

From THE DEPARTMENT OF CLINICAL NEUROSCIENCE
Karolinska Institutet, Stockholm, Sweden

**PERSONALITY TRAITS
AMONG INDIVIDUALS WHO
AS ADOLESCENTS
CONSULTED FOR A
SUBSTANCE USE PROBLEM**

Malin Hemphälä



**Karolinska
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FOR ALL OF YOU PARTICIPATING IN THE STUDY, THANKS FOR SHARING
YOUR THOUGHTS, FEELINGS AND BEHAVIOUR.

ABSTRACT

Background: Adolescent antisocial behavior including substance misuse is associated with negative consequences both for the individual and the society, for example school drop-out, and high costs in the criminal justice and health systems. Further understanding of adolescent substance misuse is needed to inform treatment programs. The main aim of this thesis is to advance understanding of personality traits, and most particularly psychopathic traits, among adolescents engaging in substance misuse. Knowledge of these traits, their associations with current and future psychopathology and antisocial and criminal behavior, and their stability as adolescents' transition to adulthood, is needed to further understanding of the development of substance use disorders and to inform interventions designed to reduce substance misuse.

Method: Data were used from a follow-up study of 180 adolescents (99 women and 81 men) who contacted a substance use clinic in 2007 during a 7-month period. Data were analysed from the initial assessment and two follow-ups, 12 months, and five years after inclusion in the study.

Results: Four main findings emerged: (1) Two measures of personality, the HP5i and the JTCI presented adequate validity when used among adolescents seeking treatment for a substance use problem. Individuals with externalizing symptoms rated themselves as more impulsive, quick-tempered, and easily bored while individuals with internalizing symptoms rated themselves as presenting higher levels of negative feelings. (2) Concurrent and longitudinal associations between psychopathic traits and symptoms of mental disorders among adolescents who sought treatment for substance misuse. There were positive associations between psychopathic traits and externalizing symptoms. Elevated levels of psychopathic traits and conduct disorder is a combination of conditions with negative prognosis, findings of the present thesis suggest that oppositional defiant disorder are equally important to assess in girls with high levels of psychopathic traits. Among boys, there was a positive association between psychopathic traits and internalizing symptoms. Lack of negative emotions is a problem among individuals with high levels of psychopathic traits and coping with negative emotions challenging for individuals with internalizing symptoms. (3) There was stability in psychopathic traits from mid-adolescence to early adulthood. Individuals with a high PCL-R score (20-40) at the five-year follow-up showed the greatest stability. (4) There were few factors associated with change in psychopathic traits and scores of psychopathic traits predicted mental health, psychosocial functioning and antisocial/criminal behaviours five years later.

Conclusion: In treatment of individuals presenting externalizing problems the trait impulsivity will be important to consider while for those presenting internalizing problems negative emotions will need to be targeted for treatment success. Co-occurring mental disorders among individuals with high levels of psychopathic traits are important to assess as they may characterize subgroups with antisocial behaviour. Adolescent substance misuse treatment programs may benefit from identifying clients presenting high levels of psychopathic traits and providing them with specific interventions that take account of their personality.

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LIST OF ABBREVIATIONS

AUD	Alcohol use disorder
ADHD	Attention deficit/hyperactivity disorder
APSD	Antisocial screening device
APSD	Antisocial personality disorder
CD	Conduct disorder
CPS	Childhood psychopathy scale
DSM	Diagnostic and statistical manual of mental disorders
DUD	Drug use disorder
FFM	Five factor model
FIGs	Family interview for genetic studies
GAF	Global assessment of functioning scale
HP5I	Health-relevant personality inventory
JTCI	Junior temperament and character inventory
K-SADS-PL	Kiddie-Schedule for affective disorders and schizophrenia for school-aged children – present and lifetime version
LHC	Life history calendar
ODD	Oppositional defiant disorder
PCL-R	The Hare Psychopathy checklist- revised
PCL:SV	The Hare Psychopathy checklist – short version
PCL:YV	The Hare Psychopathy checklist – youth version
PD	Personality disorder
PTCM	Psychobiological temperament and character model
RCI	Reliable change index
SUD	Substance use disorder
SCID	Structured clinical interview for DSM-IV disorders
Wais	Wechsler adult intelligence scale
Wisc	Wechsler intelligence scale for children

