

**Sex Differences in Antisocial Behaviour: The Roles of Anxiety,  
Depression, Hyperactivity/Inattention and Callous-Unemotional Traits**

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**D.Clin.Psy. thesis (Volume 1), 2019**

**University College London**

## UCL Doctorate in Clinical Psychology

### Thesis declaration form

I confirm that the work presented in this thesis is my own. Where information has been derived from other sources, I confirm that this has been indicated in the thesis.

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## Overview

Antisocial behaviour is known to be considerably more prevalent among males than females. This thesis explores four common comorbidities of antisocial behaviour – anxiety, depression, hyperactivity/inattention and callous and unemotional traits – examining the contributing role of each of these comorbidities to the sex difference in antisocial behaviour, and their influence on young people's engagement in antisocial behaviour over time.

Part I is a conceptual introduction which reviews the existing literature on the relationships between each of these comorbidities and antisocial behaviour. Sex differences exist within each of these comorbidities, and this introduction explores the association between these sex differences and sex differences in antisocial behaviour, as evidenced by the literature.

Part II is an empirical study which uses data from the Systemic Therapy for at Risk Teens study to examine sex differences in the respective associations between anxiety, depression, hyperactivity/inattention and callous/unemotional (CU) traits, and antisocial behaviour. Structural equation models were used to test these associations cross-sectionally at baseline, and cross-lagged panel models were used to test them longitudinally across the 18-month period of the trial. Depression, hyperactivity/inattention and CU traits each predicted self-reported delinquency at baseline, but no moderating effect of sex was found. Over time, hyperactivity/inattention and CU traits influenced self-reported delinquency in similar ways for boys and girls. However, different patterns of association appeared for anxiety and depression, suggesting that different causal mechanisms may be giving rise to conduct problems for each sex.

Part III is a critical appraisal, in which I begin by exploring the influence of socially constructed gender roles on antisocial behaviour and consider this in

relation to my study, before going on to reflect on the process of making choices within the context of a project based on secondary data analysis.

## Impact Statement

Adolescent antisocial behaviour often results in considerable distress, disruption and costs to families, schools and wider society. Through its exploration of common comorbidities of adolescent antisocial behaviour and its analysis of how these comorbidities influence engagement in antisocial behaviour over time, this thesis advances understanding of some of the underlying causes and correlates of antisocial behaviour.

One of the main findings of this thesis is that there are more similarities than differences between boys and girls who present with conduct difficulties. Both are likely to experience comorbid depression and hyperactivity/inattention, and both are likely to display callous and unemotional traits. With regards to clinical implications, this highlights the importance of appropriately assessing for these difficulties in both boys and girls, and of being wary of making assumptions based on either the prevalence of these difficulties in the general population, or on gender-normative expectations.

This said, there may be some sex differences in the way these comorbid difficulties influence antisocial behaviour over time. Girls may be more likely to act out their symptoms of depression, such that depression predicts later antisocial behaviour. Early recognition and treatment of depression in girls may therefore be particularly important to help reduce their engagement in antisocial behaviour. For boys on the other hand, antisocial behaviour may be more closely linked to concurrent anxiety symptoms than it is for girls, which is an unexpected finding given the higher prevalence of anxiety among girls with conduct difficulties.

Although it cannot be concluded from the results presented in this thesis that any of these comorbid difficulties directly cause antisocial behaviour in young people, it does provide evidence that several of them are strongly associated with it.

Thus, when working with young people with conduct problems, developing interventions which are tailored to their individual needs and which support them in managing these comorbid difficulties could help to improve their quality of life.

As well as potentially benefitting services by contributing to the development of informed interventions for young people presenting with antisocial behaviour, the information presented in this thesis could also have a wider impact for families, schools and communities. It emphasises the importance of recognising mental health difficulties in young people with conduct problems, and of supporting parents and schools to meet the individual needs of these young people. Young people with conduct difficulties are so often excluded, dismissed, rejected and forgotten, particularly when their opportunities and access to support are constrained by lower socio-economic status, and continuing to educate parents, teachers and the general public about the difficulties faced by many of these young people is crucial to the fostering of empathy and understanding, and the ultimate reduction of antisocial behaviour.

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## Acknowledgements

I would like to thank Stephen Butler, for proposing this project and supervising it until summer 2018, for his enthusiasm and his continued interest from the distant shores of Prince Edward Island. I would like to thank Peter Fonagy, for taking over supervision in the final year, for his mastery. Thanks also to Rob Saunders, for providing much needed statistical support and answering even my most nonsensical emails. *Merci à ma mère, qui est toujours là pour moi.* Thank you to all my incredible friends in the 2016 cohort, for their solidarity, and to my friends outside the course, for their understanding. Thank you to my placement supervisors, Paula Corredor Lopez, Emily Turton, Kathy Bonshor Evans and Pip Bullemor-Day, for being so supportive and accommodating. And finally, thank you to my laptop, for making it all the way to the end. We did it, buddy.

## **Part I: Literature Review**

### **Conceptual Introduction:**

**Sex Differences in Antisocial Behaviour: The Roles of Anxiety,  
Depression, ADHD and Callous-Unemotional Traits**

## **Abstract**

It is well established that males are significantly more likely to engage in antisocial behaviour than females, and that the prevalence of antisocial behaviour increases considerably during adolescence. Young people who frequently engage in antisocial behaviour often receive a diagnosis of conduct disorder (CD). This literature review explores three of the most common comorbid conditions which affect young people with CD: anxiety, depression and attention-deficit/hyperactivity disorder (ADHD), as well as callous-unemotional (CU) traits, which are thought to distinguish a particularly antisocial subgroup within CD. Sex differences exist within each of these comorbid groups, and this review aims to examine the extent to which the association between sex differences in these comorbid conditions and sex differences in CD has been explored in the literature.

## Introduction

Adolescent antisocial behaviour is a major health and social problem which is known to affect boys significantly more than girls. This study aims to examine the extent to which sex differences in antisocial behaviour can be accounted for by sex differences in anxiety, depression, hyperactivity/inattention and callous-unemotional traits, difficulties which are known to be differentially associated with antisocial behaviour, and which tend to affect boys and girls to different degrees. The study uses data from the Systemic Therapy for At Risk Teens (START) trial, an 18-month randomised controlled trial conducted with adolescents with moderate-to-severe antisocial behaviour. The differential effects of each of the above factors on self-reported delinquency for boys and girls will first be examined at baseline. The study will then examine the reciprocal relationships between each of these factors and self-reported delinquency over time for boys and for girls. Understanding the different ways in which these difficulties relate to antisocial behaviour for boys and girls may help inform the development of future interventions.

This literature review will focus on the relationship between conduct disorder (CD) and its most common comorbid disorders – anxiety, depression and attention-deficit/hyperactivity disorder (ADHD) – as well as callous-unemotional (CU) traits, which are thought to distinguish a particularly antisocial subgroup within CD. Sex differences exist within each of these comorbid groups, and this review will aim to examine the extent to which the association between sex differences in these comorbid conditions and sex differences in CD has been explored in the literature. It will begin by introducing the key concepts of antisocial behaviour, anxiety, depression, ADHD and CU traits, including definitions, prevalence rates and evidence of sex differences. It will then go on to consider each comorbidity in turn, attempting to understand how sex differences in the comorbid disorder relate to sex differences in CD. It will conclude by setting out the aims of the study, the

knowledge gap which it seeks to address, and the hypotheses which are being put forward based on the literature reviewed.

## **Key Concepts**

### **Antisocial behaviour**

#### *Oppositional defiant disorder*

According to the *Diagnostic and Statistical Manual of Mental Disorders* (5th ed.; DSM-5; American Psychiatric Association [APA], 2013), oppositional defiant disorder (ODD) is characterised by a persistent pattern of angry or irritable mood, argumentative or defiant behaviour, or vindictiveness. The estimated prevalence of ODD varies depending on population demographics, diagnostic criteria and assessment tools (Cohn & Adesman, 2015), but estimates in the general population range from 2% to 16% in children and adolescents. Although slightly more boys than girls are diagnosed with ODD in childhood, the gap closes in adolescence, with no noticeable gender difference after age 13 (Loeber, Burke, Lahey, Winters, & Zera, 2000).

#### *Conduct disorder*

Conduct disorder (CD) is characterised by a repetitive and persistent pattern of behaviour in which the basic rights of others or major age-appropriate societal norms or rules are violated (DSM-5, APA, 2013). This includes aggressive conduct which threatens or causes physical harm to people or animals, conduct which causes property damage or loss, deceitfulness or theft, and serious violation of rules. These behaviours go beyond some of the defiant behaviour seen in individuals with ODD (Cohn & Adesman, 2015). The estimated lifetime prevalence

of CD in the community is most commonly reported at around 5%, but can range from 1% to 16% depending on the sample (Thomas, 2010).

### *Development and course*

The distress, disruption and costs of ODD/CD brought upon families, schools, peer groups and wider society are often considerable (Scott, 2015). A number of risk factors have been identified for the development of these disorders, including psychological factors such as below-average IQ, reading problems, language impairment and hyperactivity; family factors such as domestic violence, parent-child conflict and exposure to parental antisocial behaviour; and environmental factors relating to schools and neighbourhoods (Cohn & Adesman, 2015). The detrimental effects of these risk factors are additive, increasing the risk for ODD and CD with each additional factor.

ODD and CD have markedly poor long term outcomes, including high levels of violent offending, drug use, teenage pregnancy, poor academic achievement and low rates of employment (Fergusson, Horwood, & Ridder, 2005). Duration and severity of symptoms, as well as age of onset, have been found to play a significant role in predicting outcomes in adulthood (Scott, 2015).

### *Sex differences*

Males are known to be generally much more antisocial than females (Moffitt, Caspi, Rutter, & Silva, 2001). In fact, together with quality of parenting, sex is the strongest predictor of antisocial behaviour in most studies (Odgers et al., 2012). In childhood, the ratio of boys to girls with ODD is 2:1, increasing to between 3:1 and 7:1 for adolescents with CD. However these gender differences may in part be an

artefact of social biases within the diagnostic criteria (Cohn & Adesman, 2015). Boys with CD are more likely to engage in overt physical aggression, while girls engage in relational and indirect aggression such as manipulative behaviour aimed at harming others. Not only is this poorly captured in the diagnostic criteria, it is also much harder to detect. In adolescence, boys are more likely to engage in behaviours such as fighting, stealing and vandalism, whereas girls are more likely to exhibit lying, truancy, running away, substance misuse and prostitution (DSM-5, APA, 2013).

In the Dunedin Multidisciplinary Health and Wellbeing Study, Moffitt et al. (2001) found that males accounted for more of every type of offence, at almost every age. In general, they accounted for between two-thirds and four-fifths of total offences, although the sex difference was slightly more significant in official conviction rates than in self-report data, most likely due to the greater severity of officially recorded crimes. They found the largest sex difference in violent offending and the smallest in drug- and alcohol-related offending, and the two sexes were the most similar in their antisocial behaviour during middle adolescence. Although high-rate offending was concentrated among a few members of the population for both males and females, the most active females offended at a much lower rate than the most active males.

Despite these differences in prevalence rates, the majority of risk factors appear to operate in the same way for boys and girls (Moffitt et al., 2001). Results from the Dunedin study show that most risk factors (including family, behavioural, neurocognitive and peer-relationship factors) applied equally well to males and females, suggesting that both sexes are equally vulnerable to these risk factors. However there were differences in rates of exposure to these risk factors. Specifically, Moffitt et al. (2001) found that the most important contributing factor to sex differences in adolescent antisocial behaviour was the sex difference in childhood hyperactivity.

## **Anxiety**

Generalised anxiety disorder (GAD) is characterised by excessive anxiety or worry about a variety of events or activities (DSM-5, APA, 2013). GAD is often accompanied by restlessness, difficulty concentrating, irritability and/or disturbed sleep. Children with GAD tend to worry particularly about their competence or the quality of their performance, often resulting in a marked impairment in school performance, family relationships and social functioning (Ialongo, Edelsohn, Werthamer-Larsson, Crockett, & Kellam, 1994).

Anxiety disorders are the most common childhood mental disorders with a prevalence of 5-10% in the general population, and an overrepresentation of girls (Pine & Klein, 2015). The prevalence of GAD among adults aged over 16 in the UK is 5.9% (Mental Health Foundation, 2016).

Studies have found that girls report a greater number of fears than boys, and that anxiety disorders are more common in girls, particularly in adolescence (Albano & Krain, 2005; Ollendick, King, & Frary, 1989). Girls have also been found to have more difficulty with psychological factors associated with the development of anxiety, reporting high self-consciousness, lower self-esteem and more physical illness (Lewinsohn et al., 1998). Sex differences in the prevalence of anxiety disorders continue through adolescence and into adulthood (Roza, Hofstra, van der Ende, & Verhulst, 2003), with one in three women meeting criteria for an anxiety disorder in her lifetime, compared with 22% of men (McLean, Asnaani, Litz, & Hofmann, 2011).

## **Depression**

Depression is characterised by depressed mood or loss of interest or pleasure in almost all activities (DSM-5, APA, 2013). In children and adolescents,

mood can sometimes present as irritable rather than sad. Prevalence of depressive disorders is 1-2% in children and 3-8% in adolescence, with a lifetime prevalence of around 20% by the end of adolescence (Costello, Mustillo, Erkanli, Keeler, & Angold, 2003). The prevalence of depression in adults aged 16 and over in the UK is 3.3% (Mental Health Foundation, 2016).

Women are two to three times more likely to experience depression, and this is reflected in both community and clinically referred samples (Zahn-Waxler, Race, & Duggal, 2005). While rates of childhood depression are similar for boys and girls, around puberty they increase dramatically for girls, remaining approximately the same for boys (Angold & Rutter, 1992). By late adolescence females have a 1 in 5 chance of experiencing a major depressive episode, twice as likely as males, making depression the most common and disabling disorder for women. Etiological theories on the sex difference in depression include a broad range of social, environmental, cognitive, personality and biological factors.

### **Attention deficit/hyperactivity disorder**

Attention deficit/hyperactivity disorder (ADHD) is characterised by persistent patterns of inattention, hyperactivity and impulsivity which interfere with development or functioning (DSM-5, APA, 2013). Inattention presents as difficulty maintaining focus, being disorganised and lacking persistence. Hyperactivity describes excessive movement when not appropriate, or excessive fidgeting or talkativeness. Impulsivity may relate to a desire for immediate rewards, and can present as making important decisions without consideration of consequences, as well as social intrusiveness (e.g. interrupting). ADHD begins in childhood, and presentations can vary significantly.

ADHD has a worldwide prevalence of 5.3%, with marked differences by country (ranging from 1% to 19%) (Polanczyk, Silva de Lima, Horta, Biederman, & Rohde, 2007). The estimated prevalence of ADHD among children in the UK is 1.5% (Russell, Rodgers, Ukoumunne, & Ford, 2014).

For much of the 20th century, ADHD was associated with aggression and conduct problems (Hinshaw & Blachman, 2005), and as boys were more likely to present with these symptoms, they were more likely to be referred clinically and selected for research investigations. The appearance of "attention deficit disorder without hyperactivity" in the DSM-III (APA, 1980) and of ADHD "inattentive type" in the DSM-IV (APA, 1994) led to increased recognition of ADHD in girls.

Nonetheless, ADHD remains two to three times more prevalent in boys than in girls in community samples (APA, 2013). In clinic-referred samples the ratio is considerably higher, because of the increased likelihood of referral for associated aggression, which is more common in boys (Hinshaw & Blachman, 2005). In community samples, girls appear to be less symptomatic than boys in terms of both inattention and hyperactivity/impulsivity and less impaired than boys with regards to reading achievement, aggression and peer status (Gershon, 2002). However, in clinic-referred samples, there is very little difference between boys and girls in relation to symptomatology and impairment, other than perhaps greater amounts of inattention among girls.

### **Callous-unemotional traits**

Psychopathy is a construct which refers to a pattern of callous, manipulative, deceitful and remorseless behaviour, and has proved important for understanding antisocial behaviour in adults (Essau, Sasagawa, & Frick, 2006). Given that adult antisocial behaviour has been found to develop from childhood, there has been

increasing research on the extension of the construct of psychopathy to children. This has focused largely on the concept of callous-unemotional (CU) traits, which can be categorised into three dimensions: callousness, characterised by a lack of empathy, guilt or remorse; uncaring, a lack of caring for the feelings of others or for one's own performance in tasks; and unemotional, an absence of emotional expression (Essau et al., 2006). As a result, the DSM-5 now includes a specifier in the diagnostic criteria for CD which identifies individuals with "limited prosocial emotions", defined as lack of remorse or guilt and callous lack of empathy (APA, 2013). These characteristics relate to the individual's pattern of interpersonal and emotional functioning as opposed to occasional occurrences, and in a sense have been used to differentiate between children whose violent and antisocial behaviour is premeditated and those for whom it is reactive and impulsive (Viding, Fontaine, & McCrory, 2012).

There is a relatively high stability of CU traits from childhood to adolescence (Frick & White, 2008). Some studies have found adolescents aged 15 to 16 to score higher on the Inventory of Callous-Unemotional Traits (ICU; Frick, 2003), supporting the notion of a normative level of change in these traits over the course of development (Essau et al., 2006).

In community samples, CU traits are low in children without CD, but are present in between 10% and 31% of children with CD (Kahn, Frick, Youngstrom, Findling, & Youngstrom, 2012). In clinic-referred samples, between 20% and 50% of children with CD receive the CU specifier. Boys have consistently been found to present with significantly higher CU traits than girls (Essau et al., 2006; Pihet, Etter, Schmid, & Kimonis, 2015).

## Review of Literature

### Anxiety and antisocial behaviour

Karpman (1941) was one of the first researchers to distinguish two subtypes of psychopathy (Brazil, van Dongen, Maes, Mars, & Baskin-Sommers, 2018), which he termed the "idiopathic" (primary) and "symptomatic" (secondary) subtypes. According to him, antisocial traits such as lack of guilt or empathy and callousness are shared between these two subtypes, but their underlying aetiologies differ. The idiopathic subtype results from a heritable affective deficit and is characterised by lack of anxiety, as well as affective and attention-related deficits. The symptomatic subtype on the other hand is thought to result from social disadvantage, excessive neurotic anxiety or other psychopathology. Thus secondary psychopaths show greater levels of anxiety, but similar levels of antisocial behaviour.

Building on Gray's reinforcement sensitivity theory (Gray, 1970), it has been proposed that primary psychopathy is the result of a low Behavioural Inhibition System (BIS) – in other words low anxiety – leading to low avoidance of possible negative consequences (Fowles, 1980; Lykken, 1995). Secondary psychopathy, by contrast, arises from an overactive Behavioural Activation System (BAS), resulting in increased risk of impulsive responses to rewarding events, including stressful situations. The presence of anxiety symptoms has therefore been proposed as the principal criterion for differentiating between individuals with persistent antisocial behaviour (Hodgins, de Brito, Simonoff, Vloet, & Viding, 2009).

The risk of developing an anxiety disorder is three times higher in children with CD than in those without (Angold, Costello, & Erkanli, 1999). Epidemiological studies have found that comorbid anxiety disorders in children with CD range from 22 to 33% in the general population and from 60 to 75% in clinic-referred populations (Russo & Beidel, 1994). However the effect of comorbid anxiety

symptoms on antisocial behaviour remains unclear. Traditionally, anxiety has been seen as a protective factor, assumed to moderate the manifestation and severity of aggressive and antisocial behaviour (Pfeffer & Plutchik, 1989), while lower levels of anxiety were associated with an increased risk of persistent antisocial behaviour (Moffitt, Caspi, Harrington, & Milne, 2002). In line with this, some studies have emphasised the low rate of transition from CD to antisocial personality disorder (ASPD) in the presence of comorbid anxiety disorders (Polier, Vloet, Herpertz-Dahlmann, Laurens, & Hodgins, 2012). For example, in a prospective study of incarcerated adolescents, those who met criteria for GAD were less likely to receive a diagnosis of ASPD three years later (Washburn et al., 2007). However, the National Comorbidity Survey found that 53.3% of American men with ASPD also had a diagnosis of anxiety disorder (Goodwin & Hamilton, 2003), and in more than half of these cases, the onset of the anxiety disorder was prior to age 16.

Some studies have found that the direction of the relationship varies according to the characteristics of the sample (Euler et al., 2015). One hypothesis is that in non-CD children, internalising problems protect against future antisocial behaviour, while in CD children the risk of future antisocial behaviour is increased (Olsson, 2009; Sourander et al., 2007). It may also be necessary to distinguish between different anxiety constructs. For example, fear may decrease antisocial behaviour, while anxiety as a negative emotional state may be a consequence of behavioural problems and be related to stress (Frick, Lilienfeld, Ellis, Loney, & Silverthorn, 1999).

The majority of studies aimed at identifying classifications of antisocial adolescents are conducted with males. Although there is a higher prevalence of CD diagnoses among boys, the prevalence among girls is between 1% and 3% (Euler et al., 2015) and the psychosocial impact on their development is significant. Given that anxiety and mood disorders are more prevalent among adolescent girls than

boys, it follows that there are higher rates of comorbidity of these disorders in CD girls. Indeed, as well as being more prevalent in girls with CD, comorbid anxiety is also associated with more severe antisocial behaviour (Lehto-Salo, Närhi, Ahonen, & Marttunen, 2009). This supports the notion of a CD "gender paradox" (Wasserman, McCreynolds, Ko, Katz, & Carpenter, 2005): girls are less likely to be affected by CD, but for those who are the severity of behavioural difficulties and rates of comorbid symptoms are higher, making their developmental prognosis worse than that of CD boys. However, other studies have found that although girls with conduct problems are more likely to have comorbid internalising problems than boys with conduct problems, the impact of these internalising problems on the severity of their antisocial behaviour was no different between the genders (Polier et al., 2012).

In summary, the relationship between anxiety and antisocial behaviour is a complex one. High levels of anxiety can increase the likelihood of engaging in antisocial behaviour that is reactive and impulsive, but can also serve as a protective factor. In addition to serving as a potential risk factor for antisocial behaviour, anxiety can also emerge as a result of risk taking behaviour which leads to negative consequences and increased stress. It is therefore unclear whether the higher rates of antisocial behaviour observed in boys can be explained by their lower rates of anxiety. What's more, the "gender paradox" is such that for girls with CD, comorbid anxiety appears to increase rates of antisocial behaviour. It seems likely therefore that the relationship between anxiety and antisocial behaviour is different for boys and girls.

## **Depression and antisocial behaviour**

Many adolescents who engage in antisocial behaviour have comorbid emotional problems. In community samples, children with CD are 6.6 times more likely to experience depression than children without CD (Angold et al., 1999). This high level of comorbidity between depression and CD is perhaps surprising because the two disorders have very little in common in terms of their symptomatology. As described above, symptoms of CD consist of violent behaviours, status offences and property crimes, and are entirely behavioural. Symptoms of depression on the other hand are more affective.

Some believe that co-occurring depression and CD represent a distinct disorder, leading to the inclusion in the *International Statistical Classification of Diseases and Related Health Problems* (ICD-10; World Health Organization, 1992) of a category termed "depressive conduct disorder". Zoccolillo's (1992) review, however, provides a convincing case against this, arguing that children with CD and depression do not differ from children with CD alone on independent validators such as association with ASPD. He proposes instead that CD should be viewed as a "disorder of multiple dysfunction", where anxiety and depression represent dysfunctions in affect regulation and CD symptoms representing social dysfunction.

The consideration of comorbidity is important, as children diagnosed with comorbid depression and CD have been found to have higher rates of suicidal behaviours and greater social dysfunction in a number of domains compared with children diagnosed with depression alone (Fombonne, Wostear, Cooper, Harrington, & Rutter, 2001). Many studies of comorbidity focus on homotypic and heterotypic continuity. Homotypic continuity refers to the continuity of a phenomenon over time in a form that changes relatively little, while heterotypic continuity refers to a continuous process which generates different forms over time (Angold et al., 1999).

A number of different developmental models have been suggested to explain the heterotypic continuity between adolescent depression and antisocial behaviour (Ritakallio et al., 2008).

The "acting out" model suggests that depressed adolescents act out internalising problems, and that depression is therefore masked by antisocial behaviour. The assumption in this model is that depression precedes and causes antisocial behaviour (Capaldi, 1992). This has been supported by a number of studies (Beyers & Loeber, 2003; Overbeek et al., 2001). Similarly, depressed mood could lead to negative interactions with others, which could in turn increase risk for conduct problems (Kovacs, Paulauskas, Gatsonis, & Richards, 1988).

The "failure model" first described by Patterson and Capaldi (1990) proposes that antisocial adolescents face a number of difficulties in social relationships (such as rejection and conflict), have low social competence and coping skills, and poor academic attainment, which in turn leads to failure experiences, subsequently increasing vulnerability for depression (Capaldi, 1992; Kiesner, 2003). Evidence for the failure model has been mixed, with some studies reporting findings in support of the model (Boivin, Poulin, & Vitaro, 1994; Capaldi, 1992; Defoe, Farrington, & Loeber, 2013; Morrow, Hubbard, Dearing, McAuliffe, & Rubin, 2006), and others not (Beyers & Loeber, 2003; Ritakallio et al., 2008).

The "stability" model is based on the assumption that the association between depression and antisocial behaviour is caused by shared or overlapping risk factors (Overbeek et al., 2001). It proposes that people internalise or externalise their difficulties to different degrees and maintain these patterns over their life course (Krueger, 1999). Some studies have indeed found that rather than one disorder causing the other, much of the covariation between depression and CD can be explained by their having common or correlated risk factors (Fergusson,

Lynskey, & Horwood, 1996). The unexplained component of comorbidity could then indicate a common syndrome independent of these common risk factors.

Finally, the "mutual influence" model also assumes that depression and antisocial behaviour result from overlapping risk factors, but makes the additional proposition that the two reciprocally reinforce each other over time (Overbeek et al., 2001). Thus, the development of one problem increases vulnerability for the other and vice versa.

It has been suggested that the common independent syndrome underlying depression and antisocial behaviour could be ODD (Burke & Loeber, 2010). As described above, ODD and CD are related but distinct disorders. While the relationship between CD and depression appears to be mediated by negative life events (Capaldi, 1992), ODD maintains an independent relationship with later depression (Maughan, Rowe, Messer, Goodman, & Meltzer, 2004; Burke & Loeber, 2010). In fact, ODD has been found to be the strongest predictor of later depression among all psychopathology, including depression itself (Burke, Loeber, Lahey, & Rathouz, 2005; Copeland, Shanahan, Costello, & Angold, 2009).

Unlike CD, ODD symptoms do include a number of affective elements. Indeed, the most common symptoms among boys with comorbid internalising disorders and ODD are being touchy, angry, spiteful and vindictive (Speltz, McClellan, Deklyen, & Jones, 1999). When affective and behavioural ODD symptoms are considered separately, negative affective ODD symptoms are found to predict increasing depression, while oppositional behaviour is not (Burke & Loeber, 2010). Vice versa, oppositional behaviour is found to predict increasing levels of CD, while negative affect is not. The comorbidity between depression and disruptive behavioural disorders may therefore be a result of the negative affective symptoms of ODD.

It is well established that antisocial behaviour is more prevalent among boys, while girls manifest more emotional problems (Côté et al., 2017). As stated above, there is also some evidence for a "gender paradox", where boys are significantly more likely to display antisocial behaviours than girls, but antisocial girls have more severe mental health problems than antisocial boys. Indeed, girls are more likely to experience comorbid depression and antisocial behaviour (49.5%) than boys (25.3%) (Wiesner & Kim, 2006), and co-occurring CD and depression remain significant for girls when controlling for other comorbidity, but not for boys (Costello, Mustillo, Erkanli, Keeler & Angold, 2003). There is evidence that for girls with CD the risk of developing depression increases with age, while for boys with CD it decreases, and both ODD and depression show increasing rates in adolescence for girls relative to boys (Zoccolillo, 1992). Girls with comorbid depression and CD have also been found to be at increased risk of poor outcomes compared with boys (Keenan et al., 2011)

In line with the "failure" model, there is some evidence that among boys, antisocial behaviour predicts depression but not vice versa (Wiesner, 2003). Other studies have found that antisocial behaviour only predicted boys' mood disorders in adulthood (Hofstra, Van Der Ende, & Verhulst, 2002). One longitudinal study of a sample of young people found partial support for the "failure" model for boys, where failures across relationship domains predicted depression and delinquency (Paquette Boots, Wareham, & Weir, 2011).

Research on the reciprocal relationship between antisocial behaviour and depression among girls is conflicting. Some studies have found that depression precedes conduct disorder in girls, and that girls with depression are at increased risk of displaying aggressive CD symptoms (Keenan et al., 2011). Others have found that antisocial behaviour increases the risk of depression and self-harm in girls (Fagan & Western, 2003; McCarty et al., 2008). Some studies suggest that for

girls, antisocial behaviour and depressive symptoms mutually predict each other (Wiesner & Kim, 2006), while others have found a circular process, where high levels of antisocial behaviour are followed by high levels of depression, which in turn are followed by a de-escalation of antisocial behaviour and a subsequent improvement in mood (Wiesner, 2003). Some have found that early depression predicts adolescent antisocial behaviour, this antisocial behaviour then further contributing to later depression (Paquette Boots et al., 2011), and others suggest a temporal sequence where the failure model (in which conduct problems in childhood contribute to the development of depression symptoms in mid-adolescence) is followed by the acting out model (where depression symptoms are channelled into antisocial behaviour in late adolescence), with no moderating effect of gender (Fontaine et al., 2018).

In their analysis of the Dunedin Study, Moffitt et al. (2001) found that adolescent conduct problems predicted adult depression, and did so more strongly for women than men. They concluded that depression emerges and worsens subsequent to conduct problems. They hypothesise that girls may reflect on their past antisocial behaviour with more guilt and self-loathing than boys, in line with theories of gender-specific moral development (Eisenberg & Lennon, 1983; Zahn-Waxler, 2012) and that antisocial girls may receive more criticism and rejection from family and friends for the same behaviours which a boy might engage in with little consequence, in line with theories of gender-specific socialisation (Block, 1983).

In summary, findings on comorbidity and continuity between antisocial behaviour and depression have been inconsistent, especially with regards to gender differences. This may be due to a number of other factors affecting the developmental phenomenology of comorbid depression and conduct problems (Keenan et al., 2011). Nonetheless, the literature seems to suggest that there is a

stronger (longitudinal) relationship between depression and antisocial behaviour for girls than there is for boys.

### **Attention deficit/hyperactivity disorder and antisocial behaviour**

ADHD is one of the most common childhood psychiatric disorders, and the relationship between ADHD and antisocial behaviour has been the subject of much research. There is an ongoing debate about whether ADHD is itself a risk factor for later antisocial behaviour or whether these problems develop primarily as a result of comorbidity with other disruptive behaviours (von Polier, Vloet, & Herpertz-Dahlmann, 2012). Clinically referred children and adolescents often present with a combination of hyperactive/inattentive and other disruptive symptoms, particularly aggressive or antisocial behaviour. Indeed, ODD and CD are the most common forms of comorbidity in children with ADHD (Thapar & van Goozen, 2018). In community samples, the risk of having ADHD is 10.7 times higher in children with CD (Angold et al., 1999), and one third of boys diagnosed with ADHD in early childhood develop CD in later childhood and adolescence (Beauchaine, Hinshaw, & Pang, 2010). While the comorbidity of ADHD and ODD/CD in the community is approximately 30%, in clinical populations it reaches up to 80 or 90% (Cohn & Adelman, 2015).

Children with ADHD, in particular with the combined type, have a much greater genetic, neurocognitive and psychosocial burden than do healthy children (Moffitt & Scott, 2008). They have more learning difficulties, poorer school performance, more difficulties interacting with peers, as well as greater neurocognitive impairment and structural and functional brain abnormalities (von Polier et al., 2012). Research has consistently demonstrated that poor academic achievement, learning disabilities and low IQ are risk factors for antisocial and

offending behaviour (Hinshaw, Carte, Sami, Treuting, & Zupan, 2002). Indeed, there are high rates of ADHD and learning disabilities (LD) among prisoners (Einat & Einat, 2008), with strong links between ADHD and early school termination, and between LD and early age of onset of criminal activity. This suggests that children with ADHD and LD are at increased risk for lower academic achievement and early involvement in offending behaviour.

Children and adolescents with ADHD have significant difficulties in their peer relationships (von Polier et al., 2012). They have fewer friends (Gresham, Macmillan, Bocian, Ward, & Forness, 1998), are perceived by others as less socially competent (DuPaul et al., 2004), are more frequently rejected by peers (Hoza et al., 2005), and are more likely to exhibit aggressive behaviour which leads to social exclusion (Erhardt & Hinshaw, 1994). Children with comorbid ADHD and ODD/CD show poorer social functioning than those with ADHD alone (Bagwell, Molina, Pelham, & Hoza, 2001). Peer rejection, in turn, is known to play a significant role in the development of antisocial behaviour (Trentacosta & Shaw, 2009).

Comorbid ADHD and CD is clinically important because these individuals present with more severe symptoms than individuals with either disorder alone, as well as a greater burden of neurocognitive impairments and poorer prognoses (Thapar & van Goozen, 2018). This has led to the inclusion in the ICD-10 (World Health Organization, 1992) of the diagnosis of "hyperkinetic conduct disorder". A compelling argument for this being considered a distinct disorder is that it has been found to differ in meaningful ways from both "pure" CD and "pure" ADHD (Waschbusch, 2002) – for example in its relationship to social-cognitive abilities, antisocial behaviour and age of onset. However, some longitudinal research, as well as pharmacotherapy and neuropsychological research, has not supported this subtype hypothesis (Abikoff & Klein, 1992; Taylor, Chadwick, Heptinstall, & Danckaerts, 1996).

ADHD is frequently conceptualised as a risk factor for CD. This is supported by evidence from prospective studies that ADHD precedes CD and not the reverse (Thapar & van Goozen, 2018). In addition to this temporal relationship, higher symptom severity in ADHD has been found to more strongly predict CD. One potential causal mechanism for this is the impact of ADHD on mother-child hostility, which is a known risk factor for CD.

