälsa och ungdomsbrott är två företeelser som existerar i många ungas vardagsliv. En ökande andel unga upplever i dag t.ex. oro, nedstämdhet, stress, impulsivitet och koncentrationssvårigheter. Samtidigt vet vi att ungdomstiden är den period i livet då brottslighet är som vanligast. Mot denna bakgrund är det som särskilt angeläget att uppmärksamma hur dessa två fenomen samspelar. Detta gäller inte minst eftersom både psykisk ohälsa och brottslighet kan få långvariga konsekvenser för både samhället och individen i relation till utbildning, arbete, relationer och hälsa. Trots detta finns flera kunskapsluckor som motiverar ytterligare forskning. För det första, trots att det finns en del betydelsefulla befolkningsstudier, bygger många studier på särskilda grupper, till exempel unga som dömts för brott eller unga som redan har kontakt med psykiatri. Det innebär att vi vet mindre om hur sambanden ser ut bland unga i allmänhet. För det andra studeras psykisk ohälsa och brott ofta vid ett och samma tillfälle, vilket gör det svårt att förstå hur förändringar i mående hänger ihop med förändringar i brottslighet över tid. För det tredje saknas det tillräcklig kunskap om hur olika typer av psykiska problem samspelar med andra viktiga faktorer i ungas liv, såsom negativa livshändelser, relationer till föräldrar och vänner samt professionellt stöd.

Den här avhandlingen bygger på fyra delstudier som försöker bidra till att fylla dessa kunskapsluckor. Samtliga studier bygger på data från Malmö Individual

and Neighbourhood Development Study (MINDS), där en grupp ungdomar i Malmö har följts över tid från att de gick i årkurs åtta till att de gick sista året på gymnasiet. I den första delstudien undersöktes sambandet mellan psykisk ohälsa och självrapporterad brottslighet bland ungdomarna och särskild uppmärksamhet riktades mot om förändringar i psykisk hälsa över tid hängde ihop med förändringar i brottsdeltagande. Resultaten visade att ungdomar med högre nivåer av externaliserande problem i högre grad rapporterade att de begått brott. Vidare framkom att förändring i psykisk ohälsa över tid samvarierade med förändringar i brottsdeltagande, vilket tyder på att sambandet inte är statistiskt utan förändras i takt med ungdomarnas utveckling.

I den andra delstudien riktades fokus särskilt mot flickors brottslighet. Flickor som rapporterade att de begått brott jämfördes med flickor som inte gjort det, med avseende på olika typer av psykisk ohälsa. Resultaten visade att psykisk ohälsa var vanligare bland flickor som begått brott. Särskilt tydligt var sambandet för externaliserande problem, men även internaliserande problem var vanligare bland de flickor som begått brott. När hänsyn togs till relationer till föräldrar och kamrater försvagades samband till både externaliserande och internaliserande problem, vilket visar att psykisk ohälsa behöver förstås i relation till den sociala kontext som flickor befinner sig i.

I den tredje delstudien undersöktes hur negativa livshändelser, såsom konflikter i familjen, och utsatthet hänger samman med brottslighet och hur förekomst av psykisk ohälsa påverkar ett eventuellt samband. Resultaten visade att negativa livshändelser hänger samman med både psykisk ohälsa och brottslighet. Vidare visade resultaten att i vissa fall fungerade externaliserande problems som en länk mellan negativa livshändelser och brottslighet. Detta tyder på att psykisk ohälsa kan vara en del av den process genom vilken negativa livserfarenheter påverkar ungas beteende.

I avhandlingens fjärde och sista delstudie undersöktes betydelsen av professionellt stöd från professionell hälso-/sjukvård och/eller socialtjänst för senare brottslighet bland ungdomar med liknande bakgrund avseende psykisk ohälsa och brottslighet. Resultaten visade att sambanden är komplexa och att stödinsatser inte automatiskt minskar risken för brott. Detta skulle kunna bero på hur problemen ser ut från början och hur väl stödet är anpassat till individens behov.

Sammanfattningsvis visar avhandlingens delstudier att psykisk ohälsa och ungdomsbrott hänger samman, men att sambanden är mångfacetterade.

Externaliserande problem har ett tydligt samband med brottslighet, medan internaliserande problem oftare hänger ihop med brottslighet när de förekommer i kombination med andra svårigheter och riskfaktorer. Vidare visar resultaten att det är viktigt att sätta sambandet mellan psykisk ohälsa och ungdomsbrott i ett större perspektiv som även tar hänsyn till hur andra faktorer, såsom negativa livshändelser och sociala relationer, bidrar till att forma dessa samband.

Utifrån resultaten kan flera slutsatser dras. För det första är det viktigt att studera olika typer av psykiska problem var för sig, eftersom deras koppling till brottslighet kan se olika ut. För det andra behöver forskning i hög grad ta hänsyn till utveckling över tid, eftersom både psykisk hälsa och brottslighet förändras under ungdomsåren. För det tredje är det centralt att inkludera sociala och miljömässiga faktorer i analyserna, snarare än att enbart fokusera på individens psykiska mående. För det fjärde visar avhandlingen på ett behov av mer studier om hur flickor och pojks brottslighet skiljer sig åt, eftersom det verkar finnas viktiga skillnader.

Avhandlingens resultat visar vidare på att det kan vara viktigt att ta hänsyn till psykisk ohälsa när man utformar preventiva insatser för ungdomsbrottslighet. Eftersom psykisk ohälsa och brottslighet tycks samspela med omgivningen är det av vikt att insatser utformas med hänsyn till ungas olika behov och livssituationer. Resultaten pekar vidare på vikten av tidiga insatser. Särskilt viktigt är att uppmärksamma och stödja unga med externaliserande problem, eftersom dessa har ett tydligt samband med brottslighet. Samtidigt bör även internaliserande problem tas på allvar, särskilt när de förekommer tillsammans med andra svårigheter eller negativa livshändelser. Professionellt stöd behöver alltså vara anpassat till individens behov och ges i rätt tid.

Framöver behövs mer forskning för att bättre förstå komplexiteten i sambanden mellan psykisk ohälsa och ungdomsbrottslighet, inklusive möjliga omvända samband, betydelsen av olika typer av psykisk ohälsa, könsspecifika mönster samt samspel med andra risk- och kontextuella faktorer.

Sammantaget visar resultaten i denna avhandling att det inte finns någon enskild förklaring till hur psykisk ohälsa och ungdomsbrottslighet hänger samman. En fördjupad förståelse av denna komplexitet är dock nödvändig för att kunna möta behoven hos en växande grupp unga med psykisk ohälsa, vilket kan bidra både till samhällsnytta och till förbättrad hälsa och livskvalitet för de berörda individerna



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I



# Development of mental health problems and crime involvement in a Swedish adolescent sample

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## Abstract

**Background:** Mental health problems (MHPs) have been seen to be associated with crime involvement among adolescents, especially externalising problems. Previous studies have often been made internationally and less research has been conducted within the Nordic countries, especially using self-reported data. **Aims:** To explore how differences in MHPs are associated with differences in crime involvement between adolescents, and how an individual's change in mental health is associated with a change in crime involvement over time. **Methods:** Data were drawn from the research project Malmö Individual and Neighborhood Development study (MINDS) and include 386 adolescents (53% girls; 47% boys). Longitudinal multilevel analysis was applied to assess the association between MHP and crime involvement. **Result:** Overall, MHPs, particularly externalising problems, were associated with crime involvement. Also, changes in MHPs were related to changes in crime involvement over time. Fitting separate models for girls and boys yielded partly different results. **Conclusion:** The results support previous findings that externalising problems are associated with crime involvement and show that an increase in externalising MHPs over time is associated with increased crime involvement. This underscores the importance of identifying and addressing externalising MHPs at an early stage to prevent a negative development.

## Keywords

criminality, development, longitudinal, mental health problems, the strength and difficulties questionnaire (SDQ)

## Introduction

It is known within the field of criminology that a large number of adolescents commit criminal offences at some point in their teenage years (e.g., Moffitt, 1993; Moffitt, 2006; Wikstrom & Butterworth, 2006). Although the vast majority of these adolescents commit few, less severe crimes (e.g. Moffitt, 1993), a small portion commit a greater number of – or more serious – crimes, continuing into adulthood (Moffitt, 2006; Sivertsson, 2022). To prevent adolescent crime involvement, as well as later adult criminality, it is important to increase knowledge of the development of criminal behaviour during adolescence and into adulthood.

Adolescents' mental health has been shown to impact the risk of criminal behaviour (e.g., Fazel et al., 2008; Colins et al., 2010). Moreover, literature reviews have shown that

mental health problems (MHPs) are positively linked to adolescent crime involvement (Fazel et al., 2008). Indeed, Moffitt et al. (2001) have shown that many adolescents who continue committing crime into adulthood reported MHPs during their lives. In the current study, we will primarily focus on two dimensions of MHPs: internalising problems (such as depression and anxiety) and externalising problems (such as conduct problems, hyperactivity and impulsivity) (Dennis et al., 2006). Research has shown that MHPs involving externalising problems often develop in early childhood (Newman et al., 1996), and are especially associated with crime involvement (e.g., Loeber & Burke, 2011).

With this in mind, less is known about how development and changes in MHPs are associated with developments in crime involvement among adolescents, particularly in a Nordic context. Given the increase in MHPs in many of the Nordic countries over the past years (self-reported as well as in terms of help seeking) (e.g., Nordic Council of Ministers, 2022; Sundhetsstyrelsen, 2022; Socialstyrelsen, 2019; Region Skåne, 2024), there is a need to increase knowledge on adolescent MHPs' association with crime involvement in a Nordic context. Expanding our understanding of how MHPs and crime develop and co-vary over time will provide better preconditions to develop effective interventions targeting adolescent crime involvement.

With this background, the aim of the current study was to explore how differences in MHPs are associated with differences in crime involvement between adolescents in a Swedish adolescent sample over time. The concept of MHPs is discussed in generic terms and the focus is on broader dimensions and problem groups of MHPs (in this case, internalising and externalising problems) rather than on specific diagnoses. References to specific diagnoses will be made when needed. Data were drawn from the longitudinal research project Malmö Individual and Neighbourhood Development Study (MINDS) and comprise 386 adolescents with data from when the participants were between 16 and 19 years old. To address this aim, we examined absolute and relative stability. In addition, negative binomial longitudinal multilevel analysis was conducted to explore how (change in) MHPs were associated with (change in) crime involvement.

## **Previous research from outside the Nordic region**

The vast majority of previous research examining the associations between adolescent MHPs and offending has been conducted within the juvenile justice systems in the United States and the United Kingdom. The prevalence of MHPs among adolescent offenders differs across these studies as a result of differences in methods and sampling (Cashman & Thomas, 2017); however, they have consistently shown that MHPs are associated with crime involvement among adolescents (e.g., Beaudry et al., 2021; Vincent et al., 2008). Findings show that as many as 52–70% of adolescents in the justice system suffer from some form of MHP (e.g. Underwood & Washington, 2016), with disorders classified as internalising problems occurring in up to 35%, and externalising problems occurring in up to approximately 59% of detained adolescents. Among this group, externalising MHPs, such as ADHD and conduct problems/disorders, have been implicated as among the most common diagnoses/disorders in both boys and girls in the juvenile justice system across several studies (Beaudry et al., 2021; Colins et al. (2010); Borschmann et al., 2020). Internalising problems have generally not been seen to be related to crime involvement among boys, whereas study results vary among girls (e.g., Jung et al., 2017). For example, depression has been shown to be common among girls in detention, with findings showing a prevalence of around 20–35% (Beaudry et al., 2021). Further, Wasserman et al. (2010)

found that repeat juvenile offenders, girls and boys, who have progressed further in the juvenile justice system reported higher rates of MHPs than those without repeated criminality in other sorts of detention and correction facilities.

Although the association between adolescent MHPs and offending in non-Nordic research has predominantly been studied in the juvenile justice system, there also exist important studies based on community samples, including register-based studies as well as self-reported studies. These studies (e.g. Moffitt, 1993; Moffitt et al., 2001; Loeber et al., 2012) are important given the possibility that MHPs and criminal behaviour perhaps differ between high-risk adolescents in the juvenile justice system and adolescents in the general community. The development of MHPs and criminal behaviour among children and adolescents has been addressed in some longitudinal studies (e.g., Moffitt, 1993; Loeber et al., 2012). These studies (as well as others) primarily show that, in the community, problems and disorders that can be classified within the group of externalising problems may especially increase the risk of offending among adolescents (Moffitt et al., 1994; Moffitt et al., 2001; Loeber et al., 2012). Additionally, these studies indicate that both MHPs and crime involvement often develop over time, and that adolescents who experience a higher degree of MHPs (particularly neuropsychological deficits linked to externalising problems and other antisocial behaviour) are likely to continue to commit crime in their adulthood (e.g., Moffitt, 2006). Further, Newman et al. (1996) found that adults with MHPs often have a history of problems starting in childhood or teenage years. Moreover, in a literature review, Hofvander et al. (2009) found that at least one-third of children diagnosed with hyperactivity problems developed a pre-adult aggressive antisocial problem, and one-fifth developed an antisocial personality disorder in adulthood.

### Nordic research on MHPs and adolescent offending

Despite the general lack of research regarding adolescent MHPs and criminal offence in the Nordic countries, some literature does exist. Existing research has focused on a more general concept of MHPs (e.g., Källmen et al., 2023), groups of problems (e.g., Ivert et al., 2017), and more specific diagnoses and disorders (e.g., Hildebrand et al., 2020; Mohr-Jensen et al., 2019; Dalsgaard et al., 2014).

Some research has shown associations between adolescent MHPs and offending in a Nordic context. In a cross-sectional study, Källmen et al. (2023) stated that MHPs were shown to be a strong explanation for criminal behaviour among adolescents when they examined the association between MHPs (without examining specific disorders or diagnoses, but instead using a scale of seven different symptoms and problems) and criminal behaviour among Swedish adolescent students in Stockholm. Further, Engqvist & Rydelius (2007) used register data to follow former Swedish Child and Adolescent Psychiatry patients and examined the association between MHPs (without focusing on specific diagnoses) and offending. Findings showed that, among former Swedish patients in Child and Adolescent Psychiatry, 50% of men and 20% of women had later been convicted of crime (a significantly higher rate than the general population at the time) (Engqvist & Rydelius, 2007).

Regarding studies using groups of problems when examining MHPs and offending, Ivert et al. (2017) examined externalising and internalising problems and crime involvement with register data from former patients at Swedish Child and Adolescent Psychiatry. Results showed that twice as many young adults that had previously been patients had committed crimes compared to controls that had not had psychiatric care (with an overrepresentation of externalising problems and violent crimes) (Ivert et al., 2017).

Further, Siponen et al. (2023) used population-based registers to examine the role of externalising and internalising problems (as well as specific disorders) in crime among Swedish adolescents. Results showed that a comorbidity of either externalising or internalising problems heightened the risk of crime compared to single diagnoses. Miettunen et al. (2014) also examined internalising and externalising problem groups in a Finnish study based on the Northern Finland birth cohort 1986 (with both self-reported data from participating children and information from teachers and parents) and found that externalising problems (but not internalising problems) among boys at age eight predicted later substance abuse, which in turn predicted later criminality. A study by Sourander et al. (2007) (based on both self-reported and register data) found that children with combined conduct problems and internalising problems at age eight had the highest risk of subsequent psychiatric disorders and criminal offenses. These children only included 4% of the sample but were responsible for 26% of all crimes at the follow-up (Sourander et al., 2007).

Studies from the Nordic countries have identified specific problems and disorders related to crime, particularly the association between externalising problems and offending. (e.g., Hildebrand et al., 2020; Mordre et al., 2011; Gosden et al., 2003). For example, register-based studies from several Nordic countries have focused on ADHD/hyperactivity problems and/or conduct disorder and offending, with results showing that adolescents with a combination of ADHD and conduct disorders, as well as early onset of substance abuse, have a more diverse history of violence and aggressive behaviour compared to adolescents without these problems (Hildebrand et al., 2020); that children and adolescents with ADHD were convicted of crimes to a higher degree both in adolescence and later adulthood compared to those without (Mohr-Jensen et al., 2019; Dalsgaard et al., 2014); and that conduct disorder and hyperkinetic conduct disorder significantly increased the risk of future criminal behaviour among former child psychiatric patients (Mordre et al. (2011).