1 INTRODUCTION

Adolescence is a period characterized by biological, cognitive, and psychological growth. Many adolescents engage in antisocial behaviour, most have used alcohol, and many have tried illicit drugs (ESPAD, 2012). Alcohol and drug use, and criminal offending have been proposed as normative behaviours among adolescents (Moffitt, 1993), but some adolescents develop substance use disorders (SUDs) (Young et al., 2002). Antisocial behaviour in adolescence is associated with negative consequences both for the individual, for example school drop-out, and for society, for example, high costs in the criminal justice and health systems. Adolescents engaging in antisocial behaviour present a challenge to treatment services. Many present co-occurring mental disorders. For example, among adolescents with a substance use problem, 60-88% presented co-occurring mental disorders both in studies of community and clinical samples (Armstrong & Costello, 2002; Couwenbergh et al., 2006). Follow-up studies have shown that substance use problems in adolescence are associated with multiple adverse outcomes including SUDs, mental and physical disorders, premature death, criminality, and poverty through the subsequent three decades of life (Hodgins, Larm, Molero-Samuleson, Tengstrom, & Larsson, 2009). Consequently, further understanding of adolescent substance use problems is needed to inform treatment programs.

The present thesis provides new knowledge about personality traits among adolescents who consulted for a substance use problem. While different personality traits are studied, the focus is primarily on psychopathic traits. The presence of psychopathic traits in mid-adolescence when the clients seek treatment for substance use problems was examined. Also, the associations of these traits with mental disorders were examined. The stability of psychopathic traits from mid-adolescence to early adulthood was estimated as were the associations of psychopathic traits in adolescence and mental health, psychosocial functioning, antisocial/criminal behaviour, and clinical service use five years later.

The Introduction begins with a brief presentation of a theoretical framework of personality. Two models of personality are presented, a review of the associations between personality and mental disorders, and a brief discussion of personality disorders (PDs). The remaining sections of the Introduction focus on psychopathic traits. The syndrome of psychopathy is described and defined as are the tools used to assess psychopathic traits. The subsequent sections describe the associations between psychopathic traits and mental disorders in adolescence, the stability of psychopathic traits, and the predictive power of psychopathic traits.

1.1 THEORETICAL PERSPECTIVE

1.1.1 Definition of personality

Personality is defined as relatively stable individual differences in thinking, feeling and behaviour (Roberts, Wood, & Caspi, 2008). Studies of the development of personality have suggested that it emerges in early childhood (Caspi et al., 2003), is not fully developed until early adulthood (Caspi, Roberts, & Shiner, 2005), is quite stable (Roberts & DelVecchio, 2000) with some change evident across the life course (Roberts, Walton, & Viechtbauer, 2006). An increase in stability has been reported up to age 30 when personality traits seem to stabilize (Terracciano, McCrae, & Costa,

2010). Both genetic and environmental factors, for example life changes and role transitions, (Caspi et al., 2005) contribute to the development of personality. Personality may also change due to increased maturity resulting from self-actualization, personal growth, and/or becoming a more productive and involved contributor to society (Caspi et al., 2005). For example, in the Dunedin study, adolescents with greater levels of maturity showed less change in personality over time (Roberts, Caspi, & Moffitt, 2001). It has also been shown that stability in personality results from individuals creating and seeking out environments that are correlated with their personality (Caspi et al., 2005).