An alternative perspective is that CD and ADHD co-develop from an early age. This is supported by evidence that cognitive, behavioural and temperamental precursors of aggression/CD and ADHD are observable from infancy onwards (Thapar & van Goozen, 2018). A recent longitudinal twin study found that ADHD and CD traits mutually influence each other across the lifespan and become increasingly correlated over time (Kuja-Halkola, Lichtenstein, D'Onofrio, & Larsson, 2015). This would suggest that although ADHD features often manifest earlier in childhood than CD features, the latter is not a consequence of the former.

Behavioural genetics research suggests that comorbidity among externalising disorders results in large part from heritable mechanisms (Beauchaine et al., 2010). Indeed, large twin studies of children and adults have shown that a significantly heritable common latent factor accounts for much of the co-variation among CD, ODD and ADHD, and that this factor can be described as trait impulsivity.

However, despite the highly heritable nature of ADHD, its development into more severe conduct problems depends considerably on exposure to environmental risk factors (Beauchaine et al., 2010). For example, the development from childhood ADHD to early-onset CD is partially mediated by ineffective/coercive parenting (Meier, Slutske, Heath, & Martin, 2009), and children with ADHD who are maltreated are more likely to develop substance use disorders later in life (De Sanctis et al.,

2008). Exposure to violence and criminality increases delinquency among impulsive boys (Lynam, Caspi, Moffitt, Loeber, & Novak, 2000), and exposure to deviant peers increases antisocial behaviour in at-risk youths residing in treatment settings (Dishion, McCord, & Poulin, 1999). Thus, an accumulation of risk factors potentiates progression in externalising symptoms among trait-impulsive, genetically vulnerable individuals (Beauchaine et al., 2010). This is consistent with findings from genome-wide association studies which indicate there is no additional genetic burden for comorbid CD and ADHD compared with ADHD alone (Anney et al., 2008), suggesting that the emergence of CD in children with ADHD is driven by environmental influences. This being said, genetic risks and ADHD symptoms in children may also evoke environmental adversities, such as hostile relationships, which in turn increase the risk of CD (Harold et al., 2013; Thapar & van Goozen, 2018).

ADHD is associated with deficits in executive function. However, in tests of executive functioning which involve an affective component, children with CD, either alone or comorbid with ADHD, appear more impaired than children with ADHD alone (Hobson, Scott, & Rubia, 2011). Indeed, CD is characterised by deficits in emotion recognition and processing (Fairchild, Goozen, Calder, & Goodyer, 2013). For healthy individuals, physiological arousal and activation of the threat system in response to another person's negative affect (e.g. sad or fearful expression) result in withdrawal and inhibition of aggression (Blair, Mitchell & Blair, 2005). Deficits in the processing of such emotional cues can lead to a disruption of this mechanism. It is therefore possible that the executive function difficulties associated with ADHD do not single-handedly cause antisocial behaviour, but rather exacerbate the antisocial behaviour present in CD. Impairments in emotional processing and motivation, for example in response to punishment cues, could therefore explain why some children with ADHD go on to develop CD and others do not, and why comorbid

ADHD and CD is related to greater symptom severity and higher risk than ADHD alone.

The direct relationship between ADHD and antisocial behaviour therefore remains unclear, particularly as few studies exclude comorbid CD at initial assessment. Although research suggests that many of the adverse outcomes attributable to ADHD can be accounted for by comorbid CD, some studies which have excluded CD have found ADHD alone to be a risk factor for the development of ASPD in adulthood (Mannuzza, Klein, Bessler, Malloy, & Lapadula, 1998) (however it must be noted that these studies did not exclude children with ODD). A more recent follow-up study found that while CD and "hyperkinetic CD" did significantly increase the risk for adult delinquency, ADHD alone did not (Mordre, Groholt, Kjelsberg, Sandstad, & Myhre, 2011), while yet another study of a "pure" ADHD cohort has found elevated rates of ASPD and adverse social outcomes (Klein, Mannuzza, Hutchison, Lashua, & Castellanos, 2012).

Despite a relatively recent increase in interest in female manifestations of ADHD, the majority of research in this domain has been conducted with male samples (Hinshaw, 2002). This being said, research which has explored sex differences in ADHD has found no evidence for a "gender paradox" – in other words, no evidence of greater severity of ADHD in girls compared to boys (Hinshaw & Blachman, 2005), and ADHD has been found to predict the development of antisocial behaviours in a similar way in boys and girls (Giannotta & Rydell, 2016). However, there are differences in comorbidity. Although externalising disorders are the most common comorbidity for both girls and boys with ADHD, girls also have a higher risk of comorbid internalising and substance misuse disorders (Tung et al., 2016). In addition, girls with ADHD have been found to be more at risk of negative peer experiences than boys. This is likely due to behavioural difficulties such as hyperactivity and disruption being more salient and deviant in female peer groups,

leading to higher levels of rejection (Hinshaw & Blachman, 2005). Because of the known link between childhood peer difficulties and mental health problems, school failure and delinquency, this has significant implications. Finally, in line with the "gender paradox" in CD, although girls have a lower risk of developing CD, those who do are more likely to show comorbid ADHD symptoms and therefore more severe overall psychopathology (Waschbusch, 2002).

In summary, although there is consistent evidence that ADHD is a risk factor for later antisocial behaviour for both boys and girls, it remains unclear whether this is due to ADHD itself or to ADHD with additional disruptive symptoms (von Polier et al., 2012). It has also been suggested that ADHD and CD may co-develop as a result of a common risk factor, such as trait impulsivity, with ADHD symptoms emerging earlier in childhood. However, not all children with ADHD go on to develop CD, and while ADHD is highly heritable, it is possible that the subsequent development of CD is a result of environmental factors. Indeed, a number of environmental risk factors have been found to influence the relationship between ADHD and antisocial behaviour, including parental psychopathology, socioeconomic status, neurocognitive impairment and poor academic performance. Whatever the mechanism, the fact remains that ADHD and ODD/CD are highly comorbid, and that children with this comorbidity have significantly poorer outcomes. In these cases, ADHD is often associated with an early onset and persistent, lifelong course of CD. Although girls with ADHD do not experience greater severity of symptoms, girls with this comorbidity are at particular risk of experiencing internalising difficulties and negative peer relationships.

## **Callous-unemotional traits and antisocial behaviour**

Among children with conduct problems, there is much variability in type of problem displayed, risk for future impairment and response to treatment (Frick, 2012). Variability in their social, emotional, cognitive and biological characteristics suggests distinct causal pathways leading to their problem behaviour (Frick & Viding, 2009). This has led to attempts to classify young people with conduct problems into meaningful groups, both for the purposes of etiological research and to guide treatment development.

Psychopathic traits in adults, which focus not only on antisocial behaviour but also on affective and interpersonal style, have been found to define an important subgroup of chronically aggressive and violent antisocial individuals (Skeem, Polaschek, Patrick, & Lilienfeld, 2011; Frick & White, 2008). There is compelling evidence that similar psychopathic traits, dubbed callous-unemotional traits, are associated with more severe conduct problems, violence, aggression and delinquency in samples of children and adolescents (Frick & Dickens, 2006).

Longitudinal studies which have explored the stability of CU traits have found that their presence in childhood and adolescent strongly predict measures of adult psychopathy, even after controlling for childhood antisocial behaviour and other psychosocial risk factors, including levels of aggression, age of onset and levels of impulsivity or ADHD symptoms (Blonigen, Hicks, Krueger, Patrick, & Iacono, 2006; Burke, Loeber, & Lahey, 2007; Lynam, Caspi, Moffitt, Loeber, & Stouthamer-Loeber, 2007; Frick et al., 2014). This association has been found to generalise across samples (community, clinical and forensic), age groups and gender, and across countries and cultures. However, although CU traits have been found to be relatively stable from childhood to adolescence (Frick & White, 2008), there is evidence that they can decrease over time, and that this tends to be related to the level of conduct

problems displayed by the child, the quality of parenting received, and socio-economic status (Frick et al., 2003).

As well as being highly related to criminal behaviour (Frick, Stickle, Dandreaux, Farrell, & Kimonis, 2005), conduct problems are associated with a range of other emotional, social and academic difficulties (Kimonis & Frick, 2010). Indeed, severe conduct problems in childhood predict later mental health, legal, educational, social, occupational and physical health difficulties (Frick et al., 2014). While psychopathic traits such as impulsivity and narcissism have been found to be more strongly associated with measures of conduct problems than CU traits, CU traits are useful for highlighting a more severe and stable pattern of antisocial behaviour within children with serious conduct problems (Frick & White, 2008). There is some evidence that callous and uncaring traits in particular, rather than unemotionality, are associated with externalising problems (Berg et al., 2013).

Antisocial young people with CU traits show a number of distinct cognitive, emotional and personality characteristics, suggesting that the causal mechanisms leading to their antisocial behaviour differ from those in effect for other antisocial young people. For instance, young people with severe conduct problems who are high in CU traits show deficits in their response to punishment cues (Frick & Viding, 2009; Frick & White, 2008). In particular, deficits in response modulation mean the individual has difficulty adapting their behaviour to altered contextual cues (Roose, Bijttebier, Oord, Claes, & Lilienfeld, 2013). Thus, when a behaviour has previously been rewarded, the individual may persist in this behaviour even as it is met with increasing rates of punishment (Guelker, Barry, Barry, & Malkin, 2014). They also show deficits in their processing of negative emotional stimuli, particularly of distress and fear in others (Frick et al., 2014; Frick & Viding, 2009), and present with impoverished experiences of fear and guilt (Marsh et al., 2011). By contrast, children with severe conduct problems but with normative levels of CU traits do not

show deficits in guilt or empathy, and tend to show exaggerated affective responses to perceived social threat and high rates of anxiety (Dadds et al., 2006; Frick et al., 2014; Frick & Viding, 2009). Functional magnetic resonance imaging (fMRI) studies support these findings, suggesting a functional neural "signature" characterised by a lack of empathy for others' distress, poor behavioural choices and difficulty learning from mistakes (Viding et al., 2012). However these studies did not directly compare antisocial young people with and without CU traits.

Perceived positive outcomes for antisocial behaviour have been found to mediate the association between CU traits and antisocial behaviour (Guelker et al., 2014). It is suggested that because they lack the sense of guilt or empathy required for effective punishment, these individuals remain free to focus primarily on the positive outcomes of their behaviour. In addition, antisocial young people with CU traits show higher levels of fearlessness and thrill-seeking, and lower levels of trait anxiety (Frick & White, 2008). This lower trait anxiety suggests that children with CU traits are less distressed by the consequences of their antisocial behaviour.

Frick and Viding (2009) therefore hypothesise that children and adolescents with elevated CU traits have a temperament which interferes with the normal development of conscience, thus placing the child at risk for particularly severe and aggressive patterns of antisocial behaviour. This follows from the proposition that anxiety and discomforting arousal following wrong-doing and punishment are essential to the development of an internal system which inhibits negative behaviour (Dadds & Salmon, 2003; Kochanska, 1993). A similar model suggests that early negative emotional responses to others' distress become conditioned to behaviours which cause distress in others, such that these behaviours are inhibited as a way of avoiding negative arousal (Blair, 1995). Children with deficits in their emotional response to distress would therefore not experience the conditioning necessary for the development of empathy.

Twin studies have reported substantial genetic influences on measures of CU traits, independent of antisocial behaviour and of other dimensions of psychopathy (Larsson, Andershed, & Lichtenstein, 2006; Taylor, Loney, Bobadilla, Iacono, & McGue, 2003). In a twin study specifically investigating the patterns of genetic influence for conduct disordered children high and low on CU traits, Viding, Blair, Moffitt and Plomin (2005) found that overall heritability was substantial for children with conduct disorder (.68), but was significantly higher for those high on CU traits (.81) compared with those low on CU traits (.30). Evidence also suggests that CU traits are particularly heritable for boys (Fontaine, Rijdsdijk, McCrory, & Viding, 2010).

Environmental factors on the other hand have been found to have a negligible influence on CU traits (Frick et al., 2014; Frick & White, 2008), although there is some evidence that this applies only to boys (Fontaine et al., 2010). By contrast, antisocial young people with normative levels of CU traits have less genetic influences and show a higher association with hostile and inconsistent parenting practices. There is evidence that they are also more likely to display hostile attribution bias and to present with deficits in verbal intelligence, suggesting a potential deficit in cognitive or emotional regulation of behaviour, which in combination with inadequate socialisation could lead to an inability to anticipate negative consequences or to delay gratification, as well as impulsive and reactive behaviour (Frick & Viding, 2009). These hypothesised causal mechanisms require further research, but highlight the importance of CU traits.

Just as adult psychopathy can be understood to present with two variants characterised by high and low co-occurring anxiety (Cleckley, 1941; Karpman, 1941), this distinction can also be made in young people with CU traits. There is evidence that CU traits accompanied by low levels of anxiety are associated with substantial genetic risk, while CU traits accompanied by high levels of anxiety are

associated more closely with environmental risk factors such as trauma (Viding & McCrory, 2015). Although they present with the same levels of CU traits, individuals with co-occurring anxiety are more likely to have experienced severe pre- and post-natal adversity (Meehan, Maughan, Cecil, & Barker, 2017) and childhood maltreatment (Kahn et al., 2013). They are also more likely to present with higher levels of psychological distress (such as depression, anger or PTSD symptoms), insecure attachment and affective dysregulation (Cecil, Mccrory, Barker, Guiney, & Viding, 2017).

Although the majority of research focusing on CU traits has been carried out using predominantly male samples, several studies have used samples with substantial representation of girls or which consisted entirely of girls, and have found a similar association between CU traits and measures of antisocial and aggressive behaviour (Frick et al., 2014). Overall however, boys have consistently been found to present with significantly higher CU traits than girls (Essau et al., 2006; Pihet et al., 2015). Gender differences have also been found in the predictive power of CU traits: while callousness predicts antisocial behaviour for both genders, uncaring traits may only be predictive of antisocial behaviour for boys. Research focused on girls has found that girls with CD and CU traits have higher rates of relational aggression, lying (Hipwell, Pardini, Loeber, Sembower, & Stouthamer-Loeber, 2007) and bullying (Thornton, Frick, Crapanzano, Terranova, & Austin, 2013), and demonstrate more proactive aggression (Colins & Andershed, 2015) than girls with CD alone (Freitag et al., 2018). Girls with CD and CU traits also have lower rates of internalising problems than typically developing girls. However, over a 6 year follow-up period, girls with CD and CU traits had the lowest levels of psychosocial adjustment, motivation and school performance.

CU traits designate a subgroup of children and adolescents with conduct problems who present significant challenges for treatment, as they do not tend to

respond positively to typical treatments offered in mental health or juvenile justice settings. However there is increasing research to show that young people high in CU traits are not "untreatable" and can improve with intensive and specially tailored treatments (Frick et al., 2014). Although relatively little research has focused explicitly on whether CU traits themselves respond to treatment, there is evidence that some treatments may be effective in this (S. Butler, Baruch, Hickey, & Fonagy, 2011; Hawes, Dadds, Hawes, & Dadds, 2007; McDonald, Dodson, Rosenfield, & Jouriles, 2011; Somech & Elizur, 2012).

In summary, the presence of CU traits distinguishes a particular subgroup of children and adolescents with more severe conduct problems, violence, aggression and delinquency, who have a number of distinct cognitive, emotional and personality characteristics. There is evidence to suggest that the antisocial behaviour of these young people is influenced by a unique causal mechanism, and that these traits are influenced more strongly by genetic than environmental factors. The higher levels of CU traits among boys are likely to be a significant factor in their increased rates of antisocial behaviour, and CU traits may also play a role in moderating the relationship between anxiety and antisocial behaviour.

### **Aims**

The aim of this study is to examine the extent to which sex differences in anxiety, depression, hyperactivity/inattention and callous-unemotional traits can account for sex differences in antisocial behaviour. As this study uses data from a cohort of adolescents all presenting with moderate-to-severe antisocial behaviour, rates of self-reported delinquency between boys and girls in this sample are not expected to be significantly different. However, it is expected that sex will have a moderating effect on some of the above factors at baseline. Specifically, it is

expected that anxiety and depression will be stronger predictors of self-reported delinquency for girls than boys. On the other hand, although boys in the sample are expected to present with higher levels of hyperactivity/inattention and CU traits, these difficulties are expected to predict self-reported delinquency in a similar way for boys and girls.

Previous research suggests that antisocial behaviour and each of these factors may mutually influence each other over time, and that these patterns may differ according to sex. Cross-lagged panel models will therefore be tested to examine how anxiety, depression, hyperactivity/inattention and callous-unemotional traits interact with self-reported delinquency at six-monthly intervals over the 18-month period of the trial.

## References

- Abikoff, H., & Klein, R. G. (1992). Attention-Deficit Hyperactivity and Conduct Disorder: Comorbidity and Implications for Treatment. *Journal of Consulting and Clinical Psychology, 60*(6), 881–892.
- Albano, A. M., & Krain, A. (2005). Anxiety and Anxiety Disorders in Girls. In D. J. Bell, S. L. Foster, & E. J. Mash (Eds.), *Handbook of Behavioral and Emotional Problems in Girls* (pp. 79–116). New York: Kluwer Academic/Plenum Publishers.
- American Psychiatric Association. (1980). *Diagnostic and statistical manual of mental disorders* (3rd ed.). Washington, DC: Author.
- American Psychiatric Association. (1994). *Diagnostic and statistical manual of mental disorders* (4th ed.). Washington, DC: Author.
- American Psychiatric Association. (2013). *Diagnostic and statistical manual of mental disorders* (5th ed.). Washington, DC: Author.
- Angold, A., Costello, E. J., & Erkanli, A. (1999). Comorbidity. *Journal of Child Psychology and Psychiatry, 40*(1), 57–87.
- Angold, A., & Rutter, M. (1992). Effects of age and pubertal status on depression in a large clinical sample. *Development and Psychopathology, 4*, 5–28.
- Anney, R. J. L., Lasky-su, J., Colm, O., Mulligan, A., Franke, B., Zhou, K., ... Steinhausen, H. (2008). Conduct Disorder and ADHD: Evaluation of Conduct Problems as a Categorical and Quantitative Trait in the International Multicentre ADHD Genetics Study. *American Journal of Medical Genetics Part B (Neuropsychiatric Genetics), 147B*, 1369–1378.  
<https://doi.org/10.1002/ajmg.b.30871>

Bagwell, C. L., Molina, B. S. G., Pelham, W. E., & Hoza, B. (2001). Attention-Deficit Hyperactivity Disorder and Problems in Peer Relations : Predictions From Childhood to Adolescence. *Journal of the American Academy of Child & Adolescent Psychiatry, 40*(11), 1285–1292. <https://doi.org/10.1097/00004583-200111000-00008>

Beauchaine, T. P., Hinshaw, S. P., & Pang, K. L. (2010). Comorbidity of Attention-Deficit/Hyperactivity Disorder and Early-Onset Conduct Disorder: Biological, Environmental, and Developmental Mechanisms. *Clinical Psychology: Science and Practice, 17*(4), 327–336. <https://doi.org/10.1111/j.1468-2850.2010.01224.x>

Berg, J. M., Lilienfeld, S. O., Reddy, S. D., Lutzman, R. D., Roose, A., Craighead, L. W., ... Raison, C. L. (2013). The Inventory of Callous and Unemotional Traits: A Construct-Validation Analysis in an At-Risk Sample. *Assessment, 20*(5). <https://doi.org/10.1177/1073191112474338>

Beyers, J. M., & Loeber, R. (2003). Untangling developmental relations between depressed mood and delinquency in male adolescents. *Journal of Abnormal Child Psychology, 31*(3), 247–266. <https://doi.org/10.1023/A:1023225428957>

Blair, R. J. R. (1995). A cognitive developmental approach to morality: investigating the psychopath. *Cognition, 57*, 1–29.

Block, J. H. (1983). Differential Premises Arising from Differential Socialization of the Sexes : Some Conjectures. *Child Development, 54*(6), 1335–1354.

Blonigen, D. M., Hicks, B. M., Krueger, R. F., Patrick, C. J., & Iacono, W. G. (2006). Continuity and Change in Psychopathic Traits as Measured Via Normal-Range Personality: A Longitudinal – Biometric Study. *Journal of Abnormal Psychology, 115*(1), 85–95. <https://doi.org/10.1037/0021-843X.115.1.85>

- Boivin, M., Poulin, F., & Vitaro, F. (1994). Depressed mood and peer rejection in childhood. *Development and Psychopathology*, 6(3), 483–498.  
<https://doi.org/10.1017/S0954579400006064>
- Brazil, I. A., van Dongen, J. D. M., Maes, J. H. R., Mars, R. B., & Baskin-Sommers, A. R. (2018). Classification and treatment of antisocial individuals: From behavior to biocognition. *Neuroscience and Biobehavioral Reviews*, 91, 259–277. <https://doi.org/10.1016/j.neubiorev.2016.10.010>
- Burke, J. D., Loeber, R., & Lahey, B. B. (2007). Adolescent Conduct Disorder and Interpersonal Callousness as Predictors of Psychopathy in Young Adults of Psychopathy in Young Adults. *Journal of Clinical Child and Adolescent Psychology*, 36(3), 334–346. <https://doi.org/10.1080/15374410701444223>
- Burke, J. D., Loeber, R., Lahey, B. B., & Rathouz, P. J. (2005). Developmental transitions among affective and behavioral disorders in adolescent boys. *Journal of Child Psychology and Psychiatry and Allied Disciplines*, 46(11), 1200–1210. <https://doi.org/10.1111/j.1469-7610.2005.00422.x>
- Burke, J., & Loeber, R. (2010). Oppositional Defiant Disorder and the Explanation of the Comorbidity Between Behavioral Disorders and Depression. *Clinical Psychology: Science and Practice*, 17(4), 319–326.  
<https://doi.org/10.1111/j.1468-2850.2010.01223.x>
- Butler, S., Baruch, G., Hickey, N., & Fonagy, P. (2011). A Randomized Controlled Trial of Multisystemic Therapy and a Statutory Therapeutic Intervention for Young Offenders. *Journal of the American Academy of Child & Adolescent Psychiatry*, 50(12), 1220–1235. <https://doi.org/10.1016/j.jaac.2011.09.017>
- Capaldi, D. M. (1992). Co-occurrence of conduct problems and depressive symptoms in early adolescent boys: II. A 2-year follow-up at Grade 8.

*Development and Psychopathology*, 4(01), 125.

<https://doi.org/10.1017/S0954579400005605>

Cecil, C. A. M., Mccrory, E. J., Barker, E. D., Guiney, J., & Viding, E. (2017).

Characterising youth with callous-unemotional traits and concurrent anxiety: evidence for a high-risk clinical group. *European Child & Adolescent Psychiatry*. <https://doi.org/10.1007/s00787-017-1086-8>

Cleckley, H. (1941). *The Mask of Sanity: an Attempt to Reinterpret the So-called Psychopathic Personality*. Mosby, Oxford, England.

Cohn, A. M., & Adesman, A. (2015). Oppositional defiant disorder and conduct

disorder. In L. A. Adler, T. J. Spencer, & T. E. Wilens (Eds.), *Attention-Deficit Hyperactivity Disorder in Adults and Children* (pp. 139–149). Cambridge:

Cambridge University Press. <https://doi.org/10.1017/CBO9781139035491.013>

Colins, O. F., & Andershed, H. (2015). The DSM-5 With Limited Prosocial Emotions Specifier for Conduct Disorder Among Detained Girls. *Law and Human Behavior*, 39(2), 198–207.

Copeland, W. E., Shanahan, L., Costello, J. E., & Angold, A. (2009). Childhood and adolescent psychiatric disorders as predictors of young adult disorders.

*Archives of General Psychiatry*, 66(7), 764–772. Retrieved from

[http://linker.worldcat.org/?ft.institution\\_id=129658&spage=764&pkgName=amassocathens&issn=0003-](http://linker.worldcat.org/?ft.institution_id=129658&spage=764&pkgName=amassocathens&issn=0003-990X&linkclass=to_article&jKey=archpsyc&issue=7&provider=silverchair&date=2009-07&aurlast=Copeland+W.E.%3B+Costello+E.J.%3B+Angold+A.%3B+Shanahan+L.&atitle=Chil)

[990X&linkclass=to\\_article&jKey=archpsyc&issue=7&provider=silverchair&date=2009-](http://linker.worldcat.org/?ft.institution_id=129658&spage=764&pkgName=amassocathens&issn=0003-990X&linkclass=to_article&jKey=archpsyc&issue=7&provider=silverchair&date=2009-07&aurlast=Copeland+W.E.%3B+Costello+E.J.%3B+Angold+A.%3B+Shanahan+L.&atitle=Chil)

[07&aurlast=Copeland+W.E.%3B+Costello+E.J.%3B+Angold+A.%3B+Shanahan+L.&atitle=Chil](http://linker.worldcat.org/?ft.institution_id=129658&spage=764&pkgName=amassocathens&issn=0003-990X&linkclass=to_article&jKey=archpsyc&issue=7&provider=silverchair&date=2009-07&aurlast=Copeland+W.E.%3B+Costello+E.J.%3B+Angold+A.%3B+Shanahan+L.&atitle=Chil)

Costello, J. E., Mustillo, S., Erkanli, A., Keeler, G., & Angold, A. (2003). Prevalence

and development of psychiatric disorders in childhood and adolescence.

*Archives of General Psychiatry*, 60, 837–844.

<https://doi.org/10.1001/archpsyc.60.8.837>

Côté, S. M., Orri, M., Brendgen, M., Vitaro, F., Boivin, M., Japel, C., ... Tremblay, R.

E. (2017). Psychometric properties of the Mental Health and Social Inadaptation Assessment for Adolescents (MIA) in a population-based sample.

*International Journal of Methods in Psychiatric Research*, 26(4), 1–10.

<https://doi.org/10.1016/j.compag.2005.01.003>

Dadds, M. R., Perry, Y., Hawes, D. J., Merz, S., Riddell, A. C., Haines, D. J., ...

Abeygunawardane, A. I. (2006). Attention to the eyes and fear-recognition deficits in child psychopathy. *British Journal of Psychiatry*, 189, 280–281.

Dadds, M. R., & Salmon, K. (2003). Punishment Insensitivity and Parenting:

Temperament and Learning as Interacting Risks for Antisocial Behavior.

*Clinical Child and Family Psychology Review*, 6(2), 69–86.

De Sanctis, V. A., Trampush, J. W., Harty, S. C., Marks, D. J., Newcorn, J. H.,

Miller, C. J., ... Halperin, J. M. (2008). Childhood Maltreatment and Conduct Disorder : Independent Predictors of Adolescent Substance Use Disorders in Youth with Attention Deficit / Hyperactivity Disorder Childhood Maltreatment and Conduct Disorder: Independent Predictors of Adolescent Substance.

*Journal of Clinical Child & Adolescent Psychology*, 37(4), 785–793.

<https://doi.org/10.1080/15374410802359650>

Defoe, I. N., Farrington, D. P., & Loeber, R. (2013). Disentangling the relationship

between delinquency and hyperactivity, low achievement, depression, and low socioeconomic status: Analysis of repeated longitudinal data. *Journal of*

*Criminal Justice*, 41(2), 100–107. <https://doi.org/10.1016/j.jcrimjus.2012.12.002>

- Dishion, T. J., McCord, J., & Poulin, F. (1999). When Interventions Harm: Peer Groups and Problem Behavior. *American Psychologist*, *54*(9), 755–764.
- DuPaul, G. J., Volpe, R. J., Jitendra, A. K., Lutz, J. G., Lorah, K. S., & Gruber, R. (2004). Elementary school students with AD / HD : predictors of academic achievement. *Journal of School Psychology*, *42*, 285–301.  
<https://doi.org/10.1016/j.jsp.2004.05.001>
- Einat, T., & Einat, A. (2008). Learning disabilities and delinquency: A Study of Israeli Prison Inmates. *International Journal of Offender Therapy and Comparative Criminology*, *52*(4), 416–434.
- Eisenberg, N., & Lennon, R. (1983). Sex Differences in Empathy and Related Capacities. *Psychological Bulletin*, *94*(1), 100–131.  
<https://doi.org/10.1037/0033-2909.94.1.100>
- Erhardt, D., & Hinshaw, S. P. (1994). Initial Sociometric Impressions of Attention-Deficit Hyperactivity Disorder and Comparison Boys: Predictions From Social Behaviors and From Nonbehavioral Variables. *Journal of Consulting and Clinical Psychology*, *62*(4), 833–842.
- Essau, C. A., Sasagawa, S., & Frick, P. J. (2006). Callous-Unemotional Traits in a Community Sample of Adolescents. *Assessment*, *13*(4), 454–469.  
<https://doi.org/10.1177/1073191106287354>
- Euler, F., Jenkel, N., Stadler, C., Schmeck, K., Fegert, J. M., Kölch, M., & Schmid, M. (2015). Variants of Girls and Boys with Conduct Disorder: Anxiety Symptoms and Callous-Unemotional Traits. *Journal of Abnormal Child Psychology*, *43*(4), 773–785. <https://doi.org/10.1007/s10802-014-9946-x>
- Fagan, A. A., & Western, J. (2003). Gender Differences in the Relationship between Offending, Self-harm and Depression in Adolescence and Young Adulthood.

*Australian and New Zealand Journal of Criminology*, 36(3), 320–337.

<https://doi.org/10.1375/acri.36.3.320>

Fairchild, G., Goozen, S. H. M. Van, Calder, A. J., & Goodyer, I. M. (2013).

Research Review: Evaluating and reformulating the developmental taxonomic theory of antisocial behaviour. *Journal of Child Psychology and Psychiatry*, 54(9), 924–940. <https://doi.org/10.1111/jcpp.12102>

Fergusson, D. M., Horwood, L. J., & Ridder, E. M. (2005). Show me the child at seven: the consequences of conduct problems in childhood for psychosocial functioning in adulthood. *Journal of Child Psychology and Psychiatry*, 46(8), 837–849. <https://doi.org/10.1111/j.1469-7610.2004.00387.x>

Fergusson, D. M., Lynskey, M. T., & Horwood, L. J. (1996). Origins of Comorbidity between Conduct and Affective Disorders. *Journal of the American Academy of Child & Adolescent Psychiatry*, 35(4), 451–460. <https://doi.org/10.1097/00004583-199604000-00011>

Fombonne, E., Wostear, G., Cooper, V., Harrington, R., & Rutter, M. (2001). The Maudsley long-term follow-up of child and adolescent depression: II. Suicidality, criminality and social dysfunction in adulthood. *British Journal of Psychiatry*, 179(03), 210–217. <https://doi.org/10.4088/JCP.11m07246>

Fontaine, N. M. G., Brendgen, M., Vitaro, F., Boivin, M., Tremblay, R. E., & Côté, S. M. (2018). Longitudinal associations between delinquency, depression and anxiety symptoms in adolescence: Testing the moderating effect of sex and family socioeconomic status. *Journal of Criminal Justice*, (September), 1–8. <https://doi.org/10.1016/j.jcrimjus.2018.09.007>

Fontaine, N. M. G., Rijdsdijk, F. V., McCrory, E. J., & Viding, E. (2010). Etiology of Different Developmental Trajectories of Callous-Unemotional Traits. *Journal of*

*the American Academy of Child & Adolescent Psychiatry*, 49(7), 656–664.

<https://doi.org/10.1016/j.jaac.2010.03.014>

Fowles, D. C. (1980). The three arousal model: implications of Gray's two-factor learning theory for heart rate electrodermal activity, and psychopathy.

*Psychophysiology*, 17, 87–104.

Freitag, C. M., Konrad, K., Stadler, C., Brito, S. A. De, Popma, A., Herpertz, S. C., ... Andreas, K. (2018). Conduct disorder in adolescent females: current state of research and study design of the FemNAT-CD consortium. *European Child & Adolescent Psychiatry*, 27(9), 1077–1093. <https://doi.org/10.1007/s00787-018-1172-6>

Frick, P. J. (2003). *The Inventory of Callous-Unemotional Traits*. University of New Orleans.

Frick, P. J. (2012). Developmental Pathways to Conduct Disorder: Implications for Future Directions in Research, Assessment, and Treatment Developmental Pathways to Conduct Disorder: Implications for Future Directions in Research, Assessment, and Treatment. *Journal of Clinical Child & Adolescent Psychology*, 41(3), 378–389. <https://doi.org/10.1080/15374416.2012.664815>

Frick, P. J., Cornell, A. H., Barry, C. T., Bodin, D. S., Dane, H. E., Bodin, S. D., & Dane, H. E. (2003). Callous-Unemotional Traits and Conduct Problems in the Prediction of Conduct Problem Severity, Aggression, and Self-Report of Delinquency. *Journal of Abnormal Child Psychology*, 31(4), 1–25.

Frick, P. J., & Dickens, C. (2006). Current Perspectives on Conduct Disorder. *Current Psychiatry Reports*, 8(1), 59\*72.

Frick, P. J., Lilienfeld, S. O., Ellis, M., Loney, B., & Silverthorn, P. (1999). The association between anxiety and psychopathy dimensions in children. *Journal*

*of Abnormal Child Psychology*, 27(5), 383–392.

<https://doi.org/10.1023/A:1021928018403>

Frick, P. J., Ray, J. V, Thornton, L. C., & Kahn, R. E. (2014). Can Callous-Unemotional Traits Enhance the Understanding , Diagnosis , and Treatment of Serious Conduct Problems in Children and Adolescents ? A Comprehensive Review. *Psychological Bulletin*, 140(1), 1–57. <https://doi.org/10.1037/a0033076>

Frick, P. J., Stickle, T. R., Dandreaux, D. M., Farrell, J. M., & Kimonis, E. R. (2005). Callous-Unemotional Traits in Predicting the Severity and Stability of Conduct Problems and Delinquency. *Journal of Abnormal Child Psychology*, 33(4), 471–487. <https://doi.org/10.1007/s10648-005-5728-9>

Frick, P. J., & Viding, E. (2009). Antisocial behavior from a developmental psychopathology perspective. *Development and Psychopathology*, 21, 1111–1131. <https://doi.org/10.1017/S0954579409990071>

Frick, P. J., & White, S. F. (2008). Research Review : The importance of callous-unemotional traits for developmental models of aggressive and antisocial behavior. *Journal of Child Psychology and Psychiatry*, 49(4), 359–375. <https://doi.org/10.1111/j.1469-7610.2007.01862.x>

Gershon, J. (2002). Meta-Analytic Review of Gender Differences in ADHD. *Journal of Attention Disorders*, 5(3), 143–154.