Studies using other methods (for example, self-reported data) have found similar results. For example, it has been found that adolescent male offenders have higher levels of overall scores of mental health difficulties – especially regarding conduct problems (Ginner Hau, 2010), and that hyperactivity/inattention and ADHD symptoms at the age of nine or 12 are the most significant risk factors for antisocial behaviour at the age of 15 (Selinus et al., 2015). In one of a few Nordic studies conducted in juvenile detention, Ankarsäter et al. (2007) found that 39% of youth met the criteria for ADHD. In regard to other diagnoses, a Finnish population-based study found that boys that had at least one psychiatric disorder, with antisocial personality disorder being the most common, accounted for almost half of all measured crimes (Elonheimo et al., 2007), and a Danish study found that, among adolescent remand prisoners, 69% had some sort of mental disorder, with the most common being conduct disorder (Gosden et al., 2003).

It can be concluded that, overall, Nordic research shows similar results to international studies outside of the Nordic region, with mainly externalising MHPs being associated with adolescent offending (e.g., Selinus et al., 2015; Gosden et al., 2003; Ivert et al., 2017; Siponen et al., 2023). Moreover, in the Nordic countries' studies based on juvenile justice, samples appear to be scarcer (e.g., Ankarsäter et al., 2007), with most studies using community samples, often in the form of register studies (e.g., Mohr-Jensen et al., 2019). Fewer Nordic studies have used self-reported data in the examination of adolescent MHPs and offending (e.g., Källmen et al., 2023). Although there are a number of studies that have examined the relationship between MHP and criminality over time, few of them have

focused on the development and stability of these phenomena over time and what that entails.

### **Aim of the current study**

The current study will contribute to the knowledge base by using self-reported data to examine how differences in MHPs were associated with differences in crime involvement between adolescents in a Swedish adolescent sample, as well as by examining how individual changes in mental health were associated with change in crime involvement over time. Based on knowledge from previous research, we hypothesise that there will be an association between MHPs and crime involvement. We also hypothesise that individual changes in MHPs will be associated with individual changes in crime involvement, e.g., if MHPs increase, this will be associated with an increase in crime involvement. However, we anticipate the possibility of finding differences due to differences in method and sample as well as due to differences in what kind of MPHs have been examined and how this has been done.

### **Method**

#### **Sample**

Data were drawn from the longitudinal research project Malmö Individual and Neighbourhood Development Study (MINDS), which comprises a random sample of 525 adolescents (approximately 20%) born in 1995 and living in Malmö, Sweden, in 2007 (for a description of the project, see e.g., Ivert et al. (2017); Ivert (2013); Chrysoulakis, 2022; Ivert, 2013). Malmö is the third largest city in Sweden, with approximately 360,000 inhabitants (Malmö Stad, 2024), and the population is relatively young, with about 20% being younger than 18 years. The percentage of inhabitants with higher education is above the national average; however, unemployment rates are also above the national average. About one-third of the population in Malmö is born abroad, compared to 25% in the other two large cities and 20% in Sweden in total (Malmö Stad, 2024). Like other large cities, Malmö has both affluent areas and disadvantaged neighbourhoods with lower socio-economic status. It can therefore be assumed that we would get similar results with data from another comparable Swedish city. Three waves of data collection (not counting a pilot study with a smaller subsample) were completed when the adolescents were approximately 16, 17 and 19 years old. About 515 adolescents participated in the data collection at age 16 and 17, and 411 at age 19. The current study includes only the 386 adolescents (53% girls and 47% boys) who participated across all three waves. Overall, adolescents from more disadvantaged neighbourhoods and with a foreign background were somewhat underrepresented in the sample. Data were collected using a self-reported questionnaire, primarily in small groups at the schools attended by the adolescents. In a few cases, mainly during the final data collection, a postal survey was sent to those who could not be reached through the school.

The study was approved by the Swedish Regional Ethical Review Board in Lund (Dnr. 201/2007, Dnr. 2014/802, and Dnr 2021-05120).

#### **Measures**

*Adolescent MHPs* were measured using the Swedish version (Svedin & Priebe, 2008) of the self-reported version of the Strength and Difficulties Questionnaire (SDQ) (Goodman et al., 1998). SDQ is widely used and has shown good validity in previous studies

(Vugteveen et al., 2021; Goodman et al., 1998). SDQ consists of 25 items, divided into five subscales (representing different dimensions of mental health) with five items each (see [www.sdqinfo.org](http://www.sdqinfo.org)). As recommended by Goodman et al. (2010), in low-risk community samples we used two subscales measuring internalising behaviour (age 16  $\alpha = 0.65$ ; age 17  $\alpha = 0.67$ ; age 19  $\alpha = 0.64$ ) and externalising behaviour (age 16  $\alpha = 0.74$ ; age 17  $\alpha = 0.71$ ; age 19  $\alpha = 0.73$ ). Both scales range from 0 to 20, and a high score on SDQ indicates higher levels of mental health problems. Overall, there were few missing values on SDQ items (< 3%). As recommended, missing values were imputed with a subscale mean if no more than two of the items were unanswered in each subscale (Sdqinfo, 2023).

In addition to the SDQ, we included eight questions about the past months (e.g., difficulties with sleep, high stress) aiming to measure the present level of *state negative affect*. This measure might, in contrast to trait negative affect measured by SDQ, be seen as a reaction to stressful events in the adolescent's life (Schmukle et al., 2002). The few cases of missing values (< 3%) were imputed with a subscale mean if no more than two of the items were unanswered. Internal consistency was satisfactory (age 16  $\alpha = 0.83$ ; age 17  $\alpha = 0.83$ ; age 19  $\alpha = 0.86$ ) and there were significant correlations between all items across all waves.

*Crime involvement* covers nine different crime items covering both property crime (shoplifting, theft from a person, residential burglary, non-residential burglary, theft from/of a car, vandalism, arson) and violence (assault, robbery). Adolescents were asked if they had committed each type of crime during the previous 12 months. The items were added into a variety scale (Sweeten, 2012) by counting the number of crime types the adolescent had committed over the 12 months preceding the data collection. Property crimes were more common than violent crime across all waves of data collection.

Adolescents who participated in all three waves of data collection diverged substantially in relation to sex, as fewer boys participated over all three years (51% at age 16; 47% at age 19). In relation to study variables, adolescents included in the current study reported higher levels of internalising problems, state negative affect, and lower levels of externalising problems at age 16, compared to those who dropped out. Examining girls and boys separately shows that the difference in state negative affect only applies to boys, and the difference in externalising problems only applies to girls. No difference was found in relation to crime involvement.

### Statistical analysis

First, to study how mental health as well as offending change over time, we examined the absolute and relative stability (Forehand & Jones, 2002). We examined absolute stability using paired-sample t-tests, comparing the mean value of each variable at age 16 with the mean value of the same variable at age 17 and at age 19. We then examined relative stability by calculating stability coefficients (Spearman's correlation), which refers to the consistency of an individual's rank order over time which, in this case, was the extent to which an individual maintained their position on a specific variable over time relative to other individuals in the sample.

Next, due to the characteristics of the outcome variable (discrete counts which were skewed and over-dispersed) we applied negative binomial longitudinal multilevel analysis (Hilbe, 2011). This allowed us to estimate within-person (level 1) change as well as between-person (level 2) differences. By nesting time within individuals in level 1, we were able to examine whether change in externalising problems over time for one individual is associated with change in crime involvement for the same individual, regardless of

the initial level of externalising problems or crime involvement. In addition, the fixed effect regression controls for all individual, time-stable variables (e.g., gender or country of birth), implying that any observed effect of a dynamic variable is independent of time-stable variables. Level 2 examined time stable differences between adolescents; for example, whether adolescents who reported higher levels of externalising problems also reported more crime involvement compared to other adolescents.

We estimated two different multilevel models. The first model tested the effects of externalising and internalising problems on crime involvement. Given that the state of mental health at the time of data collection might affect the association between externalising and internalising problems and crime involvement, the measure of state negative affect was added in the second model. Both models were adjusted for sex and time and were also estimated separately for girls and boys.

To estimate the effect of the different measures of mental health on offending, the incidence rate ratio (IRR) and corresponding confidence intervals (CI) were calculated. The IRR is the exponentiated value of the coefficients (Hilbe, 2011), and can be interpreted similarly to odds ratios. An IRR greater than 1 indicates a higher rate among those with a higher value on the exposure variable (e.g., internalising problems).

Analyses were conducted using SPSS 27 and Stata 17.

## Results

Table 1 presents descriptive statistics of study variables and the absolute stability. Comparing mean scores to examine absolute stability showed that, on average, externalising problems appear to be stable over time, while internalising problems, as well as negative affect, increase with age. Crime involvement increases from age 16 to age 17, and then decreases again at age 19. Girls reported higher levels of internalising problems and state negative affect compared to boys across all three waves of data collection ( $p < .001$ ). No sex difference was identified in relation to externalising problems. Compared to girls, boys reported higher levels of crime involvement at ages 17 and 19 ( $p < .001$ ).

**Table 1** Descriptive statistics and differences over time. Mean values (standard deviations in parentheses) if nothing else indicated. N=386

	Age 16	Age 17	Age 19
Externalising problems (0–20)	5.75 (3.41)	5.73 (3.31)	5.63 (3.17)
Internalising problems (0–20)	4.75 (2.96)	5.00 (3.11)	5.33 (3.00) <sup>b</sup>
State negative affect (0–32)	11.38 (5.52)	12.41 (5.73) <sup>a</sup>	13.16 (5.46) <sup>b</sup>
Crime involvement (0–9)	0.44 (0.99)	0.72 (1.14) <sup>a</sup>	0.29 (0.73) <sup>b</sup>
Any crime (%)	23.6	39.9	17.4
Girls (n = 206)			
Externalising problems (0–20)	5.58 (3.27)	5.56 (3.16)	5.54 (2.94)
Internalising problems (0–20)	5.40 (3.00)	5.55 (3.06)	6.11 (2.90) <sup>b</sup>
State negative affect (0–32)	13.37 (5.32)	14.36 (5.35) <sup>a</sup>	14.60 (4.81) <sup>b</sup>
Crime involvement (0–9)	0.37 (0.85)	0.44 (0.82)	0.16 (0.49) <sup>b</sup>
Any crime (%)	22.3	29.1	15.5
Boys (n=180)			

(continued)

**Table 1** (Continued)

	Age 16	Age 17	Age 19
Externalising problems (0–20)	5.96 (3.57)	5.92 (3.47)	5.74 (3.42)
Internalising problems (0–20)	3.99 (2.73)	4.36 (3.05)	4.43 (2.86) <sup>b</sup>
State negative affect (0–32)	9.08 (4.81)	10.17 (5.32) <sup>a</sup>	11.52 (5.71) <sup>b</sup>
Crime involvement (0–9)	0.52 (1.41)	1.03 (1.36) <sup>a</sup>	0.44 (0.92)
Any crime (%)	25	52.2	28.3

Between year difference based on paired samples T-test (Externalising, Internalising & State negative affect) and Wilcoxon signed ranks test (Crime involvement) for comparison of mean values.

<sup>a</sup>Significant difference between age 16 and age 17

<sup>b</sup>Significant difference between age 16 and age 19

The correlations presented in Table 2 indicate relative stability over time for all variables ( $p < 0.01$ ). The correlation with the highest magnitude (i.e. the most stable over time) was externalising problems ( $r > 0.564$ ), followed by state negative affect ( $r > 0.531$ ) and internalising problems ( $r > 0.517$ ). Correlations for crime involvement were lower, with the lowest correlation for age 16 and 19 ( $r > 0.267$ ). Overall, the magnitude of the correlations was higher for the next closest assessments. These findings indicate that participants reporting higher levels of externalising problems, internalising problems, or offending, continued to report relatively higher levels over time.

**Table 2** Stability coefficients (Spearman's correlations at age 16, 17, and 19)

Externalising	Internalising	State negative affect
0.690**	0.593**	0.670**
0.564**	0.517**	0.531**
0.637**	0.581**	0.537**

All correlations are significant at  $p < 0.01$ .

The between-participant analysis (Table 3) shows that adolescents were more likely to report crime involvement if they also experienced higher levels of externalising problems (IRR = 1.34, CI = 1.27-1.41). The inclusion of state negative affect in the second model did not have any substantial influence on the association between externalising problems and crime involvement. However, in this second model, adolescents who experienced higher levels of internalising problems were less likely to report crime involvement (IRR = 0.89, CI = 0.83-0.96), indicating that when state negative effect is held constant, adolescents with higher levels of externalising problems still report higher levels of crime involvement, but adolescents with higher levels of internalising problems report less crime involvement. Model 2 also indicates a positive association between state negative affect and crime involvement when externalising and internalising problems are held constant.

The within-participant analysis (Table 3) shows that changes in externalising problems were related to changes in crime involvement, such that an individual increase in externalising problems was associated with an individual increase in crime involvement (IRR = 1.16/1.06, CI = 1.10-1.22. /1.00-1.12). The association between internalising problems and crime involvement is barely conclusive (IRR = 1.06, CI = 1.00-1.12). Moreover, as two models were estimated, adjusting the alpha level indicated that the association was not significant. The association between change in externalising problems and change in crime involvement remained even after adjustment for state negative effect.

**Table 3** Negative binomial multilevel regression predicting overall crime involvement

Total sample	Model 1			Model 2		
	Estimate	SE	IRR (CI)	Estimate	SE	IRR (CI)
<i>Between-person</i>						
Externalising problems	0.290***	0.027	1.34 (1.27–1.41)	0.265***	0.027	1.30 (1.24–1.37)
Internalising problems	-0.042	0.030	0.96 (0.90–1.02)	-0.112**	0.038	0.89 (0.83–0.96)
State negative affect				0.066**	0.023	1.07 (1.02–1.12)
<i>Within-person</i>						
Externalising problems	0.144***	0.026	1.16 (1.10–1.22)	0.132***	0.026	1.14 (1.08–1.20)
Internalising problems	0.056 <sup>ˆ</sup>	0.027	1.06 (1.00–1.12)	0.025	0.030	1.06 (0.97–1.09)
State negative affect				0.050**	0.016	
<b>Girls</b>						
<i>Between-person</i>						
Externalising problems	0.343***	0.049	1.41 (1.28–1.55)	0.287***	0.048	1.33 (1.21–1.46)
Internalising problems	0.056	0.047	1.06 (0.96–1.16)	-.070	0.059	0.93 (0.83–1.05)
State negative affect				0.121**	0.039	1.13 (1.05–1.22)
<i>Within-person</i>						
Externalising problems	0.238***	0.044	1.27 (1.16–1.38)	0.197***	0.047	1.22 (1.11–1.33)
Internalising problems	0.027	0.043	1.03 (0.94–1.12)	-0.027	0.048	0.97 (0.89–1.07)
State negative affect				0.075**	0.027	1.08 (1.02–1.14)
<b>Boys</b>						
<i>Between-person</i>						
Externalising problems	0.269***	0.031	1.31 (1.23–1.39)	0.258***	0.032	1.29 (1.03–1.16)
Internalizing problems	-0.123**	0.041	0.88 (0.82–0.96)	-0.160**	0.050	0.85 (0.77–0.94)
State negative affect				0.035	.028	1.04 (0.98–1.09)
<i>Within-person</i>						
Externalizing problems	0.091**	0.032	1.10 (1.03–1.17)	0.089 <sup>ˆ</sup>	.032	1.09 (1.03–1.16)
Internalizing problems	0.077 <sup>ˆ</sup>	0.036	1.08 (1.01–1.16)	0.064	.038	1.07 (0.99–1.15)
State negative affect				0.024	.020	1.02 (0.99–1.06)

\*p < 0.05; \*\*p < .01; \*\*\*p < 0.001  
 Model 1 adjusted for sex and time  
 Modell 2 adjusted for sex, time and state negative effect

Fitting separate models for girls and boys yielded partially different results. The between-participant analysis (model 2) showed that girls were more likely to report crime involvement if they also experienced higher levels of externalising problems (IRR = 1.33, CI = 1.21-1.46) even after adjustment for level of state negative affect. Internalising problems were not associated with crime involvement among girls; however, we found an association between higher levels of state negative affect and higher levels of crime involvement when girls’ externalising and internalising problems were held constant. Among boys, there was a conclusive association between crime involvement and both externalising problems (IRR = 1.29, CI = 1.03-1.16) and internalising problems (IRR = 0.85, CI = 0.77-0.94), such that those with higher levels of both types of MHPs were more likely to report crime involvement.

Findings from the within-participant analysis showed that change in externalising problems over time was associated with a change in crime involvement over time for both girls (IRR = 1.22/1.08, CI = 1.11–1.33/1.02–1.14) and boys (IRR = 1.09, CI = 1.03–1.16). Among boys, however, a change in internalising problems was initially positively associated with a change in crime involvement (IRR = 1.08, CI = 0.82–0.96) but, after adjustment for change in state negative affect in the second model, this association disappeared.