1.1.2 Personality models

There are two dominant models of personality, the Five Factor Model (FFM) and the Psychobiological Temperament and Character Model (PTCM) (Cloninger, Przybeck, Svrakic, & Wetzel, 1994; Costa & McCrae, 1992). Based on the results of factor analyses, the FFM is described as including five traits: neuroticism (emotional adjustment and stability); extraversion (sociability and stimulation seeking); openness to experience (curiosity about inner and outer world); agreeableness (interpersonal relationships and strategies); and conscientiousness (achievement striving and self-discipline) (Costa & McCrae, 1992; Digman, 1990). The FFM is typically assessed using the Revised NEO Personality Inventory (NEO-PI-R; Costa & McCrae, 1992), a self-report inventory consisting of 240 questions. Recently, the Health-relevant Personality Inventory (HP5i), a Swedish short version, self-report instrument, based on the FFM has been developed. It consists of 20 items divided into five sub-scales: antagonism (hostile behaviour, negatively correlated to FFM agreeableness); impulsivity (impulsive behaviour, negatively correlated to FFM conscientiousness); hedonic capacity (capacity to experience pleasure, positively correlated with FFM extraversion); negative affectivity (experience of negative feelings, positively correlated to FFM neuroticism); and alexithymia (inability to verbally express emotions, negatively correlated to FFM openness) (Gustavsson, Jonsson, Linder, & Weinryb, 2003). The HP5i provides a profile of personality based on the FFM. So far there are few studies of the validity of HP5i, though preliminary validity has been shown in samples of adult twins, adults with long-term sick leave (Gustavsson et al., 2003), adult diabetes patients (Gustavsson, Eriksson, Hilding, Gunnarsson, & Ostensson, 2008), and a community sample of Swedish adolescents (Gunnarsson, Gustavsson, Tengstrom, Franck, & Fahlke, 2008).

The PTCM has been theoretically generated and consists of seven dimensions of temperament and character. Temperament refers to automatic emotional responses, which are heritable and stable. Character refers to self-concepts and individual differences in goals and values, which are influenced by learning and maturation. There are four dimensions of temperament: novelty seeking (behavioural activation, a genetic predisposition to being excitable, impulsive, quick-tempered); harm avoidance (behavioural inhibition, a genetic predisposition to being cautious, apprehensive, overly pessimistic); reward dependence (heritable tendency to maintaining behaviours that previously have been associated with reinforcements and a sensibility to social cues); and persistence (heritable tendency of maintaining behaviours despite fatigue and lack of reward). Additionally, there are four dimensions of character: self-directedness (individual differences in autonomy); cooperativeness (individual differences in identification with and acceptance of others); and self-transcendence (individual differences in tolerating ambiguity and uncertainty). Self-transcendence consists of two

parts; fantasy (fantasy and daydreaming) and spirituality (spiritual beliefs) (Cloninger et al., 1994). Among adolescents, the PTCM is assessed using the Junior Temperament and Character Inventory (JTCI), which consists of 204 items. It was developed to assess individual differences in both normal and abnormal personality. The JTCI provides a personality profile based on the PTCM. The JTCI has been validated in community samples of children (Asch et al., 2009; Kerekes et al., 2010; Luby, Svrakic, McCallum, Przybeck, & Cloninger, 1999) and adolescents (Jonasson, 1999; Lyoo et al., 2004), and in a mixed sample of clinical and non-referred adolescents aged 12 to 18 years (Schmeck, Goth, Poustka, & Cloninger, 2001).

To summarize, the HP5i and the JTCI provide personality profiles based on different personality models. The validity of the HP5i has been shown in adults (Gustavsson et al., 2008; Gustavsson et al., 2003), and a community study of Swedish adolescents (Gunnarsson et al., 2008), but it has not been tested in an adolescent clinical sample. While the validity of the JTCI has been shown in community samples, both among children and adolescents (Asch et al., 2009; Jonasson, 1999; Kerekes et al., 2010), only one study has validated the JTCI in an adolescent clinical sample that included both women and men (Schmeck et al., 2001). The JTCI has not been validated in a clinical sample of adolescents who consulted for a substance use problems. Further knowledge is needed about the validity of the HP5i and the JTCI among adolescents presenting substance use problems.

1.2 PERSONALITY AND PSYCHOPATHOLOGY AMONG ADOLESCENTS

Personality refers to a more normative set of behaviours while psychopathology is an extreme set of behaviours that result in impairment in functioning (Lahey, 2004). Previous research has provided convincing evidence of an association between personality and psychopathology. Three dominant theories attempt to explain this association: (1) personality and psychopathology influence each other in a bidirectional relationship (pathoplastic relationships); (2) personality causes psychopathology and vice-versa; or (3) personality and psychopathology share a common aetiology (spectrum relationship) such that the extremes of personality traits are labelled as disorders (Widiger & Smith, 2008). Although the interplay between personality and psychopathology is not fully understood, associations between personality and psychopathology have been shown.