Giannotta, F., & Rydell, A.-M. (2016). The Prospective Links Between Hyperactive/Impulsive, Inattentive, and Oppositional-Defiant Behaviors in Childhood and Antisocial Behavior in Adolescence: The Moderating Influence of Gender and the Parent-Child Relationship Quality. *Child Psychiatry & Human Development*, 47(6), 857–870. <https://doi.org/10.1007/s10578-015-0617-0>

- Goodwin, R. D., & Hamilton, S. P. (2003). Lifetime comorbidity of antisocial personality disorder and anxiety disorders among adults in the community. *Psychiatry Research*, *117*(2), 159–166. [https://doi.org/10.1016/S0165-1781\(02\)00320-7](https://doi.org/10.1016/S0165-1781(02)00320-7)
- Gray, J. A. (1970). The psychophysiological basis of introversion-extraversion. *Behaviour Research and Therapy*, *8*(3), 249–266.
- Gresham, F. M., Macmillan, D. L., Bocian, K. M., Ward, S. L., & Forness, S. R. (1998). Comorbidity of Hyperactivity-Impulsivity-Inattention and Conduct Problems: Risk Factors in Social, Affective, and Academic Domains. *Journal of Abnormal Child Psychology*, *26*(5), 393–406.
- Guelker, M. D., Barry, C. T., Barry, T. D., & Malkin, M. L. (2014). Perceived positive outcomes as a mediator between adolescent callous-unemotional traits and antisocial behavior. *Personality and Individual Differences*, *69*, 129–134. <https://doi.org/10.1016/j.paid.2014.05.029>
- Harold, G. T., Leve, L. D., Barrett, D., Elam, K., Neiderhiser, J. M., Natsuaki, M. N., ... Thapar, A. (2013). Biological and rearing mother influences on child ADHD symptoms: revisiting the developmental interface between nature and nurture. *Journal of Child Psychology and Psychiatry*, *54*(10), 1038–1046. <https://doi.org/10.1111/jcpp.12100>
- Hawes, D. J., Dadds, M. R., Hawes, D. J., & Dadds, M. R. (2007). Stability and Malleability of Callous-Unemotional Traits During Treatment for Childhood Conduct Problems. *Journal of Clinical Child and Adolescent Psychology*, *36*(3), 347–355. <https://doi.org/10.1080/15374410701444298>
- Hinshaw, S. P. (2002). Preadolescent Girls With Attention-Deficit/Hyperactivity

Disorder: I. Background Characteristics, Comorbidity, Cognitive and Social Functioning, and Parenting Practices. *Journal of Consulting and Clinical Psychology*, 70(5), 1086–1098. <https://doi.org/10.1037//0022-006X.70.5.1086>

Hinshaw, S. P., & Blachman, D. R. (2005). Attention-Deficit/Hyperactivity Disorder in Girls. In D. J. Bell, S. L. Foster, & E. J. Mash (Eds.), *Handbook of Behavioral and Emotional Problems in Girls* (pp. 117–147). New York: Kluwer Academic/Plenum Publishers.

Hinshaw, S. P., Carte, E. T., Sami, N., Treuting, J. J., & Zupan, B. A. (2002). Preadolescent girls with attention-deficit/hyperactivity disorder: II. Neuropsychological performance in relation to subtypes and individual classification. *Journal of Consulting and Clinical Psychology*, 70(5), 1099–1111. <https://doi.org/10.1037/0022-006X.70.5.1099>

Hipwell, A. E., Pardini, D. A., Loeber, R., Sembover, M., & Stouthamer-Loeber, M. (2007). Callous-Unemotional Behaviors in Young Girls : Shared and Unique Effects Relative to Conduct Problems Callous-Unemotional Behaviors in Young Girls : Shared and Unique Effects Relative to Conduct Problems. *Journal of Clinical Child and Adolescent Psychology*, 36(3), 293–304. <https://doi.org/10.1080/15374410701444165>

Hobson, C. W., Scott, S., & Rubia, K. (2011). Investigation of cool and hot executive function in ODD / CD independently of ADHD. *Journal of Child Psychology and Psychiatry*, 52(10), 1035–1043. <https://doi.org/10.1111/j.1469-7610.2011.02454.x>

Hodgins, S., de Brito, S., Simonoff, E., Vloet, T., & Viding, E. (2009). Getting the phenotypes right: An essential ingredient for understanding aetiological mechanisms underlying persistent violence and developing effective treatments. *Frontiers in Behavioral Neuroscience*, 3(November), 1–10.

<https://doi.org/10.3389/neuro.08.044.2009>

Hofstra, M. B., Van Der Ende, J., & Verhulst, F. C. (2002). Child and Adolescent Problems Predict DSM-IV Disorders in Adulthood: A 14-Year Follow-up of a Dutch Epidemiological Sample. *Journal of the American Academy of Child and Adolescent Psychiatry*, 41(2), 182–189. <https://doi.org/10.1097/00004583-200202000-00012>

Hoza, B., Mrug, S., Gerdes, A. C., Hinshaw, S. P., Bukowski, W. M., Gold, J. A., ... Arnold, L. E. (2005). What Aspects of Peer Relationships Are Impaired in Children With Attention-Deficit / Hyperactivity Disorder ? *Journal of Consulting and Clinical Psychology*, 73(3), 411–423. <https://doi.org/10.1037/0022-006X.73.3.411>

Ialongo, N., Edelsohn, G., Werthamer-Larsson, L., Crockett, L., & Kellam, S. (1994). The Significance of Self-Reported Anxious Symptoms in First-Grade Children. *Journal of Abnormal Child Psychology*, 22(4), 441–455.

Kahn, R. E., Frick, P. J., Youngstrom, E. A., Youngstrom, J. K., Feeny, N. C., & Findling, R. L. (2013). Distinguishing primary and secondary variants of callous-unemotional traits among adolescents in a clinic-referred sample. *Psychological Assessment*, 25(3), 966–978. <https://doi.org/10.1037/a0032880>

Kahn, R. E., Frick, P. J., Youngstrom, E., Findling, R. L., & Youngstrom, J. K. (2012). The effects of including a callous-unemotional specifier for the diagnosis of conduct disorder. *Journal of Child Psychology and Psychiatry*, 53(3), 271–282. <https://doi.org/10.1111/j.1469-7610.2011.02463.x>

Karpman, B. (1941). On the need of separating psychopathy into two distinct clinical types: the symptomatic and the idiopathic. *Journal of Criminal Psychopathology*, 3, 112–137.

- Keenan, K., Feng, X., Babinski, D., Hipwell, A., Hinze, A., Loeber, R., & Stouthamer-Loeber, M. (2011). Developmental Comorbidity of Depression and Conduct Problems in Girls. In M. Kerr, H. Stattin, R. C. M. E. Engels, G. Overbeek, & A.-K. Andershed (Eds.), *Understanding Girls' Problem Behavior* (pp. 117–137). Chichester, UK: John Wiley & Sons, Ltd.  
<https://doi.org/10.1002/9780470977453.ch5>
- Kiesner, J. (2003). Depressive Symptoms in Early Adolescence: Their Relations with Classroom Problem Behavior and Peer Status. *Journal of Research on Adolescence*, 12(4), 463–478. <https://doi.org/10.1111/1532-7795.00042>
- Kimonis, E. R., & Frick, P. J. (2010). Etiology of Oppositional Defiant Disorder and Conduct Disorder: Biological, Familial and Environmental Factors Identified in the Development of Disruptive Behavior Disorders. In R. C. Murrihy, A. D. Kidman, & T. H. Ollendick (Eds.), *Clinical Handbook of Assessing and Treating Conduct Problems in Youth* (pp. 49–76). Springer. <https://doi.org/10.1007/978-1-4419-6297-3>
- Klein, R. G., Mannuzza, S., Hutchison, J. A., Lashua, E. C., & Castellanos, F. X. (2012). Clinical and Functional Outcome of Childhood Attention-Deficit/Hyperactivity Disorder 33 Years Later. *Archives of General Psychiatry*, 69(12), 1295–1303. <https://doi.org/10.1001/archgenpsychiatry.2012.271>
- Kochanska, G. (1993). Toward a Synthesis of Parental Socialization and Child Temperament in Early Development of Conscience. *Child Development*, 64(2), 325–347.
- Kovacs, M., Paulauskas, S., Gatsonis, C., & Richards, C. (1988). Depressive disorders in childhood III. A longitudinal study of comorbidity with and risk for conduct disorders. *Journal of Affective Disorders*, 15(3), 205–217.  
[https://doi.org/10.1016/0165-0327\(88\)90018-3](https://doi.org/10.1016/0165-0327(88)90018-3)

- Krueger, R. F. (1999). The structure of common mental disorders. *Archives of General Psychiatry*, 56(10), 921–926.  
<https://doi.org/10.1001/archpsyc.56.10.921>
- Kuja-Halkola, R., Lichtenstein, P., D’Onofrio, B. M., & Larsson, H. (2015). Codevelopment of ADHD and externalizing behavior from childhood to adulthood. *Journal of Child Psychology and Psychiatry*, 6, 640–647.  
<https://doi.org/10.1111/jcpp.12340>
- Larsson, H., Andershed, H., & Lichtenstein, P. (2006). A Genetic Factor Explains Most of the Variation in the Psychopathic Personality. *Journal of Abnormal Psychology*, 115(2), 221–230. <https://doi.org/10.1037/0021-843X.115.2.221>
- Lehto-Salo, P., Närhi, V., Ahonen, T., & Marttunen, M. (2009). Psychiatric comorbidity more common among adolescent females with CD/ODD than among males. *Nordic Journal of Psychiatry*, 63(4), 308–315.  
<https://doi.org/10.1080/08039480902730615>
- Lewinsohn, P. M., Gotlib, I. H., Lewinsohn, M., Lewinsohn, P. M., Seeley, J. R., & Allen, N. B. (1998). Gender Differences in Anxiety Disorders and Anxiety Symptoms in Adolescents. *Journal of Abnormal Psychology*, 107(1), 109–117.
- Loeber, R., Burke, J. D., Lahey, B. B., Winters, A., & Zera, M. (2000). Oppositional Defiant and Conduct Disorder: A Review of the Past 10 Years, Part I. *Journal of the American Academy of Child & Adolescent Psychiatry*, 39(12), 1468–1484. <https://doi.org/10.1097/00004583-200012000-00007>
- Lykken, D. T. (1995). *The Antisocial Personalities*. Hillsdale, NJ: Lawrence Erlbaum Associates.
- Lynam, D. R., Caspi, A., Moffitt, T. E., Loeber, R., & Novak, S. (2000). The Interaction Between Impulsivity and Neighborhood Context on Offending : The

Effects of Impulsivity Are Stronger in Poorer Neighborhoods. *Journal of Abnormal Psychology*, 109(4), 563–574. <https://doi.org/10.1037//0021-843X.109.4.563>

Lynam, D. R., Caspi, A., Moffitt, T. E., Loeber, R., & Stouthamer-Loeber, M. (2007). Longitudinal Evidence That Psychopathy Scores in Early Adolescence Predict Adult Psychopathy. *Journal of Abnormal Child Psychology*, 116(1), 155–165. <https://doi.org/10.1037/0021-843X.116.1.155>

Mannuzza, S., Klein, R. G., Bessler, A., Malloy, P., & Lapadula, M. (1998). Adult Psychiatric Status of Hyperactive Boys Grown Up. *American Journal of Psychiatry*, 155(4), 493–498.

Marsh, A. A., Finger, E. C., Schechter, J. C., Jurkowitz, I. T. N., Reid, M. E., & Blair, R. J. R. (2011). Adolescents with psychopathic traits report reductions in physiological responses to fear. *Journal of Child Psychology and Psychiatry*, 52(8), 834–841. <https://doi.org/10.1111/j.1469-7610.2010.02353.x>

Maughan, B., Rowe, R., Messer, J., Goodman, R., & Meltzer, H. (2004). Conduct Disorder and Oppositional Defiant Disorder in a national sample: developmental epidemiology. *Journal of Child Psychology and Psychiatry*, 45(3), 609–621.

McCarty, C. A., Mason, W. A., Kosterman, R., Hawkins, J. D., Lengua, L. J., & McCauley, E. (2008). Adolescent School Failure Predicts Later Depression Among Girls. *Journal of Adolescent Health*, 43(2), 180–187. <https://doi.org/10.1016/j.jadohealth.2008.01.023>

McDonald, R., Dodson, M. C., Rosenfield, D., & Jouriles, E. N. (2011). Effects of a Parenting Intervention on Features of Psychopathy in Children. *Journal of Abnormal Child Psychology*, 39, 1013–1023. <https://doi.org/10.1007/s10802-011-9512-8>

- McLean, C. P., Asnaani, A., Litz, B. T., & Hofmann, S. G. (2011). Gender differences in anxiety disorders : Prevalence , course of illness , comorbidity and burden of illness. *Journal of Psychiatric Research*, *45*(8), 1027–1035.  
<https://doi.org/10.1016/j.jpsychires.2011.03.006>
- Meehan, A. J., Maughan, B., Cecil, C. A. M., & Barker, E. D. (2017). Interpersonal callousness and co-occurring anxiety: Developmental validity of an adolescent taxonomy. *Journal of Abnormal Psychology*, *126*(2), 225–236.  
<https://doi.org/10.1037/abn0000235>
- Meier, M. H., Slutske, W. S., Heath, A. C., & Martin, N. G. (2009). The Role of Harsh Discipline in Explaining Sex Differences in Conduct Disorder: a Study of Opposite-Sex Twin Pairs. *Journal of Abnormal Child Psychology*, *37*, 653–664.
- Mental Health Foundation. (2016). *Fundamental Facts About Mental Health 2016*. London.
- Moffitt, T., Caspi, A., Rutter, M., & Silva, P. A. (2001). *Sex Differences in Antisocial Behaviour: Conduct Disorder, Delinquency, and Violence in the Dunedin Longitudinal Study*. Cambridge University Press.  
<https://doi.org/10.1017/CBO9780511490057>
- Moffitt, T. E., Caspi, A., Harrington, H., & Milne, B. J. (2002). Males on the life-course-persistent and adolescence-limited pathways: Follow-up at age 26 years. *Development and Psychopathology*, *14*, 179–207.  
<https://doi.org/10.1017/S0954579402001104>
- Moffitt, T. E., & Scott, S. (2008). Conduct Disorders of Childhood and Adolescence. In M. Rutter, D. V. M. Bishop, D. S. Pine, S. Scott, J. Stevenson, E. Taylor, & A. Thapar (Eds.), *Rutter's Child and Adolescent Psychiatry* (5th ed., pp. 543–564). Blackwell.

- Mordre, M., Groholt, B., Kjelsberg, E., Sandstad, B., & Myhre, A. M. (2011). The impact of ADHD and conduct disorder in childhood on adult delinquency: A 30 years follow-up study using official crime records. *BMC Psychiatry, 11*(57).
- Morrow, M. T., Hubbard, J. A., Dearing, K. F., McAuliffe, M. D., & Rubin, R. M. (2006). Childhood aggression, depressive symptoms, and peer rejection: The mediational model revisited. *International Journal of Behavioral Development, 30*(3), 240–248. <https://doi.org/10.1177/0165025406066757>
- Odgers, C. L., Caspi, A., Russell, M. A., Sampson, R. J., Arseneault, L., & Moffitt, T. E. (2012). Supportive parenting mediates neighborhood socioeconomic disparities in children ' s antisocial behavior from ages 5 to 12. *Development and Psychopathology, 24*, 705–721. <https://doi.org/10.1017/S0954579412000326>
- Ollendick, T. H., King, N. J., & Frary, R. B. (1989). Fears in children and adolescents: reliability and generalizability across gender, age and nationality. *Behaviour Research and Therapy, 27*(1), 19–26.
- Olsson, M. (2009). DSM diagnosis of conduct disorder (CD) - A review, 9488(Cd). <https://doi.org/10.1080/08039480802626939>
- Overbeek, G., Vollebergh, W., Meeus, W., Engels, R., & Luijpers, E. (2001). Course, Co-Occurrence, and Longitudinal Associations of Emotional Disturbance and Delinquency from Adolescence to Young Adulthood: A Six-Year Three-Wave Study. *Journal of Youth and Adolescence, 30*(4), 401–426. <https://doi.org/10.1023/A:1010441131941>
- Paquette Boots, D., Wareham, J., & Weir, H. (2011). Gendered Perspectives On Depression and Antisocial Behaviors: An Extension of the Failure Model in Adolescents. *Criminal Justice and Behavior, 38*(1), 63–84.

<https://doi.org/10.1177/0093854810388504>

Patterson, G. R., & Capaldi, D. M. (1990). A mediational model for boys' depressed mood. In J. Rolf, A. S. Masten, D. Cicchetti, K. H. Nuchterlein, & S. Weintraub (Eds.), *Risk and protective factors in the development of psychopathology* (pp. 141–163). Cambridge: Cambridge University Press.

<https://doi.org/http://dx.doi.org/10.1017/CBO9780511752872.010>

Pfeffer, C. R., & Plutchik, R. (1989). Co-occurrence of psychiatric disorders in child psychiatric patients and nonpatients: a circumplex model. *Comprehensive Psychiatry*, *30*(4), 275–282.

Pihet, S., Etter, S., Schmid, M., & Kimonis, E. R. (2015). Assessing Callous-Unemotional Traits in Adolescents: Validity of the Inventory of Callous-Unemotional Traits Across Gender, Age, and Community/Institutionalized Status. *Journal of Psychopathology and Behavioral Assessment*, *37*(3), 407–421. <https://doi.org/10.1007/s10862-014-9472-8>

Pine, D. S., & Klein, R. G. (2015). Anxiety disorders. In A. Thapar, D. S. Spine, J. F. Leckman, S. Scott, M. J. Snowling, & E. Taylor (Eds.), *Rutter's Child and Adolescent Psychiatry* (6th ed., pp. 822–840). Wiley.

Polanczyk, G., Silva de Lima, M., Horta, B. L., Biederman, J., & Rohde, L. A. (2007). The Worldwide Prevalence of ADHD: A Systematic Review and Metaregression Analysis. *American Journal of Psychiatry*, *164*(6), 942–948.

Polier, Georg G., Vloet, T. D., Herpertz-Dahlmann, B., Laurens, K. R., & Hodgins, S. (2012). Comorbidity of conduct disorder symptoms and internalizing problems in children: Investigating a community and a clinical sample. *European Child and Adolescent Psychiatry*, *21*(1), 31–38. <https://doi.org/10.1007/s00787-011-0229-6>

- Ritakallio, M., Koivisto, A. M., von der Pahlen, B., Pelkonen, M., Marttunen, M., & Kaltiala-Heino, R. (2008). Continuity, comorbidity and longitudinal associations between depression and antisocial behaviour in middle adolescence: A 2-year prospective follow-up study. *Journal of Adolescence*, *31*(3), 355–370.  
<https://doi.org/10.1016/j.adolescence.2007.06.006>
- Roose, A., Bijttebier, P., Oord, S. Van Der, Claes, L., & Lilienfeld, S. O. (2013). Psychopathic Traits in Youth and Associations with Temperamental Features: Results from a Performance-Based Measure. *Journal of Individual Differences*, *34*(1), 1–7. <https://doi.org/10.1027/1614-0001/a000090>
- Roza, S. J., Hofstra, M. B., van der Ende, J., & Verhulst, F. C. (2003). Stable Prediction of Mood and Anxiety Disorders Based on Behavioral and Emotional Problems in Childhood: A 14-Year Follow-Up During Childhood, Adolescence, and Young Adulthood. *American Journal of Psychiatry*, *160*, 2116–2121.
- Russell, G., Rodgers, L. R., Ukoumunne, O. C., & Ford, T. (2014). Prevalence of Parent-Reported ASD and ADHD in the UK: Findings from the Millennium Cohort Study. *Journal of Autism and Developmental Disorders*, *44*(31), 31–40.  
<https://doi.org/10.1007/s10803-013-1849-0>
- Russo, M. F., & Beidel, D. C. (1994). Comorbidity of childhood anxiety and externalizing disorders: Prevalence, associated characteristics, and validation issues. *Clinical Psychology Review*, *14*(3), 199–221.  
[https://doi.org/10.1016/0272-7358\(94\)90008-6](https://doi.org/10.1016/0272-7358(94)90008-6)
- Scott, S. (2015). Oppositional and conduct disorders. In A. Thapar, D. S. Spine, J. F. Leckman, S. Scott, M. J. Snowling, & E. Taylor (Eds.), *Rutter's Child and Adolescent Psychiatry* (6th ed., pp. 913–930). Wiley.
- Skeem, J. L., Polaschek, D. L. L., Patrick, C. J., & Lilienfeld, S. O. (2011).

Psychopathic Personality: Bridging the Gap Between Scientific Evidence and Public Policy. *Psychological Science in the Public Interest*, 12(3), 95–162.

Somech, L. Y., & Elizur, Y. (2012). Cooperation in Pre-Kindergarten Children With Conduct Problems : A Randomized Controlled Trial. *Journal of the American Academy of Child & Adolescent Psychiatry*, 51(4), 412–422.  
<https://doi.org/10.1016/j.jaac.2012.01.019>

Sourander, A., Jensen, P., Davies, M., Niemelä, S., Elonheimo, H., Ristkari, T., ... Almqvist, F. (2007). Who is at greatest risk of adverse long-term outcomes? The Finnish from a boy to a man study. *Journal of the American Academy of Child and Adolescent Psychiatry*, 46(9), 1148–1161.  
<https://doi.org/10.1097/chi.0b013e31809861e9>

Speltz, M. L., McClellan, J., Deklyen, M., & Jones, K. (1999). Preschool boys with oppositional defiant disorder: Clinical presentation and diagnostic change. *Journal of the American Academy of Child and Adolescent Psychiatry*, 38(7), 838–845. <https://doi.org/10.1097/00004583-199907000-00013>

Taylor, E., Chadwick, O., Heptinstall, E., & Danckaerts, M. (1996). Hyperactivity and Conduct Problems as Risk Factors for Adolescent Development. *Journal of the American Academy of Child & Adolescent Psychiatry*, 35(9), 1213–1226.  
<https://doi.org/10.1097/00004583-199609000-00019>

Taylor, J., Loney, B. R., Bobadilla, L., Iacono, W. G., & McGue, M. (2003). Genetic and Environmental Influences on Psychopathy Trait Dimensions in a Community Sample of Male Twins. *Journal of Abnormal Child Psychology*, 31(6), 633–645.

Thapar, A., & van Goozen, S. (2018). Conduct disorder in ADHD. In T. Banaschewski, D. Coghill, & A. Zuddas (Eds.), *Oxford Textbook of Attention*

*Deficit Hyperactivity Disorder* (Vol. 1, pp. 1–17). Oxford University Press.

<https://doi.org/10.1093/med/9780198739258.003.0020>

Thornton, L. C., Frick, P. J., Crapanzano, A. M., Terranova, A. M., & Austin, S. F.

(2013). The Incremental Utility of Callous-Unemotional Traits and Conduct Problems in Predicting Aggression and Bullying in a Community Sample of Boys and Girls. *Psychological Assessment*, 25(2), 366–378.

<https://doi.org/10.1037/a0031153>

Trentacosta, C. J., & Shaw, D. S. (2009). Journal of Applied Developmental

Psychology Emotional self-regulation, peer rejection, and antisocial behavior: Developmental associations from early childhood to early adolescence. *Journal of Applied Developmental Psychology*, 30(3), 356–365.

<https://doi.org/10.1016/j.appdev.2008.12.016>

Tung, I., Li, J. J., Meza, J. I., Jezior, K. L., Jessica, S. V., Hentschel, P. G., ... Lee, S.

S. (2016). Patterns of Comorbidity Among Girls With ADHD : A Meta-analysis. *Pediatrics*, 138(4). <https://doi.org/10.1542/peds.2016-0430>

Viding, E., Blair, R. J. R., Moffitt, T. E., & Plomin, R. (2005). Evidence for substantial

genetic risk for psychopathy in 7-year-olds. *Journal of Child Psychology and Psychiatry*, 46(6), 592–597. <https://doi.org/10.1111/j.1469-7610.2004.00393.x>

Viding, E., Fontaine, N. M. G., & McCrory, E. J. (2012). Antisocial behaviour in

children with and without callous-unemotional traits. *Journal of the Royal Society of Medicine*, 105, 195–200. <https://doi.org/10.1258/jrsm.2011.110223>

Viding, E., & McCrory, E. (2015). Developmental risk for psychopathy. In A. Thapar,

D. S. Pine, J. F. Leckman, S. Scott, M. J. Snowling, & E. Taylor (Eds.), *Rutter's Child and Adolescent Psychiatry* (6th ed., pp. 966–980).

von Polier, G.G., Vloet, T. D., & Herpertz-Dahlmann, B. (2012). ADHD and

- Delinquency - a Developmental Perspective. *Behavioral Sciences and the Law*, 30, 121–139. <https://doi.org/10.1002/bsl.2005>
- Waschbusch, D. A. (2002). A meta-analytic examination of comorbid hyperactive-impulsive-attention problems and conduct problems. *Psychological Bulletin*, 128(1), 118–150. <https://doi.org/10.1037//0033-2909.128.1.118>
- Washburn, J. J., Romero, E. G., Welty, L. J., Abram, K. M., Teplin, L. A., McClelland, G. M., & Paskar, L. D. (2007). Development of Antisocial Personality Disorder in Detained Youths: The Predictive Value of Mental Disorders. *Journal of Consulting and Clinical Psychology*, 75(2), 221–231. <https://doi.org/10.1037/0022-006X.75.2.221>
- Wasserman, G. A., McCreynolds, L. S., Ko, S. J., Katz, L. M., & Carpenter, J. R. (2005). Gender Differences in Psychiatric Disorders at Juvenile Probation Intake, 95(1), 131–137. <https://doi.org/10.2105/AJPH.2003.024737>
- Wiesner, M. (2003). A Longitudinal Latent Variable Analysis of Reciprocal Relations between Depressive Symptoms and Delinquency during Adolescence. *Journal of Abnormal Psychology*, 112(4), 633–645. <https://doi.org/10.1037/0021-843X.112.4.633>
- Wiesner, M., & Kim, H. K. (2006). Co-occurring delinquency and depressive symptoms of adolescent boys and girls: A dual trajectory modeling approach. *Developmental Psychology*, 42(6), 1220–1235. <https://doi.org/10.1037/0012-1649.42.6.1220>
- World Health Organization. (1992). *The ICD-10 classification of mental and behavioural disorders: Clinical descriptions and diagnostic guidelines*. Geneva: World Health Organization.
- Zahn-Waxler, C. (2012). The Development of Empathy, Guilt, and Internalization of

Distress. In *Anxiety, Depression, and Emotion*.

<https://doi.org/10.1093/acprof:oso/9780195133585.001.0001>

Zahn-waxler, C., Race, E., & Duggal, S. (2005). Mood Disorders and Symptoms in Girls. In D. J. Bell, S. L. Foster, & E. J. Mash (Eds.), *Handbook of Behavioral and Emotional Problems in Girls* (pp. 25–77). New York: Kluwer Academic/Plenum Publishers.

Zoccolillo, M. (1992). Co-occurrence of Conduct Disorder and Its Adult Outcomes with Depressive and Anxiety Disorders: A Review. *Journal of the American Academy of Child & Adolescent Psychiatry*, 31(3), 547–556.

<https://doi.org/10.1097/00004583-199205000-00024>

## **Part II: Empirical Paper**

### **Sex Differences in Antisocial Behaviour: The Roles of Anxiety, Depression, Hyperactivity/Inattention and Callous-Unemotional Traits**

## Abstract

**Aims:** Antisocial behaviour is a major health and social problem which is known to affect males significantly more than females. Antisocial behaviour is also known to be highly comorbid with a number of other difficulties, including anxiety, depression, hyperactivity/inattention and callous-unemotional (CU) traits, which are themselves known to differentially affect males and females. This study aims to investigate the roles of these comorbid difficulties as risk factors for antisocial behaviour, and to examine the extent to which sex differences in these factors may account for the sex difference in antisocial behaviour.

**Method:** This study used self-report data from the Systemic Therapy for At Risk Teens (START) trial, an 18-month randomised controlled trial conducted with 683 adolescents (433 boys and 250 girls) with moderate-to-severe antisocial behaviour, to examine sex differences in the associations between each of the above difficulties and antisocial behaviour. Structural equation models were used to test these associations cross-sectionally at baseline, and cross-lagged panel models (CLPMs) were used to test longitudinal associations across the 18-month period of the trial.

**Results:** Within this sample there were no sex differences in volume of self-reported antisocial behaviour. Results showed that depression, hyperactivity/inattention and CU traits, but not anxiety, were significant predictors of self-reported antisocial behaviour at baseline. Although girls in the sample were more likely to report anxiety, depression and hyperactivity/inattention than boys, there was no moderating effect of sex on the relationship between any of the four factors examined and self-reported antisocial behaviour. Results of the CLPMs suggest that anxiety and CU traits may be more strongly associated with concurrent

antisocial behaviour for boys, while depression may be more likely to predict later antisocial behaviour for girls.

**Conclusion:** The present study suggests that overall there are more similarities than differences between boys and girls who engage in antisocial behaviour, and it is not possible to draw conclusions from these results about whether sex differences in comorbid anxiety, depression, hyperactivity/inattention or CU traits account for sex differences in antisocial behaviour in the general population. However, in line with previous research, anxiety and depression do appear to influence engagement in antisocial behaviour in different ways for boys and girls over time, suggesting that there may be different causal mechanisms operating for each sex.

## Introduction

Although it is well established that males are generally much more antisocial than females (Moffitt, Caspi, Rutter, & Silva, 2001), the specific causes behind this sex difference remain the subject of much research. Indeed, understanding this sex difference has important implications for understanding the fundamental causes of antisocial behaviour. One potential avenue for exploring this is the consideration of comorbidity. Antisocial behaviour is known to be highly comorbid with a number of other difficulties, including externalising disorders such as attention-deficit/hyperactivity (ADHD), internalising disorders such as anxiety and depression, and personality factors such as callous and unemotional (CU) traits (Angold et al., 1999; Frick & White, 2008). These comorbid difficulties are themselves known to differ in prevalence between the sexes, with ADHD and CU traits showing a male preponderance, and internalising disorders showing a female preponderance.

This study aims to investigate the roles of these comorbid difficulties as risk factors for antisocial behaviour, and to examine the extent to which sex differences in these factors account for sex differences in antisocial behaviour. It uses data from the Systemic Therapy for At Risk Teens (START) trial, an 18-month randomised controlled trial conducted with adolescents with moderate-to-severe antisocial behaviour. The known increase in prevalence in antisocial behaviour which occurs during adolescence means that studying sex differences during this period provides a unique opportunity to examine the factors which may influence antisocial behaviour. In addition to examining the associations between each of the above four factors and antisocial behaviour for boys and girls cross-sectionally at baseline, this study will also strive to understand the nature of these associations by investigating their reciprocal relationships over the 18-month period of the trial.

### *Anxiety and antisocial behaviour*

It has long been considered that there exists a relationship between anxiety and antisocial behaviour, and indeed, anxiety disorders are three times more common among young people with conduct disorder (CD) compared to those without (Angold et al., 1999). Unsurprisingly, given the higher prevalence of anxiety disorders among girls in general, this comorbidity is even more prevalent among CD girls (Euler et al., 2015). This supports the notion of a "gender paradox", whereby girls are less likely to be affected by CD, but those who are experience more severe associated difficulties. Indeed, there is evidence that among girls, comorbid anxiety is associated with more severe antisocial behaviour (Euler et al., 2015; Wasserman et al., 2005).

However, the nature of the relationship between anxiety and antisocial behaviour remains unclear. Some research has suggested that anxiety can serve as a protective factor, such that individuals who are more anxious are more likely to consider the negative consequences of their actions and therefore less likely to engage in antisocial behaviour (El Sayed et al., 2016; Pfeffer & Plutchik, 1989). On the other hand, studies have also found high levels of anxiety disorders among offenders (Hodgins, Brito, Chhabra, & Côté, 2010), and as stated above, the comorbidity between anxiety and conduct disorder in children is high. Several hypotheses have been put forward for this. Some have suggested that anxiety may be the result of the negative consequences which follow antisocial behaviour, such as social stigma, conflict in relationships, loss of employment, arrest, incarceration etc. (Frick et al., 1999). Others have suggested that different symptoms of anxiety may relate to antisocial behaviour in different ways. For example, although worry may serve as a protective factor, restlessness and impulsivity may increase the risk of engaging in antisocial behaviour (Frick et al., 1999). This relates to Karpman's (1941) hypothesis that there exist two subtypes of psychopathy: one characterised

by low levels of trait anxiety, the other characterised by high levels of anxiety and impulsivity. Others yet suggest that anxiety may relate differently to different forms of antisocial behaviour (Fontaine et al., 2018), such that reactive antisocial behaviour (which occurs in response to real or perceived threat) may be positively predicted by anxiety due to increased responsiveness to threat (Hodgins et al., 2010), while proactive antisocial behaviour (such as behaviour for instrumental gain) may be inhibited by anxiety due to fear of negative consequences (El Sayed et al., 2016). Evidence for a moderating effect of sex are mixed (Euler et al., 2015; Fontaine et al., 2018; Wasserman et al., 2005), however, based on the literature supporting the notion of a “gender paradox”, it is expected that within this sample the association between anxiety and self-reported delinquency will be stronger for girls than it is for boys.