## Discussion

As hypothesised, findings from the present study are in line with both research from countries outside of the Nordic region and research from the Nordic countries (e.g., Beaudry et al., 2021; Colins et al., 2010; Moffitt, 1993; Ivert et al., 2017; Miettunen et al., 2014). Firstly, the result shows that many adolescents offend at some point during their adolescence and, as Moffitt (2006) stated, that number drops after a certain age (in this study, 17 years of age) and only a smaller number of adolescents continue their crime involvement as they become older. Further, results show that individual change in externalising problems was associated with change in crime involvement, with similar patterns for girls and boys. This thus supports findings from research outside of the Nordic region from the juvenile justice system and communities, as well as research from the Nordic countries, that has found associations between problems and diagnoses associated with externalising problems and offending, such as ADHD (e.g., Beaudry et al., 2021; Colins et al., 2020; Moffitt et al., 2001; Loeber et al., 2012; Ivert et al., 2017; Miettunen et al., 2014; Mohr-Jensen et al., 2019; Dalsgaard et al., 2014).

Generally, we found no association between internalising problems and crime involvement. That is, the level of internalising problems did not differentiate between adolescents involved in crime and those who were not, nor was individual level of internalising behaviour associated with individual level in crime involvement. Findings from previous research are inconclusive; there are studies reporting findings similar to ours, showing no increased risk for crime involvement among adolescents with internalising problems (e.g., Miettunen et al., 2014), but there are also studies reporting opposite results, i.e., an increased risk for crime involvement among adolescents with internalising problems (e.g., Sourander et al., 2007). However, when conducting separate analysis for girls and boys, the results indicate that internalising problems were associated with less crime involvement among boys. Additional research is therefore needed to fully understand the association between internalising problems and adolescent offending, particularly by examining potential gender differences and various populations.

The study findings therefore suggest that externalising problems (which, as mentioned, reflect some neuropsychiatric problems) may be an especially important variable for understanding why some individuals continue their crime involvement in adulthood (cf. Moffitt et al., 1994; Moffitt et al., 2001). It can be hypothesised that the strong and stable association between externalising problems and offending in research is due to the fact that some externalising problems reflect phenomena that have been theoretically and empirically linked to crime, such as self-control (e.g., Gottfredson & Hirschi, 1990) and morality (e.g., Wikström, 2006). For example, impulsivity and hyperactivity are linked to problems with self-control (e.g., Barkley, 1997), while antisocial and conduct problems have been associated with deviant moral values (e.g., Stams et al., 2006). In contrast, internalising problems may reflect MHPs linked to introverted behaviour (e.g., Nikstat &

Riemann, 2020) that are not as strongly associated with problems of self-control or deviant moral values (e.g., Moffitt et al., 2002).

However, even though findings are in line with previous research, this study also contributes with important, new evidence owing to its longitudinal, community-based, self-reported data design, of which there is a current lack in research from the Nordic countries. Moreover, although the role of state negative affect was not the focus of the study, this is a variable that should be further explored in future research. Indeed, the stability coefficient was rather high ( $r > 0.531$ ) in the current sample, indicating that this measure does not fluctuate as much over time as we expected and therefore might be an indication of something other than a reaction to stressful events. In addition, this measure appears to affect girls and boys differently, and this is something that should be addressed in future studies.

There are some methodological considerations that need to be mentioned in relation to the present study. First, the sample is rather small, and this might be associated with some uncertainty regarding the generalisability of the findings, especially since many of the adolescents had committed few or no crimes at all. However, findings are overall in line with previous research, which reflects its relevance and reliability. Further, there are some methodological considerations associated with the SDQ. Although SDQ is widely used and has been suggested to be useful for screening for MHPs (Vugteveen et al., 2021), it has been argued that SDQ may not be optimised for use in community samples and more research is needed to understand how different items are related to each other and differentially contribute to the subscales and overall score (Vaz et al., 2016). However, in the present study we used the broader externalising and internalising subscales as suggested for community samples (Goodman et al., 2010). In addition, the alpha value for the internalising subscale was below the recommended 0.7 level and therefore the results should be interpreted with caution. The externalising subscale does include conduct problems, which by itself includes some antisocial and criminal behaviours. However, conduct disorder is a diagnosis in the *DSM-5* American Psychiatric Association (2022) and it is important to address conduct problems as MHPs when, for example, guiding intervention and preventive measures. A potential limitation is the use of self-reported data, which can implicate problems with both over- and under-reporting, as well as internal and external dropouts. However, this type of data also enables access to information that might not be found in, for example, official registers, and which can provide an insight into MHPs and crime involvement among community-based adolescents that have not been in contact with, for example, a psychiatrist or the police. Furthermore, there was an inability to check for confounding effects and reverse causality regarding state negative affect and crime involvement; thus, the results should be interpreted carefully, and future research is suggested to consider these possibilities. Finally, the choice of statistical approach might have affected the findings and alternative methods, e.g., zero inflated models or lagged analyses, could have yielded somewhat different results. Even though findings from the present study overall align with previous research, we encourage future studies to try additional statistical approaches.

To guide future research further and to reduce stigmatisation of adolescents with MHPs (both in the Nordic countries and internationally), it must be highlighted that MHPs cannot on their own explain adolescent crime involvement. Further research is needed to explore how the association between externalising behaviour and crime involvement is affected by other factors, such as criminal attitudes or moral values. More research is also needed to explore gender differences; while externalising problems appear to affect both

girls' and boys' criminality in similar ways, state negative affect was only associated with crime involvement among girls.

## Conclusion

To conclude, from what we now know about the association between adolescent MHPs and crime involvement, both from previous research from outside the Nordic region and the Nordic countries, as well as from the results of the current study, it is of importance to address and fully understand the relationship between MHPs and crime involvement, not only for the health of adolescents, but also to minimise the risk of increasing criminality and other adverse outcomes. The study results highlight the importance of addressing externalising problems comprehensively and developing preventive measures targeting externalising problems broadly, as a negative development appears to increase the risk of crime involvement, regardless of the initial level of problems. Combined with the knowledge that MHPs often start in childhood/adolescence (Newman et al., 1996), and that more children and adolescents are having problems with mental health and seeking help for MHPs (e.g., Nordic Council of Ministers, 2022; Socialstyrelsen, 2019; Region Skåne, 2024), it can be suggested that it is important to detect both boys and girls with MHPs (especially externalising problems) as early as possible in the community. The study is further an important complement to previously existing research due to its unique design, using longitudinal self-reported data from a community-based sample (which gave the ability to capture MHPS and offending that has not been actualised within, for example, healthcare or police registers) as well as due to it being able to follow the development of MHPS and offending over time, as well as to study differences in development in MHPS in relation to differences in development in offending among adolescents in the community.

## Data availability statement

The data that supports the findings of this study are not publicly available due to privacy, ethical, and legal restrictions. The data can be available upon request to the corresponding author with the guarantee that privacy, ethical, and legal restrictions are maintained.

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III



RESEARCH

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# Girls, mental health problems, and offending: findings from a community sample

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## Abstract

**Background** Mental health problems (MHPs) are associated with youth offending, but research on MHPs among specifically offending girls, particularly in community settings, is limited.

**Aims** To explore if MHPs were more common among adolescent girls who reported committing crimes compared to those who did not, as well as to investigate how different MHPs were associated with offending, and examine the potential effects of parental relationships, parental monitoring, and association with deviant peers.

**Methods** Data were drawn from the Malmö Individual and Neighbourhood Development Study (MINDS), a longitudinal study which comprises a random sample of 525 adolescents (~ 20%) born in 1995 and living in Malmö, Sweden, in 2007. The current study included the 240 girls that participated in wave two (age 16) and three (age 17) of data collection. Data were collected using a self-reported questionnaire. Independent samples T-tests analysed differences in MHPs between offending and non-offending girls. Pearson's correlation test and logistic regressions examined the association between MHPs and offending and how these associations were affected by parental relationship, parental monitoring, and deviant peers.

**Results** Offending girls had higher levels of MHPs than non-offending girls, with the most significant differences in hyperactivity and externalising problems. Logistic regressions partly confirmed these findings, showing strong associations between externalising problems and offending. Internalising problems showed mixed results in their association with offending.

**Conclusion** Girls who had offended had higher levels of both internalising and externalising MHPs compared to those who had not offended. This indicates that measures to prevent youth crime should acknowledge MHPs. Overall, more research is needed on girls' MHPs and offending, particularly on the association between internalising problems and offending.

**Keywords** Girls, Mental health problems, Offending, Community sample, Deviant peers, Parents

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## Introduction

In criminology, it has historically been uncommon for studies to focus only on girls' offending, and therefore, there are still unanswered questions about why girls offend and if there are risk factors that are specific for them [35]. However, during the past decades, there has been an increase in girls who offend (e.g., [36, 57, 61]) and an increased number of girls in the juvenile justice system [17, 23, 80]. This development can also be seen in Sweden, with just over 50% of ninth-grade school girls in Sweden reporting that they have committed some offence during the past year in the National School Survey on Crime 2023 [75]. Previous studies on mixed gender samples have provided a general basis for understanding girls' offending, and the studies have found that, for example, mental health problems (MHPs) seem to be an important variable for explaining offending (e.g., [1, 10, 13, 44]). For example, having externalising problems [15] and problems with several different sorts of MHPs (Siponen et al., [67]) has been found to increase the risk of offending, and among youth that commit a high number of crimes and continue to offend in adulthood the rate of MHPs is generally higher than among those who do not (e.g., [49, 51]). The more limited amount of research focusing specifically on girls has shown similar results as the research on mixed samples (e.g., [51]), but also notable differences [39]. For example, besides externalising problems, internalising problems have also been found to be common among offending girls [73]. At the same time, a growing number of girls report having problems with some types of MHPs (e.g., [74, 85]), especially when it comes to internalising problems [12]. The fact that girls are experiencing an increase of both MHPs and offending calls for more knowledge about the associations between these factors. Knowing more could provide better explanatory models for why some girls offend and foster better preconditions for preventive measures, which in turn can contribute to better living conditions for girls. Previous research has indicated that variables such as parent–child relationship, parental monitoring, and peers might be of high importance for youth MHPs (e.g., [9, 38, 70]), as well as offending (e.g., [24–26]). Since they might affect an offending outcome, they need to be controlled for. Therefore, in the current study, we explore if some MHPs are more common among girl offenders, how different MHPs are associated with offending, and if these associations are affected by parent–child relationship, parental monitoring, and peers.

## Background

Initially, this will provide a description of how MHPs are defined in the current study, which is followed by a presentation of findings from previous research on the association between offending and MHPs. Lastly, it presents

findings from previous research on the risk factors of both crime and MHPs that are examined in the current study, the parent–child relationship, parental monitoring, and associations with peers.

## Study definition of mental health problems

In this study, the concept of MHPs is based on the definitions from the WHO [86] and the American Psychiatric Association [5], including disorders, disabilities, and impairments originating from deviations in brain functioning, as well as the consequences and problems of these disorders and impairments that, among other things, can affect behaviour, emotions, and well-being. In the current study, we explore a range of self-reported symptoms, such as symptoms of hyperactivity or emotional problems; and symptoms that can also be divided into the broader symptom subgroups of internalising and externalising problems. These symptoms possibly indicate a mental disorder according to the current diagnostic symptoms, but not necessarily. Consequently, we use the broader term MHP rather than, e.g., mental disorder. This approach allows for a broader understanding of which types of problems and symptoms are most relevant for girls' offending, while also potentially reducing stigma related to diagnoses.

## Mental health problems and offending

### *Findings from studies with mixed gender samples*

Much of the previous research providing knowledge about the association between girls' MHPs and offending has been conducted on samples with both girls and boys, and the amount of research focusing on only girls is still quite low. Many of the mixed sample studies have been conducted on clinical samples (e.g. [48]) or within the juvenile justice system, where it has been found that between 52 and 70% of youth suffer from some form of MHP (e.g., [11, 46, 79]), with especially externalising problems being common [13]. Even though there are fewer studies conducted on community samples, the existing ones show similar results as the ones from the juvenile justice system, indicating that externalising problems are important for understanding youth offending. For example, Moffitt [49, 50] and Moffitt et al. [51] found that individuals who followed a trajectory of persistent and frequent crime involvement (life course persistent offenders) often had externalising problems like neurodevelopmental problems (which are problems with the development of the nervous system in both the brain and spinal cord, potentially causing, for example, hyperactivity, inattention, and emotional dysregulation) and conduct problems. Moffitt's [49, 50] and Moffitt's et al. [51] findings have been supported in more recent community-based studies, which have found that externalising problems are more common than internalising

problems among youth offenders [42], that neurodevelopmental problems are associated with offending among youth at ages 9–12 [62], and that youth having unmedicated ADHD (and thus unmedicated problems with hyperactivity, concentration, and impulsivity) had a higher risk of offending [52]. However, even though there already are indications of associations between externalising problems and youth offending, there are also studies indicating that the relationships between youth MHPs and offending are quite complex and need to be further studied (e.g., [47, 67]). For example, Anderson et al. [6] found that depression may increase the risk of property crimes, but not violent crimes, and a recent Swedish national population-based register study by Siponen et al. [67] found that comorbidity between several problems and diagnoses, including both internalising and externalising problems, may increase the risk of criminal conviction.

#### **Findings from studies focusing on girls**

##### ***Findings from justice settings or clinical populations***

Even though studies on mixed gender samples have contributed with important knowledge about the associations between girls' MHPs and offending, the few studies that have focused on and examined only girls on their own might be of even greater importance for understanding the associations between girls' MHPs and offending. As with studies including both genders, it is most common that studies focusing on girls have been conducted in the juvenile justice setting or on clinical samples. To start, and notably, it has been suggested that MHPs might be more important to explain girls' offending rather than boys', as it was found that MHPs may lead to a higher risk of being convicted of offences among girls than boys in a longitudinal, registry-based sample from Sweden [67]. Similar indications have been found among adult females in the justice setting, showing that no matter their ethnic background and age, female offenders have higher rates of MHPs compared to male offenders (e.g., [14, 28, 31]). Moreover, up to 80% of women in prison have some form of MHPs [87], and they are up to five times more likely to suffer from MHPs than women in the general population [78]. Even though these findings refer to adult females, similar results have been found among girls in the juvenile justice system, with as much as 74% of girls suffering from one or more MHPs [73, 80]. Further, like the findings from mixed samples, findings from studies on only girls in the juvenile justice system also indicate that externalising problems could be important among offending girls where, for example, it has been found that 46% of detained girls had disruptive behaviour problems [73], that girls were both more likely to be diagnosed with oppositional-defiant disorder (ODD) or conduct disorder (CD) [19], and with being more violent towards staff

(thus showing tendencies of disruptive behaviour) than boys [76].

Previous research from the juvenile justice setting with its focus on only girls has, however, also shown that not only externalising problems are associated with offending (e.g., [73]), but importantly and interestingly that also internalising problems might be important for fully understanding girls' offending [39]. For example, in a longitudinal study where detained girls were assessed two times during a 4.5 year time period, Van der Molen et al. [80] identified three trajectories of disruptive behaviour, with those in the high-risk group facing increased risks of not only aggression, but also depression, self-harm, and PTSD. Moreover, among girls in the juvenile justice system, it has been found that 19% of the girls had depression [73], 47% to 72% of the girls had anxiety disorders [14, 56], and Trulson et al. [76] reported that girl offenders were likely to have experienced risk factors for internalising disorders such as sexual, physical, and emotional abuse. However, there is research indicating that a prison environment can affect female mental health, especially depression and anxiety, negatively (e.g., [34, 77]), which might possibly contribute to the high levels of these problems in juvenile justice settings, making it difficult to fully understand how internalising problems are associated with offending among girls.

Notably, many of the studies conducted in justice or clinical settings rely on cross-sectional designs, which affect the possibility to determine whether MHPs precede offending behaviour or are a consequence of it—or perhaps are influenced by shared underlying risk factors. This is something that needs to be considered when drawing conclusions in relation to the causal order of MHPs and criminality.