Only a small number of studies have examined the association between personality and psychopathology in adolescent samples. Two personality traits assessed using the FFM have been suggested to be risk factors for the development of mental disorders among adolescents, neuroticism, the degree of emotional adjustment and stability, and conscientiousness, the degree of achievement striving and self-discipline (Tackett, 2006). More specifically, in adults high neuroticism scores have been linked to internalizing problems (major depression, dysthymia, general anxiety disorder, agoraphobia, social phobia, simple phobia, panic disorder) (Krueger & Markon, 2006). By contrast, in adults, low scores for conscientiousness, agreeableness, and neuroticism have been linked to externalizing problems (conduct disorder (CD), SUD, antisocial personality disorder (ASPD) (Krueger & Markon, 2006). Furthermore, low scores for extraversion are a risk factor for the development of depression (Clark, Watson, & Mineka, 1994), and low scores for agreeableness and neuroticism are associated with externalizing problems (Ruiz, Pincus, & Schinka, 2008). Similarly, one study reported that adolescents diagnosed with CD and SUDs obtained higher scores for neuroticism, lower scores for agreeableness and conscientiousness than their siblings (Anderson,

Tapert, Moadab, Crowley, & Brown, 2007). Among university students, scores for neuroticism and conscientiousness have been linked to both drinking and alcohol-related problems (Ruiz, Pincus, & Dickinson, 2003), while among preadolescent and adolescent students, high scores for extraversion and low scores for conscientiousness predicted frequent alcohol use (Merenakk et al., 2003). There is only one study of an adolescent community sample showing that elevated levels of antagonism and impulsivity measured by the HP5i were associated with an increase in hazardous alcohol consumption (Gunnarsson et al., 2008). To summarize, among adolescents, low scores for neuroticism and conscientiousness have been associated with externalizing problems such as CD and SUDs, while high scores for neuroticism have been linked to internalizing problems such as depression and anxiety.

Similar associations between PTCM scales and mental disorders have been reported. Internalizing problems have been associated with high scores for harm avoidance, (behavioural inhibition), and externalizing problems with high scores for novelty seeking (behavioural activation) (Copeland, Landry, Stanger, & Hudziak, 2004; Gothelf, Aharonovsky, Horesh, Carty, & Apter, 2004; Schmeck & Poustka, 2001). Similar findings were reported for a sample of children where high scores for novelty seeking were associated with disruptive behaviour disorders, and disruptive behaviour disorders in combination with internalizing disorders (Rettew, Copeland, Stanger, & Hudziak, 2004). Among middle school students, high scores for harm avoidance and self-transcendence, and low scores for reward dependence, were associated with self-assessed internalizing problems (Kim et al., 2006). Also, among children and adolescents, different temperament profiles have been found to be associated with specific anxiety disorders. For example, social phobia was associated with high scores for harm avoidance and low scores for self-directedness (Cho et al., 2009). Further no study has explored the links between JTICI scores and mental disorders in adolescents over time, while among adults, high scores for harm avoidance and low scores for self-directedness predicted changes in depression over one year (Cloninger, Svrakic, & Przybeck, 2006). To summarize, high scores for harm avoidance have been associated with internalizing problems and high scores for novelty seeking with externalizing problems.