#### *Depression and antisocial behaviour*

Depression is also a common comorbidity for young people with CD, who are 6.6 times more likely to experience depression than those without (Angold et al., 1999). Again, it is a more common comorbidity among girls (Wiesner & Kim, 2006), and these girls have been found to be at increased risk of poor outcomes compared with boys (Keenan et al., 2011). As is the case with anxiety, the relationship between antisocial behaviour and depression is unclear. The "acting out" model posits that underlying depression is acted out through antisocial behaviour (Capaldi, 1992). The "failure" model suggests that it is the social and academic difficulties faced by antisocial adolescents which lead to depression (Patterson & Capaldi, 1990). The “stability” model proposes that depression and antisocial behaviour result from overlapping risk factors and remain stable over time, while the “mutual influence” model suggests that they reciprocally reinforce each other over time (Overbeek et al., 2001). Various studies have found different patterns of reciprocal

associations between antisocial behaviour and depression over time, some of which were moderated by sex, and some of which were not (Fontaine et al., 2018; Paquette Boots et al., 2011; Wiesner, 2003). Overall, the literature seems to suggest that the relationship between antisocial behaviour and depression is stronger for girls than it is for boys, and that this may be due to gender-specific socialisation and moral development (Block, 1983; Moffitt et al., 2001; Zahn-Waxler, 2012). On this basis, it is expected that depression will be a stronger predictor of self-reported delinquency for girls in this sample at baseline, as well as being associated with poorer outcomes over time.

#### *Hyperactivity/inattention and antisocial behaviour*

ADHD is two to three times more prevalent among boys than girls in community samples (American Psychiatric Association, 2013), and has long been associated with conduct problems and aggression (Hinshaw & Blachman, 2005). Indeed, the comorbidity of ADHD and oppositional defiant disorder (ODD) or CD in the community is approximately 30%, increasing to 80 or 90% in clinical populations, and young people with this comorbidity have been found to have significantly poorer outcomes in terms of severity of symptoms, higher burden of neurocognitive impairments and poorer prognoses (Thapar & van Goozen, 2018). Hyperactive-impulsive traits have been found to predict CD more than inattention (Thapar & van Goozen, 2018), and it has been suggested that it is the hyperactivity-impulsiveness symptoms alone which predict conduct disorder and antisocial outcomes, while inattention is more related to academic failure. In fact, hyperactivity has been found to be one of the most potent predictors of antisocial behaviour within both sexes, as well as the most important contributing factor to sex differences in adolescent antisocial behaviour (Moffitt et al., 2001). Although girls are more likely to display inattentive or disorganised symptoms (Hinshaw & Blachman, 2005), research

suggests that ADHD predicts the development of antisocial behaviours in a similar way in boys and girls (Giannotta & Rydell, 2016). This said, in addition to the externalising disorders which are a common comorbidity for both girls and boys with ADHD, girls also have a higher risk of comorbid internalising and substance misuse disorders (Tung et al., 2016).

Some debate remains about the specific mechanism linking ADHD to antisocial behaviour. ADHD in childhood may be a risk factor for antisocial behaviour in itself, or it may be the risk is due to comorbid disruptive symptoms (G.G. von Polier et al., 2012). Alternatively, ADHD and CD may co-develop as a result of a third common risk factor such as trait impulsivity (Beauchaine et al., 2010). Some have suggested that while ADHD is highly heritable, CD may subsequently develop as a result of environmental risk factors, such as parental psychopathology, socioeconomic status, neurocognitive impairment and poor academic performance (Beauchaine et al., 2010). Overall, it is expected based on the literature that ADHD symptoms will be equally associated with self-reported delinquency for both males and females in this sample, and that those presenting with this comorbidity will have poorer outcomes.

#### *Callous-unemotional traits and antisocial behaviour*

Callous-unemotional traits relate to a pattern of interpersonal and emotional functioning in children and adolescents which is characterised by a callous lack of empathy, guilt or remorse, a lack of caring for the feelings of others or one's own performance, and an absence of emotional expression (Essau et al., 2006). Like psychopathy in adulthood, CU traits are thought to distinguish a particularly chronic and aggressive subgroup of antisocial young people (Frick & Dickens, 2006), and have consistently been found to be more common among boys (Essau et al., 2006;

Pihet et al., 2015). However, although the majority of studies which have examined CU traits have focused on boys, those which have included both sexes have found that the association between CU traits and antisocial behaviour is similar for girls and boys (Frick et al., 2014).

CU traits have been found to be relatively stable from childhood into adulthood (Frick & White, 2008), strongly predicting adult psychopathy, and having associations not only with antisocial behaviour but with a range of emotional, social and academic difficulties (Kimonis & Frick, 2010). They are thought to affect behaviour through a number of cognitive mechanisms, including deficits in response to punishment cues and in the processing of negative emotional stimuli (Frick & Viding, 2009; Frick & White, 2008). CU traits have been found to be highly heritable and to have little association with environmental factors (Frick et al., 2014; Frick & White, 2008), particularly for boys (Fontaine et al., 2010). Based on the literature it is therefore expected that more boys will have engaged in antisocial behaviour because of their higher levels of CU traits, but that among those presenting with high CU traits in the sample there will be no difference in outcomes between boys and girls.

### **Aims and hypotheses**

Examining the associations between each of these factors and antisocial behaviour in a sample of young people with moderate-to-severe conduct problems, and investigating whether these associations are different for boys and for girls, both cross-sectionally and longitudinally over an 18-month period, may help to further our understanding of the role of these different factors, both in explaining the sex difference in antisocial behaviour, and as contributing causes of antisocial behaviour.

Based on the literature it is expected that depression, hyperactivity/inattention and CU traits will each predict self-reported delinquency at baseline. The effect of anxiety on self-reported delinquency is more difficult to predict, given that it has previously been conceptualised as both a risk factor and a protective factor for antisocial behaviour.

Given that internalising problems are more common amongst girls with CD, and that this comorbidity appears to be related to more severe antisocial behaviour among girls, it is expected that sex will moderate the respective relationships between anxiety and depression, and self-reported delinquency at baseline, such that these associations will be stronger for girls than boys. It is not expected that sex will moderate the relationship between hyperactivity/inattention or CU traits and self-reported delinquency at baseline, as these factors appear to influence antisocial behaviour in the same way for boys and girls. However, it is expected that more boys than girls in the sample will present with these difficulties.

Each of these four factors and self-reported delinquency are also expected to be associated longitudinally. Cross-lagged panel models will be tested to explore these associations at 6-month intervals over the 18-month period of the trial. Homotypic continuity over time is expected, such that each factor will be predicted by its immediate prior value. Based on the literature, concurrent associations are expected between self-reported delinquency and depression, hyperactivity/inattention and CU traits respectively. Once again, it is less clear whether concurrent associations will be present between anxiety and self-reported delinquency.

Given that ADHD is highly heritable, it follows that hyperactivity/inattention is more likely to cause delinquency than vice-versa. Any cross-lagged associations are therefore expected to be unidirectional, from hyperactivity/inattention at time  $n$  to

self-reported delinquency at time  $n+1$ . This is also the case for callous-unemotional traits (although it is conceivable that callous or unemotional attitudes could be adopted post-hoc as a justification for antisocial behaviour). These associations are not expected to be moderated by sex.

Cross-lagged associations between anxiety and self-reported delinquency are more difficult to predict based on the literature. If anxiety serves as a protective factor, there may be negative associations between anxiety and subsequent self-reported delinquency. If it serves as a risk factor, these associations will be positive. If anxiety develops as a result of antisocial behaviour, then there may be positive associations between self-reported delinquency and subsequent anxiety. Similarly, in the case of depression, the “acting out” model would predict positive associations between depression and subsequent self-reported delinquency, the “failure model” would predict positive associations between self-reported delinquency and subsequent depression, the “stability” model would not predict any cross-lagged associations, while the “mutual influence” model would predict cross-lagged associations in both directions. As in the baseline analyses, these associations may be moderated by sex.

Given that the young people in this sample were recruited based on their moderate-to-severe antisocial behaviour, there are not expected to be any differences in the amount of delinquency reported between the sexes. This makes it difficult to investigate the extent to which sex differences in each of these factors can account for sex differences in antisocial behaviour in the general population. However, different patterns of associations between these factors and self-reported delinquency for boys and girls could allow us to hypothesise, based on the literature, that they do play a role. For example, anxiety and depression, which show a female preponderance, are associated with antisocial behaviour primarily in the context of comorbid conduct disorder. However, hyperactivity/inattention and CU traits have

been identified as significant risk factors for antisocial behaviour more generally. It could therefore be hypothesised that the male preponderance for hyperactivity/inattention and CU traits accounts for some of the sex difference in antisocial behaviour in the general population.

## **Methods**

### **Participants**

This study used data collected as part of the Systemic Therapy for At Risk Teens (START) study, a pragmatic, randomised controlled, superiority trial of multisystemic therapy (MST) pilot services in the UK (Fonagy et al., 2018).

Participants were 683 young people (433 boys and 250 girls) aged 11 to 17 years, displaying moderate-to-severe antisocial behaviour, manifesting as at least one of the following (Fonagy et al., 2013):

- Persistent and enduring violent and aggressive interpersonal behaviour, occurring weekly for a minimum of six months;
- A significant risk of harm to self or others (e.g. self-harm, substance misuse, sexual exploitation, absconding);
- At least one conviction and three warnings, reprimands or convictions in the past 18 months;
- Current diagnosis of an externalising disorder and a record of unsuccessful outpatient treatment;
- Permanent school exclusion.

In addition, participants were required to meet at least three of the following criteria:

- Excluded from school or at significant risk of exclusion;
- High levels of non-attendance at school;
- A history of offending, or at significant risk of offending;
- Previous episodes on the Child Protection Register;
- Previous episodes of being 'looked after', that is, placed outside of the home (whether via incarceration, psychiatric hospitalisation, residential schooling or assignment to residential local authority care);
- Previous referral to a Family Group Conference (usually a meeting between the family members and sometimes also friends or neighbours, the young person and his/her supporter or advocate if requested, and professionals from the health, education or social services to discuss, plan and make decisions regarding a child at risk to prevent the young person from becoming looked after);
- History of siblings being looked after and taken into local authority care.

Exclusion criteria were:

- History or current diagnosis of psychosis;
- Generalised learning problems (clinical diagnosis) as indicated by intelligence quotient (IQ) below 65;
- Identified serious risk of injury or harm to a therapist or researcher;

- Presenting issues for which MST has not been empirically validated, in particular, substance abuse in the absence of criminal conduct or sex offending as the sole presenting issue.

Participants were recruited from nine MST pilot sites across the UK. Five referral routes were used: youth offending teams, social care, child and adolescent mental health services, education services and voluntary services. Details of the recruitment process are outlined in the START study protocol (Fonagy et al., 2013). Approximately half of the participants were randomised to MST alone (50.1%), and the other half to management as usual (MAU; 49.9%). However, as the START study identified no long-term benefits in behaviour, mental health, social care, forensics or education for MST compared with MAU (Fonagy et al., 2018), the present study did not include treatment received in its analyses.

The average age of participants at the beginning of the study was 13.81 years (SD = 1.41). The majority of the sample was White British/European (78.3%), with the remainder identifying as Black African/Afro-Caribbean (10.4%), Asian (2.3%) or Mixed/Other (7.5%), and a small number not providing information on their ethnicity (1.5%). Socioeconomic status in the sample was as follows: low (62.1%), medium (26.1%), high (9.9%) and not reported (1.9%). Antisocial behaviour was classified as either early-onset (43.5%) or late-onset (56.5%), depending on whether the behaviour emerged before or after 11 years of age. Based on Development and Wellbeing Assessments (DAWBA) carried out at baseline, 78% of participants received a diagnosis of CD.

## **Procedures**

The research assistants for the START study administered pre-test questionnaires during the initial contact with the young person and their family, after

they had given consent to participate in the trial, prior to being assigned to a group. Post-test questionnaires were administered by the research assistants approximately six months later – a minimum of two weeks after the family had completed the intervention. Follow-up questionnaires were completed by the families at 12- and 18-months post-randomisation.

## Measures

A range of questionnaires were administered to parents and young people as part of the START trial. This study used young people's self-report data from four of these questionnaires: the Strengths and Difficulties Questionnaire (SDQ; Goodman & Scott, 1999), the Short Mood and Feelings Questionnaire (SMFQ; Angold et al., 1995), the Inventory of Callous-Unemotional Traits (ICU; Frick, 2003) and the Self-Report Delinquency measure (SRD; Smith & McVie, 2003).

The SDQ is a brief behavioural screening questionnaire, with 25 items divided into five scales of five items each, generating scores for Conduct Problems, Hyperactivity/Inattention, Emotional Problems, Peer Problems, and Prosocial Behaviour (Goodman & Scott, 1999). Items are rated on a three point scale ("not true", "somewhat true" and "certainly true").

The latent variable *Anxiety* was created using four items from the Emotional Problems scale of the SDQ, including items such as "I worry a lot" and "I have many fears, I am easily scared". The original five-item scale has been found to be a reliable and valid measure for detecting internalising problems in children (Goodman & Scott, 1999). For the purposes of this study, the item "I am often unhappy, downhearted, or tearful" was removed as it is clearly a measure depression rather than anxiety. The internal consistency of this four-item scale was moderate, with a Cronbach's alpha of .64.

The latent variable *Hyperactivity/Inattention* was created using the Hyperactivity/Inattention scale of the SDQ, which includes two items relating to hyperactivity, such as "I am restless, I cannot stay still for long", two items relating to inattention, such as "I am easily distracted, I find it difficult to concentrate", and one item relating to impulsivity, "I think before I do things". This five-item scale has been found to be a valid and reliable measure for detecting hyperactivity/inattention in children (Goodman & Scott, 1999).

The latent variable *Depression* was created using the SMFQ, a brief measure of depressive symptoms in children and adolescents. The SMFQ has 13 items consisting of statements relating to low mood experienced in the last two weeks (e.g., "I felt miserable or unhappy"), as well as psychological correlates such as low self-worth (e.g., "I felt I was no good anymore"). Items are rated on a three-point scale ("not true", "sometimes true" and "true"). The SMFQ has been found to show reasonable psychometric properties for identifying adolescents with depression (Rhew et al., 2010; Turner, Joinson, Peters, Wiles, & Lewis, 2014).

The latent variable *Callous-unemotional traits* were created using the ICU, a 24-item scale consisting of equal numbers of positively-worded items (e.g., "the feelings of others are important to me") and negatively-worded items (e.g., "I do not care who I hurt to get what I want"). Items are rated on a four-point scale ("not at all true", "somewhat true", "very true" and "definitely true"). The ICU has been found to be a useful measure of CU traits in adolescents, capturing three dimensions of behaviour: callousness, uncaring and unemotional (Essau et al., 2006).

*Antisocial behaviour* was measured using the "Volume of Delinquency" subscale of the Self-Reported Delinquency scale (SRD). This is comprised of 21 items asking respondents about their engagement in a range of antisocial behaviours in the previous six months, including theft (e.g., "during the last six

months, did you steal something from a shop or store?"), destruction of property (e.g., "during the last six months, did you damage or destroy property that did not belong to you on purpose (e.g. windows, cars or street lights)?" ) and violence (e.g., "during the last six months, did you hit, kick or punch someone else on purpose (fight with them)?"). Other antisocial behaviours addressed include truancy, identity fraud, robbery, burglary, fire-setting, possession of weapons, forced sexual behaviour, and drug dealing. If respondents answer yes, they are asked to indicate how many times they engaged in the behaviour in the previous six months (once, twice, 3 times, 4 times, 5 times, between 6 and 10 times or more than 10 times). This provides a score between 0 and 153. The SRD was chosen over recorded offences as a measure of antisocial behaviour due to the high proportion of offences which are known to go unreported and unrecorded (Her Majesty's Inspectorate of Constabulary, 2014), as well as the discrepancy in the recording of male and female offences (Moffitt et al., 2001).

## **Analyses**

Structural equation models (SEMs) were tested in Mplus 8.1 (Muthén & Muthén, 1998-2017). Maximum likelihood estimation with robust standard errors (MLR) was used to address the non-normality of the SRD data. Young people with partially missing data were included in the model by using a full information maximum likelihood procedure (FIML) (Enders, 2010). To determine model fit, the Root Mean Squared Error of Approximation (RMSEA) (acceptable value  $<.08$ ) (Browne & Cudeck, 1992), the Comparative Fit Index (CFI) and Tucker Lewis Index (TLI) (acceptable values  $\geq .90$ ) (Bentler, 1990), and the Standardised Root Mean Square Residual (SRMR) (acceptable value  $\leq .08$ ) (Schreiber, Stage, King, Nora, & Barlow, 2006) were used.

### *Sex differences in antisocial behaviour*

Independent-sample t-tests were carried out to establish whether there were any mean differences in volume of self-reported delinquency between boys and girls.

### *Confirmatory Factor Analysis (CFA)*

A confirmatory factor analysis was carried out to test the construct validity of the four latent factors, anxiety, depression, hyperactivity/inattention and CU traits.

### *Baseline analyses*

Structural equation models were tested in Mplus 8.1 (Muthén & Muthén, 1998-2017) to examine:

- whether sex predicted anxiety, depression, hyperactivity/inattention and CU traits at baseline;
- whether anxiety, depression, hyperactivity/inattention and CU traits individually predicted self-reported delinquency at baseline;
- whether anxiety, depression, hyperactivity/inattention and CU traits combined predicted self-reported delinquency at baseline;
- whether sex moderated the relationships between anxiety, depression, hyperactivity/inattention and CU traits and self-reported delinquency at baseline.

### *Cross-lagged panel models*

Several cross-lagged panel models (CLPMs) were tested in Mplus 8.1 (Muthén & Muthén, 1998-2017) to examine the interrelations between each of the latent variables and self-reported delinquency over the four time points. This was done first for both sexes together, and then for boys and girls separately. In each model, change within the variables was accounted for by regressing each repeated variable on its immediate prior value, indicating continuity within variables. Associations between repeated variables were represented by cross-lagged, across time paths. The models also included cross-sectional correlations between parallel variables. An example CLPM is shown in Figure 1.

### *Power analyses*

Despite an increase in the number of SEM-based research publications, applied information on how to determine adequate sample size for these studies remains inconclusive (Wolf, Harrington, Clark, & Miller, 2013). Rules-of-thumb have been advanced, ranging from a minimum sample size of 100 or 200 (Boomsma, 1985), to 10 cases per indicator variable (Nunnally, 1967), to 10 or 20 cases per parameter (Kline, 2005). The number of indicator variables per latent variable can also affect power (Wang & Wang, 2012), with some researchers suggesting that more indicators per factor can compensate for small sample size (Wolf et al., 2013). This can make it difficult to predict in advance whether a given sample size is likely to provide sufficient power to detect an effect. It was expected that this sample of 683 cases would provide sufficient power for the cross-sectional analyses, but could lack power for the CLPMs.

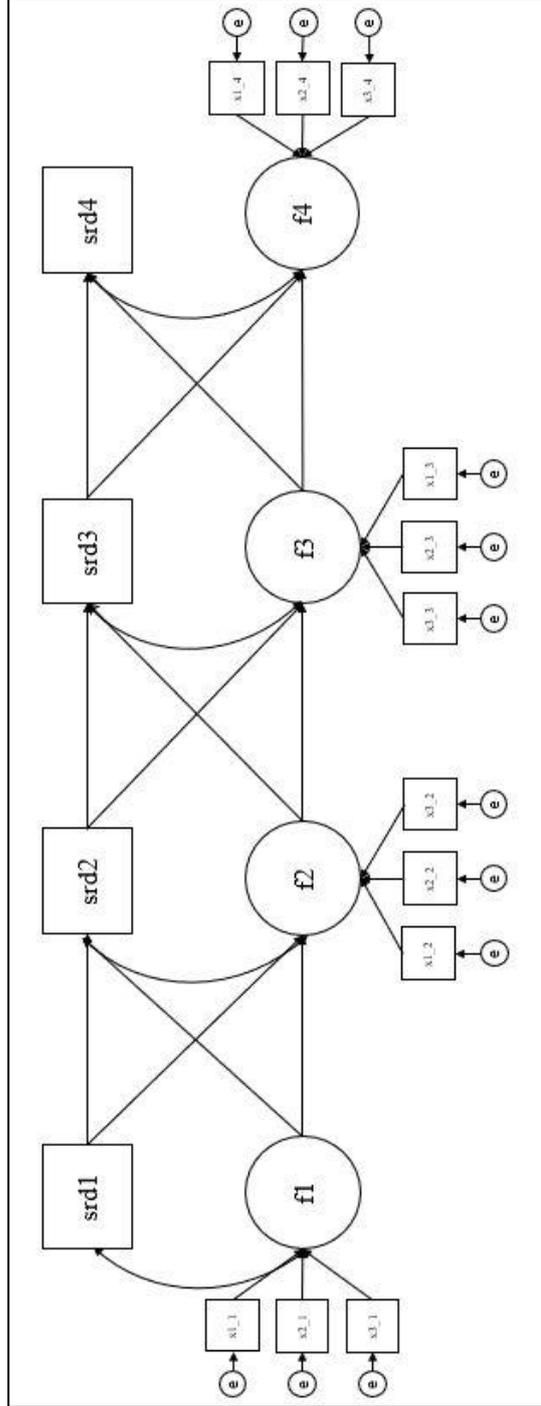


Figure 1: Example CLPM. Note: srd = volume of self-reported delinquency at times 1-4. f = latent factor at times 1-4. x = indicator variable (x1\_1 = indicator variable 1 at time 1 etc). e= error variance. Straight arrows represent direct paths and curved arrows represent correlation.

## Results

### Sex differences in antisocial behaviour

Results of the t-test showed no differences in self-reported delinquency between the two sexes at any time point. Descriptive statistics can be found in Table 1.

### Confirmatory factor analysis

Results of the initial CFA showed that four items from the ICU did not load significantly ( $p < .01$ ) onto the latent factor *CU traits*: items 2, 6, 10 and 22 (of note, three of these items were questions relating to unemotionality). Model fit was slightly improved by the removal of these items, and all further analyses were carried out using this adjusted *CU traits* variable. All other items in the CFA loaded significantly onto their respective factors ( $p < .01$ ). The adjusted CFA is shown in Figure 2 (for clarity, standard errors are not shown). Model fit remained relatively poor (RMSEA=.05, CFI=.78, TLI= .77 and SRMR=.07) due to the poorer fit of the *CU traits* factor. Indeed, when this factor was excluded from the CFA altogether, model fit was good (RMSEA=.05, CFI=.90, TLI=.89 and SRMR = .05). A correlation matrix of all indicator variables at baseline can be found in Appendix A.

**Table 1***Descriptive statistics for boys' and girls' volume of self-reported delinquency (t1-t4)*

	Boys				Girls				MΔ		
	N	Range	Mean	SD	Mode	N	Range	Mean		SD	Mode
SRD (t1)	431	0-115	20.32	18.88	0 (7%)	250	0-115	20.20	18.37	0 (5.6%)	.12
SRD (t2)	387	0-103	15.15	18.49	0 (23.7%)	228	0-82	15.11	15.43	0 (19.3%)	.04
SRD (t3)	344	0-113	11.63	16.42	0 (29.4%)	198	0-77	10.68	2.55	0 (24.7%)	.95
SRD (t4)	313	0-67	8.88	11.80	0 (33.5%)	182	0-77	9.53	13.41	0 (25.4%)	-.65

*Note.* N = number of non-missing cases; SD = standard deviation; MΔ = mean difference between sexes.

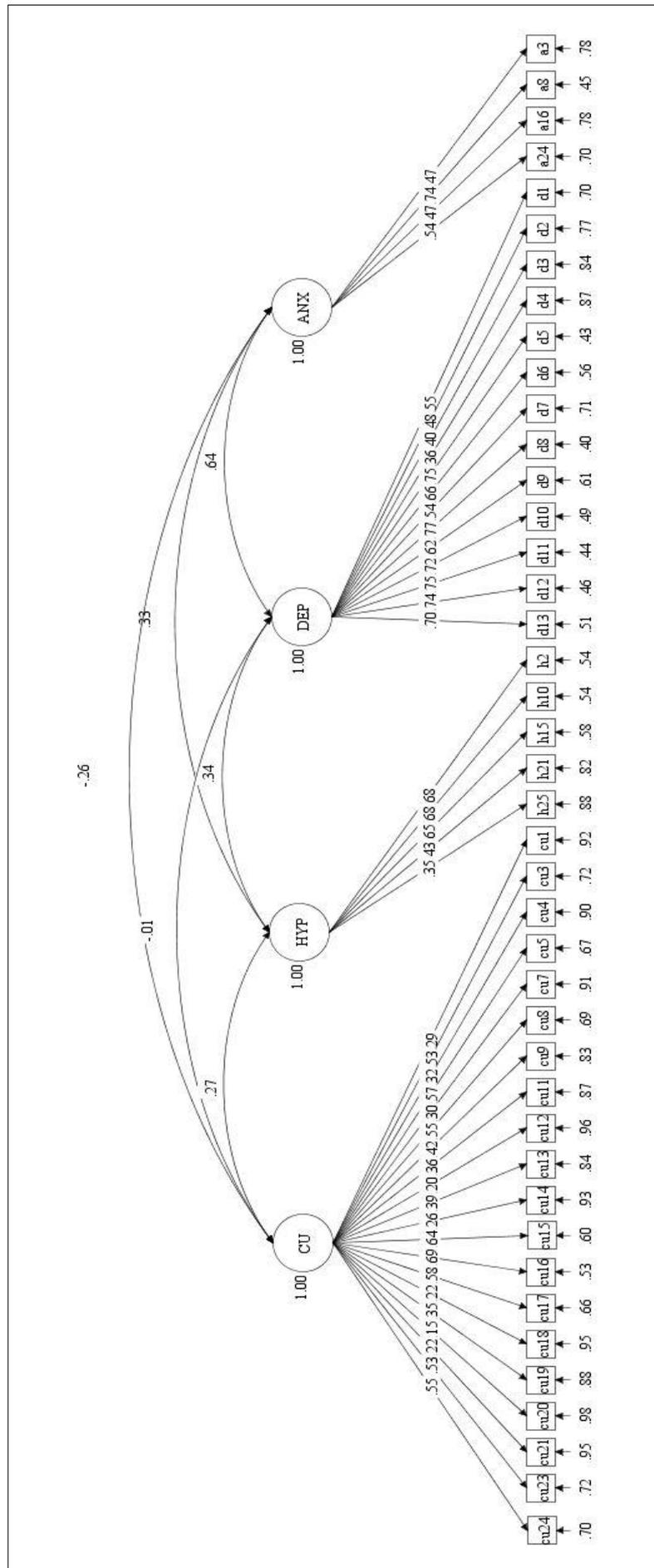


Figure 2: CFA for anxiety, depression, hyperactivity/inattention and CU traits.

## Baseline analyses

### *Sex as a predictor of anxiety, depression, hyperactivity/inattention and CU traits*

Results from the models tested indicated that sex significantly predicted three of the four latent variables, such that girls were more likely to self-report anxiety (standardised coefficient = .36 ( $p < .01$ ),  $R^2 = .13$ ), depression (standardised coefficient = .30 ( $p < .01$ ),  $R^2 = .09$ ) and hyperactivity/inattention (standardised coefficient = .12 ( $p < .01$ ),  $R^2 = .02$ ). Sex was not a significant predictor of CU traits (standardised coefficient =  $-.03$  (n.s.),  $R^2 = .00$ ). Descriptive statistics can be found in Table 2, and model fit information in Table 3.

**Table 2**

*Descriptive statistics for boys' and girls' total scores on self-reported anxiety, depression, hyperactivity/inattention and CU traits*

	Boys				Girls				MΔ
	N	Range	Mean	SD	N	Range	Mean	SD	
Anxiety	431	0-8	2.35	1.99	249	0-8	3.68	2.15	-4.52
Depression	427	0-25	7.41	5.88	247	0-26	10.96	6.68	-3.55
H/I	431	0-10	6.19	2.62	248	0-10	6.87	2.35	-0.68
CU traits	409	1-57	27.31	8.90	231	3-56	26.58	9.35	0.73

*Note.* N = number of non-missing cases; SD = standard deviation; MΔ = mean difference between sexes.

The finding that girls were more likely to report hyperactivity/inattention than boys was unexpected, although the descriptive statistics indicate that this was not a large effect. Nonetheless, two further tests were carried out to explore this finding further. First, sex was tested as a predictor of ADHD diagnosis, as assessed by clinicians using the Development and Wellbeing Assessment (DAWBA). Results indicated that boys in the sample were slightly more likely to have received a diagnosis of ADHD than girls (standardised coefficient =  $-.09$ ,  $p=.05$ ,  $R^2=.01$ ). Second, the relationship between self-reported hyperactivity/inattention and ADHD was examined. Results showed that ADHD diagnosis was a significant predictor of self-reported hyperactivity/inattention (standardised coefficient =  $.22$ ,  $p<.01$ ,  $R^2=.05$ ).

**Table 3**

*Goodness of fit information for SEMs testing sex as a predictor of four latent variables*

Latent variable	RMSEA	CFI	TLI	SRMR	Interpretation
Anxiety	.02	.99	.99	.02	Good
Depression	.07	.90	.89	.05	Acceptable
Hyperactivity/inattention	.08	.97	.87	.04	Acceptable
CU traits	.08	.63	.59	.08	Poor

*Anxiety, depression, hyperactivity/inattention and CU traits as predictors of self-reported delinquency*

Results from the models tested indicated that depression (standardised coefficient = .13 ( $p < .01$ ),  $R^2 = .02$ ), hyperactivity/inattention (standardised coefficient = .22 ( $p < .01$ ),  $R^2 = .05$ ) and CU traits (standardised coefficient = .33 ( $p < .01$ ),  $R^2 = .11$ ) each individually predicted self-reported delinquency, but anxiety did not (standardised coefficient = -.03 (n.s.),  $R^2 = .00$ ). Model fit information can be found in Table 4.

**Table 4**

*Goodness of fit information for SEMs testing four latent variables as predictors of SRD*

Latent variable	RMSEA	CFI	TLI	SRMR	Interpretation
Anxiety	.00	1.00	1.01	.01	Good
Depression	.06	.93	.91	.05	Good
Hyperactivity/inattention	.08	.92	.87	.04	Moderate
CU traits	.08	.64	.60	.08	Poor

These four factors were then combined into a single model, shown in Figure 3. For clarity, indicator variables are not shown in the diagram. Standard errors are shown in brackets. All paths and correlations in the model were significant at  $p < .01$ , except the path from anxiety to SRD, and the correlation between depression and CU traits, which were not significant. Results indicated that these four factors combined explained 14.2% of the variance in self-reported delinquency. However,

model fit for this model did not reach acceptable level (RMSEA= .05, CFI= 0.78, TLI= 0.77, SRMR= .07), primarily due to the poor fit of the *CU traits* variable.

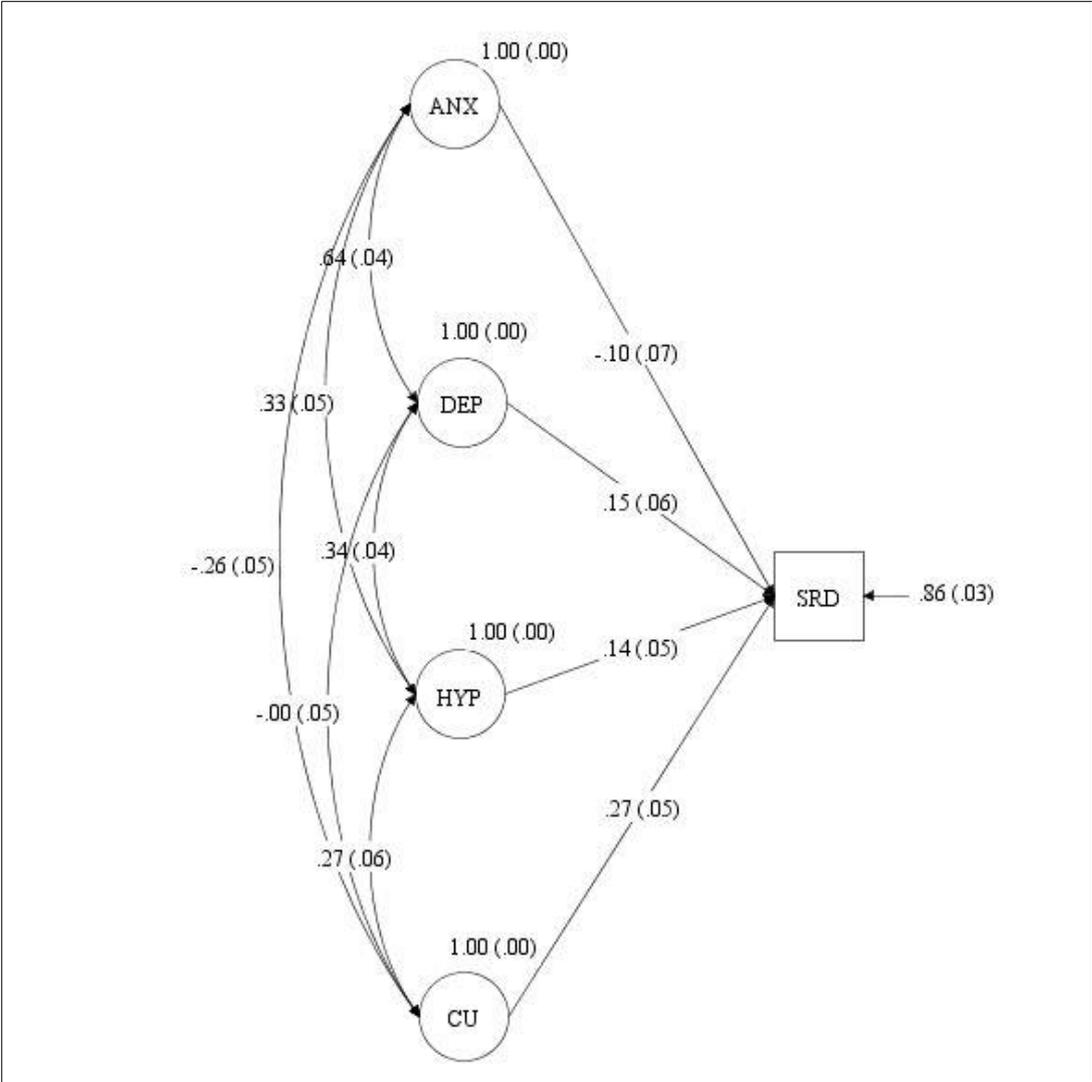


Figure 3: SEM testing anxiety, depression, hyperactivity/inattention and CU traits as predictors of SRD.