##### ***Findings from community-based studies***

Overall, community-based studies show similar results as studies conducted in the juvenile justice setting; MHPs can also be a risk factor of girls' offending in community samples. However, compared to studies conducted in justice or clinical settings, there are more studies with longitudinal designs. For instance, a school-based study tracking girls from middle and high school into adulthood found that severe MHPs, such as anxiety and depression, were significant predictors of offending [64]. Additionally, a longitudinal study following serious adolescent offenders through their transition to adulthood revealed that girls with MHPs (also, for example, depression and anxiety) and trauma symptoms were more likely to engage in persistent criminal behaviour. Moreover, the study highlighted that MHPs, combined with substance abuse and family dynamics, were key factors influencing continued offending among girls [54]. Farrington [24] also conducted a longitudinal study following both girls

and boys from childhood into adulthood, focusing on the development of offending behaviour. When examining only the included girls, Farrington [24] found that girls with early signs of emotional dysregulation and MHPs, such as anxiety and depression, were more likely to engage in delinquent behaviour and MHPs were also found to interact with other risk factors, such as family instability and exposure to violence, to increase the likelihood of criminal activity [24]. Similar to Farrington [24], Moffitt [51] examined only the girls' offending trajectories in more detail and separately from boys, and found that girls who start offending early exhibit the same externalising problems and follow the same trajectory paths as found in the mixed gender studies presented earlier [7, 8, 51, 68]. Moreover, regarding girls' trajectories, Andersson et al. [8] interestingly identified a small group of females with adult-onset offending that has not been seen to the same extent in mixed sample studies, indicating important gender-specific characteristics of girls' offending development and trajectories. Also, in the Girls Group Study, conducted by the U.S. Department of Justice, developmental pathways to delinquency in girls were examined. This study identified that girls with MHPs and trauma had higher rates of offending and recidivism compared to those without [69].

#### ***The complexity of different MHPs for girls' offending***

However, even though there are indications from previous findings that MHPs seem to be an important risk factor of girls' offending, the associations between different MHPs and offending might need to be problematised further due to potential complex interactions between both MHPs and offending. For example, in regard to ADHD and its association with offending (e.g., [52]), explanations of the association between ADHD and offending often focus on externalising problems such as hyperactivity and impulsivity [2], but there are suggestions that also internalising problems must be considered among offending girls with the diagnosis (e.g., [41, 47]). Girls with ADHD have been found to report less externalising behaviour compared to boys, and more depressive problems [41], and it has been suggested that ADHD is underdiagnosed among girls, with one explanation being that ADHD symptoms are misinterpreted or overshadowed by other MHPs such as anxiety, depression, and self-harm [47]. This suggests that when exploring the association between MHPs and offending among girls, it might be an advantage to define and examine different MHPs rather than disorders and diagnoses.

#### **Risk factors associated with both offending and MHPs**

Different factors are often said to interact with each other to explain individuals' crime involvement (e.g., [26, 49]). Three variables that previous research have identified as

highly important for both youth MHPs and offending include the parent–child relationship, parental monitoring, and associations with peers (e.g., [24, 26, 49, 53]). Since these three variables are associated with both MHPs and offending, it can be hypothesised that they might affect the association between MHPs and offending. There is therefore a need to control for the effects of parent–child relationship, parental monitoring, and associations with peers when examining girls' MHPs and offending.

#### **Parent–child relationship**

Regarding the relationship between youth MHPs and parents, previous studies have found that a higher-quality relationship (with a positive, high-quality relationship between parents and youth being defined as characterised by support, warmth, attentive communication, behavioural consistency, and the absence of harsh punishment, rejection, and maltreatment (e.g., [43]) predicts higher self-esteem and lower depression [38], and that abusive and neglectful parenting is a predictor of adult mental illness (e.g., [53]). It has further been found that parental support was associated with lower levels of emotional and behavioural problems in adolescents [32] and that critical and unsupportive parenting was associated with an increased risk of depressive symptoms in adolescents [88]. It has further been suggested that girls have more expressive and communicative bonds (including attachment and monitoring) with parents than do boys [87], which might partly explain the gender gap in offending. Moreover, regarding relationships with offending, a study that, among other variables, examined gender, family, and offending indicated that low parental attachment is a much stronger predictor of violent crime among females than men [3].

#### **Parental monitoring**

Also, as mentioned, parental monitoring has been found to affect both mental health and offending among youth; for example, it has been found that parental monitoring is associated with lower levels of youth behavioural problems and better mental health outcomes Dishion and McMahon [21], and that low parental monitoring is associated with increased delinquency and emotional problems in youth [7]. However, Hardie [33] found that the role of monitoring may decrease depending on the youth's ability to exercise morality and self-control, which in turn can be affected by, for example, MHPs included in the externalising problem group [4]. There are thus clear indications that both the parent–child relationship and parental monitoring can affect both MHPs and offending; however, less is known from studies examining all variables together and whether they affect the association between MHPs and offending.

## Peers

Regarding youth peers and MHPs, it has been found that positive friendships are important; for example, they can reduce anxiety and depression [9], and that socialising with peers with disruptive and deviant behaviour carries a higher risk of individuals developing similar behaviours and adopting similar attitudes (e.g., [22, 49]) which can lead to increased emotional problems [22]. Also, Prinstein and Dodge [60] emphasise that peer influence plays a critical role in shaping adolescents' behaviours and mental health, and states that peer acceptance and the desire to fit in can lead to adopting harmful behaviours, contributing to mental health issues such as anxiety, depression, and substance abuse. Moreover, in relation to offending, it is widely known within the field of criminology that associations with antisocial and deviant peers are an important predictor of youth offending (e.g., [72, 82–89]). However, findings in studies vary across genders, for example, one study found deviant peers to be a better predictor among boys than girls who offend [58], but another study found that the effect of deviant peers on offending was similar among girls and boys [84], indicating the need for more research to understand the effect of deviant peers on offending among girls, and also to enable considering the effects in relation to MHPs and offending. As with parents, there are thus clear indications that associations with deviant peers can affect both MHPs and offending, but less is known from studies examining all variables together and whether deviant peers affect the association between MHPs and offending.

## Current study

From what has been presented above, we know that MHPs, to different degrees, seem to be associated with offending among girls and that this association may be influenced by factors such as parent–child relationship, parental monitoring, and peers they associate with. However, as previous research in this field is mainly based on clinical or juvenile justice samples, we need more knowledge on how offending and MHPs are associated among girls in a community-based sample. Addressing this in a community sample enhances the possibilities for early intervention by identifying problems before they escalate to a level where mental health care is needed or the young person becomes involved with the juvenile justice system.

The current study explores: (1) if some MHPs are more common among teen girls who reported that they have committed crime(s) compared to those who have not, (2) how different types of MHPs are associated with offending, and (3) whether these associations are affected when we control for parent–child relationship, parental monitoring, and peers.

## Method

### Sample

Data used in the study were drawn from the research project Malmö Individual and Neighbourhood Study (MINDS), which is modelled on the Peterborough Adolescent and Young Adult Development Study (e.g., Wikström et al., 2012) with some modifications to better meet the specific aims of the MINDS project and a Swedish context. The project was approved by the Swedish Regional Ethical Review Board in Lund (Dnr. 201/2007 and Dnr. 2014/802). It has a longitudinal design and follows a sample of 526 randomly selected adolescent boys and girls born in Malmö, Sweden, in 1995 (about 20% of the total cohort) and living there in 2007 (when the project was initiated). Three waves of data collection (excluding a pilot study with a smaller subsample) were completed when the adolescents were approximately 16, 17, and 19 years old. At ages 16 and 17, about 515 adolescents participated in the data collection; at age 19, the attrition rate increased, resulting in the number of participants dropping to 411. Data were collected using a self-report questionnaire and structured interviews, usually in small groups at the participants' schools. For a small number of cases, a postal survey was sent to those who could not be reached through the school (for a more detailed description of the project, see e.g., [18, 37]).

The current study included data on girls from the MINDS study who participated in the second and third wave of data collection when the participants were 16 and 17 ( $n = 240$  girls) years old. Since relatively few girls reported that they had committed any crime (age 16,  $n = 59$ ; age 17,  $n = 77$ ), we merged the two waves to increase power, resulting in a total of 240 girls included in the analytical sample (i.e., 96% of the girls participating in wave two thus also participated in wave three, giving a small external dropout and missing values in the analytical sample). Wave one was excluded in the current study due to its pilot design, and wave four was excluded due to the increase in attrition and participants then being considerably older (19).

About 65% percent of the girls in the study lived with both their parents, which is in line with Swedish children on average [61]. Almost 40% of the girls have two foreign-born parents. This indicates an underrepresentation of participants with a foreign background, as the corresponding figure for the total cohort was about 50% [62]. There is also an overrepresentation of girls from the more affluent areas of Malmö.

Malmö is the third-largest city in Sweden, with approximately 360,000 inhabitants [45]. About one-third of the population in Malmö is born abroad, compared to 25% in the other two large cities and 20% in Sweden in total, and the population is relatively young, with about 20% being younger than 18 years. The percentage of inhabitants

with higher education is above the national average; however, unemployment rates are also above the national average [45]. Like other large Swedish cities, Malmö has both affluent areas and disadvantaged neighbourhoods with lower socioeconomic status.

### Measures

The data employed in the current study were based on the self-report questionnaire.

#### Dependent variable

Self-reported offending was measured with a self-report questionnaire with ten different crime items, including violence (e.g., assault and arson), property crime (e.g., burglary and vandalism), and drug crimes (if the participant had used any drugs). Committing property crimes (age 16  $n=50$ ; age 17  $n=69$ ) was more common across both waves of data collection than committing violent crimes (age 16  $n=9$ ; age 17  $n=8$ ) and using drugs (age 16  $n=8$ ; age 17  $n=33$ ) (see Appendix 1 for a detailed description of number of participants committing each crime type across the two different waves). Drug use almost exclusively involved the use of cannabis (wave two  $n=8$  and wave three  $n=33$ ), and due to the relatively small evidence of cannabis (compared to, for example, cocaine or amphetamine) (e.g., [20, 55]) increasing the risk of offending, we chose to not examine drug use as a risk factor of offending in the current sample and study, but only as a crime type. The crime types were added together into a variety scale by counting the crime types that each respondent had committed over the past 12 months. The variety scale was then dichotomised to represent whether a girl had committed any crime ( $=1$ ) or not ( $=0$ ). The crime scale was chosen to be dichotomised due to the skewed nature of the crime variable; a rather small number of girls had committed crimes, and in that way we addressed the problem of using a non-normally distributed variable in, for example, linear regressions (e.g. [27]).

#### Independent variables

Youth MHPs were measured by using the Swedish version [71] of the self-report version of the Strength and Difficulties questionnaire (SDQ) [30]. SDQ is a widely used questionnaire, and the SDQ total difficulties sum has been found to be a psychometrically sound measure of overall child MHPs in studies from around the world [29]. However, the 25 items of SDQ can also be divided into five subscales with five different items each. The subscales have the intention of tapping into five different dimensions of mental health: emotional symptoms (alpha value for wave 2 = 0.68 and wave 3 = 0.67), conduct problems (alpha value for wave two = 0.50 and wave three = 0.45), hyperactivity (alpha value for wave

two = 0.73 and wave three = 0.70), peer-related problems (alpha value for wave two = 0.45 and wave three = 0.48), and prosocial behaviour (alpha value for wave two = 0.63 and wave three = 0.56). SDQ can also be said to measure personality traits, instead of distinct MHPs; for example, traits of anxiety and depression. However, even though in the current study we are interested in problems and not traits, we argue the fit of the measure due to that the measured traits in turn give rise to MHPs associated with the traits. Prosocial behaviour stands out from the other four subscales in the way that it does not represent a problem but instead consists of variables that may have a positive effect on mental health [9]. Even though this subscale does not represent an MHP, it was chosen to be included in the analyses because it might give important information about whether prosocial behaviour decreases the risk of offending or affects the association between the other subscales and offending. Even though some of the subscales showed poor alpha-values (i.e., below 0.70), the five subscales were chosen to be used since they arguably have the possibility to tap into more distinct information about youth MHPs and have the potential to predict child mental disorders [29] and thus also to contribute with valuable information for the aim of the current study regarding examining if some MHPs are more common among girls who offend compared to those who do not, as well as to examine the association between different MHPs and offending. For both waves, there were a few missing values on SDQ items, and missing values were imputed with a subscale mean if the answers to no more than two of the items were missing in each subscale [63]. However, SDQ can also be divided into two broader subscales [29] of internalising problems (consisting of the two subscales of emotional symptoms and peer-related problems) (alpha value for wave two = 0.65 and wave three = 0.67), and externalising problems (consisting of the two subscales of conduct problems and hyperactivity/inattention) (alpha value for wave two = 0.74 and wave three = 0.71). The scales of internalising and externalising problems range from 0 to 20, and a high score indicates higher levels of MHPs. The broader subscales were also used in the current study, both because they have been suggested to better fit a low-risk community sample [29], as well as because much previous research has used these problem groups (thus opening the opportunity for comparisons with the results of the current study). For all subscales, a higher value indicated higher levels of MHPs (except for the subscale of prosocial behaviour, where it is the opposite).

#### Control variables

To assess the potential effect of the control variables (parent-child relationship, parental monitoring, and deviant peers), three different measures were created. Two

items were combined into a mean index of Parent–child relationship: ‘If you have a problem, or feel sad or disappointed, do you normally speak to any of your parents or stepparents?’ ranging from ‘yes, always’ (0) to ‘no, never’ (3), and ‘How often do you speak to your parents or stepparents about how you are doing in school and if you get along with your friends?’ ranging from ‘Every day/almost every day’ (0) to ‘never/almost never’ (3). Even though the scale preferably should have included a higher number of items, these were the only two items in the questionnaire that measured the parent–child relationship, while the other parent-related question fit better in the parental monitoring scale. There were overall a few missing values on the items. The parent–child relationship measure was scaled so that a higher mean value indicated a weaker relationship. The Cronbach’s alpha of the measure was 0.6 in both waves.

Parental monitoring refers to the adolescents’ own perception of to what extent their parents have knowledge about their whereabouts. Another way of describing parental monitoring is how and to what degree the parent can influence the adolescent’s view of different situations and what action alternatives they find possible (even if the parent is absent) [33]. In the current study, parental monitoring was measured using three different items: ‘When you are out on your own or with friends, do your parents or stepparents normally know what you are doing?’, ‘When you are out on your own or with friends, do your parents or stepparents normally know where you are?’, and ‘When you are out on your own or with friends, do your parents or stepparents normally know what friends you are with?’. The girls had to rate to what extent the parents had this information on a scale with four options, ranging from ‘no, never’ (3) to ‘yes, always’ (0). These items were combined into a mean index with a Cronbach’s alpha of 0.80 in wave two and 0.79 in wave three. There were overall a few missing values, and they were imputed with a subscale mean if the answers to no more than two of the items were missing. The parental monitoring was scaled so that a higher mean value indicated a lower degree of monitoring.

To measure association with deviant peers, six different items were combined into a mean index. Each item consisted of a statement regarding whether the adolescent’s closest friend or friends engaged in different sorts of anti-social behaviour (e.g., ‘Do any of your closest friend or friends shoplift or steal from other humans or stores?’ or ‘Do any of your closest friend or friends destroys things that do not belong to them; for example, break windows, scribble or beet the paint on cars?’ and the girls had to rate the frequency of the behaviour on a scale ranging from never (0) to very often/many times (3). There were overall a few missing values, and they were imputed with a subscale mean if the answers to no more than four of

the items were missing. The deviant peers measure was scaled so that a higher mean value indicated a higher level of association with deviant peers. The Cronbach’s alpha of the measure was 0.78 in wave two and 0.76 in wave three.

All measures were created separately for each wave and then combined into one by taking the average, with the exception of offending, where scales were combined and dichotomised. A paired sample t-test showed no significant differences between the two waves in relation to internalising problems, externalising problems, or parent–child relationship. The level of parental monitoring increased from age 16 to age 17, just like association with deviant peers.

### Analytical strategy

First, a descriptive analysis, which presents mean values and standard deviations for all variables, was conducted. Second, to examine if some MHPs were more common among girls who reported that they had committed crime(s) compared to those who had not, bivariate analyses of differences in MHPs between girls who had committed any offence and those who had not committed any offence were conducted using the independent samples t-tests. Third, to explore associations between offending, MHPs, and control variables, as well as testing for multicollinearity, Pearson’s correlations were calculated between the study variables as well as testing VIF values. Lastly, a number of logistic regression models were estimated to address if associations between MHPs and offending were affected when controlling for parent–child relationship, parental monitoring, and peers. In the first model (Model 1), the five subscales of SDQ were added in the same model to examine whether the association with offending changed when all scales were included in the same model, giving knowledge of their odds ratios and associations with offending when compared to each other. Next (Model 2), parent–child relationship, parental monitoring, and deviant peers were added to the analysis to examine whether these variables affect the odds ratios, and thus the associations between MHPs and offending (Model 3). In the fourth and final model, the five smaller SDQ subscales were replaced with the broader scales measuring externalising and internalising problems. The broader subscales were tested in their own model because they were computed of the smaller subscales, and there would be an overlap in measurement if all scales were added in the same model. Moreover, testing the broader subscales is in line with the previous recommendation that the broader subscales better fit low-risk community samples [29]. Testing them separately from the five smaller subscales of SDQ further gave the possibility to examine if they had better

predictive value (higher odds ratios) than the five smaller subscales of SDQ in the current sample.