Generally, previous studies of personality traits measured by the FFM and the PTCM have shown that among adolescents, internalizing problems are associated with high scores for neuroticism and harm avoidance. Both neuroticism and harm avoidance are traits indicative of negative emotions. Individuals high in neuroticism and harm avoidance tend to be anxious, prone to worry, and shy in most social situations (Cloninger et al., 1994; Costa & McCrae, 1992). By contrast, externalizing problems are associated with low scores for conscientiousness and high scores for novelty seeking. Conscientiousness and novelty seeking are traits covering two aspects of externalizing problems, the inability to tolerate frustration and impulsivity. Individuals with low conscientiousness cannot force themselves to do things, are lackadaisical, and unreliable. Individuals with high novelty seeking are quick-tempered, easily board, impulsive, and quickly disengage when frustrated. There is limited knowledge of the associations between personality traits measured by the FFM and the PTCM and psychopathology among adolescents with a substance use problem. Further, most studies are limited to associations measured cross-sectionally, that is at one time point only. More knowledge about the associations, both cross-sectional and longitudinal, between personality traits, measured by the FFM and the PTCM, and psychopathology among adolescents with substance use problems is needed to further understanding of the development of mental disorders and also to inform treatment efforts.

1.3 PERSONALITY DISORDERS

It has been suggested that PDs are extreme variations of normal personality (Widiger & Smith, 2008). However, a problem with defining personality as extremes of normal variation is that that extremity alone cannot explain a disorder. The Diagnostic and statistical manual of mental disorders IV (DSM-IV) definition of PDs includes clusters of inflexible and maladaptive traits and requires that there is significant functional impairment or distress (DSM-IV, 1995). PDs are diagnosed in a specific axis (axis II), apart from so-called functional disorders such as depression, anxiety and SUDs (axis I). In the DSM-IV, axis II disorders are divided into three clusters: cluster A includes paranoid, schizoid, and schizotypal PD; cluster B include antisocial, borderline, histrionic, and narcissistic PD; and cluster C include avoidant, dependent, obsessive-compulsive, and passive-aggressive PD. In contrast to most measures of personality which are dimensional, the DSM-IV offers a categorical definition of PDs. If a certain number of symptoms are fulfilled and there is a functional impairment, a diagnosis of PD is made. Although the notion of PD has been traced back to ancient Greece, PDs were first described as a separate axis in the DSM-III which was published in 1980. This focused attention on these disorders. Still, a number of difficulties with the DSM-IV definition have been acknowledged. For example, the same symptoms are included among the criteria for different PDs, and the co-occurrence between PDs is relatively common. ASPD in adolescence may have a long term effect on life quality. In a study of a community sample of adolescents, aged on average 13.8 years, three groups were compared: with axis I disorder; with axis II disorder; and with both axis I and II disorders. By age 33, adolescents presenting both axis I and II disorders had a lower level of education, lower occupational status, less social support, lower health status (for example chronic illness, pain), lower life satisfaction, lower psychosocial functioning, more antisocial behaviour and axis I disorders than the other two groups (Crawford et al., 2008). These results suggest that PDs are important to diagnose in adolescence, although caution is warranted since ASPD is not to be diagnosed before age 18.

1.4 PSYCHOPATHY

Unlike, ASPD, psychopathy is not included in the DSM-IV system list of PDs, though it is still viewed as a PD (Lynam & Gudonis, 2005; Skeem & Cooke, 2010). Similar to ASPD, the syndrome of psychopathy includes an early onset and persistence of antisocial behaviour. The syndrome of psychopathy is distinguished from ASPD by including specific traits of personality. The definition of psychopathy has changed over time. Previous definitions emphasized different aspects of psychopathy, for example violent, antisocial behaviour, charm, attention seeking, brutality, and emotional coldness (Pinel, 1962; Kraepelin, 1915). The current conceptualization of psychopathy derives from the work of Cleckley (1941), who hypothesized that severe underlying pathology was masked by outward good mental health. Cleckley's definition included three components: emotional unresponsiveness and impaired social relatedness (for example, lack of remorse, poverty in affective reactions); positive psychological adjustment (for example, good intelligence, absence of nervousness); and behavioural pathology (for example, impulsive antisocial acts, irresponsibility). Inspired by Cleckley, Hare (1980) developed the Psychopathy Checklist – Revised (PCL-R). The PCL-R assesses three main features covering the combination of personality traits and socially deviant behaviours of psychopathy, interpersonal, affective, and behavioural/lifestyle (Hare, 2003). The interpersonal component includes grandiosity and manipulation, the affective component includes shallow/lacking emotions and

inability to maintain close relationship, and the behavioural component includes impulsive and criminal behaviour. Cleckley conceptualized psychopathy as a disorder of personality and did not include criminality among the criteria for the disorder. Today, there is still a debate about this issue. Some authors (Skeem & Cooke, 2010) argue that the criteria for psychopathy should only include measures of personality and antisocial behaviour, not criminality, while others such as Hare argue that it is an essential part of the syndrome of psychopathy.