*Moderation analysis*

Sex was examined as a moderator for the individual relationships between anxiety, depression, hyperactivity/inattention and CU traits and self-reported

delinquency at baseline. No moderating effect of sex was found for any of the four predictors. Results are shown in Tables 5 to 8.

**Table 5**

*Moderating effect of sex on the relationship between anxiety and self-reported delinquency at baseline*

Predictor	$\beta$	p value	R <sup>2</sup>	$\Delta R^2$
Anxiety	.008	.895	.003	.002
Sex	.011	.783		
Anxiety x Sex	-.045	.351		

*Note:* R<sup>2</sup> is the proportion of variance in SRD predicted by the entire model.  $\Delta R^2$  is the additional variance in SRD that was predicted by the inclusion of sex and the interaction term into the model. \*p<.05 \*\*p<.01

**Table 6**

*Moderating effect of sex on the relationship between depression and self-reported delinquency at baseline*

Predictor	$\beta$	p value	R <sup>2</sup>	$\Delta R^2$
Depression	.158	.004**	.023	.006
Sex	-.04	.342		
Depression x Sex	-.016	.698		

*Note:* R<sup>2</sup> is the proportion of variance in SRD predicted by the entire model.  $\Delta R^2$  is the additional variance in SRD that was predicted by the inclusion of sex and the interaction term into the model \*p<.05 \*\*p<.01

**Table 7**

*Moderating effect of sex on the relationship between hyperactivity/inattention and self-reported delinquency at baseline*

Predictor	$\beta$	p value	R <sup>2</sup>	$\Delta R^2$
Hyperactivity/Inattention	.245	.001**	.052**	.002
Sex	-.020	.595		
Hyperactivity/Inattention x Sex	-.027	.551		

*Note:* R<sup>2</sup> is the proportion of variance in SRD predicted by the entire model.  $\Delta R^2$  is the additional variance in SRD that was predicted by the inclusion of sex and the interaction term into the model \*p<.05 \*\*p<.01

**Table 8**

*Moderating effect of sex on the relationship between CU traits and self-reported delinquency at baseline*

Predictor	$\beta$	p value	R <sup>2</sup>	$\Delta R^2$
CU traits	.343	.001**	.11	.00
Sex	.007	.855		
CU traits x Sex	-.015	.708		

*Note:* R<sup>2</sup> is the proportion of variance in SRD predicted by the entire model.  $\Delta R^2$  is the additional variance in SRD that was predicted by the inclusion of sex and the interaction term into the model \*p<.05 \*\*p<.01

## **Cross-lagged panel models**

Results of the cross-lagged panel models tested showed abnormalities at the 18-month time point, which may have been due to errors in the data, or to the large amounts of missing data at this follow-up point (between 188 and 271 cases, depending on the item). The 18-month time point was therefore excluded from the analyses.

### *Anxiety*

The results of the cross-lagged panel analyses examining the associations between anxiety and self-reported delinquency across baseline, six- and 12-month follow-up are shown in Figure 4. The results for boys alone are shown in Figure 5 and for girls alone in Figure 6. For clarity, only significant paths are shown. Standard errors are shown in brackets. The items are named after the question they pertain to in the SDQ, for example item A3\_1 is question 3 of the SDQ at time point 1. Goodness of fit information for each model can be found in Table 9.

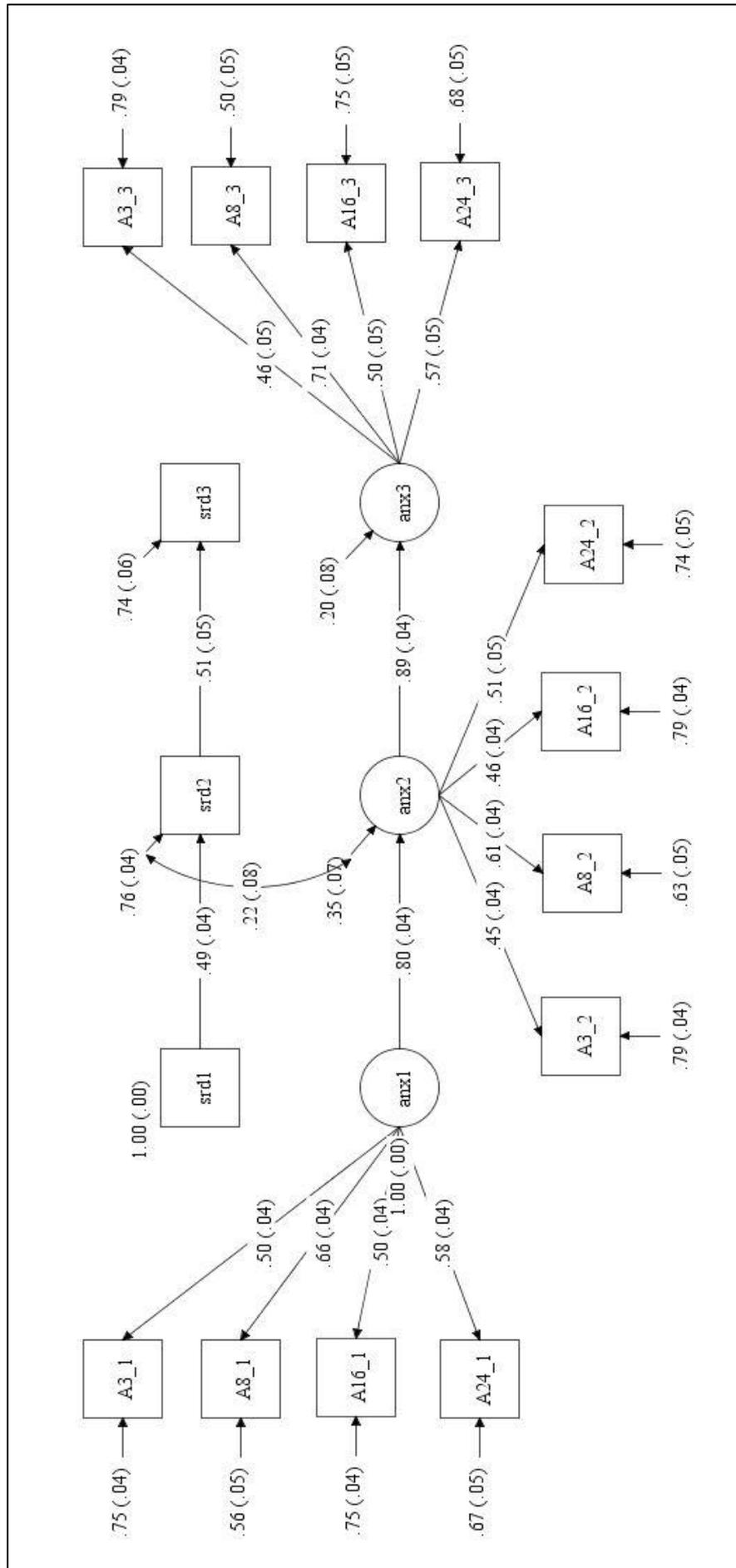


Figure 4: CLPM of anxiety and self-reported delinquency over time.

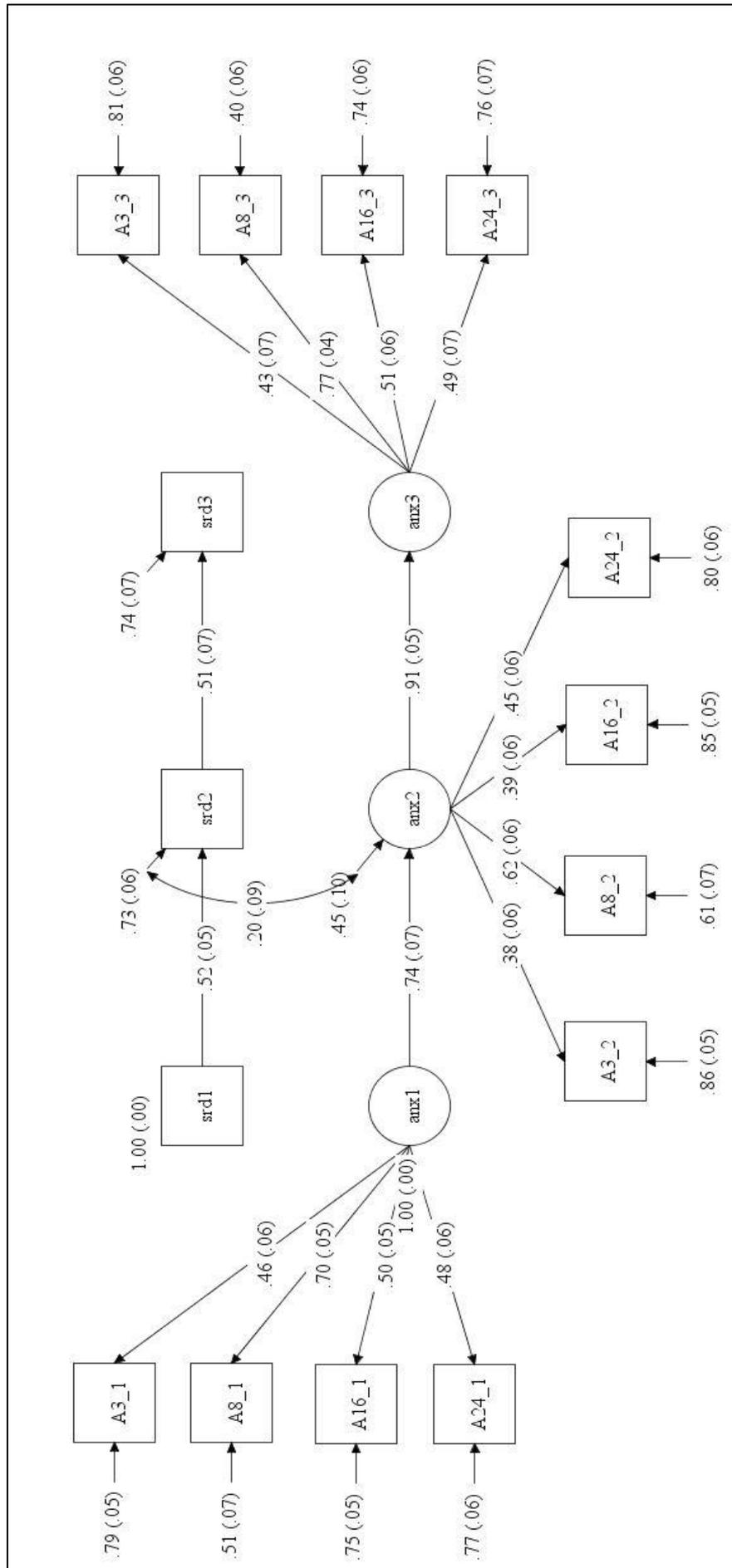


Figure 5: CLPM of anxiety and self-reported delinquency over time for boys alone.

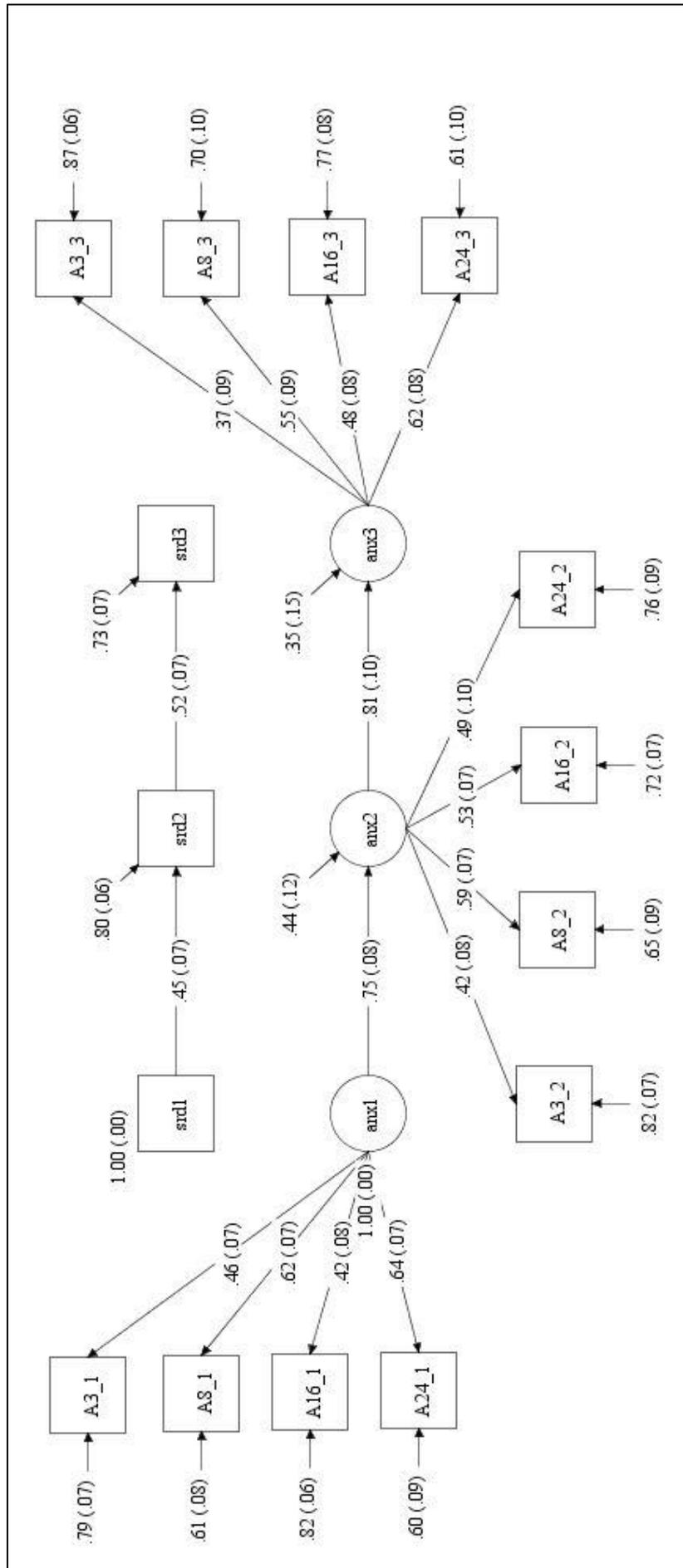


Figure 6: CLPM of anxiety and self-reported delinquency over time for girls alone.

**Table 9**

*Goodness of fit information for CLPMs examining the associations between anxiety and SRD over time*

Sex	RMSEA	CFI	TLI	SRMR	Interpretation
Both	.07	.84	.79	.05	Poor
Male	.07	.82	.77	.06	Poor
Female	.07	.79	.74	.07	Poor

### *Depression*

The results of the cross-lagged panel models testing the associations between depression and self-reported delinquency across baseline, six- and 12-month follow-up are shown in Figure 7. The results for boys alone are shown in Figure 8 and for girls alone in Figure 9. For clarity, only significant paths are shown. Standard errors are shown in brackets. The items are named after the question they pertain to in the SMFQ. Goodness of fit information for each model can be found in Table 10.

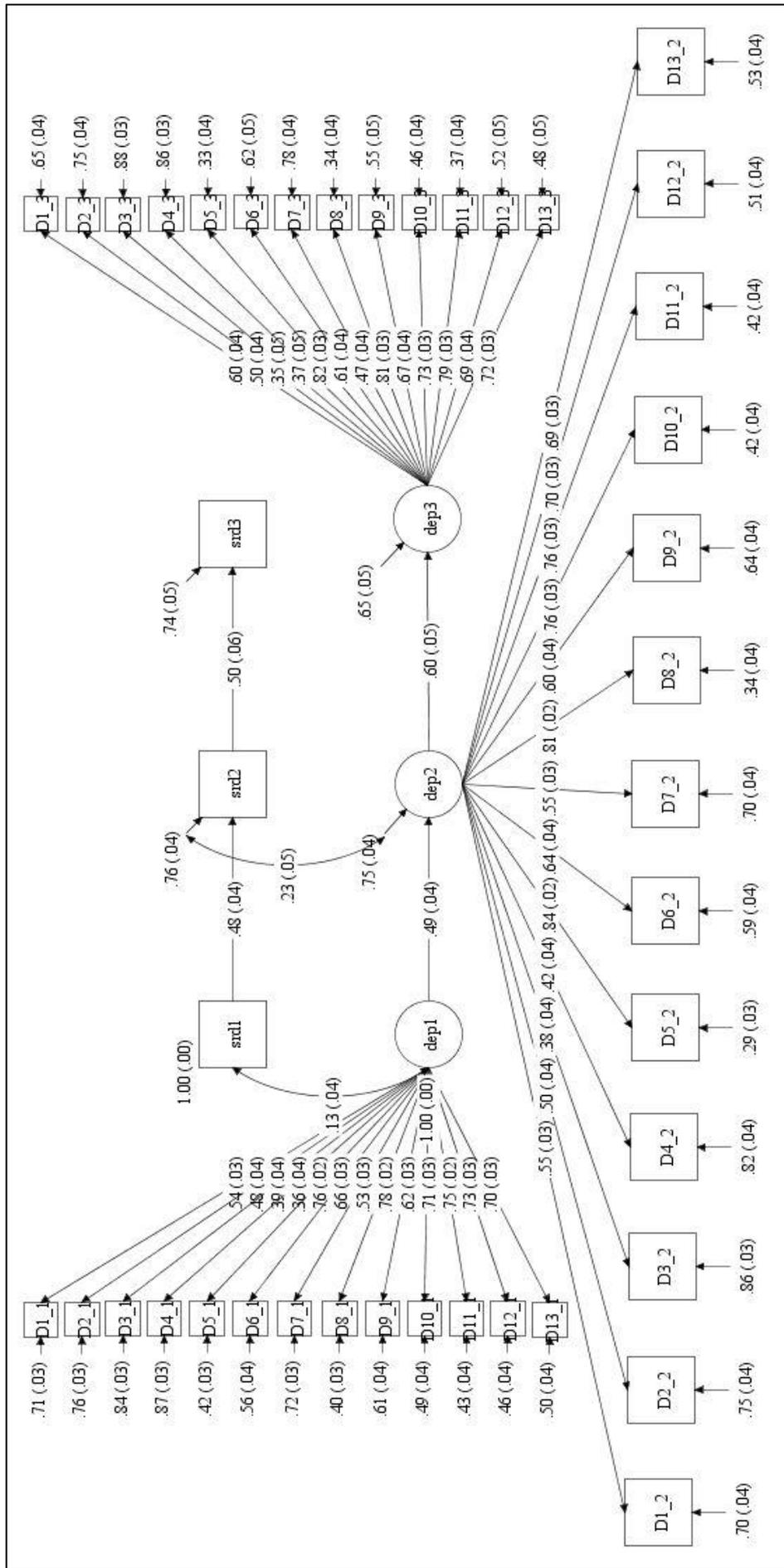


Figure 7: CPML of depression and self-reported delinquency over time.

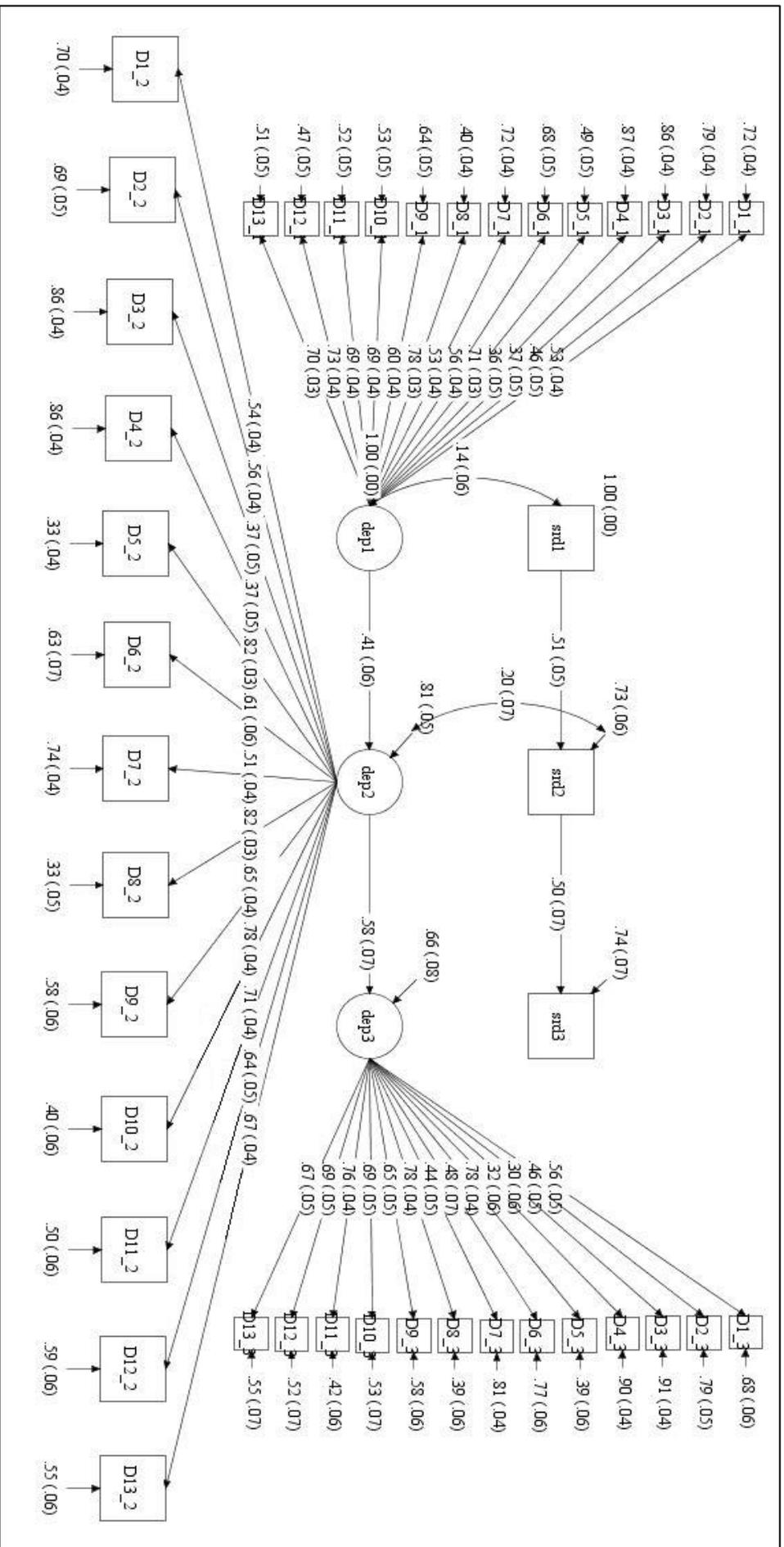


Figure 8: CPLM of depression and self-reported delinquency over time for boys alone.

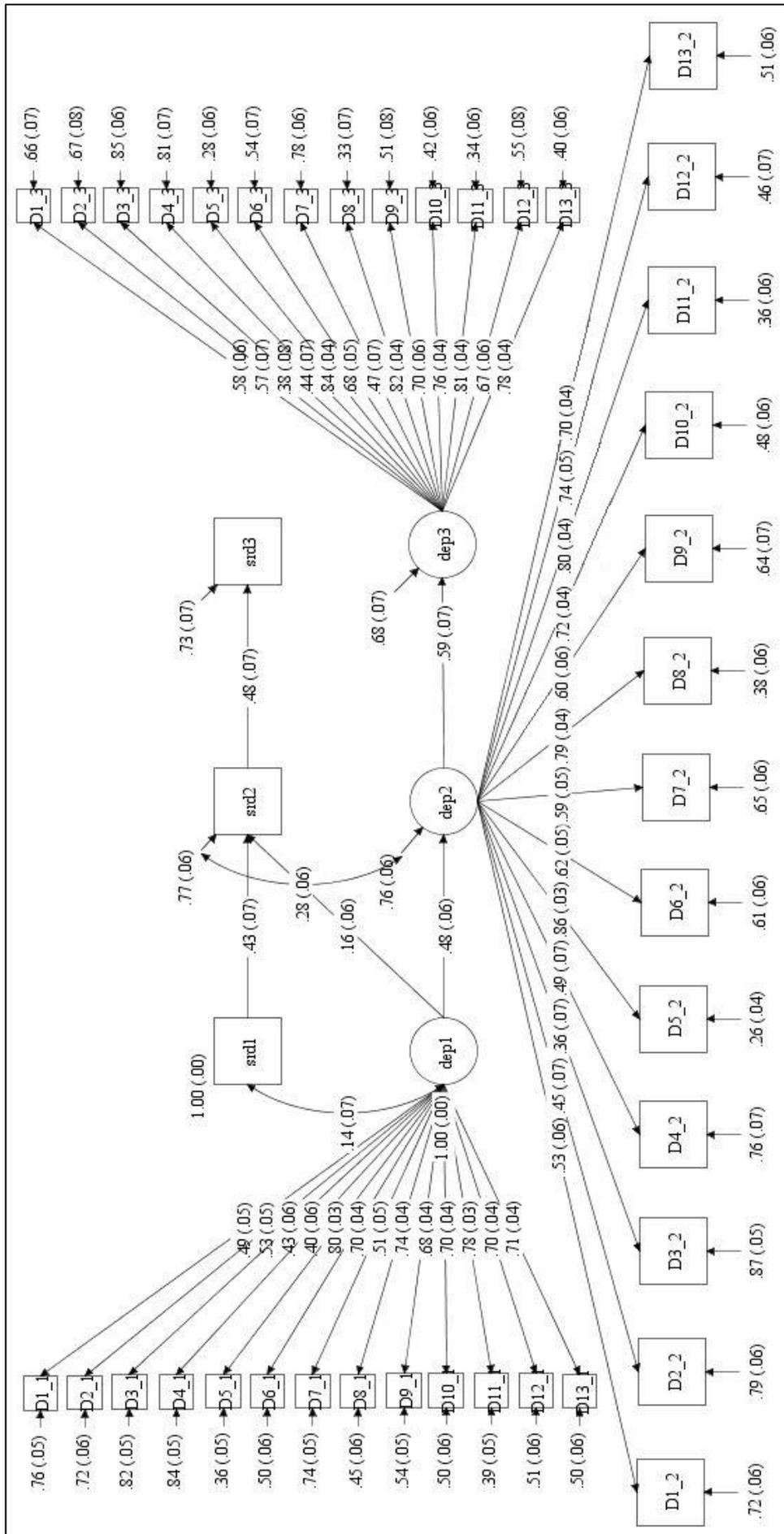


Figure 9: CPLM of depression and self-reported delinquency over time for girls alone.

**Table 10**

*Goodness of fit information for CLPMs examining the associations between depression and SRD over time*

Sex	RMSEA	CFI	TLI	SRMR	Interpretation
Both	.05	.87	.86	.06	Moderate
Male	.05	.85	.84	.07	Poor
Female	.05	.87	.86	.07	Moderate

### *Hyperactivity/inattention*

The results of the cross-lagged panel models testing the associations between hyperactivity/inattention and self-reported delinquency across baseline, six- and 12-month follow-up are shown in Figure 10. The results for boys alone are shown in Figure 11 and for girls alone in Figure 12. For clarity, only significant paths are shown. Standard errors are shown in brackets. The items are named after the question they pertain to in the SDQ. Goodness of fit information for each model can be found in Table 11.

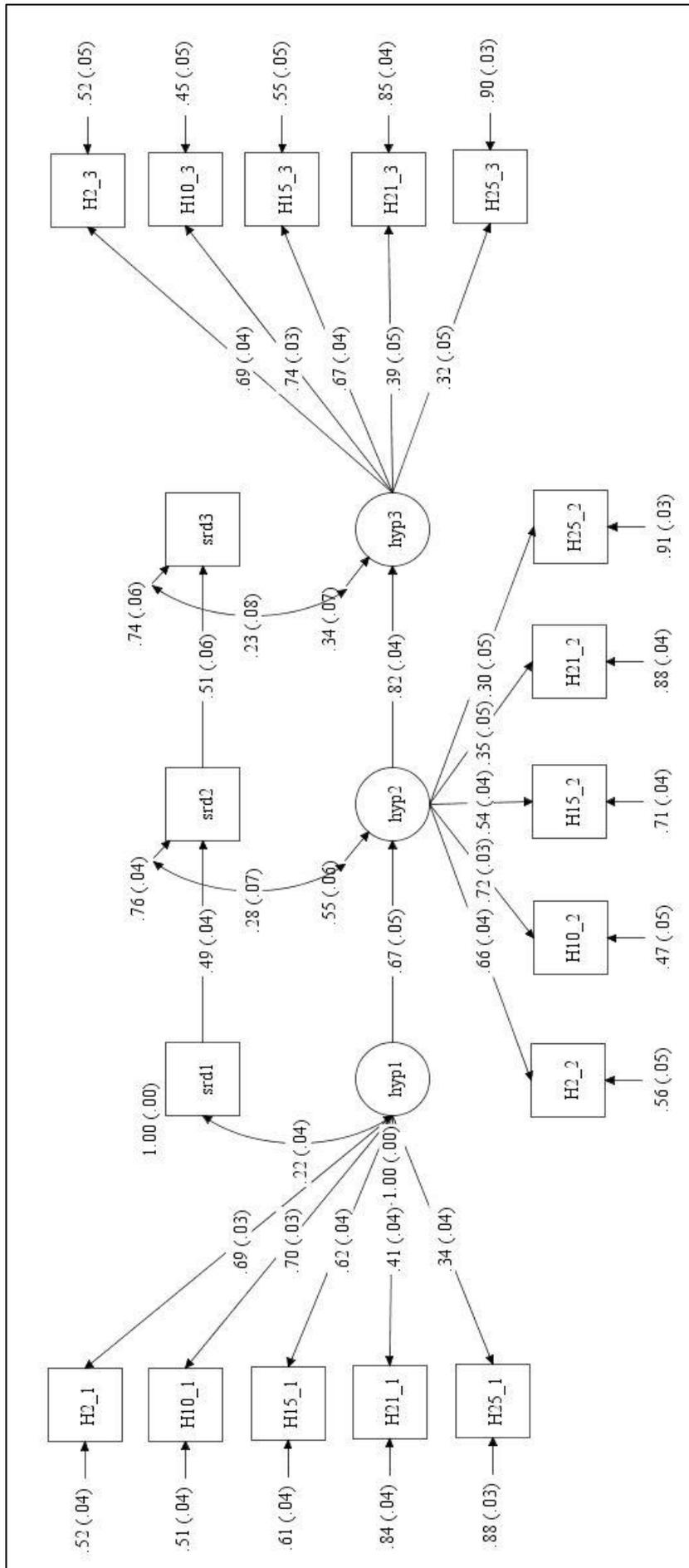


Figure 10: CPLM of hyperactivity/inattention and self-reported delinquency over time.

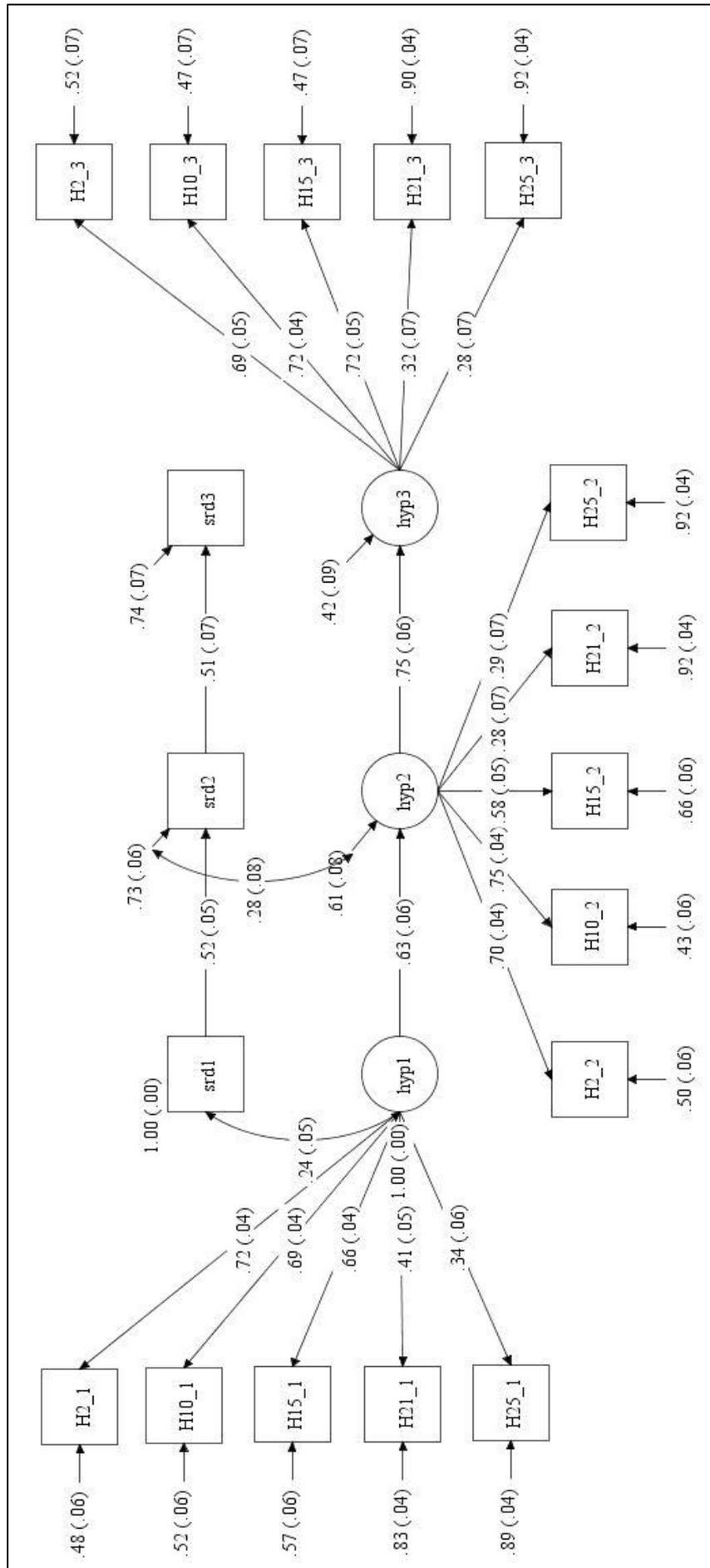


Figure 11: CPLM of hyperactivity/inattention and self-reported delinquency over time for boys alone.