In addition, we conducted a number of sensitivity analyses using crime as a continuous/count variable. Both OLS and negative binomial regressions yielded results very similar to the ones found in the logistic regressions, indicating the same associations between MHPs, control variables (parent–child relationship, parental monitoring, and deviant peers) and offending, supporting the use of the dichotomous crime variable and presenting the result from the logistic regressions.

All analyses were conducted in IBM SPSS Statistics 29.

**Results**

Table 1 presents the result from the independent samples t-tests, conducted to examine research question one: Were MHPs more common among girls who reported that they had committed crime(s) compared to those who had not? The analyses show that, except for peer problems, there was a significant difference in MHPs between girls who reported any offence and those who had not offended ( $p < 0.05$ ). Girls who had offended reported higher levels of emotional symptoms, hyperactivity, and conduct problems, and lower levels of prosocial behaviour. Consequently, they scored higher on the two broader subscales of internalising and externalising problems. Among the five SDQ subscales representing different dimensions of MHPs, hyperactivity showed the biggest differences in mean values between offenders and non-offenders (5.09,  $SD = 2.05$ , compared to 3.48,  $SD = 1.20$ ), indicating that hyperactivity is the most

common MHP among offending girls in the current sample. Furthermore, the bivariate analyses show that girls who offended reported weaker relationship with their parents, lower levels of parental monitoring, and more association with deviant peers.

Table 2 presents the result from the bivariate analyses using Pearson's correlation to examine research question two: how different types of MHPs are associated with offending. The findings showed that externalising problems, hyperactivity, and conduct problems had the highest correlation with offending, while internalising problems, emotional symptoms, and peer problems showed lower correlations with offending. Prosocial behaviour was the only variable with a negative correlation with offending. When testing for multicollinearity, no multicollinearity was found, with all VIF values below 1.6, and thus below the recommended cut of 5 [66]. The results presented in Table 2 indicate that especially problems that are included in the group of externalising problems have important associations with offending, while problems included in the group of internalising problems seem less important in relation to girls' offending.

Table 3 presents the three models of logistic regressions, conducted to examine both research question two: How do different types of MHPs associate with offending? and three: Are these associations affected when we control for parent–child relationship, parental monitoring, and peers? In the first model, when SDQ subscales were entered simultaneously, it was found that conduct problems, hyperactivity, and emotional symptoms were positively associated with offending, with conduct problems ( $OR = 2.05$ ,  $CI = 1.55–2.70$ ) and hyperactivity ( $OR = 1.46$ ,  $CI = 1.26–1.70$ ) showing the strongest associations. After including parental monitoring, parent–child relationship, and association with deviant peers in the second model, the positive associations between hyperactivity and offending remained ( $OR = 1.22$ ,  $CI = 1.02–1.47$ ), as did the association between conduct problems and offending ( $OR = 1.37$ ,  $CI = 0.99–1.91$ , indicating that girls with these types of problems are more likely to offend regardless of the quality of their relationship with parents, level of parental monitoring, or their association with deviant peers. Regarding emotional problems, the association with offending was no longer significant after controlling for parent–child relationship, level of parental monitoring, and association with deviant peers. In the third and final model, using the externalising and internalising scales instead of the subscales of SDQ, a positive association between externalising problems and offending was found ( $OR = 1.27$ ,  $CI = 1.12–1.44$ ), also after controlling for parent–child relationship, parental monitoring, and association with deviant peers, indicating that externalising problems have important associations with

**Table 1** Difference in mean scores between girls who had offended and girls who had not offended

	Total sample (n=240)	Offended (n=87)	No offending (n=127)	t-value
Emotional symptoms (0–10)	3.83 (2.04)	4.35 (2.05)	3.50 (2.05)	– 2.814***
Hyperactivity (0–10)	4.03 (2.15)	5.09 (2.03)	3.48 (1.20)	– 5.620***
Conduct problems (0–10)	4.03 (1.16)	2.22 (1.11)	1.33 (1.08)	– 5.798***
Peer problems (0–10)	1.59 (1.27)	1.72 (1.16)	1.52 (1.50)	– 1.030
Prosocial behaviour (0–10)	8.46 (1.21)	8.22 (1.22)	8.61 (1.21)	2.326*
Internalising problems (0–20)	5.43 (2.73)	6.07 (2.99)	5.07 (2.57)	– 2.528*
Externalising problems (0–20)	5.70 (2.92)	7.28 (2.62)	4.82 (2.68)	– 6.703***
Parent–child relationship (0–3)	1.00 (0.68)	1.24 (0.70)	0.89 (0.63)	– 3.723***
Parental monitoring (0–3)	0.87 (0.53)	1.08 (0.50)	0.74 (0.55)	– 4.619***
Deviant peers (0–3)	0.54 (0.43)	0.75 (0.45)	0.40 (0.36)	– 6.115***

Standard deviations are reported within brackets

\* $p < 0.05$ , \*\* $p < 0.01$ , \*\*\* $p < 0.001$

**Table 2** Correlation tests between MHPs, control variables and offending. N= 240

	Offending	Hyperactivity	Conduct problems	Emotional symptoms	Peer problems	Prosocial behaviour	Internalising problems	Externalising problems	Parental monitoring	Parent-child relationship	Deviant peers
Offending	1										
Hyperactivity	0.361**	1									
Conduct problems	0.372**	0.502**	1								
Emotional symptoms	0.189**	0.238**	0.126	1							
Peer Problems	0.074	0.016	0.188**	0.321**	1						
Prosocial behaviour	- 0.0158**	- 0.224**	- 0.328**	0.107	- 0.136*	1					
Internalising Problems	0.176**	0.185**	0.181**	0.897**	0.707**	0.016	1				
Externalising Problems	0.417**	0.938**	0.770**	0.226**	0.087	- 0.296**	0.209**	1			
Parental Monitoring	0.307**	0.206**	0.279**	0.200**	0.045	- 0.245**	0.170**	0.263**	1		
Parent-child relationship	0.252**	0.235**	0.182**	0.215**	0.080	- 0.249**	0.198**	0.246**	0.510**	1	
Deviant Peers	0.400**	0.358**	0.412**	0.082	0.023	- 0.157*	0.072	0.429**	0.406**	0.212**	1

\*\*p < 0.01, \*\*\*p < 0.001

**Table 3** Logistic regression predicting offending

	Model 1	Model 2 (Nagelkerke R Square = 0.348)	Model 3 (Nagelkerke R Square = 0.346)
	OR (CI)	OR (CI)	OR (CI)
Emotional symptoms	1.21 (1.06–1.39)*	1.10 (0.92–1.32)	
Hyperactivity	1.46 (1.26–1.70)**	1.22 (1.02–1.47)*	
Conduct problems	2.05 (1.55–2.70)**	1.37 (0.99–1.91)*	
Peer problems	1.12 (0.91–1.38)	1.05 (0.82–1.38)	
Prosocial behaviour	0.79 (0.61–0.96)*	0.98 (0.73–1.30)	
Externalising problems			1.27 (1.12–1.44)***
Internalising problems			1.09 (0.96–1.22)
Parent–child relationship		1.33 (0.78–2.23)	1.33 (0.78–2.25)
Parental monitoring		1.44 (0.68–3.05)	1.49 (0.71–3.11)
Deviant peers		4.65 (1.73–12.53)*	4.76 (1.77–12.74)*

Odds ratios (OR) and 95% confidence intervals (CI) in brackets. N = 240

\* $p < 0.05$ , \*\* $p < 0.01$ , \*\*\* $p < 0.001$

girls' offending, regardless of the quality of their relationship with parents, level of parental monitoring, or their association with deviant peers. Internalising problems were found to have no significant association with offending when controlling for parent–child relationship, parental monitoring, and association with deviant peers. However, the confidence intervals and p-value suggest that this association nearly reached statistical significance (OR = 1.09, CI = 0.96–1.22,  $p = 0.06$ ), and results highlight challenges, which could be attributed to the rather small sample, in drawing definitive conclusions about the relationship between internalising problems and offending, especially after accounting for factors such as parental relationship quality, parental monitoring, and associations with deviant peers. In this final model, association with deviant peers was also associated with offending, indicating that girls with deviant peers were more likely to have committed any offence.

## Discussion

MHPs among youth is an important public health issue that not only influences the everyday life of those affected but also can have more far-reaching consequences. This study examined if some MHPs were more common among girls that had offended compared to those that had not. Further, the association between MPHs and offending was investigated, as well as how these associations were affected by the relationship between the girl and her parents, the level of parental monitoring, and association with deviant peers. Firstly, in the current study, almost 35% of the girls reported that they had committed an offence during the past year. Compared to the prevalence reported in the National School Survey on Crime, where just over 50% of the Swedish girls reported any crime involvement during the past 12 months [75], this is considerably lower. However, crime involvement among girls has increased over time. Among girls who had offended, levels of MHPs were higher than among those who had

not offended, with the most pronounced differences found in relation to the single subscale of hyperactivity and the bigger subscale of externalising problems. Results from the logistic regressions showed that problems that are included in the group of externalising problems have important associations with offending among teen girls, and also when controlling for other types of MHPs and parent–child relationship, parental monitoring, and deviant peers. These results are in line with previous research from both the juvenile justice setting (e.g., [19, 73]) and research based on community samples that have found both high frequencies of externalising problems among girls who offend, as well as highlighted their importance for explaining the development of offending (e.g., [51]). Combining the study result regarding externalising problems together with Moffitt et al.'s findings (e.g., [49, 50, 51]) that youth that commit a high number of crimes and continue doing so in their adulthood often have externalising problems, and the fact that girls' offending trajectories seem to be similar to those in mixed gender studies [8, 68], gives important knowledge for prevention strategies. Based on the findings, it can be argued that it is of great importance to screen for externalising problems among girls at a young age as a way of decreasing the risk of a negative development in both MHPs and offending, especially among girls that risk developing long-lasting criminality with a high number of offenses.

Regarding problems included in the group of internalising problems, findings from the current study showed mixed results, which is in line with findings from previous research. The t-tests showed that girls who had offended reported significantly higher levels of emotional symptoms and internalising problems than non-offenders. However, in the logistic regressions, no significant association remained between internalising problems (neither subscales nor the combined scale) and offending when analysed together with externalising behaviour, and after controlling for parent–child relationship,

parental monitoring, and deviant peers. However, it should be noted that the trait of internalising problems was almost significant (with a *p* value of 0.06), and that emotional problems were significantly associated with offending before controlling for parent–child relationship, parental monitoring, and deviant peers. So, even though no firm conclusions can be drawn from the results regarding internalising problems, they partially support previous research from both the juvenile justice setting (e.g., [14, 76]) and community-based studies (e.g., [24, 64]) that have found that problems included in the group of internalising problems have had positive associations with girls' offending. The result of the emotional problem subscale further supports previous research that has reported high levels of, for example, depression among girls who offend (e.g., [73]). It could be considered whether the results are affected by the rather small sample size, the fact that internalising problems seems to be increasing among girls in general [12], and that the differences between offenders and non-offenders might be smaller in a low-risk community sample, than if girls in a community sample had been compared to high-risk girls in the juvenile justice system. Moreover, findings from Van der Molen et al. [80], Siponen et al. [67], and Martin [47] are interesting in relation to the findings of internalising problems in the current study, with Martin [47] suggesting that ADHD in girls might be misdiagnosed and coexist with other MHPs, Siponen et al. [67] noticing that especially a comorbidity of different MHPs impact offending, and Van der Molen et al. [80] stating that high-risk girls with disruptive behaviour also had higher risks of depression and self-harm. Their findings, combined with the findings from the current study, indicate that some internalising problems might be common among offending girls and have important associations with girls' offending, even though the associations seem to be more complex than between externalising problems and offending. The results further thus indicate that more research is needed to fully understand the association between internalising problems and girls' offending, especially when combined with other MHPs and in relation to other important risk factors of offending.

Regarding the control variables of parent–child relationship, parental monitoring, and associations with deviant peers on associations between MHPs and offending, results from the *t*-tests support previous findings (e.g., [72, 83]), showing that girls who had offended had a weaker relationship with parents, experienced less monitoring, and had a higher level of antisocial peers than those who had not offended. As mentioned, regarding their effect on associations between MHPs and offending, results from the logistic regressions showed that externalising MHPs remained significant after controlling for parent–child relationship, parental monitoring,

and association with deviant peers, indicating that the associations between externalising MHPs and offending still remain when parental relationship, parental monitoring and deviant peers are adjusted for. It is also worth noticing that deviant peers were significantly associated with offending, indicating that deviant peers are also an important risk factor when MHPs are considered. More research is needed to fully understand the seemingly-complex relationships between externalising problems, deviant peers, and offending. The associations between internalising problems and offending did, however, seem to be more sensitive to the effects of the control variables. Findings regarding the effect of the control variables on the association between MHPs thus implicate that MHPs, and especially externalising problems, must be addressed when working with offending girls, and also among girls with multiple problems in different domains of their lives.

#### Methodological considerations

There are several limitations in the current study that need to be addressed. Firstly, the sample was rather small, with a small overall number of girls and an even smaller group of girls who had offended. However, this was addressed by combining two waves of data, giving a higher amount of crime occasions than if we had used only one wave. That the MINDS study represents about 20% of the total cohort might increase the risk of skewedness from the full population. An indication of this is the underrepresentation of participants with foreign backgrounds and from more disadvantaged neighbourhoods. This needs to be considered when drawing conclusions from the study findings. However, the fact that the results are in line with previous research indicates that they are valid, even though it could imply that we overestimate or underestimate certain associations. Moreover, even if the sample was small, it has some important qualities and strengths; it is a community sample (in contrast to the more common juvenile detention samples), which could provide important results from a previously understudied population. Secondly, all data in the study were collected through self-report questionnaires, which always comes with the risk of both over- and under-reporting and internal dropout. However, dropouts were not an issue in the present study, given the low number of missing data and cases. Further, using self-reported data also gives the important chance and possibility of measuring unreported adolescent offending and MHPs that are still unknown by the psychiatric healthcare system, which thus might be missing in official records. Thirdly and lastly, even though SDQ has been suggested to be useful for screening for MHPs and is used widely [81], it has also been argued to not be optimised for community samples, and the alpha values for

some of the five subscales were below the recommended threshold of 0.7. However, in the present study, we also used the broader externalising and internalising subscales as suggested for community samples [29], which showed better alpha-values. Furthermore, the SDQ subscale of conduct problems (a subscale that is also included in the externalising problems scale) includes some behaviours that can be considered as criminal behaviours (e.g., fighting). This implies a potential overlap of measurement with the offending variables. However, conduct problems are recognised as mental health problems, as they are found, for example, in the DSM-5 [5] in, for example, the diagnosis of conduct disorder, and it is therefore important to address conduct problems as MHPs when guiding intervention and preventive measures. In relation to internalising problems, since previous research and results from the current study have indicated that different types of internalising problems might be of more importance for girls' offending than previously discussed, using a more distinguished measurement giving more detailed information of different internalising problems than SDQ, could have been beneficial for the study and both enhanced the clarity and applicability of the study findings. Therefore, it is recommended to, in the future, focus on the development of such types of instruments.

To guide future research, it is recommended that more focus is put on better understanding the associations between especially girls' internalising problems and offending. Since results regarding internalising problems have been mixed in both previous research and in the current study, more research is needed to understand how these problems are associated with offending, particularly since they are increasing among girls [12]. Further, variables like past trauma also need to be examined in association to MHPs and girls' offending, and also in regard to externalising problems. Past trauma has, in previous research, repeatedly been associated with girls' MHPs [16, 59] and offending [40]. Investigating this association might expand the existing knowledge of the complex associations between girls' MHPs, variables in the social environment, and offending.

## Conclusion

The current study corroborates findings from previous research showing that MHPs have important correlations to offending among youth girls, even when studying a community sample rather than juvenile justice or clinical samples. Particularly, externalising problems were common among girls who had offended, associations that remained after controlling for parent–child relationship, parental monitoring, and associations with deviant peers, indicating that externalising problems are especially important in relation to girls' offending. Also, internalising problems were more common among girls who had

offended in comparison to girl who had not. However, the association between internalising problems and offending was not as strong and conclusive, and appears to be affected by both the occurrence of externalising problems and factors such as deviant peers and family factors. This calls for further research to fully understand this association. Nevertheless, in general terms, the results indicate that it is important to recognise and address MHPs among girls as part of crime prevention. Doing so may foster better conditions for effectively addressing both girls' MHPs and offending, ultimately contributing to improved lives for them.

## Supplementary Information

The online version contains supplementary material available at <https://doi.org/10.1186/s13034-025-00907-3>.

Supplementary Material 1.