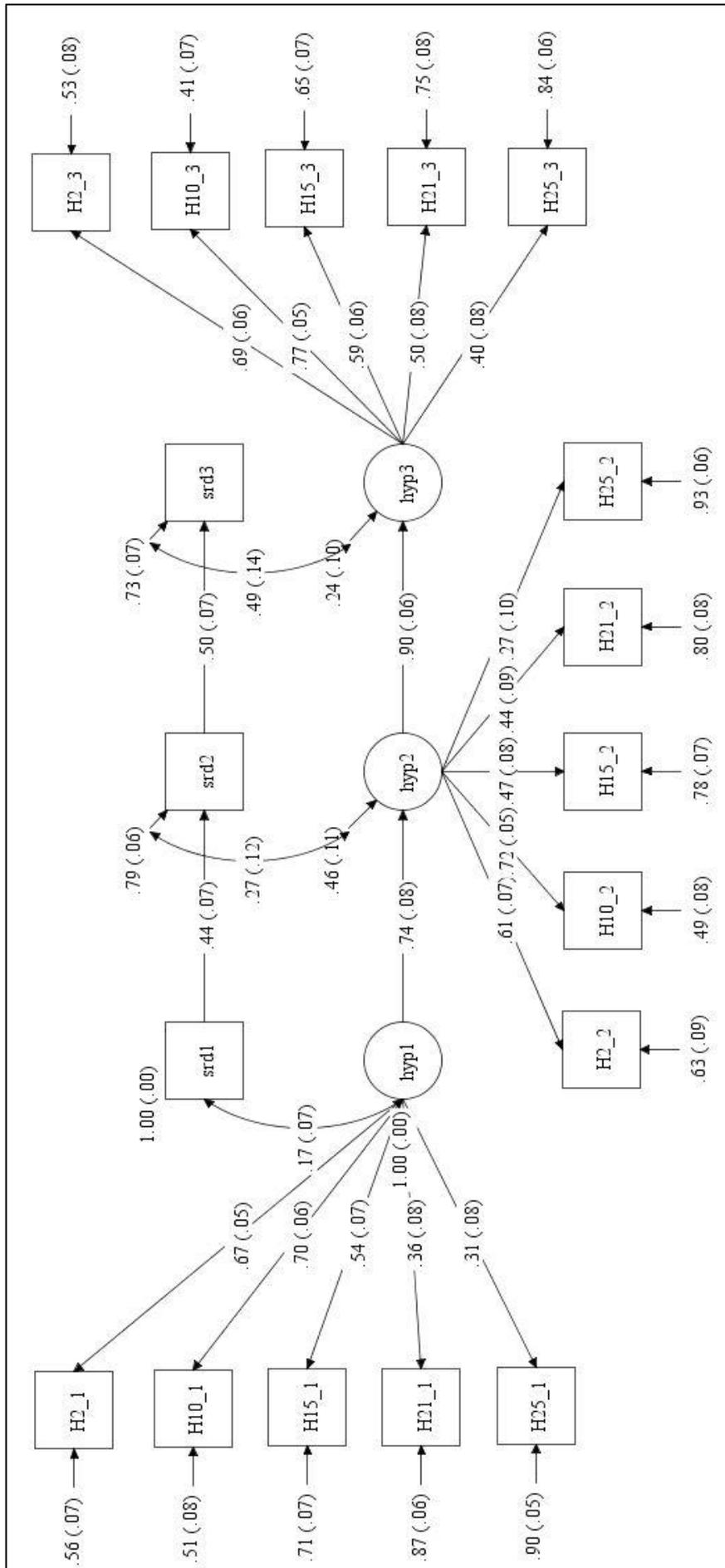


Figure 12: CPLM of hyperactivity/inattention and self-reported delinquency over time for girls alone.

**Table 11**

*Goodness of fit information for CLPMs examining the associations between hyperactivity/inattention and SRD over time*

Sex	RMSEA	CFI	TLI	SRMR	Interpretation
Both	.07	.83	.79	.07	Poor
Male	.07	.82	.78	.08	Poor
Female	.07	.79	.75	.08	Poor

*Callous-unemotional traits*

The results of the cross-lagged panel models examining the associations between CU traits and self-reported delinquency across baseline, six- and 12-month follow-up are shown in Figure 13. The results for boys alone are shown in Figure 14 and for girls alone in Figure 15. For clarity, only significant paths are shown. Standard errors are shown in brackets. The items are named after the question they pertain to in the ICU. Goodness of fit information for each model can be found in Table 12.

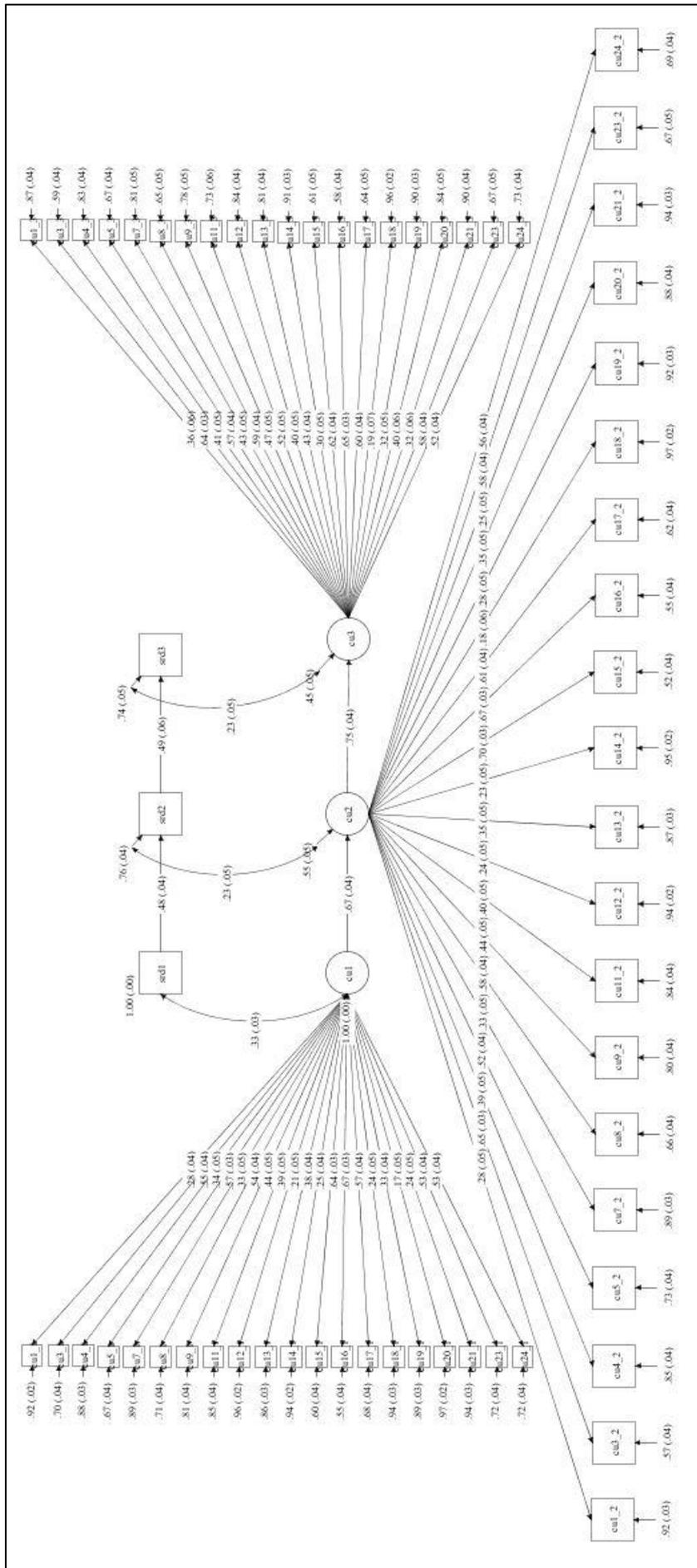


Figure 13: CPLM of CU traits and self-reported delinquency over time.

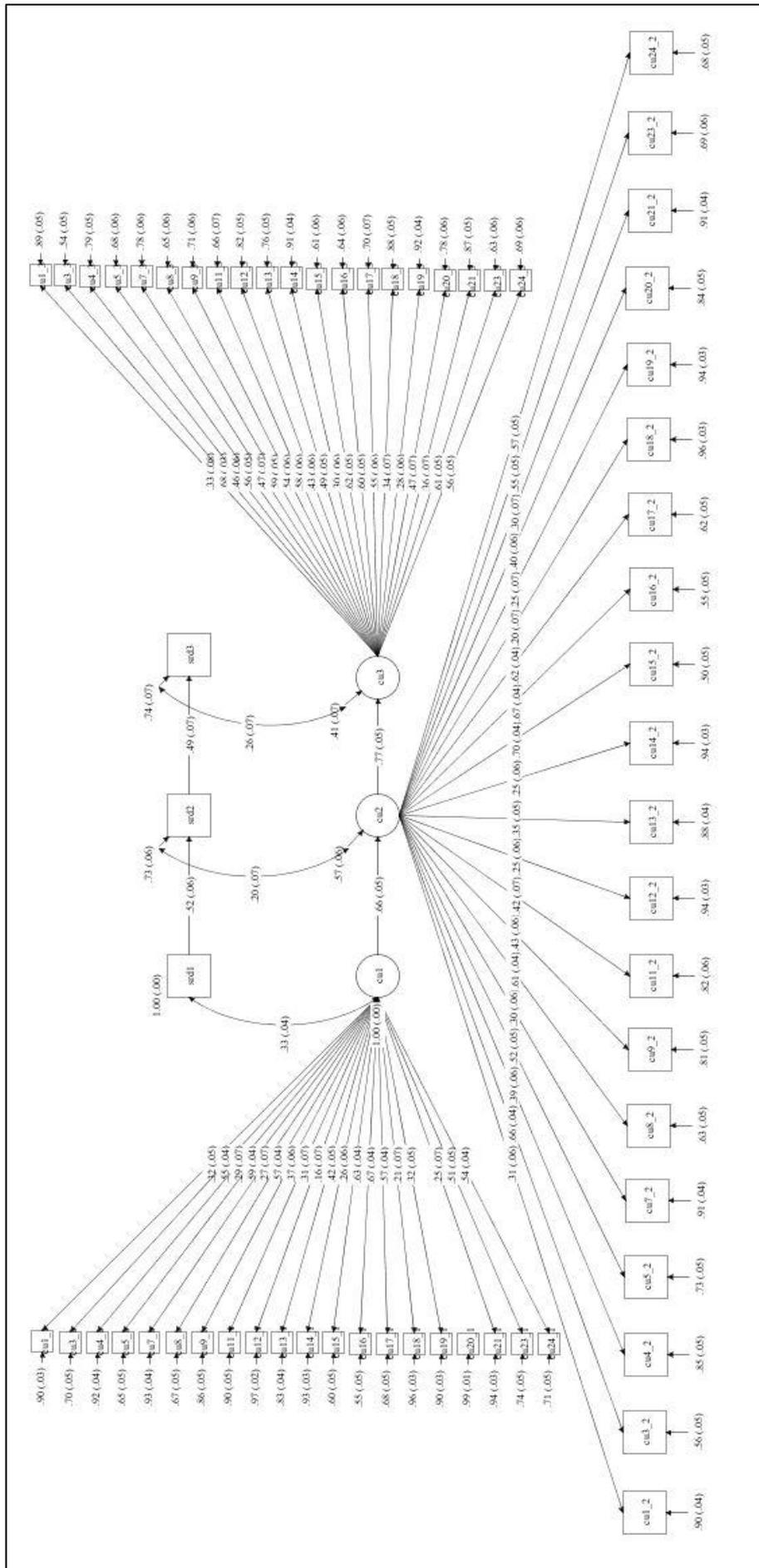


Figure 14: CPLM of CU traits and self-reported delinquency over time for boys alone.

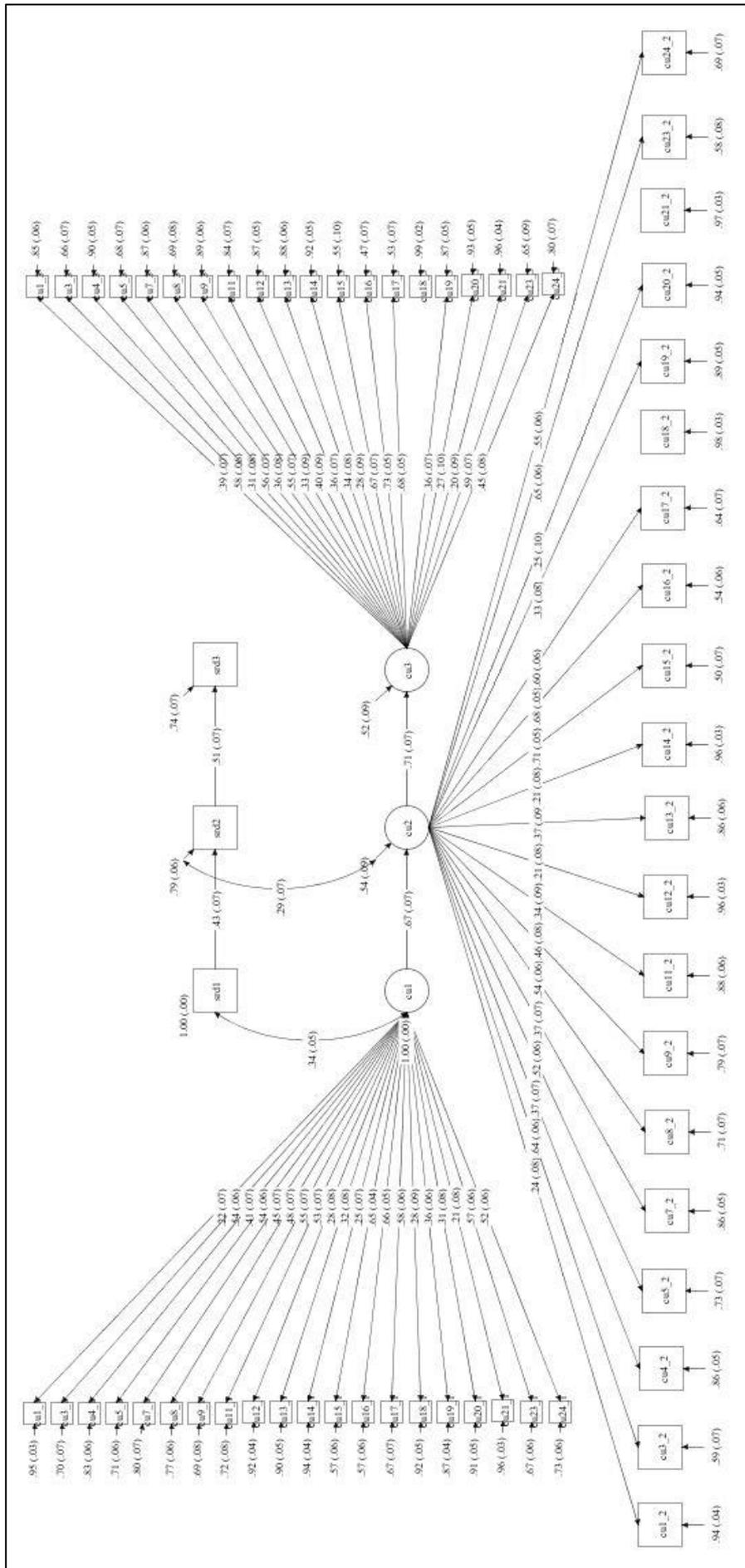


Figure 15: CPLM of CU traits and self-reported delinquency over time for girls alone.

**Table 12**

*Goodness of fit information for CLPMs examining the associations between CU traits and SRD over time*

Sex	RMSEA	CFI	TLI	SRMR	Interpretation
Both	.05	.60	.59	.07	Poor
Male	.05	.60	.58	.08	Poor
Female	.06	.56	.54	.08	Poor

## **Power**

As described above, a conservative rule of thumb for calculating the sample size required to generate sufficient power to detect small effects in SEM is 10 or 20 cases per parameter (Kline, 2005). At baseline, the two models which estimated the highest number of parameters were the initial CFA (132 parameters; see Figure 2) and the model testing the combined effects of all four factors on self-reported delinquency (138 parameters; see Figure 3). These analyses are likely to have lacked power as they would have required samples of well over 2,000 participants, applying the most conservative rule of thumb. The other models estimating high numbers of parameters at baseline were those which tested the latent variables *Depression* (40 and 42 parameters) and *CU traits* (61 and 63 parameters), as these latent variables had higher numbers of indicators. If applying the more conservative rule of thumb (20 cases per parameter), power may have been insufficient.

The number of parameters estimated in the CLPMs varied considerably. Once again, power is likely to have been sufficient for those models which tested *Anxiety* (53

parameters) and *Hyperactivity/Inattention* (62 parameters), but not for those testing *Depression* (134 parameters) and *CU traits* (197 parameters). However, further power was lost when the sample was split according to sex, and none of these analyses would have achieved sufficient power with sample sizes of 433 boys and 250 girls.

Results should therefore be interpreted with some caution. This said, rules of thumb have been criticised in SEM, and there is evidence that a higher number of indicators increases rather than decreases power (Wolf et al., 2013). It would therefore be premature to dismiss these results entirely based on a lack of power as assessed using this very conservative rule of thumb.

## **Discussion**

### **Baseline analyses**

#### *Sex differences*

The high proportion of boys (63%) in this sample is reflective of the male preponderance of conduct difficulties in the community (Cohn & Adesman, 2015). Within the sample however, boys and girls reported very similar levels of delinquency, which was expected given that the trial specifically recruited participants based on their serious and persistent antisocial behaviour. What is more surprising is the relatively high proportion of young people (7% of boys and 5.6% of girls) reporting 0 delinquent behaviours in the past six months at baseline. This highlights one of the limitations of using a self-report delinquency measure which very much relies on young people reporting their behaviour honestly and accurately.

Over time, there is a notable decrease in self-reported delinquency for both boys and girls. If, as hypothesised, sex differences in comorbidity account for the sex difference in prevalence of antisocial behaviour, one would expect that resolution of the

comorbid condition would result in a reduction in antisocial behaviour. This would be shown in cross-lagged associations between the comorbid difficulty and self-reported delinquency over time, and it is expected that the strength of these associations for each sex would be in line with the hypotheses outlined above, i.e. changes in anxiety and depression would more strongly predict changes in self-reported delinquency for girls, while changes in hyperactivity/inattention and CU traits would be related to changes in self-reported delinquency in the same way for both sexes. It should be noted however that this decrease in self-reported delinquency is occurring in the context of increasingly high levels of drop-out, where those who dropped out may well have been those who continued to engage in antisocial behaviour.

As expected, girls in the sample presented with significantly higher levels of depression and anxiety than boys. This is in line with research evidence (Euler et al., 2015; Wasserman et al., 2005; Wiesner & Kim, 2006) and supports the notion of a gender paradox, whereby girls are less likely than boys to receive a diagnosis of CD, but those who do are more likely to experience a higher burden of comorbid difficulties.

Surprisingly, girls in the sample also reported slightly higher levels of hyperactivity/inattention. This is the opposite of what was expected given the large body of evidence demonstrating that ADHD is more prevalent among boys (American Psychiatric Association, 2013; Gershon, 2002). It is also perplexing given the higher proportion of boys in the sample meeting criteria for ADHD (33.7% vs. 25.5% of girls), as assessed by the DAWBA. This said, the mean difference between boys' and girls' total score on the Hyperactivity/Inattention subscale was small, and given that the data analysed was self-report, it is possible that this result reflects a higher awareness of hyperactive/inattentive symptoms among girls, rather than an increased prevalence.

Girls and boys in the sample did not differ in their degrees of CU traits. Although it was expected that boys might present with higher levels of CU traits because of the

higher prevalence of these traits among boys in the community (Essau et al., 2006; Pihet et al., 2015), it is perhaps not surprising that within a sample of antisocial adolescents these traits were evenly distributed across both sexes. Indeed, the association between CU traits and aggressive and antisocial behaviour has been found to be similar for girls and boys (Frick et al., 2014).

### *Predictors of self-reported delinquency*

Hyperactivity/inattention and CU traits both positively predicted self-reported delinquency at baseline, as expected based on evidence from previous research which has identified these as significant risk factors for antisocial behaviour (Frick & Dickens, 2006; Frick et al., 2014; Frick, Stickle, Dandreaux, Farrell, & Kimonis, 2005; Moffitt et al., 2001; Thapar & van Goozen, 2018). These results support the usefulness of CU traits as a construct for understanding young people's antisocial behaviour. However, it should be noted that results of the CFA did highlight some potential issues with the ICU as a valid and reliable measure of CU traits (Frick, 2003), in particular its *unemotional* subscale, three items of which had to be removed as they did not load significantly onto the general *CU traits* factor. This is consistent with previous evaluations of the ICU (Essau et al., 2006; Pihet et al., 2015), and suggests that unemotionality may in fact be a slightly separate trait from callousness and uncaring.

Although depression was also found to positively predict self-reported delinquency, it is not possible to draw conclusions about causality based on this association at baseline. In other words, it is not clear whether this association was due to young people externalising their feelings of low mood, worthlessness or guilt by engaging in antisocial behaviour (as suggested by the "acting out" model) (Capaldi, 1992), to young people feeling depressed as a result of the negative consequences of their antisocial behaviour (as suggested the "failure" model) (Patterson & Capaldi,

1990), or due to similar or overlapping risk factors leading to both depressed mood and antisocial behaviour (Overbeek et al., 2001).

Anxiety was found to have a slight negative association with self-reported delinquency at baseline, but this did not reach significance. There may be several reasons for this. Firstly, the only questionnaire items relating to anxiety which were available in the data were four items from the "Emotional Problems" scale of the SDQ. Although these four items loaded well onto a latent factor and had an acceptable level of internal consistency (Cronbach's alpha = .64), this latent factor was highly correlated with depression and may not be an accurate measure of anxiety. Secondly, the four items used each captured slightly different features of anxiety, such as fearfulness, nervousness and worry. It has been suggested that these different features may relate to antisocial behaviour in slightly different ways (Frick et al., 1999). Lastly, there is evidence that anxiety can serve as both a protective factor (Pfeffer & Plutchik, 1989) and a risk factor (Olsson, 2009; Sourander et al., 2007), depending for example on which features of anxiety are being considered, the type of offending behaviour (proactive or reactive) (Hodgins et al., 2009), as well as other characteristics of the individual.

Several significant correlations were found between the four factors examined in this study. As expected there was a strong correlation between depression and anxiety, these two disorders being highly comorbid (American Psychiatric Association, 2013). There was a negative correlation between anxiety and CU traits, which supports Karpman's (1941) notion of "primary" psychopathy, whereby for some individuals, antisocial behaviour is associated with high levels of callous and unemotional traits and low trait anxiety. On the other hand, CU traits were positively correlated with hyperactivity/inattention. It is unclear from a theoretical standpoint why this should be the case, but it is possible that CU traits could develop as a defence mechanism for coping with the negative consequences of hyperactive, or impulsive behaviour. Finally,

hyperactivity/inattention was correlated with both anxiety and depression. Again, these are not uncommon comorbidities, given the higher levels of difficulty faced by young people with hyperactive/inattentive symptoms (Moffitt & Scott, 2008; Sonuga-Barke & Taylor, 2015).

#### *Moderation by sex*

The results indicate that sex did not moderate the relationship between any of the four factors examined and self-reported delinquency. In other words, comorbid difficulties did not differentially predict volume of self-reported delinquency for girls and boys in this sample. Although this was the expected result with regards to hyperactivity/inattention and CU traits, which previous research has found to affect boys' and girls' antisocial behaviour in similar ways (Frick et al., 2014; Giannotta & Rydell, 2016), it had been hypothesised that depression and anxiety would be more predictive of self-reported delinquency for girls than for boys (Keenan et al., 2011; Lehto-Salo et al., 2009).

One of the difficulties of using a sample of young people who were recruited based on their moderate-to-severe antisocial behaviour is that this eliminates any sex difference in self-reported delinquency which would have been expected in the general population. This presents a challenge when attempting to examine causal factors which may underpin this sex difference. It is not possible, for example, to examine the factors in question as mediators in the relationship between sex and antisocial behaviour, if in this sample there is no relationship between sex and antisocial behaviour. It was hoped that for those factors which have previously been found to influence antisocial behaviour in different ways for boys and girls, i.e. anxiety and depression, a moderating effect of sex could be detected, but alas this was not the case. Thus, the recruitment of this particular sample is likely to have obscured underlying population differences.

This said, taking these results at face value, it is entirely possible that although girls with conduct problems are more likely to experience comorbid depression and anxiety (American Psychiatric Association, 2013), when these comorbidities are present, they predict antisocial behaviour in the same way for both sexes. This would suggest that the results do not support the overarching hypothesis that sex differences in comorbid difficulties account for the sex difference in antisocial behaviour. Instead, the results highlight the importance of assessing both boys and girls presenting with antisocial behaviour for anxiety and depression, as well as hyperactivity/inattentiveness and CU traits, without being biased by expectations based on the prevalence of these difficulties in the general population.

### **Cross-lagged panel models**

#### *Anxiety*

There were no significant cross-lagged associations between anxiety and self-reported delinquency at baseline, six and twelve months. In other words, anxiety symptoms at one time point did not predict volume of self-reported delinquency in the following six months, nor did volume of delinquency reported at the end of a six-month period predict anxiety symptoms six months later, after controlling for concurrent associations.

However, although no significant association was found between anxiety and self-reported delinquency at baseline, a significant positive association did appear at six months. This suggests that a relationship between anxiety and self-reported delinquency does exist which was not captured at baseline. It is of course not possible to infer causality from this concurrent association, as it may be that high anxiety increased the risk of reactive antisocial behaviour (Hodgins et al., 2009), or it may be that engaging in antisocial behaviour led to increased anxiety (Frick et al., 1999). What

these results do indicate is that in this sample anxiety does not serve as a protective factor against antisocial behaviour, as no negative associations were found.

When considering the cross-lagged associations between anxiety symptoms and self-reported delinquency for boys alone, the pattern of associations remained the same as it was for both sexes together, albeit with a slightly stronger concurrent association at six months. However, when considering girls alone, there were no significant associations between anxiety and self-reported delinquency at any time point. This is contrary to the initial hypothesis that anxiety is a stronger predictor of antisocial behaviour for girls than boys, and suggests that although girls with CD are more likely to experience comorbid anxiety (Lehto-Salo et al., 2009), when it comes to engaging in antisocial behaviour, anxiety may be a more significant risk factor for boys.

In all three of the above analyses, the strongest associations were the internal associations over time, such that strongest predictor of self-reported delinquency at any one time point was self-reported delinquency at the previous time point, and likewise, the strongest predictor of anxiety at any one time point was anxiety at the previous time point, demonstrating homotypic continuity of these difficulties over time. This is consistent with evidence from longitudinal studies that anxiety tends to remain stable through adolescence (Waszczuk, Zavos, Gregory, & Eley, 2016).

These results highlight the importance of assessing the role of anxiety in young people's antisocial behaviour. Despite anxiety being a more common comorbidity in girls, and the subsequent expectation that this would result in a stronger association between anxiety and antisocial behaviour among this group, these results suggests that it is in fact boys for whom anxiety is especially associated with antisocial behaviour. However, it is important to bear in mind the limitations of this study when considering these results, particularly with regards to the measurement of anxiety, and the limited power to detect effects in the CLPMs testing associations for girls alone.

## *Depression*

There were no significant cross-lagged associations between depression and self-reported delinquency at baseline, six and twelve months. However, in addition to the significant association between depressive symptoms and self-reported delinquency found at baseline, this concurrent association was not only present but considerably stronger six months later. Surprisingly, this association disappeared at twelve-month follow up, but this may be due to increasing amounts of missing data at each follow-up resulting in less accurate results. Although it is not possible to infer causality from these associations, according to the "failure" model (Patterson & Capaldi, 1990), one would expect to see associations between self-reported delinquency at one time point and depression six months later, as the negative consequences of antisocial behaviour are experienced by the individual, but this is not the case. On the other hand, self-reports of concurrent depression and antisocial behaviour could suggest a pattern of "acting out" (Capaldi, 1992), whereby depressive symptoms are externalised into antisocial behaviour. However, the model which most accurately fits the results is the "stability model" (Overbeek et al., 2001), whereby depressed mood and antisocial behaviour remain stable over time, and are thought to be caused by associated psychopathological processes, but do not mutually influence each other (no significant cross-lagged associations). According to this hypothesis, individuals develop internalising and externalising habits, which they maintain throughout adolescence. This is not consistent with this study's hypothesis that sex differences in antisocial behaviour are driven by sex differences in vulnerability to depression.

When considering the longitudinal associations between depressive symptoms and self-reported delinquency for boys alone, the pattern of associations remained the same as it was for both sexes together, albeit with a slightly weaker concurrent association at six months. However, when considering girls alone, as well as having a stronger concurrent association between the two factors at six months, a cross-lagged

association appeared, such that depressive symptoms at baseline not only predicted self-reported delinquency at baseline, they also predicted self-reported delinquency over the following six-month period. This suggests that the "acting out" model may be more pertinent for girls than it is for boys. This is consistent with the initial hypothesis that sex differences in antisocial behaviour are driven in part by sex differences in comorbid depression, and is of particular importance when one considers that comorbid depression is much more prevalent among girls with CD than boys with CD (Wiesner & Kim, 2006).

In all three of the above analyses, the strongest associations were the internal associations over time, such that strongest predictor of self-reported delinquency at any one time point was self-reported delinquency at the previous time point, and likewise, the strongest predictor of depression at any one time point was depression at the previous time point, demonstrating homotypic continuity, i.e. stability, of these difficulties over time. This is consistent with evidence from longitudinal studies that depression tends to remain stable through adolescence (Waszczuk et al., 2016), but once again goes against the overarching hypothesis of this study.

These results provide further evidence of the association between depression and antisocial behaviour which has previously been reported in the literature (Angold et al., 1999), and highlight the importance of assessing for low mood when working with young people – particularly girls – presenting with antisocial behaviour. Indeed, these results suggest that girls are at particular risk of “acting out” and externalising their depressive symptoms. It is possible that delivering interventions aimed at improving mood could therefore help to reduce engagement in antisocial behaviour.

### *Hyperactivity/inattention*

There were no significant cross-lagged associations between hyperactivity/inattention and self-reported delinquency at baseline, six and twelve months. However, in addition to the significant association between hyperactivity/inattention and self-reported delinquency found at baseline, this concurrent association was also present at six and twelve months. This suggests a stable relationship between hyperactivity/inattention and self-reported delinquency, and is in line with previous research which has consistently identified a strong link between ADHD and antisocial behaviour (Angold et al., 1999; Cohn & Adelman, 2015; Thapar & van Goozen, 2018). However, due to the absence of any cross-lagged associations, it is not possible to draw conclusions about whether hyperactivity/inattentiveness is itself a risk factor for antisocial behaviour, or whether these difficulties develop as a result of comorbidity with other psychopathologies or neurocognitive impairments (G.G. von Polier et al., 2012).

When considering the longitudinal associations between hyperactivity/inattention and self-reported delinquency for boys alone, surprisingly, the concurrent association at 12 months disappeared. The reason for this is unclear, but it may be a reflection of boys' potential lack of awareness of their own hyperactivity/inattention, and subsequent lower accuracy in self-reporting. When considering girls alone, the pattern of associations remained the same as it was for both sexes together. Overall, this shows some support for the hypothesis that boys and girls with conduct difficulties are affected by hyperactivity/inattention in similar ways. It would be interesting to further explore the relationship between hyperactivity/inattention and self-reported delinquency in this sample by examining potential mediating factors, as well as potential sex differences in mediating factors, such as social exclusion (DuPaul et al., 2004; Gresham et al., 1998; Hoza et al., 2005) academic achievement (Hinshaw et al., 2002; G.G. von Polier et al., 2012) and parenting practices (Meier et al., 2009).

In all three of the above analyses, the strongest associations were the internal associations over time, such that strongest predictor of self-reported delinquency at any one time point was self-reported delinquency at the previous time point, and likewise, the strongest predictor of hyperactivity/inattention at any one time point was hyperactivity/inattention at the previous time point, demonstrating homotypic continuity of these difficulties over time. This is consistent with evidence that ADHD symptoms tend to persist across the lifespan (Biederman, Petty, & Faraone, 2012), and that they are especially persistent in children with comorbid conduct difficulties (Sonuga-Barke & Taylor, 2015).

These results reinforce existing evidence that there is a strong association between hyperactivity/inattention and antisocial behaviour (Angold et al., 1999; Moffitt et al., 2001). Continued exploration of the factors which mediate the relationship between hyperactivity/inattention and antisocial behaviour for boys and girls will increasingly allow for the development and provision of specifically targeted interventions.

#### *Callous-unemotional traits*

There were no significant cross-lagged associations between CU traits and self-reported delinquency at baseline, six and twelve months. However, in addition to the significant association between CU traits and self-reported delinquency found at baseline, this association was also significant at six and twelve months. This suggests a stable relationship between CU traits and self-reported delinquency, and is in line with previous research which has found these traits to be highly related to antisocial behaviour (Frick & Dickens, 2006; Frick et al., 2014). Although it is not possible to infer causality from these concurrent associations, it follows logically that CU traits would cause antisocial behaviour and not vice versa. This said, it is not impossible that a

young person could adopt callous or unemotional attitudes post-hoc as a means of justifying antisocial behaviour.