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## Author contributions

All authors contributed to the study conception and design. Material preparation, data collection and analysis were performed by LP and A-K. I. The first draft of the manuscript was written by both authors and both authors also commented on versions of the manuscript. Both authors read and approved the final manuscript.

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## Availability of data and materials

The data that supports the findings of this study are not publicly available due to privacy, ethical, and legal restrictions. The data can be available upon request to the corresponding author with the guarantee that privacy, ethical, and legal restrictions are maintained.

## Declarations

### Ethics approval and consent to participate

Data were drawn from the longitudinal research project Malmö Individual and Neighborhood Development study (MINDS), which was approved by the Swedish Regional Ethical Review Board in Lund (Dnr. 201/2007 and Dnr. 2014/802). All human participants have given written, informed consent to participate in the study, as have their parents or other caregiver.

### Consent for publication

Consent for publication have been given by all human participants, and the used consent form is available if needed.

### Competing interests

The authors declare no competing interests.

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III



# Associations and mediation between exposure to negative life events, mental health problems and offending among youth

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## Abstract

**Background:** Exposure to negative life events (NLEs) has been consistently linked to both mental health problems (MHPs) and youth offending. While the associations between NLEs and offending, and between MHPs and offending, are well established, fewer studies have examined whether MHPs mediate the relationship between NLEs and later offending. **Aim:** The present study aimed to examine (1) the associations between different subtypes of NLEs and youth offending, and (2) whether MHPs (internalising and externalising problems) mediate these associations. **Method:** Data were drawn from the Malmö Individual and Neighbourhood Study (MINDS), a longitudinal community-based study. NLEs were measured at age 16, MHPs at age 17, and offending at age 19. Mediation analyses were conducted using Hayes' PROCESS macro to estimate total, direct, and indirect effects. Models were estimated without covariates, as well as adjusting for prior offending, and for prior MHPs. **Results:** Conflict-related NLEs were the only subtype associated with later offending. Externalising problems significantly mediated the association between conflict-related NLEs and offending, even after adjusting for prior offending and MHPs. Victimization-related NLEs also showed indirect effects through externalising problems in models without covariates. Internalising problems did not mediate any associations. No significant direct effects remained after accounting for mediators in the fully adjusted models. **Conclusion:** Externalising problems play a mediating role in the association between conflict-related NLEs and youth offending. These findings highlight the importance of early identification and intervention targeting behavioural regulation among youth exposed to adverse social environments related to especially conflict.

**Keywords:** Negative life events, mental health problems, youth offending, mediation, longitudinal study.

## 1. Introduction

Crime involvement during youth is common, with many adolescents engaging in some form of crime, as seen in both international studies (e.g. Moffitt, 1993; Agnew & Brezina, 2017; Ullman et al., 2024) and Swedish reports and studies (e.g. Brottsförebyggande rådet, 2024; Estrada, 1999; Andershed et al., 2010). However, most youths commit only a few minor offenses, and only a small proportion commit a larger number of more serious crimes (e.g. Moffitt, 1993; Sivertsson et al., 2024; Wikström et al., 2012). Much research has focused on identifying and examining risk factors for youth offending (e.g. Moffitt, 1993; 2020; Farrington, 2005), with one important variable being the experience of negative life events (NLEs) such as childhood neglect and abuse (e.g. Turner et al., 2021; Fox et al., 2015; Källström et al., 2020; Peltonen et al., 2020). The association between NLEs and offending has been established in several previous large-scale prospective studies (e.g. Widom & Maxfield, 2001; Thornberry et al., 2010) and meta-reviews (e.g. Braga et al., 2017; Fitton et al., 2018). Systematic reviews and meta-analyses have also found that exposure to NLEs increases the risk of re-offending (Yohros, 2023; Astridge et al., 2023), as well as that the type and extent of NLE experienced may influence the offending risk (Turner et al., 2021).

Exposure to NLEs has in previous systematic reviews also been strongly linked to mental health problems (MHPs), both of the externalising kind (including hyperactivity, impulsivity and conduct problems) and the internalising kind (depression and anxiety) (e.g. Pessoa & Almedia, 2024; Abate et al., 2024). MHPs, in turn, as NLEs, have also been associated with criminal behaviour among youth in a high number of previous studies, including systematic reviews and meta-analyses (e.g. Fazel, Doll & Långström, 2008; Beaudry et al., 2021; Borchman et al., 2020; Carlijn et al., 2017). Despite the well-established links between NLEs and MHPs, between NLEs and offending, and between MHPs and offending, there are only a few studies that have examined NLEs, MHPs and offending together to investigate whether

NLEs are directly related to offending or if this relationship is mediated through MHPs.

Further investigation of these associations will enhance our understanding of the complex interplay between NLEs, MHPs and youth offending, which may improve existing prevention efforts and youth health and quality of life. Therefore, in the current study we aimed to explore the associations between past exposure to NLEs and youth offending, as well as examine the potential mediating role of different MHPs.

## **2. Background**

### **2.1 Negative life events, offending and MHPs**

Previous research has defined NLEs in different ways, but the concept always incorporates events that negatively impact on the life of an individual, either during a specific occasion or a longer period (e.g. Snyder & Ford, 1987; Young et al., 2021; Turner et al., 2021). There is also different terminology for the same concept, or aspects of it (adverse life events, traumatic experiences, stressful life events, etc.). In the current study, based on previous argumentation by, for example, Willard and Elliot (2014) – who argue for broader terms of stressful life events – the term “negative life events” is employed since it refers to events that might negatively affect the individual, but still incorporates less severe events and a broader range of stressors compared to, for example, the term “traumatic experiences” – for which clinical criteria are also required. Furthermore, in the current study, NLE incorporates both specific incidents or events that occur during a short time (e.g. being a victim of a crime or being hit by a parent), as well as stressful life situations that continue during a longer time (e.g. being bullied at school).

How NLEs are perceived and experienced is subjective, and some experiences can be perceived as more severe than others (Bonanno, 2000), as well as have different impacts on

the individual's life (e.g. Snyder & Ford, 1987; Yaacob et al., 2019; Bonnano, 2004 ). How individuals understand and handle NLEs depends on an individual's coping skills (Yaacob et al., 2019), social support (Bonnano, 2004) and individual factors like previous levels of MHPs and stress (e.g. Hammen, 2005; McLaughlin et al., 2010). For example, individuals with higher levels of psychological distress tend to show heightened stress sensitivity and are more likely to interpret life events as threatening or overwhelming (Monroe & Simons, 1991; McLaughlin et al., 2010). Moreover, an individual's mental health is of great importance for how an individual reacts to and copes with NLEs (e.g. Olf et al., 2007; Ozer et al., 2003). For example, Janssen et al. (2015) found that NLEs were experienced differently by individuals who already suffered from mental health problems from PTSD. Further, genetic disposition (Rutter, 2021) and previous experiences of NLEs can affect the manner in which an individual copes with subsequent NLEs (Seery et al., 2010).

With regard to the relationship between NLEs and offending, it has been found that adolescents who have committed offences have reported high rates of multiple experiences of exposure to NLEs (Baglivio et al., 2014). Aebi et al. (2015) moreover found that it was more common for young male offenders who had experienced emotional, physical, and sexual abuse to get re-arrested compared to those without experiences of childhood abuse, and Pflugradt et al. (2017) found that homicide offenders had experienced various types of previous abuse and neglect, and reported higher dysfunction related to having family members with mental illness and substance use. Furthermore, it has been found that repeated exposure to NLEs may have an accumulative effect on offending behaviour; the more someone is exposed to NLEs, the greater the risk of crime becomes (Fox et al., 2015). Different subtypes of NLEs may also affect the risk of criminal behaviour to different degrees (Turner et al., 2021; Ford et al., 2013). Some studies have, for example, highlighted that

especially exposure to NLEs in childhood that involves parents, such as abuse and neglect, seems to be increasing the risk of antisocial behaviour and offending (e.g. Felitti et al., 1998) and is common among offenders (e.g. Pessoa & Almeida 2024). Many studies have focused on male offenders, but Turner and colleagues (2021) found that young female offenders more frequently reported childhood emotional, physical and sexual abuse than males. These results may indicate that NLEs affect female offenders to a greater degree than males, however more research is still needed.

In the current literature, there is a well-established association between NLEs and MHPs, between both externalising and internalising problems (e.g. Pessoa & Almeida, 2024; Moffitt; 1993; Turner et al., 2021). Previous studies have, for example, found that individuals who experienced more than four events of NLE are at an increased risk of lifelong problems with mental health (Almeida et al., 2024), and only two events of NLE have been linked to an increased risk of suicide among prisoners (Ford et al., 2020). Research has explained that repeated and severe childhood neglect and negative life events can exert a stronger influence on mental health than isolated stressors due to cumulative stress exposure, stress sensitisation and because ongoing NLEs undermine the emotional skills, social support and sense of security that normally protect mental health (e.g. Turner et al. 2021; Kabiru et al., 2014; McLaughlin et al., 2010; Evans & Kim; 2013). Anda et al. (2006) further highlight that exposure to NLEs during childhood can potentially impact neuropsychological development by altering brain function. These types of deviations in the development of brain functioning have, in turn, been associated with personality disorders, substance use disorders, antisocial behaviour, etc. (e.g. Berret et al., 2014; Moffitt, 1993), as well as externalising problems like increased irritability and impulsivity (Turner et al., 2021). It has also been suggested that MHPs may interact with the environment of the child, and that further experiences of NLEs in

a dysfunctional environment may lead to the development of other MHPs like conduct disorders, pathological aggression and ADHD (e.g. Moffit, 1993; Moffit, 2010; Turner et al., 2021).

Recognising the association between NLEs, MHPs and offending makes it of great importance to address also the association between MHPs and offending. Firstly, MHPs have previously been defined and measured in different ways, from broader and more generic ways to certain problem groups (such as internalising and externalising problems) and diagnoses and disorders. In the current study, the concept of MHPs is discussed primarily in broader problem groups, rather than in terms of specific diagnoses; however, in some cases specific disorders of significant importance will be mentioned. Secondly, different aspects of MHPs are associated with youth offending to different degrees; this applies particularly to externalising problems (e.g. Källmen et al., 2023; Basto-Pereira & Farrington, 2022).

Research within the juvenile justice system has found that neurodevelopmental problems, like ADHD (Borchman et al., 2020) and conduct disorders (Beaudry et al., 2020), are common among youth offenders. Similar findings have been found in community-based studies (e.g. Moffit & Caspi, 2001; Moffitt, 1993; Mohr-Jensen et al., 2019). For example, Moffit (1993) found two trajectories of youth criminality, one with individuals who committed a lower number of less severe crimes and stopped before adulthood, and one where individuals committed a higher number of more severe crimes and continued doing so in adulthood. The latter group was also found to often have neurodevelopmental problems and, for example, problems with conduct disorders (Moffitt, 1993; 2010). Further, externalising problems are the types of MHPs that have been suggested to be most affected by exposure to NLEs and the potential changes in brain development, especially in combination with further exposure to NLEs and maladaptive and dysfunctional social environments (Anda et al., 2006; Moffit,

2010). With regard to internalising problems, findings have been less consistent, showing mixed results especially concerning specific diagnoses where they are included. For example, PTSD has been seen to be highly and significantly associated with offending (Svingen, 2023; Becker et al., 2012), while diagnosis of depression and anxiety show more unstable results (e.g., Wibbelink et al., 2017; Jolliffe et al., 2019). However, the fact that PTSD involves both internalising and externalising symptoms could help explain this association since it aligns with broader findings that these problem dimensions are associated with youth offending (Abram et al., 2003; Beaudry et al., 2020; Källmen et al., 2023). Importantly, however, some studies have emphasised that internalising problems are both more common among female offenders (Abram et al., 2003; Beaudry et al., 2020; Vahl et al., 2016) and seem to be of more importance among female offenders in comparison to male offenders (e.g., Kofler et al., 2011).

### **2.3 Current study**

Given the well-established associations between NLEs, MHPs and offending (e.g. Yohros, 2023; Astridge et al., 2024; Pessoa & Almedia, 2024; Turner et al., 2021), as well as MHPs and offending among youth (e.g. Fazel, Doll & Långström, 2008; Beaudry et al., 2021; Borchman et al., 2020; Moffitt, 1993), it appears relevant to raise the question of whether the association between exposure to NLEs and offending is mediated by MHPs. Based on findings and implications from previous research, a hypothesis of mediation can be suggested: *exposure to NLEs may lead to increased levels of MHPs, which in turn may increase the risk of offending*; thus, MHPs mediate the association between NLEs and offending. To fully understand the associations between NLEs, MHPs and offending, this hypothesis needs to be examined. Moreover, given the implications from previous research that the degrees of exposure and different types of NLEs may affect both MHPs and offending in varying ways

(e.g. Turner et al., 2021; Ford et al., 2013; Fox et al., 2015), there is a need to examine the associations between different types of NLEs and MHPs in relation to offending. However, prior levels of mental health problems should be considered when examining these associations, as previous research has found that the NLE is experienced differently based on individual factors like previous MHPs and stress (e.g. Bonnano, 2004; Hammen, 2005; McLaughlin et al., 2010). Observed associations between NLEs and later MHPs may therefore partly reflect pre-existing vulnerabilities rather than the causal impact of the events themselves. However, controlling for previous MHPs reduces the risk of reverse causation, allowing for a more accurate estimation of the unique effect of NLEs.

Examining the associations and relationships between these variables can yield important knowledge that can be used to, among other things, develop effective treatment and prevention strategies and programmes that have an increased possibility of successfully reducing both existing and future negative consequences of NLEs, MHPs and offending among youth. Therefore, based on the hypothesis that MHPs mediate the associations between NLEs and offending, the current study aimed to examine the association between different subtypes of NLEs and MHPs and youth offending, as well as to examine whether youth MHPs mediated a potential association between NLEs and offending – while also adjusting for previous levels of MHPs and offending.

### **3. Method**

#### **3.1 Sample**

The data used in this study originate from the Malmö Individual and Neighbourhood Study (MINDS), which is modelled on the Peterborough Adolescent and Young Adult Development Study, conducted at the Institute of Criminology, University of Cambridge, UK (Wikström et

al., 2012). MINDS has been adapted to a Swedish context as well as to align with the specific objectives of the MINDS project, which includes, amongst others, adding questions about mental health. The study received approval from the Swedish Regional Ethical Review Board in Lund (Dnr. 201/2007 and Dnr. 2014/802). Designed as a longitudinal study, it tracks a cohort of adolescents born in Malmö in 1995 who resided there in 2007 (when the project was initiated). The total sample includes 525 randomly selected adolescents, representing approximately 20% of those born in Malmö in 1995. Data collection has occurred on four separate occasions, with the initial occasion being a pilot study on a smaller group. Data was collected through self-reported questionnaires and structured interviews.

The current study includes both boys and girls who participated in the MINDS study during the second, third and fourth waves of data collection when the youth were about 16, 17 and 19 years old. The number of participants who participated in all three waves, and thus in the current study, was 386. The first wave of data collection was excluded due to its pilot design.

### **3.2 Measures**

#### **Dependent variable**

*Self-reported youth offending* was measured using a self-report questionnaire that included nine different crime types when they were 19 years old, covering both violent acts (e.g. assault) and property offenses (e.g. burglary and vandalism). Property crimes were more prevalent than violent crimes. All crime types were added together into a variety scale for each age (Sweeten, 2012) by counting the crime types each respondent had committed over the past 12 months.

#### **Mediating variables**

*Youth MHPs* were measured at age 17 using the Swedish version (Svedin & Priebe, 2008) of the self-report version of the Strengths and Difficulties Questionnaire (SDQ) (Goodman et al., 1998). The SDQ is widely used and has shown good validity in previous studies (Vugteveen, 2021; Goodman, 1998). The questionnaire consists of 25 items that can be divided into five subscales with the intention to tap into five different dimensions of mental health: emotional symptoms, conduct problems, hyperactivity/inattention, peer-related problems and prosocial behaviour (Sdqinfo, 2023). In the current study, conduct problems and hyperactivity/inattention were combined into broader measures of externalising problems (at age 17 Cronbach's  $\alpha = 0.67$ ) and emotional problems and peer-related problems into internalising problems (at age 17 Cronbach's  $\alpha = 0.71$ ). These broader measures were chosen since they have been suggested to better fit a low-risk community sample (Goodman et al., 2010), as well as since much previous research within the field has used these problem groups (and thus offers an opportunity for comparisons with the results of the current study). The scales of externalising and internalising problems ranges from 0 to 20, and the higher the score the higher the indication of MHPs.

### **Independent variables**

*Negative life events* were measured at age 16, with seven different variables: 1) "Have you ever felt so unsafe at school (been afraid of other students) that you stayed home?"; 2) "Have you ever, during eighth grade, been bullied by another pupil in a way that made you feel upset or sad afterwards?"; 3) "How often do you argue with, or get angry at, your parents?"; 4) "Have your parents ever given you a slap in the face, or something similar, because you behaved badly?"; 5) "Have you ever, during eighth grade, felt unfairly treated or attacked by a teacher?"; 6) Has anyone kicked or hit you in a way that injured you during the time you were in eighth grade?"; and 7) "Have you been stolen from or robbed during the time you were in

eighth grade?”. Principal Component Analysis (PCA) was applied to the NLE variables to reduce dimensionality and to create composite variables that capture shared variance among conceptually related events, thereby identifying coherent thematic groupings within the data (Jolliffe, 2002). Varimax rotation with Kaiser normalisation was further applied to enhance the interpretability of the PCA by producing a simpler component structure in which variables loaded strongly onto a single component, facilitating the identification of coherent thematic groupings of negative life events (Kaiser, 1958; Jolliffe, 2002; Jolliffe & Cadima, 2016). A cut-off value of 0.5 communalities was used for deciding which composite variable a variable belonged to, and the PCA resulted in three composite variables: 1) *School-related NLE*; 2) *Conflict-related NLE*; and 3) *Victimisation-related NLE*. All new NLE variables were coded so that a higher value represented a higher level of exposure to NLEs.

## **Covariates**

*Self-reported youth offending* at age 16 was used as a covariate, using a self-report questionnaire that included nine different crime types at the occasion of measurement when the participants were 16 years old. As when the participants were 19 years old, property crimes were more prevalent than violent crimes in both waves of data collection. All crime types were added together into a variety scale (Sweeten, 2012) by counting the crime types each respondent had committed over the past 12 months.

*Youth MHPs* at age 16 was used as a covariate, measured in the same way as for the mediating variables, using the Swedish version (Svedin & Priebe, 2008) of the self-report version of the SDQ (Goodman et al., 1998). Also, as covariates, the broader subscales of internalising problems (Cronbach alpha at age 16 = 0.65) and externalising problems (Cronbachs alpha at

age 16 = 0.74) were used. See Table 1 below for descriptive statistics of the included study variables.

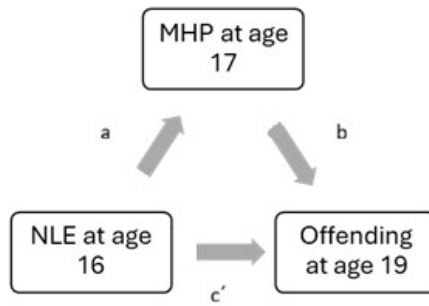
<b>Variable</b>	<b>Frequency reporting yes</b>	<b>Min - Max</b>	<b>Mean value</b>	<b>Standard deviation from mean value</b>
Offending at age 19	88	0 - 8	0.461	1.090
Offending at age 16	91	0 - 7	0.443	0.995
Internalising problems at age 16	367	0 - 13	4.749	2.956
Internalising problems at age 17	368	0 - 15	5.000	3.107
Externalising problems at age 16	373	0 - 17	5.752	3.414
Externalising problems at age 17	370	0 - 15	5.727	3.306
School-related NLE at age 16		-1.350 – 4.815	-0.0242	0.958
Conflict-related NLE at age 16		-1.715 – 3.516	-0.006	0.999
Victimisation-related NLE at age 16		-1.852 – 4.426	-0.021	0.991

### **3.3 Analytical design and strategy**

Mediation analyses with the bootstrap test were conducted as the main analytical strategy, both to examine the association between different subtypes of NLEs and youth offending, as well as to examine whether youth MHPs mediated the potential associations between NLEs and offending. The bootstrap test gives result regarding *total effect*, *indirect effect* and *direct effect* (e.g. Hayes, 2018; Abu-Bader & Jones, 2021). The direct effect (path *c'*) estimates the association between NLEs and offending after controlling for the mediator, whereas the indirect effect reflects the portion of this association that operates through the mediator ( $a \times b$ ). The total effect (path *c*) estimates the overall association between NLEs and offending

without accounting for the mediator (Hayes, 2018; Abu-Bader & Jones, 2021). Alongside providing the opportunity to examine total, indirect and direct effects between NLEs, MHPs and offending, the bootstrap test has several benefits compared to more traditional tests (MacKinnon et al., 2004; Preacher & Hayes, 2004). Unlike parametric tests such as Sobel test, the bootstrap test does not assume that the sampling distribution of the indirect effect is normal – an assumption that is frequently violated, as the product of regression coefficients typically has a skewed distribution (MacKinnon et al., 2004; Preacher & Hayes, 2004). Instead, the bootstrap test estimates confidence intervals for indirect effects and is thus a non-parametric resampling method that repeatedly draws samples from the observed data to empirically approximate the sampling distribution of the indirect effect, thereby avoiding reliance on normality assumptions (Taylor & MacKinnon, 2009; Hayes, 2018; Abu-Bader & Jones, 2021). As a result, bootstrapped confidence intervals provide more accurate and reliable estimates, particularly when variables are non-normally distributed or when models are complex (Preacher & Hayes, 2008). As described by Figure 1, the analyses in the current study were designed so that NLE variables from when the respondents were 16 years old were used, MHP variables from when they were 17 years old and offending from when they were 19 years old. This offered the possibility to account for a development of both MHPs and offending behaviour *after* exposure to different NLEs, thus guaranteeing the required temporal order of the occurrence of the variables (Baron & mohl, 1986; Hayes, 2022).

**Figure 1.** Mediation model illustrating the indirect effect of **NLE** on **offending** through **MHP**. Rectangles represent used variables. Path *a* represents the effect of NLE on MHP, path *b* represents the effect of MHP on offending, accounting for NLE, and path *c'* represents the direct effect of NLE on offending, accounting for MHP. The indirect effect ( $a \times b$ ) was tested with mediation analyses conducted with bootstrap test.



Three sets of bootstrap analyses were conducted for each NLE variable in relation to the two MHP variables. The first set included no covariates and examined whether youth MHPs mediated the association between NLEs and offending. The second set was adjusted for offending at age 16. In the third set, we instead adjusted for MHPs at age 16. Altogether, this resulted in 18 different models. For all analyses, model number four in Hayes SPSS PROCESS Macro was used, and statistical significance of indirect effects was determined using 95% bias-corrected bootstrap confidence intervals. The number of bootstrap samples was 5,000, since this number provides a good balance between statistical precision and computational feasibility (Efron & Tibshirani, 1993).

Even though the Sobel test was not the main analytical strategy, analyses utilising the Sobel test were also conducted to give the opportunity to compare the results between analyses with Sobel tests and analyses with bootstrap tests. As for the analyses with the bootstrap test, NLE variables at 16 were used, MHP variables at age 17 and offending at age 19. In addition to the analyses with the Sobel test, linear regressions between the NLE variables (at age 16) and offending (at age 19) were conducted to examine the association between the NLE variables and offending.

All analyses were conducted with PROCESS Macro (Hayes & Rockwood, 2017; Rockwood & Hayes 2020) in IBM SPSS Statistics 30.

## 4. Results

Across the six mediation models presented in Table 2, the only statistically significant *total effect* identified was that between conflict-related NLE on offending, models 1.2.1 and 1.2.2 ( $b = 0,1148$ ,  $CI = 0,0394 - 0,1902$ ). The analyses also revealed significant *indirect effects* through externalising problems, tested between conflict-related NLEs and offending (model 1.2.2,  $b = 0,0812$ ,  $CI = 0,00442 - 0,1261$ ) and tested between victimisation-related NLEs and offending (model 1.3.2,  $b = 0,0350$ ,  $CI = 0,0097 - 0,0674$ ), as the 95% bias-corrected confidence intervals did not include zero. The *direct effect* was significant only when conflict-related NLEs were tested with internalising problems as the mediator (model 1.2.1,  $b = 0,1195$ ,  $CI = 0,0438 - 0,1951$ ). The results in Table 1 thus indicate that only conflict-related NLEs are associated with offending before controlling for mediators, but that after examining indirect and direct effects, this association operates via externalising problems in a full mediation, as well as an association between victimisation-related NLEs and offending operating through externalising problems.

**Table 2. Model 1: Mediation analyses between NLE subtypes, MHPS (externalising & internalising problems), and offending, without controlling for any other variable**

### Model 1.1: School-related NLE as independent variable

#### 1.1.1 Internalising problems as mediator

	<i>b</i>	<i>SE</i>	<i>t</i>	<i>p</i>	<i>95% confidence interval</i>	
NLE->crime	-0,0327	0,0427	-0,7654	0,4445	-0,1167	0,0513
NLE->MHP	1,0407	0,1640	6,3461	0,0000	0,7182	1,3632
NLE->MHP->crime	-0,0093	0,0130	-0,7099	0,4782	-0,0349	0,0164
<b>Effects</b>						
Direct	-0,0327	0,0427	-0,7654	0,4445	-0,1167	0,0513
Indirect	-0,0096	0,0107			-0,0316	0,0112
Total	-0,0423	0,0405	-1,0462	0,2962	-0,1219	0,0372

#### 1.1.2 Externalising problems as mediator

	<i>b</i>	<i>SE</i>	<i>t</i>	<i>p</i>	<i>95% confidence interval</i>	
NLE->crime	-0,0415	0,0383	-1,0825	0,2797	-0,1169	0,0339
NLE->MHP	-0,0113	0,1812	-0,0623	0,9504	-0,3677	0,3451
NLE->MHP->crime	0,0721	0,0112	6,4423	0,0000	0,0501	0,0941
<b>Effects</b>						

Direct	-0,0415	0,0383	-1,0825	0,2797	-0,1169	0,0339
Indirect	-0,0008	0,0128			-,0287	0,0218
Total	-0,0423	0,0405	-1,0462	0,2962	-0,1219	0,0372

### Model 1.2: Conflict-related NLE as independent variable

#### 1.2.1 Internalising problems as mediator

	<i>b</i>	<i>SE</i>	<i>t</i>	<i>p</i>	<i>95% confidence interval</i>	
NLE->crime	0,1195	0,0385	3,1057	0,0021	0,0438	0,1951
NLE->MHP	0,2936	0,1650	1,7798	0,0760	-0,0308	0,6180
NLE->MHP->crime	-0,0160	0,0123	-1,3045	0,1929	-0,0401	0,0081
<b>Effects</b>						
Direct	0,1195	0,0385	3,1057	0,0021	0,0438	0,1951
Indirect	-0,0047	0,0043			-0,0156	0,0014
Total	0,1148	0,0383	2,9937	0,0029	0,0394	0,1902

#### 1.2.2 Externalising problems as mediator

	<i>b</i>	<i>SE</i>	<i>t</i>	<i>p</i>	<i>95% confidence interval</i>	
NLE->crime	0,0336	0,0394	0,8515	0,3951	-0,0440	0,1111
NLE->crime	1,1873	0,1619	7,3356	0,0000	0,8690	1,5056
NLE->MHP->crime	0,0684	0,0120	5,6984	0,0000	0,0448	0,0920
<b>Effects</b>						
Direct	0,0336	0,0394	0,8515	0,3951	-0,0440	0,1111
Indirect	0,0812	0,0209			0,0442	0,1261
Total	0,1148	0,0383	2,9937	0,0029	0,0394	0,1902

### Model 1.3: Victimization-related NLE as independent variable

#### 1.3.1 Internalising problems as mediator

	<i>b</i>	<i>SE</i>	<i>t</i>	<i>p</i>	<i>95% confidence interval</i>	
NLE->crime	0,0225	0,0392	0,5737	0,5665	-0,0546	0,0897
NLE->MHP	-0,2449	0,1665	-1,4708	0,1422	-0,5724	0,0826
NLE->MHP->crime	-0,0119	0,0124	-0,9577	0,3389	-0,0363	0,0125
<b>Effects</b>						
Direct	0,0225	0,0392	0,5737	0,5665	-0,0546	0,0897
Indirect	0,0029	0,0038			-0,0022	0,0128
Total	0,0254	0,0391	0,6500	0,5161	-0,0515	0,1023

#### 1.3.2 Externalising problems as mediator

	<i>b</i>	<i>SE</i>	<i>t</i>	<i>p</i>	<i>95% confidence interval</i>	
NLE->crime	-0,0096	0,0375	-0,2562	0,7979	-0,0833	0,0641
NLE->MHP	0,4830	0,1731	2,7898	0,0056	0,1425	0,8234
NLE->MHP->crime	0,0725	0,0113	6,4044	0,0000	0,0502	0,0948
<b>Effects</b>						
Direct	-0,0096	0,0375	-0,2562	0,7979	-0,0833	0,0641
Indirect	0,0350	0,0150			0,0097	0,0674
Total	0,0254	0,0391	0,6500	0,5161	-0,0515	0,1023

In the next set of mediation models presented in Table 3, where offending at age 16 was included as a covariate, there were no significant **total effect** in any of the models, although model 2.2. was close to p-values below 0.05. The analyses revealed a significant **indirect effect** only through externalising problems when tested between conflict-related NLEs and offending (model 2.2.2,  $b = 0,0560$ ,  $CI = 0,0270 - 0,0930$ ), as the 95% bias-corrected confidence intervals did not include zero. There was no statistically significant **direct effect** in any of the models. The results in Table 2 thus indicate that there are no associations between any subtype of NLE and offending before controlling for mediators, but that after examining indirect effects and direct effects, externalising problems mediate an association between

conflict-related NLEs and offending in a full mediation, and also when controlling for previous offending.

**Table 3. Model 2: Mediation analyses between NLE subtypes, MHPS (externalising & internalising problems), and offending, while adjusting for prior offending**

**2.1: School-related NLE as independent variable**

**2.1.1 Internalising problems as mediator**

	<i>b</i>	<i>SE</i>	<i>t</i>	<i>p</i>	<i>95% confidence interval</i>	
NLE->crime	-0,0379	0,0415	-0,9138	0,3614	-0,1195	0,0437
NLE->MHP	1,0412	0,1637	6,3593	0,0000	0,7192	1,3632
Prior crime->MHP	-0,2271	0,1551	-01,4642	0,1440	-0,5321	0,0779
NLE->MHP->crime	-0,0046	0,0127	-0,3631	0,7168	-0,0296	0,0204
<b>Effects</b>						
Direct	-0,0379	0,0415	-0,9138	0,3614	-0,1195	0,0437
Indirect	-0,0048	0,0103			-0,0259	0,0150
Total	-0,0427	0,0393	-1,0877	0,2775	-0,1200	0,0345

**2.1.2 Externalising problems as mediator**

	<i>b</i>	<i>SE</i>	<i>t</i>	<i>p</i>	<i>95% confidence interval</i>	
NLE->crime	-0,0419	0,0380	-1,1031	0,2707	-0,1166	0,0328
NLE->MHP	-0,0138	0,1699	-0,0814	0,9352	-0,3479	0,3202
Prior crime->MHP	1,1430	0,1609	7,1034	0,0000	0,8265	1,4594
NLE->MHP->crime	0,0602	0,0118	5,0914	0,0000	0,0370	0,0835
<b>Effects</b>						
Direct	-0,0419	,0380	-1,1031	0,2707	-0,1166	0,0328
Indirect	-0,0008	,0089			-0,0197	0,0155
Total	-0,0427	,0393	-1,0877	0,2775	-0,1200	0,0345

**Model 2.2: Conflict-related NLE as independent variable**

**2.2.1 Internalising problems as mediator**

	<i>b</i>	<i>SE</i>	<i>t</i>	<i>p</i>	<i>95% confidence interval</i>	
NLE->crime	0,0779	0,0391	1,9941	0,0469	0,0011	0,1547
NLE->MHP	0,3762	0,1700	2,2130	0,0275	0,0419	0,7105
Prior crime->MHP	-0,3200	0,1681	-1,9034	0,0578	-0,6506	0,0106
NLE->MHP->crime	-0,0111	0,0121	-0,9209	0,3577	-0,0349	0,0126
<b>Effects</b>						
Direct	0,0779	0,0391	1,9941	,0469	0,0011	0,1547
Indirect	-0,0042	0,0045			-0,0147	0,0033
Total	0,0737	0,0388	1,9002	,0582	-0,0026	0,1500

**2.2.2 Externalising problems as mediator**

	<i>b</i>	<i>SE</i>	<i>t</i>	<i>p</i>	<i>95% confidence interval</i>	
NLE->crime	0,0177	0,0395	0,4492	0,6536	-0,0599	0,0954
NLE->MHP	0,9545	0,1605	5,9458	0,0000	0,6388	1,2702
Prior crime->MHP	0,9021	0,1587	5,6825	0,0000	0,5899	1,2142
NLE->MHP->crime	0,0586	0,0124	4,7194	0,0000	0,0342	0,0831
<b>Effects</b>						
Direct	0,0177	0,0395	0,4492	0,6536	-0,0599	0,0954
Indirect	0,0560	0,0169			0,0270	0,0930
Total	0,0737	0,0388	1,9002	0,0582	-0,0026	0,1500