When considering the longitudinal associations between CU traits and self-reported delinquency for boys alone, the pattern of associations remained the same as it was for both sexes together. When considering girls alone however, the concurrent association at 12 months disappeared. However, it seems unlikely that CU traits would bear no relationship to self-reported delinquency, and this finding may in fact be due to increasing amounts of missing data at each follow-up resulting in less accurate results, as well as a considerably smaller sample of girls resulting in less power to detect smaller effects. Overall, these results seem to support the hypothesis that the association between CU traits and antisocial and aggressive behaviour is similar for boys and girls (Frick et al., 2014).

In all three of the above analyses, the strongest associations were the internal associations over time, such that the strongest predictor of self-reported delinquency at any one time point was self-reported delinquency at the previous time point, and likewise, the strongest predictor of CU traits at any one time point was CU traits at the previous time point, demonstrating homotypic continuity of these difficulties over time. This is consistent with previous research evidence that CU traits tend to be stable through childhood and adolescence (Frick & White, 2008).

The consistent association between CU traits and antisocial behaviour found over time further supports the usefulness of CU traits as a construct for understanding young people's antisocial behaviour. Research has found that young people with CU traits show distinct cognitive and emotional characteristics, such as response to punishment, emotional processing and thrill-seeking (Frick & Viding, 2009; Frick & White, 2008), which suggest specific causal mechanisms leading to antisocial behaviour. Identifying young people with CU traits may therefore help to tailor

interventions to take into account these distinct characteristics. Although CU traits have been found to be relative stable, there is evidence that they can improve with intensive and specifically tailored treatment (S. Butler et al., 2011; Frick et al., 2014).

## **Limitations**

This study used self-report data in order to gain an insight into the inner worlds of the young people who took part in the START study. However, the use of self-report data has obvious limitations. It relies on the honesty of the respondent, on their motivation to answer the questions accurately, and on their ability to recognise symptoms and traits within themselves. Using self-report measures with young people can have particular limitations, as they are more inclined to respond based on their state of mind in the moment and tend to under-report behavioural difficulties (Deighton et al., 2014). However, reliability of self-report has been found to improve considerably from the age of 10 (Edelbrock, Costello, Dulcan, Kalas, & Conover, 1985), which suggests that the 11-to-17-year-olds in the current sample can be expected to have had good understanding of the questionnaires and appropriate level of insight into their difficulties. This said, there is evidence that young people with ADHD in particular are significantly more likely to under-report or inconsistently report delinquent behaviours (Sibley et al., 2010). This can be due in some cases to ADHD symptoms affecting the accuracy of self-report (such as forgetfulness, carelessness or impatience), and in others it can be due to purposeful untruthfulness.

As this study was an analysis of secondary data, the questionnaires completed by the young people were not specifically chosen for the purpose of examining the factors of interest here. In particular, the only available self-report measure of hyperactivity/inattention was from the "Hyperactivity/inattention" subscale of the SDQ, and the only available self-report measure of anxiety was four items from the

"Emotional Problems" subscale of the SDQ. The outcomes from these may therefore not have been as valid or reliable as if disorder-specific questionnaires had been available. In addition, although the ICU has been found to be internally consistent and externally valid in terms of its total score, callous subscale and uncaring subscale, there are concerns around the validity of the unemotional subscale (Cardinale & Marsh, 2017; Pihet et al., 2015). This is consistent with findings from this study where a number of items from this subscale were removed because they did not load onto the general *CU traits* factor. This may have affected the goodness of fit of the models examining CU traits.

A considerable strength of SEM is its ability to specify latent variable models that provide estimates of both the relations among latent constructs and their observed indications (the measurement model) and the relations among constructs (the structural model) (Tomarken & Waller, 2005). This allows for the estimation of relations among constructs that are corrected for biases caused by random error and unrelated variance. A particular strength of the CLPM is that it gives time for causes to have their effects, and therefore allows for stronger inferences about the direction of causation compared to cross-sectional models (Selig & Preacher, 2009). Another advantage of SEM is the availability of measures of global fit that enable a summary evaluation of even complex models containing large numbers of linear equations, as well as comparison of fit between different models (Tomarken & Waller, 2005). This said, goodness of fit is most often assessed using rules of thumb, and there are limitations to this: often the rules used are too lenient and in fact the optimal cut-off criteria depend on a number of factors such as estimation method used, sample size, model complexity and the degree to which assumptions of normality are violated.

Goodness of fit describes the extent to which observed data matches the values expected by theory. In this study, many of the models tested did not have adequate fit. A number of factors are likely to have contributed to this, including the number of

variables relative to the sample size. Indeed, large numbers of variables are known to negatively affect model fit, as is smaller sample size. This is another reason why model fit was poorer for models testing CU traits, as this variable was made up of a considerably higher number of indicators than the others. Model fit for the CLPMs will also have been affected by their higher number of variables, all the more so when broken down by gender. Indeed, these would have benefitted from a sample size far greater than the number recruited in the START study.

Finally, as is so often the case in follow-up studies and in particular with this population, drop-out rates were considerable. Although a full information maximum likelihood procedure (FIML) was used, the accuracy of results across time is likely to have been affected by the increasing amounts of missing data. Indeed, results at 18 months were so distorted that they had to be excluded from the analysis. Results of the CLPMs should therefore be interpreted with this in mind.

## **Conclusions**

Overall, the results of this study provided little evidence to support the overarching hypothesis that the sex difference in antisocial behaviour could be accounted for by sex differences in anxiety, depression, hyperactivity/inattention or CU traits. In fact, they demonstrated that there are more similarities than differences between boys and girls who engage in antisocial behaviour, a finding which is consistent with much of the literature.

The results did however provide further evidence of the strong association between both hyperactivity/inattention and CU traits, and antisocial behaviour. Although boys within this particular sample did not present with higher levels of hyperactivity/inattention or CU traits, these difficulties are well known to be more prevalent among boys in the general population. Based on this, it could be

hypothesised that the male preponderance of these risk factors may account for some of the sex difference in antisocial behaviour in the general population, although conclusions cannot be drawn about this based on the current results.

Depression was also found to be associated with antisocial behaviour, and over time this appeared to be particularly true for girls, for whom antisocial behaviour may be a way of acting out depressed mood. The relationship between anxiety and antisocial behaviour was less clear, and there may be a number of reasons for this, as outlined above. Contrary to what was expected based on the literature, there appeared to be an association between anxiety and antisocial behaviour for boys, but not for girls. This could be hypothesised to indicate a relationship between anxiety and reactive aggression for boys (Brazil et al., 2018).

Although the longitudinal analyses consistently demonstrated that the strongest predictor of current antisocial behaviour in this sample was previous antisocial behaviour, results also showed considerable reductions in antisocial behaviour over the 18-month period of the study, for both boys and girls. The absence of any cross-lagged associations in all but one CLPM suggests that this change was not particularly related to any changes in comorbid difficulties. This goes against the overarching hypothesis of this study, that sex differences in antisocial behaviour can be accounted for by sex differences in comorbid conditions. However, the results do demonstrate the clinical importance of recognising anxiety, depression, hyperactivity/inattention and CU traits in young people who are presenting with antisocial behaviour, and of tailoring interventions to support them, their families and their schools in addressing these difficulties from an early age. Further research into the mediating factors between each of these difficulties and antisocial behaviour is needed to further understand the causal mechanisms at play, and to subsequently develop increasingly tailored interventions which may ultimately help to reduce engagement in antisocial behaviour.

## References

- American Psychiatric Association. (2013). *Diagnostic and statistical manual of mental disorders* (5th ed.). Washington, DC: Author.
- Angold, A., Costello, E. J., & Erkanli, A. (1999). Comorbidity. *Journal of Child Psychology and Psychiatry*, *40*(1), 57–87.
- Angold, A., Costello, E. J., Messer, S. C., Pickles, A., Winder, F., & Silver, D. (1995). The Development of a Questionnaire for Use in Epidemiological Studies of Depression in Children and Adolescents. *International Journal of Methods in Psychiatric Research*, *5*, 237–249.
- Beauchaine, T. P., Hinshaw, S. P., & Pang, K. L. (2010). Comorbidity of Attention-Deficit/Hyperactivity Disorder and Early-Onset Conduct Disorder: Biological, Environmental, and Developmental Mechanisms. *Clinical Psychology: Science and Practice*, *17*(4), 327–336. <https://doi.org/10.1111/j.1468-2850.2010.01224.x>
- Bentler, P. M. (1990). Comparative Fit Indexes in Structural Models. *Psychological Bulletin*, *107*(2), 238–246.
- Biederman, J., Petty, C., & Faraone, S. V. (2012). Adult outcome of attention deficit/hyperactivity disorder: a controlled 16-year follow-up study. *Journal of Clinical Psychiatry*, *73*, 941–950. [https://doi.org/10.1016/S0924-977X\(12\)70683-1](https://doi.org/10.1016/S0924-977X(12)70683-1)
- Block, J. H. (1983). Differential Premises Arising from Differential Socialization of the Sexes : Some Conjectures. *Child Development*, *54*(6), 1335–1354.
- Boomsma, A. (1985). Nonconvergence, improper solutions. and starting values in LISREL maximum likelihood estimation. *Psychometrika*, *50*(2), 229–242.
- Brazil, I. A., van Dongen, J. D. M., Maes, J. H. R., Mars, R. B., & Baskin-Sommers, A. R. (2018). Classification and treatment of antisocial individuals: From behavior to

biocognition. *Neuroscience and Biobehavioral Reviews*, 91, 259–277.

<https://doi.org/10.1016/j.neubiorev.2016.10.010>

Browne, M. W., & Cudeck, R. (1992). Alternative Ways of Assessing Model Fit.

*Sociological Methods and Research*, 21(2), 230–258.

Butler, S., Baruch, G., Hickey, N., & Fonagy, P. (2011). A Randomized Controlled Trial

of Multisystemic Therapy and a Statutory Therapeutic Intervention for Young

Offenders. *Journal of the American Academy of Child & Adolescent Psychiatry*,

50(12), 1220–1235. <https://doi.org/10.1016/j.jaac.2011.09.017>

Capaldi, D. M. (1992). Co-occurrence of conduct problems and depressive symptoms in

early adolescent boys: II. A 2-year follow-up at Grade 8. *Development and*

*Psychopathology*, 4(01), 125. <https://doi.org/10.1017/S0954579400005605>

Cardinale, E. M., & Marsh, A. A. (2017). The Reliability and Validity of the Inventory of

Callous Unemotional Traits: A Meta-Analytic Review. *Assessment*,

107319111774739. <https://doi.org/10.1177/1073191117747392>

Cohn, A. M., & Adelman, A. (2015). Oppositional defiant disorder and conduct disorder.

In L. A. Adler, T. J. Spencer, & T. E. Wilens (Eds.), *Attention-Deficit Hyperactivity*

*Disorder in Adults and Children* (pp. 139–149). Cambridge: Cambridge University

Press. <https://doi.org/10.1017/CBO9781139035491.013>

Deighton, J., Croudace, T., Fonagy, P., Brown, J., Patalay, P., & Wolpert, M. (2014).

Measuring mental health and wellbeing outcomes for children and adolescents to

inform practice and policy: A review of child self-report measures. *Child and*

*Adolescent Psychiatry and Mental Health*, 8(1), 1–14. <https://doi.org/10.1186/1753->

2000-8-14

DuPaul, G. J., Volpe, R. J., Jitendra, A. K., Lutz, J. G., Lorah, K. S., & Gruber, R.

(2004). Elementary school students with AD / HD : predictors of academic

achievement. *Journal of School Psychology*, 42, 285–301.

<https://doi.org/10.1016/j.jsp.2004.05.001>

Edelbrock, C., Costello, A. J., Dulcan, M. K., Kalas, R., & Conover, N. C. (1985). Age Differences in the Reliability of the Psychiatric Interview of the Child Authors ( s): Craig Edelbrock , Anthony J . Costello , Mina K . Dulcan , Robert Kalas and Noelle Calabro Conover Published by : Wiley on behalf of the Society for Research in Ch. *Child Development*, 56(1), 265–275.

El Sayed, S., Piquero, A. R., Schubert, C. A., Mulvey, E. P., Pitzer, L., & Piquero, N. L. (2016). Assessing the Mental Health/Offending Relationship Across Race/Ethnicity in a Sample of Serious Adolescent Offenders. *Criminal Justice Policy Review*, 27(3), 265–301. <https://doi.org/10.1177/0887403415575145>

Enders, C. K. (2010). *Applied missing data analysis*. London: Guilford Press.

Essau, C. A., Sasagawa, S., & Frick, P. J. (2006). Callous-Unemotional Traits in a Community Sample of Adolescents. *Assessment*, 13(4), 454–469.  
<https://doi.org/10.1177/1073191106287354>

Euler, F., Jenkel, N., Stadler, C., Schmeck, K., Fegert, J. M., Kölch, M., & Schmid, M. (2015). Variants of Girls and Boys with Conduct Disorder: Anxiety Symptoms and Callous-Unemotional Traits. *Journal of Abnormal Child Psychology*, 43(4), 773–785. <https://doi.org/10.1007/s10802-014-9946-x>

Fonagy, P., Butler, S., Cottrell, D., Scott, S., Pilling, S., Eisler, I., ... Goodyer, I. M. (2018). Multisystemic therapy versus management as usual in the treatment of adolescent antisocial behaviour (START): a pragmatic, randomised controlled, superiority trial. *The Lancet Psychiatry*, 5, 119–133. [https://doi.org/10.1016/S2215-0366\(18\)30001-4](https://doi.org/10.1016/S2215-0366(18)30001-4)

Fonagy, P., Butler, S., Goodyer, I., Cottrell, D., Scott, S., Pilling, S., ... Haley, R. (2013).

Evaluation of multisystemic therapy pilot services in the Systemic Therapy for At Risk Teens (START) trial: study protocol for a randomised controlled trial. *Trials*, 14(265), 1–19. <https://doi.org/10.1186/1745-6215-14-265>

Fontaine, N. M. G., Brendgen, M., Vitaro, F., Boivin, M., Tremblay, R. E., & Côté, S. M. (2018). Longitudinal associations between delinquency, depression and anxiety symptoms in adolescence: Testing the moderating effect of sex and family socioeconomic status. *Journal of Criminal Justice*, (September), 1–8. <https://doi.org/10.1016/j.jcrimjus.2018.09.007>

Fontaine, N. M. G., Rijdsdijk, F. V., McCrory, E. J., & Viding, E. (2010). Etiology of Different Developmental Trajectories of Callous-Unemotional Traits. *Journal of the American Academy of Child & Adolescent Psychiatry*, 49(7), 656–664. <https://doi.org/10.1016/j.jaac.2010.03.014>

Frick, P. J. (2003). The Inventory of Callous-Unemotional Traits. University of New Orleans.

Frick, P. J., & Dickens, C. (2006). Current Perspectives on Conduct Disorder. *Current Psychiatry Reports*, 8(1), 59\*72.

Frick, P. J., Lilienfeld, S. O., Ellis, M., Loney, B., & Silverthorn, P. (1999). The association between anxiety and psychopathy dimensions in children. *Journal of Abnormal Child Psychology*, 27(5), 383–392. <https://doi.org/10.1023/A:1021928018403>

Frick, P. J., Ray, J. V, Thornton, L. C., & Kahn, R. E. (2014). Can Callous-Unemotional Traits Enhance the Understanding , Diagnosis , and Treatment of Serious Conduct Problems in Children and Adolescents ? A Comprehensive Review. *Psychological Bulletin*, 140(1), 1–57. <https://doi.org/10.1037/a0033076>

Frick, P. J., Stickle, T. R., Dandreaux, D. M., Farrell, J. M., & Kimonis, E. R. (2005).

Callous-Unemotional Traits in Predicting the Severity and Stability of Conduct Problems and Delinquency. *Journal of Abnormal Child Psychology*, 33(4), 471–487. <https://doi.org/10.1007/s10648-005-5728-9>

Frick, P. J., & Viding, E. (2009). Antisocial behavior from a developmental psychopathology perspective. *Development and Psychopathology*, 21, 1111–1131. <https://doi.org/10.1017/S0954579409990071>

Frick, P. J., & White, S. F. (2008). Research Review : The importance of callous-unemotional traits for developmental models of aggressive and antisocial behavior. *Journal of Child Psychology and Psychiatry*, 49(4), 359–375. <https://doi.org/10.1111/j.1469-7610.2007.01862.x>

Gershon, J. (2002). Meta-Analytic Review of Gender Differences in ADHD. *Journal of Attention Disorders*, 5(3), 143–154.

Giannotta, F., & Rydell, A.-M. (2016). The Prospective Links Between Hyperactive/Impulsive, Inattentive, and Oppositional-Defiant Behaviors in Childhood and Antisocial Behavior in Adolescence: The Moderating Influence of Gender and the Parent-Child Relationship Quality. *Child Psychiatry & Human Development*, 47(6), 857–870. <https://doi.org/10.1007/s10578-015-0617-0>

Goodman, R., & Scott, S. (1999). Comparing the Strengths and Difficulties Questionnaire and the Child Behavior Checklist: Is Small Beautiful? *Journal of Abnormal Child Psychology*, 27(1), 17–24.

Gresham, F. M., Macmillan, D. L., Bocian, K. M., Ward, S. L., & Forness, S. R. (1998). Comorbidity of Hyperactivity-Impulsivity-Inattention and Conduct Problems : Risk Factors in Social , Affective , and Academic Domains. *Journal of Abnormal Child Psychology*, 26(5), 393–406.

Her Majesty's Inspectorate of Constabulary. (2014). *Crime-recording: making the victim*

count.

Hinshaw, S. P., & Blachman, D. R. (2005). Attention-Deficit/Hyperactivity Disorder in Girls. In D. J. Bell, S. L. Foster, & E. J. Mash (Eds.), *Handbook of Behavioral and Emotional Problems in Girls* (pp. 117–147). New York: Kluwer Academic/Plenum Publishers.

Hinshaw, S. P., Carte, E. T., Sami, N., Treuting, J. J., & Zupan, B. A. (2002). Preadolescent girls with attention-deficit/hyperactivity disorder: II. Neuropsychological performance in relation to subtypes and individual classification. *Journal of Consulting and Clinical Psychology, 70*(5), 1099–1111. <https://doi.org/10.1037/0022-006X.70.5.1099>

Hodgins, S., Brito, S. A. De, Chhabra, P., & Côté, G. (2010). Anxiety Disorders Among Offenders With Antisocial Personality Disorders: A Distinct Subtype? *The Canadian Journal of Psychiatry, 55*(12), 784–791. <https://doi.org/10.1177/070674371005501206>

Hodgins, S., de Brito, S., Simonoff, E., Vloet, T., & Viding, E. (2009). Getting the phenotypes right: An essential ingredient for understanding aetiological mechanisms underlying persistent violence and developing effective treatments. *Frontiers in Behavioral Neuroscience, 3*(November), 1–10. <https://doi.org/10.3389/neuro.08.044.2009>

Hoza, B., Mrug, S., Gerdes, A. C., Hinshaw, S. P., Bukowski, W. M., Gold, J. A., ... Arnold, L. E. (2005). What Aspects of Peer Relationships Are Impaired in Children With Attention-Deficit / Hyperactivity Disorder ? *Journal of Consulting and Clinical Psychology, 73*(3), 411–423. <https://doi.org/10.1037/0022-006X.73.3.411>

Karpman, B. (1941). On the need of separating psychopathy into two distinct clinical types: the symptomatic and the idiopathic. *Journal of Criminal Psychopathology, 3*,

112–137.

Keenan, K., Feng, X., Babinski, D., Hipwell, A., Hinze, A., Loeber, R., & Stouthamer-Loeber, M. (2011). Developmental Comorbidity of Depression and Conduct Problems in Girls. In M. Kerr, H. Stattin, R. C. M. E. Engels, G. Overbeek, & A.-K. Andershed (Eds.), *Understanding Girls' Problem Behavior* (pp. 117–137). Chichester, UK: John Wiley & Sons, Ltd.  
<https://doi.org/10.1002/9780470977453.ch5>

Kimonis, E. R., & Frick, P. J. (2010). Etiology of Oppositional Defiant Disorder and Conduct Disorder: Biological, Familial and Environmental Factors Identified in the Development of Disruptive Behavior Disorders. In R. C. Murrihy, A. D. Kidman, & T. H. Ollendick (Eds.), *Clinical Handbook of Assessing and Treating Conduct Problems in Youth* (pp. 49–76). Springer. <https://doi.org/10.1007/978-1-4419-6297-3>

Kline, R. B. (2005). *Principles and practice of structural equation modeling* (2nd ed.). New York: Guilford Press. Retrieved from <papers2://publication/uuid/3B80771A-1F25-493A-A492-AEAC4770538D>

Lehto-Salo, P., Närhi, V., Ahonen, T., & Marttunen, M. (2009). Psychiatric comorbidity more common among adolescent females with CD/ODD than among males. *Nordic Journal of Psychiatry*, 63(4), 308–315.  
<https://doi.org/10.1080/08039480902730615>

Meier, M. H., Slutske, W. S., Heath, A. C., & Martin, N. G. (2009). The Role of Harsh Discipline in Explaining Sex Differences in Conduct Disorder: a Study of Opposite-Sex Twin Pairs. *Journal of Abnormal Child Psychology*, 37, 653–664.

Moffitt, T., Caspi, A., Rutter, M., & Silva, P. A. (2001). *Sex Differences in Antisocial Behaviour: Conduct Disorder, Delinquency, and Violence in the Dunedin*

*Longitudinal Study*. Cambridge University Press.

<https://doi.org/10.1017/CBO9780511490057>

Moffitt, T. E., & Scott, S. (2008). Conduct Disorders of Childhood and Adolescence. In M. Rutter, D. V. M. Bishop, D. S. Pine, S. Scott, J. Stevenson, E. Taylor, & A. Thapar (Eds.), *Rutter's Child and Adolescent Psychiatry* (5th ed., pp. 543–564). Blackwell.

Muthén, L. K., & Muthén, B. O. (2017). *Mplus User's Guide* (8th ed.). Los Angeles, CA: Muthén & Muthén.

Nunnally, J. C. (1967). *Psychometric theory*. London: McGraw-Hill.

Olsson, M. (2009). DSM diagnosis of conduct disorder (CD) - A review, 9488(Cd).  
<https://doi.org/10.1080/08039480802626939>

Overbeek, G., Vollebergh, W., Meeus, W., Engels, R., & Luijpers, E. (2001). Course, Co-Occurrence, and Longitudinal Associations of Emotional Disturbance and Delinquency from Adolescence to Young Adulthood: A Six-Year Three-Wave Study. *Journal of Youth and Adolescence*, 30(4), 401–426.  
<https://doi.org/10.1023/A:1010441131941>

Paquette Boots, D., Wareham, J., & Weir, H. (2011). Gendered Perspectives On Depression and Antisocial Behaviors: An Extension of the Failure Model in Adolescents. *Criminal Justice and Behavior*, 38(1), 63–84.  
<https://doi.org/10.1177/0093854810388504>

Patterson, G. R., & Capaldi, D. M. (1990). A mediational model for boys' depressed mood. In J. Rolf, A. S. Masten, D. Cicchetti, K. H. Nuchterlein, & S. Weintraub (Eds.), *Risk and protective factors in the development of psychopathology* (pp. 141–163). Cambridge: Cambridge University Press.  
<https://doi.org/http://dx.doi.org/10.1017/CBO9780511752872.010>

- Pfeffer, C. R., & Plutchik, R. (1989). Co-occurrence of psychiatric disorders in child psychiatric patients and nonpatients: a circumplex model. *Comprehensive Psychiatry*, 30(4), 275–282.
- Pihet, S., Etter, S., Schmid, M., & Kimonis, E. R. (2015). Assessing Callous-Unemotional Traits in Adolescents: Validity of the Inventory of Callous-Unemotional Traits Across Gender, Age, and Community/Institutionalized Status. *Journal of Psychopathology and Behavioral Assessment*, 37(3), 407–421.  
<https://doi.org/10.1007/s10862-014-9472-8>
- Rhew, I. C., Simpson, K., Tracy, M., Lymp, J., McCauley, E., Tsuang, D., & Stoep, A. Vander. (2010). Criterion validity of the Short Mood and Feelings Questionnaire and one- and two-item depression screens in young adolescents. *Child and Adolescent Psychiatry and Mental Health*, 4(8), 1–11.
- Schreiber, J. B., Stage, F. K., King, J., Nora, A., & Barlow, E. A. (2006). Reporting Structural Equation Modeling and Confirmatory Factor Analysis Results: A Review. *The Journal of Educational Research*, 99(6), 323–337.
- Selig, J. P., & Preacher, K. J. (2009). Mediation Models for Longitudinal Data in Developmental Research. *Research in Human Development*, 6(2–3), 144–164.  
<https://doi.org/10.1080/15427600902911247>
- Sibley, M. H., Pelham, W. E., Molina, B. S. G., Waschbusch, D. A., Gnagy, E. M., Babinski, D. E., & Biswas, A. (2010). Inconsistent self-report of delinquency by adolescents and young adults with ADHD. *Journal of Abnormal Child Psychology*, 38(5), 645–656. <https://doi.org/10.1007/s10802-010-9404-3>
- Smith, D. J., & McVie, S. (2003). Theory and method in the Edinburgh study of youth transitions and crime. *British Journal of Criminology*, 43(1), 169–195.
- Sonuga-Barke, E. J. S., & Taylor, E. (2015). ADHD and hyperkinetic disorder. In A.

Thapar, D. S. Spine, J. F. Leckman, S. Scott, M. J. Snowling, & E. Taylor (Eds.), *Rutter's Child and Adolescent Psychiatry* (6th ed., pp. 738–756). Wiley.

Sourander, A., Jensen, P., Davies, M., Niemelä, S., Elonheimo, H., Ristkari, T., ... Almqvist, F. (2007). Who is at greatest risk of adverse long-term outcomes? The Finnish from a boy to a man study. *Journal of the American Academy of Child and Adolescent Psychiatry*, *46*(9), 1148–1161.

<https://doi.org/10.1097/chi.0b013e31809861e9>

Thapar, A., & van Goozen, S. (2018). Conduct disorder in ADHD. In T. Banaschewski, D. Coghill, & A. Zuddas (Eds.), *Oxford Textbook of Attention Deficit Hyperactivity Disorder* (Vol. 1, pp. 1–17). Oxford University Press.

<https://doi.org/10.1093/med/9780198739258.003.0020>

Tomarken, A. J., & Waller, N. G. (2005). Structural Equation Modeling: Strengths, Limitations, and Misconceptions. *Annual Review of Clinical Psychology*, *1*(1), 31–65. <https://doi.org/10.1146/annurev.clinpsy.1.102803.144239>

Tung, I., Li, J. J., Meza, J. I., Jezior, K. L., Jessica, S. V., Hentschel, P. G., ... Lee, S. S. (2016). Patterns of Comorbidity Among Girls With ADHD : A Meta-analysis. *Pediatrics*, *138*(4). <https://doi.org/10.1542/peds.2016-0430>

Turner, N., Joinson, C., Peters, T. J., Wiles, N., & Lewis, G. (2014). Validity of the Short Mood and Feelings Questionnaire in Late Adolescence. *Psychological Assessment*, *26*(3), 752–762. <https://doi.org/10.1037/a0036572>

von Polier, G. G., Vloet, T. D., & Herpertz-Dahlmann, B. (2012). ADHD and Delinquency - a Developmental Perspective. *Behavioral Sciences and the Law*, *30*, 121–139. <https://doi.org/10.1002/bsl.2005>

Wang, J., & Wang, X. (2012). *Structural Equation Modeling: Applications Using Mplus* (1st ed.). Higher Education Press. <https://doi.org/10.1002/9781118356258.ch7>

- Wasserman, G. A., McCreynolds, L. S., Ko, S. J., Katz, L. M., & Carpenter, J. R. (2005). Gender Differences in Psychiatric Disorders at Juvenile Probation Intake, *95*(1), 131–137. <https://doi.org/10.2105/AJPH.2003.024737>
- Waszczuk, M. A., Zavos, H. M. S., Gregory, A. M., & Eley, T. C. (2016). The stability and change of etiological influences on depression, anxiety symptoms and their co-occurrence across adolescence and young adulthood. *Psychological Medicine*, *46*(1), 161–175. <https://doi.org/10.1017/S0033291715001634>
- Wiesner, M. (2003). A Longitudinal Latent Variable Analysis of Reciprocal Relations between Depressive Symptoms and Delinquency during Adolescence. *Journal of Abnormal Psychology*, *112*(4), 633–645. <https://doi.org/10.1037/0021-843X.112.4.633>
- Wiesner, M., & Kim, H. K. (2006). Co-occurring delinquency and depressive symptoms of adolescent boys and girls: A dual trajectory modeling approach. *Developmental Psychology*, *42*(6), 1220–1235. <https://doi.org/10.1037/0012-1649.42.6.1220>
- Wolf, E. J., Harrington, K. M., Clark, S. L., & Miller, M. W. (2013). Sample Size Requirements for Structural Equation Models. *Educational and Psychological Measurement*, *73*(6), 913–934. <https://doi.org/10.1177/0013164413495237>
- Zahn-Waxler, C. (2012). The Development of Empathy, Guilt, and Internalization of Distress. In *Anxiety, Depression, and Emotion*. <https://doi.org/10.1093/acprof:oso/9780195133585.001.0001>

## Part III: Critical Appraisal

## **Introduction**

In this critical appraisal, I will begin by reflecting on what initially inspired me to explore the factors underlying the sex difference in antisocial behaviour: my curiosity about the influence of socially constructed gender roles. Acknowledging that this is not something I was ultimately able to investigate using the data available to me, I will dedicate the first part of this appraisal to exploring the literature on this topic and reflecting on how it relates to my findings. I will then go on to describe the process of designing my study based on the data I had, contemplating the choices I was faced with and how I came to make them. I will end by reflecting on the process of carrying out this study, with a consideration of what I might have done differently and a suggestion for future research which could be carried out using this data. I hope that this appraisal will provide some helpful insights into the process of conducting secondary data analyses, particularly for future trainees.

## **Gender roles**

I was initially drawn to this project because of my interest in both forensic psychology and feminist theory. More specifically, I was interested in how socially constructed gender roles might play a part in the sex difference in antisocial behaviour. However, I soon realised that it would not be possible to explore this question using the data collected as part of the Systemic Therapy for At Risk Teens (START) trial. I have therefore chosen to dedicate some time to it here.

For decades, academics studying crime focused primarily on the criminal behaviour of men and boys. Then, from the late 1960s onwards, the experiences of women and girls as offenders, victims, defendants and prisoners, and the ways in which these were similar or different to those of men and boys, came increasingly into focus

(Gartner & McCarthy, 2014). From the 1990s, this began to include considerations of the role of gender as a social construct, shaping crime and the responses to crime.

My study explored similarities and differences between boys and girls, and I deliberated for some time about whether to use the term “sex” or “gender” to define these groups. “Sex” refers to biological sex, characterised by genotype and phenotype, while gender refers to sociocultural definitions of masculinity and femininity. I chose “sex” because of the little scope there was to explore the role of gender as a social construct within this study, although in reality, social constructions of and expectations about gender will have influenced every aspect of it, from the initial referral of the young people and their selection as participants, to the development of the measures used, to the very diagnoses on which those measures are based. My conflict is perhaps evident in my choice to use the words “boys” and “girls” rather than “males” and “females” throughout my study.

The concept of “doing gender” (West & Zimmerman, 1987) relates to the way men and women engage in gendered practices. It is both a response to cultural expectations about masculinity and femininity and reproduction of them (Miller, 2014). Theories around gender roles suggest that feminine roles restrain delinquency more than masculine roles do (Shover & Norland, 1978). Hegemonic feminine ideals include nurturance, passivity, connectedness to others and physical weakness, which are for the most part incongruent with criminal behaviour, whereas masculine ideals emphasize strength, competitiveness, independence and aggressiveness (Cumley, Heimer, & De Coster, 2015). There is some evidence that affiliation with these constructions of gender contributes to the gender gap in offending (McCarthy, Hagan, & Woodward, 2006). I would have been curious to collect information from the young people who participated in the START trial about how much they ascribe to such traditional constructions of gender, and to explore how their beliefs around gender relate to their engagement in antisocial behaviour. On reflection, it might also have been interesting to analyse young

people's responses to the Antisocial Beliefs and Attitudes Scale (ABAS; Butler, Leschied, & Fearon, 2007), and to consider potential gender differences from a social constructionist perspective.

Thus, according to this theory, crime can be a way of "doing gender" for boys and men, a resource for constructing masculine identities (Messerschmidt, 1993). When legitimate channels are blocked by structural barriers such as unemployment or poverty, they may instead attempt to display masculinity through violence and crime. But what is "masculinity"? It is not a single concept, but one which shifts over time, and varies according to race, class, culture, sexual orientation and social standing (Watson, 2009; Whitlock, 2014). For example, among the English upper classes, public displays of violence in defence of male honour were regarded positively up until the mid-19<sup>th</sup> century, when duels were eventually outlawed. As late as the 1900s in America, men were responsible for upholding the sexual honour of women, and the "unwritten law" meant that men who killed their wives' "seducers" could escape punishment (Whitlock, 2014). Acceptance of violence eventually began to decline in Victorian society, and the masculine ideal for middle class men came to be characterised by civility, reason and responsibility. At this point violence came to be seen as an attribute of the lower classes, and working-class masculinity depicted as animalistic and aggressive. Male criminality is therefore intricately bound up with these multiple definitions of masculinity.