**Model 2.3: Victimization-related NLE as independent variable**

**2.3.1 Internalising problems as mediator**

	<i>b</i>	<i>SE</i>	<i>t</i>	<i>p</i>	<i>95% confidence interval</i>	
NLE->crime	-0,0281	0,0396	-0,7087	0,4790	-0,1059	0,0498
NLE->MHP	-0,1968	0,1732	-1,1364	0,2566	-0,5373	0,1438
Prior crime->MHP	-0,1720	0,1699	-1,0126	0,3119	-0,5061	0,1621
NLE->MHP->crime	-0,0088	0,0121	-0,7316	0,4649	-0,0326	0,0149
<b>Effects</b>						
Direct	-0,0281	0,0396	-0,7087	0,4790	-0,1059	0,0498
Indirect	0,0017	0,0033			-0,0027	0,0104
Total	-0,0263	0,0395	-0,6664	0,5056	-0,1040	0,0513

**2.3.2 Externalising problems as mediator**

	<i>b</i>	<i>SE</i>	<i>t</i>	<i>p</i>	<i>95% confidence interval</i>	
NLE->crime	-0,00371	0,0382	-0,9700	0,3327	-0,1122	0,0381
NLE->MHP	0,1764	0,1703	1,0357	0,3010	-0,1586	0,5114
Prior crime->MHP	1,0954	0,1671	6,5562	0,0000	0,7668	1,4240
NLE->MHP->crime	0,0609	0,0119	5,1396	0,0000	0,0376	0,0842

<i>Effects</i>						
Direct	-0,0371	0,0382	-0,9700	0,3327	-0,1122	0,0381
Indirect	0,0107	0,0115			-0,0111	0,0352
Total	-0,0263	0,0395	-0,6664	0,5056	-0,1040	0,0513

Finally, in the third set of mediation models presented in Table 4, where internalising and externalising problems at age 16 were included as covariates, there were no significant *total effect* in any of the models. The analyses revealed a significant *indirect effect* only through externalising problems when tested between conflict-related NLEs and offending (model 3.2.2,  $b = 0,0248$ ,  $CI = 0,0054 - 0,0496$ ), as the 95% bias-corrected confidence intervals did not include zero. However, there was no statistically significant *direct effect* after accounting for mediators. The results in Table 3 thus indicate that there are no associations between any subtype of NLE and offending before accounting for mediators, but that after examining indirect effects and direct effects, externalising problems mediate an association between conflict-related NLEs and offending in a full mediation, and also when controlling for previous internalising and externalising problems.

**Table 4. Model 3: Mediation analyses between NLE subtypes, MHPS (externalising & internalising problems) and offending, while adjusting for prior MHPs (externalising & internalising problems)**

**3.1: School-related NLE as independent variable**

3.1.1 Internalising problems as mediator

	<i>b</i>	<i>SE</i>	<i>t</i>	<i>p</i>	<i>95% confidence interval</i>	
NLE->crime	-0,0244	0,0435	-0,5621	0,5744	-0,1100	0,0611
NLE->MHP	0,3211	0,1507	2,1306	0,0338	0,0247	0,6175
Prior.Int.MHP->MHP	0,6080	0,0492	12,3668	0,0000	0,5113	0,7047
Prior.Ext.MHP->MHP	-0,0115	0,0401	-0,2879	0,7736	-0,0903	0,0673
NLE->MHP->crime	-0,0254	0,0153	-1,6627	0,0973	-0,0554	0,0046
<i>Effects</i>						
Direct	-0,0244	0,0435	-0,5621	0,5744	-0,1100	0,0611
Indirect	-0,0081	0,0061			-0,0229	0,0004
Total	-0,0326	0,0433	-0,7523	0,4523	-0,1178	0,0526

3.1.2 Externalising problems as mediator

	<i>b</i>	<i>SE</i>	<i>t</i>	<i>p</i>	<i>95% confidence interval</i>	
NLE->crime	-0,0356	0,0423	-0,8426	0,4000	-0,1188	0,0475
NLE->MHP	0,0470	0,1488	0,3159	0,7522	-0,2456	0,3397
Prior.Int.MHP->MHP	0,0863	0,0485	1,7772	0,0764	-0,0092	0,1817
Prior.Ext.MHP->MHP	0,6372	0,0396	16,1108	0,0000	0,5594	0,7150
NLE->MHP->crime	0,0648	0,0151	4,2850	0,0000	0,0351	0,0946
<i>Effects</i>						
Direct	-0,0356	0,0423	-0,8426	0,4000	-0,1188	0,0475
Indirect	0,0030	0,0092			-0,0147	0,0209
Total	-0,0326	0,0433	-0,7523	0,4523	-0,1178	0,0526

**Model 3.2: Conflict-related NLE as independent variable**

3.2.1 Internalising problems as mediator

	<i>b</i>	<i>SE</i>	<i>t</i>	<i>p</i>	<i>95% confidence interval</i>	
NLE->crime	0,0578	0,0414	1,3979	0,1630	-0,0235	0,1392
NLE->MHP	-0,0498	0,1455	-0,3420	0,7326	-0,3359	0,2364

Prior.Int.MHP->MHP	0,6521	0,0458	14,2377	0,0000	0,5620	0,7421
Prior.Ext.MHP->MHP	-0,0182	0,0429	-0,4245	0,6714	-0,1025	0,0661
NLE->MHP->crime	-0,0260	0,0151	-1,7154	0,0872	-0,0557	0,0038
<b>Effects</b>						
Direct	0,0578	0,0414	1,3979	0,1630	-0,0235	0,1392
Indirect	0,0013	0,0042			-0,0074	0,0100
Total	0,0591	0,0415	1,4254	0,1549	-0,0224	0,1407

### 3.2.2 Externalising problems as mediator

	<i>b</i>	<i>SE</i>	<i>t</i>	<i>p</i>	<i>95% confidence interval</i>	
NLE->crime	0,0343	0,0410	0,8360	0,4037	-0,0464	0,1150
NLE->MHP	0,3957	0,1412	2,8026	0,0053	0,1180	0,6734
Prior.Int.MHP->MHP	0,0749	0,0445	1,6841	0,0930	-0,0126	0,1623
Prior.Ext.MHP->MHP	0,5930	0,0416	14,2531	0,0000	0,5111	0,6748
NLE->MHP->crime	0,0627	0,0153	4,1013	0,0001	0,0326	0,0928
<b>Effects</b>						
Direct	0,0343	0,0410	0,8360	0,4037	-0,0464	0,1150
Indirect	0,0248	0,0113			0,0054	0,0496
Total	0,0591	0,0415	1,4254	0,1549	-0,0224	0,1407

### Model 3.3: Victimisation-related NLE as independent variable

#### 3.3.1 Internalising problems as mediator

	<i>b</i>	<i>SE</i>	<i>t</i>	<i>p</i>	<i>95% confidence interval</i>	
NLE->crime	-0,0166	0,0391	-0,4242	0,6717	-0,0936	0,0604
NLE->MHP	-0,1801	0,1367	-1,3176	0,1885	-0,4490	0,0887
Prior.Int.MHP->MHP	0,6461	0,0453	14,2534	0,0000	0,5569	0,7352
Prior.Ext.MHP->MHP	-0,0131	0,0406	-0,3225	0,7473	-0,0929	0,0668
NLE->MHP->crime	-0,0268	0,0152	-1,7622	0,0789	-0,0567	0,0031
<b>Effects</b>						
Direct	-0,0166	0,0391	-0,4242	0,6717	-0,0936	0,0604
Indirect	0,0048	0,0049			-0,0029	0,0162
Total	-0,0118	0,0392	-0,3007	0,7638	-0,0888	0,0652

#### 3.3.2 Externalising problems as mediator

	<i>b</i>	<i>SE</i>	<i>t</i>	<i>p</i>	<i>95% confidence interval</i>	
NLE->crime	-0,0185	0,0383	-0,4832	0,6292	-0,0938	0,0568
NLE->MHP	0,1034	0,1343	0,7699	0,4419	-0,1608	0,3676
Prior.Int.MHP->MHP	0,0946	0,0445	2,1227	0,0345	0,0069	0,1822
Prior.Ext.MHP->MHP	0,6295	0,0399	15,7760	0,0000	0,5510	0,7080
X->M->Y	0,0649	0,0151	4,2848	0,0000	0,0351	0,0947
<b>Effects</b>						
Direct	-0,0185	0,0383	-0,4832	0,6292	-0,0938	0,0568
Indirect	0,0067	0,0094			-0,0105	0,0270
Total	-0,0118	0,0392	-0,3007	0,7638	-0,0888	0,0652

Sensitivity analyses with linear regressions and Sobel test yielded similar results to the bootstrap analyses. Among the linear regressions, only conflict-related NLE had a significant association with offending, and among the analyses with Sobel test, only externalising problems showed to mediate the association between conflict-related NLE and offending.

## 5. Discussion

The current study examined the association between different subtypes of NLEs and MHPs and youth offending, and also examined whether youth MHPs mediated a potential association between NLEs and offending. Consistent with a substantial body of prior research, the results demonstrated associations between NLEs and MHPs and offending (e.g. Widom & Maxfield, 2001; Thornberry et al., 2010; Braga et al., 2017; Fitton et al., 2018). However, it

was only conflict-related NLEs, from among the three examined subtypes, that yielded significant associations with offending, indicating that this subtype of NLE is of extra importance for the risk of future offending among youth. However, it should be noted that the lack of total effects in the bootstrap test can be assigned to sample size (Hayes, 2018; Efron & Tibshirani, 1993), and that a larger sample might have yielded additional significant associations between subtypes of NLE and offending. Regarding mediation, conflict-related NLEs and offending and victimisation-related NLEs were seen to operate through externalising problems, while analyses with internalising problems as the mediator yielded no significant results. This mediation through externalising problems was robust: the indirect effect found in model 1 (without covariates) remained in model 3 (adjusting for prior MHPs), and almost remained in model 2 (adjusting for previous offending). This is strongly aligned with previous research showing that exposure to interpersonal conflict, abuse or other harsh social environments contributes to elevated externalising problems, such as aggression, impulsivity and conduct problems (Anda et al., 2006; Moffitt, 2010; Turner et al., 2021), problems that are, in turn, well-established risk factors for later offending (Loeber & Burke, 2011; Moffitt, 1993; Farrington, 2003; Källmen et al., 2023). The current findings therefore reinforce the already established knowledge about externalising behaviour and offending, but also add new evidence of the role of NLEs, especially NLEs associated with conflict, and disruptive social environments seem to operate through externalising behavioural problems, which directly affect later offending. Regarding internalising problems, the study results consistently found that internalising problems did not mediate any associations between NLEs and offending. Although internalising problems have been linked to exposure to NLEs (e.g. Low et al., 2012; Yarrington et al., 2023) and are prevalent among some groups of offenders, especially girls (Abram et al., 2003; Beaudry et al., 2020; Vahl et al., 2016), they did not explain the current associations. This aligns with earlier findings suggesting that internalising

problems often have weaker or more inconsistent associations with offending compared to externalising problems (e.g. Wibbelink et al., 2017; Jolliffe et al., 2019). One explanation, consistent with previous research, for example Bonanno (2000) and Olf et al. (2007), is that internalising problems may influence *how* adolescents perceive and experience NLEs rather than how they *behave* as a consequence of those events. Internalising problems may therefore affect emotional responses such as fear, avoidance or withdrawal, reactions less directly linked to offending behaviour. Another possibility, drawn from evidence in previous research, is that the effects of internalising problems are more gender-specific than those of externalising problems, regarding how they are related to both NLEs (e.g. Olf et al., 2007) and offending (Kofler et al., 2011). Given that internalising issues tend to be more significant among female offenders (Abram et al., 2003), the limited statistical power due to sample size or gender distribution in the current sample may have reduced the ability to detect such relationships. The results underscore the importance of early identification and support for youth with externalising problems, particularly if they have also experienced conflictual or disrupted social environments. Given that externalising problems was found to mediate associations between NLEs and offending, interventions and prevention measures targeting these types of problems, like behavioural and emotional regulation, may be especially beneficial. The current findings thus also suggest that interventions should not focus solely on reducing exposure to NLEs, but also on supporting the youth's behavioural and emotional development in the aftermath of such events.

## **5.1 Methodological considerations**

The current study has several methodological limitations that should be noted. First, the sample size is relatively small, which reduces the statistical power of the analyses.

Nonetheless, its community-based design provides valuable insights into how exposure to

NLEs affects youth in the general population, and the results can help inform community-level prevention. The longitudinal design is also a strength, since it improves the plausibility of the temporal ordering required for mediation (Baron & Kenny, 1986; Hayes, 2022) and reduces concerns about simultaneity bias. Nevertheless, the found mediation of externalising problems cannot be interpreted as causal, as the study does not manipulate exposure or control for all possible confounders. Unobserved variables, such as uncontrolled family functioning, peer relations or other personality traits, substance abuse, could influence both MHPs and offending (e.g., Moffitt, 1993; Farrington, 2003; Laird et al., 2001; Karlén et al., 2020; Hoeve et al., 2019). Second, the sample is largely low-risk, with few participants committing a high number of crimes, i.e. those who, according to Moffitt's (1993) taxonomy, might be at risk of a persistent criminal career. Given that NLEs might affect individuals with pre-existing vulnerabilities to a higher degree than those without (Hammen, 2005; McLaughlin et al., 2010), Moffitt's life-course persistent (LCP) group is particularly relevant, as those individuals are often exposed to life stressors and increased levels of MHPs (Moffitt, 1993; 2010). A sample including more high-risk individuals would likely yield stronger results, and future research should therefore focus on such groups to further explore how existing MHPs interact with NLEs in predicting offending. Third, the measure of externalising problems contained a few items that directly reflect offending behaviours, raising the possibility of measurement overlap. Still, these items make up a small portion of the scale, and externalising problems are widely recognised as MHPs, including in the DSM-5 (American Psychiatric Association, 2022) through diagnoses such as conduct disorder. It is therefore appropriate to address them as MHPs when considering intervention and prevention. Fourth, the NLE measures included relatively few items on severe events, such as sexual abuse, which is strongly associated with offending (Aebi et al., 2015). The results may therefore have been stronger and more conclusive had such experiences been included. Even so, examining both

severe and less severe NLEs remains important for both understanding all the aspects of the complex associations between different types of NLEs, MHPs and offending and for developing nuanced prevention strategies. On the same note, the current study did not include a measure of PTSD, despite its well-documented links to both MHPs and offending (e.g. Wojciechowski, 2020). However, because our analyses included externalising and internalising problems, which are core features of PTSD, our findings nonetheless suggest that at least some PTSD-related symptoms may be relevant to offending. Finally, boys and girls were not analysed separately, as dividing the sample would have resulted in small subsamples. Yet, given prior research suggesting gender differences in the associations between NLEs, MHPs and offending (e.g., Abram et al., 2003; Beaudry et al., 2020; Vahl et al., 2016; Kofler et al., 2011; Turner et al., 2021; Belknap & Holsinger, 2006; Conrad et al., 2014) future studies should pursue gender-specific analyses to deepen understanding.

## **6. Conclusion**

The present study contributes to a growing understanding of how negative life events are associated with later offending, and how MHPs may mediate this association. Externalising problems emerged as a key mediator, particularly for conflict-related NLEs, highlighting its importance for youth offending. Internalising problems did not mediate any associations, suggesting that these types of problems play a less central role as mediators between NLEs and offending. The current findings therefore underline that interventions should focus on youth with histories of NLEs and existing MHPs, addressing both treatment needs and ongoing exposure to negative environments as a means to mitigating the long-term consequences of negative life events, MHPs and offending. However, future research with larger and more diverse samples, refined measures of NLEs and attention to gender

differences will be essential for deepening understanding and guiding more effective prevention strategies.

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**M**ental health problems (MHPs) and offending often first emerge during adolescence, and both can pose major challenges at societal as well as individual levels. Previous research has shown that MHPs are associated with youth offending; however, questions remain regarding the nature of these associations.

This thesis aims to extend the knowledge and contribute to a more comprehensive understanding of the associations between MHPs and youth offending. By examining, for example, development of MHPs and offending, gender specific associations, associations with contextual variables and the effects of support from health care professionals and/or the social services, the present thesis aims to provide knowledge that is of relevance to research, policy, and practice, and ultimately to support more effective support, prevention, and intervention measures that can improve mental health, reduce offending, and result in a better quality of life among youth.

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