In addition to conceptualising involvement in crime as a potential resource for constructing a gendered identity, research on "doing gender" and gendered lives has highlighted a number of indirect ways in which social constructions of gender might influence engagement in antisocial behaviour. Research which has focused on gendered activities and social practices has found that activities assigned to girls, such as childcare and other parental responsibilities, together with the male domination of most adolescent activities, effectively curtail opportunities for girls' engagement in antisocial activities (Bottcher, 2006). Sociopsychological research further suggests that

part of the gender gap in offending is linked to the greater parental control experienced by girls, both directly through monitoring and supervision, and indirectly through emotional bonding (Chapple, Vaske, & Hope, 2010). Power control theory on the other hand focuses on the gender schemas that parents impart on their children, often as a result of their own workplace authority, such that delinquency is more likely to be discouraged in boys whose mothers have more workplace authority and personal agency (Hagan, Boehnke, & Merkens, 2004). General strain theory (Agnew, 1992) suggests that emotions are gendered in ways that aggravate male offending but suppress female offending (Kruttschnitt, 2013). Indeed, there is much to be gained from research which focuses not only on how negative emotions can lead to offending, but on how positive emotions such as caring and empathy may inhibit offending, and the gendered learning of these emotions.

My own study focused on psychological traits and mental health difficulties which are related to antisocial behaviour, and which are known to affect boys and girls in different ways. Boys, for example, are more hyperactive than girls (T. Moffitt et al., 2001), and are more likely to present with callous and unemotional traits (Essau et al., 2006), which puts them at increased risk of engaging in antisocial behaviour. However, this only pushes the question back a step further: why are boys more hyperactive? Why are they more callous and unemotional? Although these traits are known to be influenced in part by genetic heritability (Larsson et al., 2006; Sonuga-Barke & Taylor, 2015), their development is also affected by environmental factors which are themselves subject to the influence of gender norms. The differences I found in how depression and anxiety related to antisocial behaviour over time for boys and girls also suggest a difference in the way boys and girls experience and express their emotions, which again is likely to be influenced by internalised gender norms.

There is growing evidence to suggest that among those who engage in antisocial behaviour, there are more similarities than differences between males and

females (Cumley et al., 2015; Kruttschnitt, 2013). This is also what I found in my study – boys and girls in the sample both reported high levels of CU traits and hyperactivity, and these factors influenced antisocial behaviour in similar ways for both sexes. What could not be explained by my study was the difference in numbers, why the trial recruited 433 boys but only 250 girls. Indeed, although the START data provided a unique opportunity to explore similarities and differences between antisocial boys and antisocial girls, it did not allow me to explore differences between boys and girls who were and were not antisocial, and to examine whether the same risk factors predicted engagement in antisocial behaviour for both sexes.

Having discussed some of the various ways in which socially constructed gender roles might influence the gender gap in offending, it must also be acknowledged that for the past 50 years this gap has been steadily narrowing. Between 2003 and 2008, the number of young female offenders had risen by approximately 18%, and their number of violent offences had doubled (Arnull & Eagle, 2009). Explanations for these rising rates of female violence are under-researched, and there is ongoing debate about whether these statistical increases are due to changes in reporting and recording, policing and policy, attitudes to female offending or real increases in female violence (Carrington & Death, 2014). This tendency to deny, rationalise or erase the violence of women has resulted in the lack of sophisticated feminist theory of female violence, and more research is needed.

Finally, any research on gender and antisocial behaviour must also take into account hierarchy and power, and the intersections of gender, race, class and other inequalities (Miller, 2014). More research is needed to fully understand how structural contexts, socialisation practices and identity salience come together to produce differences in women's and men's experiences, which may have implications for their involvement in crime (Kruttschnitt, 2013).

## **Making choices**

### **Design and measurement**

What I was most struck by in carrying out this project was the seemingly infinite number of choices I had to make. I had naively assumed that by conducting a secondary data analysis, my choices would be black and white, that there would always be a “best” option. What I found instead was that for every choice I made, I was faced with a myriad of new choices, each as with its own advantages and disadvantages. In this section I will relay my journey along this vast decision tree, reflecting on the choices I made.

When I first looked through the measures which had been administered in the START trial, I felt overwhelmed: everything seemed important and I wanted to include it all. Delving into the existing research on sex differences in antisocial behaviour, I came across Moffit et al.'s (2001) thorough exploration of this in the Dunedin Multidisciplinary Health and Wellbeing Study. One of their most significant findings regarding sex differences in risk factors for antisocial behaviour was that boys had considerably higher rates of hyperactivity than girls. Thus, I made my first choice: to focus on hyperactivity.

This immediately opened up a series of other choices: how would I measure hyperactivity? Would I use self-report or parent-report or even teacher-report? Would I use the Strengths and Difficulties Questionnaire (SDQ; Goodman & Scott, 1999) or the Conners (Conners, 2008)? Would I focus on symptomatology or on ADHD diagnosis? If I used ADHD diagnosis would I take ADHD subtypes into account? Should I use more than one source? And what about my outcome measure? Should I measure antisocial behaviour according to self-reported delinquency or recorded offences? Should I separate out violent and non-violent offences? If so, where does one draw the line between violent and non-violent offending?

I put these questions aside temporarily as I considered what exactly I wanted to know about the relationship between hyperactivity and antisocial behaviour. Once again, the possibilities seemed endless. ADHD might affect school performance, peer relations, family relations, mood... each of which could in turn affect engagement in antisocial behaviour. Once again, I wanted to include it all. Through discussions with my supervisor, I understood why this wasn't possible, how incredibly complicated it would be to try to include so many factors in one model, let alone the sample size it would require to generate sufficient power for such an analysis.

My supervisor recommended that I look into typologies of antisocial behaviour and I came across a review by Brazil, van Dongen, Maes, Mars, and Baskin-Sommers (2018) on the classification of antisocial individuals, in which they highlighted the importance of anxiety, as well as psychopathic traits, in differentiating between individuals who engaged in antisocial behaviour. Looking back over the START questionnaires with this in mind, I subsequently decided to focus my study on four individual risk factors: anxiety, depression, hyperactivity and callous-unemotional traits (the equivalent of psychopathic traits in young people). The decision to include depression came from further reading which suggested that this was a factor which was likely to present some sex differences in relation to antisocial behaviour (Keenan et al., 2011; Wiesner & Kim, 2006).

Having chosen to focus on these individual risk factors, I came back to the question of measurement. It now seemed clearer that the most logical choice was to use self-report, as I was focusing on individual factors which the young people themselves were likely to have the most insight into, nonetheless acknowledging, as I did in my report, that this choice is not without its limitations. Furthermore, using self-report rather than diagnosis would allow me to examine the effects of symptoms over time. This also seemed the best choice for measuring antisocial behaviour, as it is well known that much antisocial behaviour goes unreported and unrecorded. Indeed,

recorded offences might be considered a measure of “likelihood of being arrested for antisocial behaviour”, rather than a measure of engagement in antisocial behaviour. In addition, as described above, criminal justice responses to antisocial behaviour are known to be influenced by gender, and using recorded offences might therefore have led to an underrepresentation of girls’ offending.

Unfortunately, I soon realised the factors I had chosen to focus on had not all been equally thoroughly measured in the START trial. In fact, when I began looking through the data, I noticed that a number of questionnaires had been added in later waves of the study, and that the questionnaire pack I had initially been given therefore contained questionnaires which had not been administered at baseline. This meant that while two of my factors, depression and CU traits, would be comprised of items from comprehensive questionnaires (the Inventory of Callous-Unemotional Traits; ICU; Frick, 2003; and the Short Mood and Feelings Questionnaire; SMFQ; Angold et al., 1995), the other two, anxiety and hyperactivity, would have to be comprised of items from subscales of the SDQ (Goodman & Scott, 1999). In reality, the data contained no reliable measure of anxiety, hence my decision to use the “Emotional Problems” subscale of the SDQ with the question pertaining to depression removed. Furthermore, although much of the literature referred to the “Hyperactivity” subscale of the SDQ, I realised that this subscale also contained questions pertaining to inattention and impulsivity. This meant departing slightly from the original hypothesis about the specific role of hyperactivity in the sex difference in antisocial behaviour (T. Moffitt et al., 2001). However, examining a wider spectrum of ADHD symptoms did have the advantage of making the large body of existing research on ADHD and antisocial behaviour more relevant to my study. Thus, one obvious limitation of secondary data analysis is that one is very much constrained by the data which was originally collected.

## Statistical analysis

The next choice I was faced with was how to analyse my data. One of the difficulties I faced was that by using a sample of young people who were recruited based on their moderate-to-severe antisocial behaviour, any sex differences in self-reported delinquency that would be expected in the general population were eliminated. This made it difficult to test my hypothesis that the sex difference in antisocial behaviour could be accounted for, at least in part, by sex differences in anxiety, depression, hyperactivity/inattention and CU traits. I wondered if despite reporting very similar levels of delinquency, the causes for this delinquent behaviour might be slightly different for boys and girls. Based on the literature I hypothesised that this was unlikely to be the case for hyperactivity/inattention or CU traits, which seem to affect boys and girls in the same way, but that it might be the case for anxiety and depression. However, finding a moderating effect of sex when there was no main effect of sex was always going to be challenging, and indeed I did not find one.

Initial baseline analyses did however show a main effect of three of my four factors (depression, hyperactivity/inattention and CU traits) on self-reported delinquency. Although knowing that these factors differentially affect boys and girls in the general population meant I could infer a likely role for them in the sex difference in antisocial behaviour, this did not feel like an entirely satisfying conclusion to my study. From early on I had wondered how I could make use of the longitudinal data available from the START trial, as it seemed important to make use of the opportunity to examine these relationships over time. Much of the existing research of sex differences in antisocial behaviour was either cross-sectional or used longitudinal data from long-term cohort studies (e.g. the Dunedin study). I did however find three studies which examined the relationships between different factors and antisocial behaviour across several time points at relatively short intervals (Defoe et al., 2013; Fontaine et al., 2018; Overbeek et al., 2001). All three of these studies made use of cross-lagged panel

designs, and this is how I came to choose this analysis to examine the relationships between each of my factors and self-reported delinquency over time.

### **Reflections and future research**

Looking back, the process of conducting this study feels like a journey I made in the dark, not knowing what I didn't know. Each choice I describe above felt at the time like the best choice I could make, given the knowledge I had. Were I to begin this journey again, I think my choices would be different.

Feeling overwhelmed with the possibilities of what could be explored led me to include four different factors in my study. In effect, my study became a collection of four smaller studies. Were I to start afresh, I would focus on just one of these factors to explore in more depth. I might, for example, choose hyperactivity/inattention and examine whether its relationship with self-reported delinquency was mediated by another factor such as parenting style, known to be associated with both ADHD symptomatology and antisocial behaviour. I might examine this mediating relationship both cross-sectionally and over time, considering the moderating effects of gender.

This said, I hope that my study provides a good starting point from which to explore the causal mechanisms linking each of my four factors to antisocial behaviour. The opportunities for exploring the roles of a range of different mediating factors are rife within the START data. I have now learnt that the key is not to try and explore them all at once.

## References

- Agnew, R. (1992). Foundation for a General Strain Theory of Crime and Delinquency. *Criminology*, 30(1), 47–88. <https://doi.org/10.1111/j.1745-9125.1992.tb01093.x>
- Angold, A., Costello, E. J., Messer, S. C., Pickles, A., Winder, F., & Silver, D. (1995). The Development of a Questionnaire for Use in Epidemiological Studies of Depression in Children and Adolescents. *International Journal of Methods in Psychiatric Research*, 5, 237–249.
- Arnall, E., & Eagle, S. (2009). *Girls and offending - patterns, perceptions and interventions*. London: Youth Justice Board.
- Bottcher, J. (2006). Social Practices of Gender: How Gender Relates To Delinquency in the Everyday Lives of High-Risk Youths. *Criminology*, 39(4), 893–932. <https://doi.org/10.1111/j.1745-9125.2001.tb00944.x>
- Brazil, I. A., van Dongen, J. D. M., Maes, J. H. R., Mars, R. B., & Baskin-Sommers, A. R. (2018). Classification and treatment of antisocial individuals: From behavior to biocognition. *Neuroscience and Biobehavioral Reviews*, 91, 259–277. <https://doi.org/10.1016/j.neubiorev.2016.10.010>
- Butler, S. M., Leschied, A. W., & Fearon, P. (2007). Antisocial beliefs and attitudes in pre-adolescent and adolescent youth: The development of the Antisocial Beliefs and Attitudes Scales (ABAS). *Journal of Youth and Adolescence*, 36(8), 1058–1071. <https://doi.org/10.1007/s10964-007-9178-2>
- Carrington, K., & Death, J. (2014). Feminist Criminologies' Contribution to Understandings of Sex, Gender, and Crime. In R. Gartner & B. McCarthy (Eds.), *The Oxford Handbook of Gender, Sex, and Crime*. Oxford: Oxford University Press. <https://doi.org/10.1093/oxfordhb/9780199838707.013.0006>

- Chapple, C. L., Vaske, J., & Hope, T. L. (2010). Sex differences in the causes of self-control: An examination of mediation, moderation, and gendered etiologies. *Journal of Criminal Justice*, 38(6), 1122–1131.  
<https://doi.org/10.1016/j.jcrimjus.2010.08.004>
- Conners, C. K. (2008). *Conners 3: teacher + parent forms*. New York: Multi-Health Systems.
- Cumley, S. R., Heimer, K., & De Coster, S. (2015). *Crime and Gender. International Encyclopedia of the Social & Behavioral Sciences: Second Edition* (Second Edition, Vol. 5). Elsevier. <https://doi.org/10.1016/B978-0-08-097086-8.45003-8>
- Defoe, I. N., Farrington, D. P., & Loeber, R. (2013). Disentangling the relationship between delinquency and hyperactivity, low achievement, depression, and low socioeconomic status: Analysis of repeated longitudinal data. *Journal of Criminal Justice*, 41(2), 100–107. <https://doi.org/10.1016/j.jcrimjus.2012.12.002>
- Essau, C. A., Sasagawa, S., & Frick, P. J. (2006). Callous-Unemotional Traits in a Community Sample of Adolescents. *Assessment*, 13(4), 454–469.  
<https://doi.org/10.1177/1073191106287354>
- Fontaine, N. M. G., Brendgen, M., Vitaro, F., Boivin, M., Tremblay, R. E., & Côté, S. M. (2018). Longitudinal associations between delinquency, depression and anxiety symptoms in adolescence: Testing the moderating effect of sex and family socioeconomic status. *Journal of Criminal Justice*, (September), 1–8.  
<https://doi.org/10.1016/j.jcrimjus.2018.09.007>
- Frick, P. J. (2003). *The Inventory of Callous-Unemotional Traits*. University of New Orleans.
- Gartner, R., & McCarthy, B. (2014). Introduction. In R. Gartner & B. McCarthy (Eds.), *The Oxford Handbook of Gender, Sex, and Crime*. Oxford: Oxford University

Press. <https://doi.org/10.1093/oxfordhb/9780199838707.013.0001>

- Goodman, R., & Scott, S. (1999). Comparing the Strengths and Difficulties Questionnaire and the Child Behavior Checklist: Is Small Beautiful? *Journal of Abnormal Child Psychology*, 27(1), 17–24.
- Hagan, J., Boehnke, K., & Merkens, H. (2004). Gender differences in capitalization processes and the delinquency of siblings in Toronto and Berlin. *British Journal of Criminology*, 44(5), 659–676. <https://doi.org/10.1093/bjc/azh039>
- Keenan, K., Feng, X., Babinski, D., Hipwell, A., Hinze, A., Loeber, R., & Stouthamer-Loeber, M. (2011). Developmental Comorbidity of Depression and Conduct Problems in Girls. In M. Kerr, H. Stattin, R. C. M. E. Engels, G. Overbeek, & A.-K. Andershed (Eds.), *Understanding Girls' Problem Behavior* (pp. 117–137). Chichester, UK: John Wiley & Sons, Ltd. <https://doi.org/10.1002/9780470977453.ch5>
- Kruttschnitt, C. (2013). Gender and Crime. *Ssrn*. <https://doi.org/10.1146/annurev-soc-071312-145605>
- Larsson, H., Andershed, H., & Lichtenstein, P. (2006). A Genetic Factor Explains Most of the Variation in the Psychopathic Personality. *Journal of Abnormal Psychology*, 115(2), 221–230. <https://doi.org/10.1037/0021-843X.115.2.221>
- McCarthy, B., Hagan, J., & Woodward, T. S. (2006). In the company of women: structure and agency in a revised power-control theory of gender and delinquency. *Criminology*, 37(4), 761–789. <https://doi.org/10.1111/j.1745-9125.1999.tb00504.x>
- Messerschmidt, J. W. (1993). *Masculinities and crime: critique and reconceptualization of theory*. Lanham: Rowman & Littlefield.
- Miller, J. (2014). Doing Crime as Doing Gender?: Masculinities, Femininities and Crime. In R. Gartner & B. McCarthy (Eds.), *The Oxford Handbook of Gender, Sex, and*

*Crime*. Oxford: Oxford University Press.

<https://doi.org/10.1093/oxfordhb/9780199838707.013.0002>

Moffitt, T., Caspi, A., Rutter, M., & Silva, P. A. (2001). *Sex Differences in Antisocial Behaviour: Conduct Disorder, Delinquency, and Violence in the Dunedin Longitudinal Study*. Cambridge University Press.

<https://doi.org/10.1017/CBO9780511490057>

Overbeek, G., Vollebergh, W., Meeus, W., Engels, R., & Luijpers, E. (2001). Course, Co-Occurrence, and Longitudinal Associations of Emotional Disturbance and Delinquency from Adolescence to Young Adulthood: A Six-Year Three-Wave Study. *Journal of Youth and Adolescence*, 30(4), 401–426.

<https://doi.org/10.1023/A:1010441131941>

Shover, N., & Norland, S. (1978). Sex roles and criminality: Science or conventional wisdom? *Sex Roles*, 4(1), 111–125. <https://doi.org/10.1007/BF00288382>

Sonuga-Barke, E. J. S., & Taylor, E. (2015). ADHD and hyperkinetic disorder. In A. Thapar, D. S. Spine, J. F. Leckman, S. Scott, M. J. Snowling, & E. Taylor (Eds.), *Rutter's Child and Adolescent Psychiatry* (6th ed., pp. 738–756). Wiley.

Watson, E. (2009). *Pimps, Wimps, Studs, Thugs and Gentlemen: Essays on Media Images of Masculinity*. Jefferson, NC: McFarland.

West, C., & Zimmerman, D. H. (1987). Doing gender. *Gender & Society*, 1(2), 125–151.

Whitlock, T. (2014). Masculinities and Crime in Historical Perspective. In R. Gartner & B. McCarthy (Eds.), *The Oxford Handbook of Gender, Sex, and Crime*. Oxford: Oxford University Press.

<https://doi.org/10.1093/oxfordhb/9780199838707.013.0011>

Wiesner, M., & Kim, H. K. (2006). Co-occurring delinquency and depressive symptoms of adolescent boys and girls: A dual trajectory modeling approach. *Developmental*

*Psychology*, 42(6), 1220–1235. <https://doi.org/10.1037/0012-1649.42.6.1220>

## Appendices

### Appendix A: Correlation matrix for baseline indicator variables

Variables	H_SD 2_1	H_SD 10_1	H_SD 15_1	H_SD 21_1	H_SD 25_1	A_SD 3_1	A_SD 8_1	A_SD 16_1	A_SD 24_1	D_MF 1_1	D_MF 2_1
H_SD2_1	-										
H_SD10_1	.522**	-									
H_SD15_1	.435**	.422**	-								
H_SD21_1	.239**	.236**	.295**	-							
H_SD25_1	.192**	.182**	.251**	.291**	-						
A_SD3_1	.166**	.200**	.146**	.030	-.024	-					
A_SD8_1	.097*	.170**	.169**	.055	-.008	.339**	-				
A_SD16_1	.168**	.208**	.265**	.050	.146**	.217**	.327**	-			
A_SD24_1	.058	.083*	.126**	.049	-.025	.273**	.407**	.286**	-		
D_MF1_1	.127**	.130**	.101**	.092*	.094*	.300**	.319**	.225**	.241**	-	
D_MF2_1	.061	.110**	.062	.080*	.070	.127**	.152**	.149**	.130**	.404**	-
D_MF3_1	.117**	.148**	.091*	.078*	.039	.182**	.190**	.168**	.124**	.250**	.321**
D_MF4_1	.254**	.261**	.161**	.155**	.081*	.210**	.142**	.093*	.104**	.245**	.265**
D_MF5_1	.159**	.199**	.126**	.168**	.128**	.239**	.312**	.164**	.190**	.401**	.427**
D_MF6_1	.035	.062	.076*	.113**	.055	.206**	.359**	.224**	.278**	.362**	.263**
D_MF7_1	.237**	.269**	.308**	.189**	.199**	.247**	.265**	.272**	.177**	.322**	.341**
D_MF8_1	.119**	.195**	.115**	.115**	.076*	.233**	.354**	.195**	.271**	.400**	.373**
D_MF9_1	.120**	.126**	.099**	.134**	.037	.153**	.263**	.159**	.186**	.327**	.291**
D_MF10_1	.113**	.158**	.116**	.060	.024	.256**	.394**	.241**	.241**	.410**	.297**
D_MF11_1	.146**	.165**	.130**	.127**	.076*	.168**	.343**	.181**	.224**	.353**	.325**
D_MF12_1	.227**	.196**	.160**	.171**	.051	.247**	.388**	.193**	.285**	.367**	.283**
D_MF13_1	.162**	.209**	.117**	.149**	.075	.179**	.310**	.195**	.194**	.368**	.328**
CU1_1	.059	.077*	.067	.119**	.078*	.084*	-.038	.032	-.057	-.006	.092*
CU3_1	.127**	.150**	.193**	.200**	.206**	.023	-.054	-.003	-.029	.054	.095*
CU4_1	.035	.063	.042	.103**	.072	-.016	-.088*	-.034	-.029	-.062	.054
CU5_1	.012	-.029	.038	.031	.047	-.068	-.293**	-.123**	-.158**	-.079*	.016
CU7_1	.072	.038	.088*	.125**	.146**	.056	-.050	.010	.010	.074	.098*
CU8_1	.052	.000	.054	.080*	.057	-.107**	-.200**	-.055	-.119**	-.020	.040
CU9_1	.119**	.091*	.117**	.123**	.103**	.046	-.076*	-.003	.007	-.001	.047
CU11_1	.135**	.107**	.128**	.106**	.130**	.081*	-.081*	.011	.012	.047	.074
CU12_1	.099**	.098*	.070	.084*	.017	.139**	-.006	.077*	.099**	.207**	.160**
CU13_1	.060	.050	.067	.161**	.103**	-.040	-.057	.034	-.008	.048	-.024
CU14_1	.000	-.003	-.025	.055	.028	.015	-.025	-.036	-.061	-.040	-.045
CU15_1	.084*	.120**	.119**	.300**	.267**	-.017	-.057	.002	-.063	.089*	.067
CU16_1	.072	.084*	.090*	.166**	.180**	-.030	-.208**	-.020	-.125**	.031	.059
CU17_1	.097*	.074	.068	.166**	.113**	-.046	-.130**	-.075	-.113**	-.033	-.015
CU18_1	.048	.028	.009	.031	.005	-.015	-.076*	-.043	.026	-.026	.079*
CU19_1	.030	-.031	-.016	.044	.032	-.069	-.164**	-.109**	-.156**	-.167**	-.071
CU20_1	.087*	.098*	.069	.057	.136**	-.020	-.001	.019	.027	-.029	.039
CU21_1	.009	.035	.047	.033	-.028	-.012	-.032	-.026	-.028	.022	.099**
CU23_1	.060	.083*	.160**	.216**	.221**	-.022	-.062	.033	-.009	.028	.018
CU24_1	.030	-.012	-.001	.164**	.133**	-.070	-.227**	-.077*	-.102**	-.034	-.030

Note: \* Correlation is significant at the 0.05 level (2-tailed). \*\* Correlation is significant at the 0.01 level (2-tailed).

Variables	D_MF3_1	D_MF4_1	D_MF5_1	D_MF6_1	D_MF7_1	D_MF8_1	D_MF9_1	D_MF10_1	D_MF11_1	D_MF12_1
H_SD2_1										
H_SD10_1										
H_SD15_1										
H_SD21_1										
H_SD25_1										
A_SD3_1										
A_SD8_1										
A_SD16_1										
A_SD24_1										
D_MF1_1										
D_MF2_1										
D_MF3_1	-									
D_MF4_1	.339**	-								
D_MF5_1	.347**	.309**	-							
D_MF6_1	.258**	.209**	.489**	-						
D_MF7_1	.273**	.386**	.425**	.328**	-					
D_MF8_1	.305**	.241**	.633**	.522**	.368**	-				
D_MF9_1	.217**	.236**	.409**	.424**	.363**	.469**	-			
D_MF10_1	.241**	.220**	.496**	.538**	.358**	.549**	.414**	-		
D_MF11_1	.226**	.205**	.607**	.498**	.333**	.591**	.471**	.601**	-	
D_MF12_1	.234**	.218**	.526**	.508**	.350**	.570**	.506**	.533**	.561**	-
D_MF13_1	.274**	.215**	.515**	.422**	.380**	.526**	.524**	.494**	.524**	.581**
CU1_1	.052	.095*	.077*	.026	.090*	.054	.082*	.040	.093*	.069
CU3_1	.065	.058	.046	.029	.070	.063	.083*	-.003	.102**	-.007
CU4_1	.012	.081*	.056	.041	.030	.039	.049	-.041	.037	-.023
CU5_1	-.090*	.019	-.086*	-.139**	.006	-.094*	-.113**	-.116**	-.083*	-.177**
CU7_1	.067	.037	.021	-.016	.043	.060	.053	.010	.059	.001
CU8_1	-.005	.064	-.050	-.071	.021	-.066	-.023	-.082*	.015	-.121**
CU9_1	.033	.045	.031	.013	.040	.065	.073	.040	.082*	.053
CU11_1	.050	.072	.079*	.021	.073	.080*	.069	.033	.063	.052
CU12_1	.067	.119**	.148**	.105**	.190**	.160**	.202**	.177**	.189**	.177**
CU13_1	.038	.084*	.081*	.065	.049	.045	.068	.017	.056	.001
CU14_1	.004	.007	-.060	-.095*	-.038	-.083*	-.069	-.102**	-.088*	-.071
CU15_1	.017	.092*	.069	.028	.109**	.052	.093*	.032	.058	.038
CU16_1	-.025	.084*	.046	-.084*	.069	-.045	-.013	-.078*	-.015	-.121**
CU17_1	-.045	.093*	-.019	-.098*	.012	-.040	.011	-.099**	-.042	-.120**
CU18_1	.059	.014	-.026	-.026	.046	-.004	-.026	-.062	-.029	-.018
CU19_1	-.133**	-.052	-.145**	-.222**	-.073	-.155**	-.157**	-.166**	-.101**	-.144**
CU20_1	-.001	-.009	-.029	-.033	.072	.011	-.005	-.047	-.002	.002
CU21_1	.052	.077*	.050	-.012	.041	.061	.021	-.034	.037	-.018
CU23_1	.034	.040	.002	.006	.070	.018	.011	-.030	-.022	-.068
CU24_1	-.028	.053	-.007	-.057	-.010	-.048	-.038	-.103**	-.070	-.101**

Note: \* Correlation is significant at the 0.05 level (2-tailed). \*\* Correlation is significant at the 0.01 level (2-tailed).

Variables	D_MF1 3_1	CU1_1	CU3_1	CU4_1	CU5_1	CU7_1	CU8_1	CU9_1	CU11_1	CU12_1	CU13_1
H_SD2_1											
H_SD10_1											
H_SD15_1											
H_SD21_1											
H_SD25_1											
A_SD3_1											
A_SD8_1											
A_SD16_1											
A_SD24_1											
D_MF1_1											
D_MF2_1											
D_MF3_1											
D_MF4_1											
D_MF5_1											
D_MF6_1											
D_MF7_1											
D_MF8_1											
D_MF9_1											
D_MF10_1											
D_MF11_1											
D_MF12_1											
D_MF13_1-											
CU1_1	.086 <sup>ˆ</sup>	-									
CU3_1	.107 <sup>**</sup>	.117 <sup>**</sup>	-								
CU4_1	.061	.045	.148 <sup>**</sup>	-							
CU5_1	-.080 <sup>ˆ</sup>	.137 <sup>**</sup>	.271 <sup>**</sup>	.194 <sup>**</sup>	-						
CU7_1	.037	.046	.266 <sup>**</sup>	.239 <sup>**</sup>	.106 <sup>**</sup>	-					
CU8_1	-.012	.168 <sup>**</sup>	.296 <sup>**</sup>	.196 <sup>**</sup>	.391 <sup>**</sup>	.101 <sup>**</sup>	-				
CU9_1	.081 <sup>ˆ</sup>	.089 <sup>ˆ</sup>	.306 <sup>**</sup>	.344 <sup>**</sup>	.189 <sup>**</sup>	.491 <sup>**</sup>	.161 <sup>**</sup>	-			
CU11_1	.140 <sup>**</sup>	.092 <sup>ˆ</sup>	.323 <sup>**</sup>	.314 <sup>**</sup>	.148 <sup>**</sup>	.305 <sup>**</sup>	.131 <sup>**</sup>	.410 <sup>**</sup>	-		
CU12_1	.192 <sup>**</sup>	.087 <sup>ˆ</sup>	.049	.198 <sup>**</sup>	.038	.206 <sup>**</sup>	.140 <sup>**</sup>	.213 <sup>**</sup>	.304 <sup>**</sup>	-	
CU13_1	.053	.075	.132 <sup>**</sup>	.053	.259 <sup>**</sup>	-.008	.201 <sup>**</sup>	.084 <sup>ˆ</sup>	.049	.026	-
CU14_1	-.046	.155 <sup>**</sup>	.041	-.003	.182 <sup>**</sup>	-.015	.130 <sup>**</sup>	.041	-.031	-.083 <sup>ˆ</sup>	.202 <sup>**</sup>
CU15_1	.118 <sup>**</sup>	.174 <sup>**</sup>	.427 <sup>**</sup>	.136 <sup>**</sup>	.324 <sup>**</sup>	.194 <sup>**</sup>	.307 <sup>**</sup>	.253 <sup>**</sup>	.210 <sup>**</sup>	.035	.300 <sup>**</sup>
CU16_1	.008	.219 <sup>**</sup>	.250 <sup>**</sup>	.195 <sup>**</sup>	.459 <sup>**</sup>	.111 <sup>**</sup>	.415 <sup>**</sup>	.201 <sup>**</sup>	.145 <sup>**</sup>	.119 <sup>**</sup>	.324 <sup>**</sup>
CU17_1	-.006	.135 <sup>**</sup>	.235 <sup>**</sup>	.179 <sup>**</sup>	.342 <sup>**</sup>	.086 <sup>ˆ</sup>	.388 <sup>**</sup>	.164 <sup>**</sup>	.138 <sup>**</sup>	.133 <sup>**</sup>	.314 <sup>**</sup>
CU18_1	-.004	.087 <sup>ˆ</sup>	.121 <sup>**</sup>	.195 <sup>**</sup>	.153 <sup>**</sup>	.224 <sup>**</sup>	.054	.219 <sup>**</sup>	.211 <sup>**</sup>	.141 <sup>**</sup>	-0.026
CU19_1	-.101 <sup>**</sup>	.346 <sup>**</sup>	.123 <sup>**</sup>	.032	.253 <sup>**</sup>	-.002	.204 <sup>**</sup>	.083 <sup>ˆ</sup>	.047	.034	.119 <sup>**</sup>
CU20_1	.002	.009	.123 <sup>**</sup>	.179 <sup>**</sup>	.025	.292 <sup>**</sup>	.027	.231 <sup>**</sup>	.269 <sup>**</sup>	.207 <sup>**</sup>	-0.025
CU21_1	.051	.053	.130 <sup>**</sup>	.137 <sup>**</sup>	.144 <sup>**</sup>	.137 <sup>**</sup>	.177 <sup>**</sup>	.211 <sup>**</sup>	.203 <sup>**</sup>	.203 <sup>**</sup>	0.036
CU23_1	.057	.115 <sup>**</sup>	.420 <sup>**</sup>	.065	.245 <sup>**</sup>	.152 <sup>**</sup>	.226 <sup>**</sup>	.174 <sup>**</sup>	.141 <sup>**</sup>	-.035	.237 <sup>**</sup>
CU24_1	.001	.185 <sup>**</sup>	.245 <sup>**</sup>	.096 <sup>ˆ</sup>	.300 <sup>**</sup>	.092 <sup>ˆ</sup>	.317 <sup>**</sup>	.131 <sup>**</sup>	.167 <sup>**</sup>	.110 <sup>**</sup>	.261 <sup>**</sup>

Note: <sup>ˆ</sup> Correlation is significant at the 0.05 level (2-tailed). <sup>\*\*</sup> Correlation is significant at the 0.01 level (2-tailed).

Variables	CU14_1	CU15_1	CU16_1	CU17_1	CU18_1	CU19_1	CU20_1	CU21_1	CU23_1	CU24_1
H_SD2_1										
H_SD10_1										
H_SD15_1										
H_SD21_1										
H_SD25_1										
A_SD3_1										
A_SD8_1										
A_SD16_1										
A_SD24_1										
D_MF1_1										
D_MF2_1										
D_MF3_1										
D_MF4_1										
D_MF5_1										
D_MF6_1										
D_MF7_1										
D_MF8_1										
D_MF9_1										
D_MF10_1										
D_MF11_1										
D_MF12_1										
D_MF13_1										
CU1_1										
CU3_1										
CU4_1										
CU5_1										
CU7_1										
CU8_1										
CU9_1										
CU11_1										
CU12_1										
CU13_1										
CU14_1	-									
CU15_1	.173**	-								
CU16_1	.250**	.423**	-							
CU17_1	.185**	.324**	.514**	-						
CU18_1	.032	.064	.100**	.080*	-					
CU19_1	.316**	.199**	.250**	.213**	.095*	-				
CU20_1	-.064	.052	.004	.040	.265**	-0.053	-			
CU21_1	.039	.047	.151**	.068	.253**	.058	.200**	-		
CU23_1	.107**	.549**	.326**	.270**	.103**	.117**	.079*	-0.008	-	
CU24_1	.146**	.338**	.421**	.352**	0.047	.251**	.041	.099**	.342**	-

Note: \* Correlation is significant at the 0.05 level (2-tailed). \*\* Correlation is significant at the 0.01 level (2-tailed).