The PCL-R consists of 20 items rated by clinicians trained to use the PCL-R based on all available clinical and criminal files and an interview. Item scores vary from 0 to 2, and the total score from 0 to 40. The cut-off score to indicate the presence of the syndrome of psychopathy varies. In samples recruited in North America, it is 30 or higher, while in European samples it is 25 or higher (Hare, 2003). Initially, factor analyses indicated that the PCL included two factors (Hare, 1980). More recent factor analyses have identified two different factor models (see figure 1). A three-factor model focuses on the interpersonal, affective, and behavioural components of psychopathy while ignoring criminal behaviour (Cooke & Michie, 2001). The four-factor model includes all four components; interpersonal, affective, behavioural, and criminal, and uses all the items of the PCL (Hare, 2003). Criminality is not included in the three-factor model, but rather it is viewed as a correlate of psychopathy. However, criminality is part of the four factor model (Skeem & Cooke, 2010).

Two-factor model	Three-factor model	Four-factor model
Factor I - Interpersonal/affective	Factor I – Interpersonal	Facet I - Interpersonal
Impression management	Impression management	Impression management
Grandiose sense of self-worth	Grandiose sense of self-worth	Grandiose sense of self-worth
Pathological lying	Pathological lying	Pathological lying
Manipulation for personal gain	Manipulation for personal gain	Manipulation for personal gain
Lack of remorse	Factor II - Affective	Facet II – Affective
Shallow affect	Lack of remorse	Lack of remorse
Callous/lacking empathy	Shallow affect	Shallow affect
Failure to accept responsibility	Callous/lacking empathy	Callous/lacking empathy
Factor II- Socially deviant lifestyle	Failure to accept responsibility	Failure to accept responsibility
Stimulation seeking	Factor III - Behavioral	Facet III – Lifestyle
Parasitic orientation	Stimulation seeking	Stimulation seeking
Lacks goals	Parasitic orientation	Parasitic orientation
Impulsivity	Lacks goals	Lacks goals
Irresponsibility	Impulsivity	Impulsivity
Poor anger control	Irresponsibility	Irresponsibility
Early behaviour problems		Facet IV – Antisocial
Juvenile delinquency		Poor anger control
Revocation of conditional release		Early behaviour problems
		Juvenile delinquency
		Revocation of conditional release
		Criminal versatility

Figure 1. PCL models of psychopathy.

The prevalence rate of the syndrome of psychopathy in the general adult population is estimated to range from 1-2% (Hare, 1993). Psychopathy is much more prevalent in samples of incarcerated offenders (Hare, 2003).

1.4.1 Psychopathic traits among children and adolescents

Emerging evidence suggests that psychopathic traits are present before age 5 (Dadds, Fraser, Frost, & Hawes, 2005). Children with psychopathic traits present more severe conduct problems than other children with CD, including aggressive behaviour, and an elevated risk of persistent criminal offending (Frick, 2009; Hodgins, Larm, Ellenbogen, Vitaro, & Tremblay, 2013; Lawing, Frick, & Cruise, 2010; Moffitt, 1993), a sub-group of antisocial children. They show deficits in reactions to negative emotional stimuli that cause distress in most children (Blair, Morris, Frith, Perrett, & Dolan, 1999). They have difficulty recognizing sadness in the faces or voices of others (Dadds et al., 2006). Further, they show cognitive deficits. Importantly, they fail to use punishment to guide their behaviour (Barry et al., 2000), as indicated by a failure to learn from time-out (Hawes & Dadds, 2007), and insensitivity to poor parenting practices (Hawes & Dadds, 2005). Some authors suggest that they require specific interventions that target their empathetic deficits and not simply interventions focused on their conduct problems (Hawes & Dadds, 2007). Most treatment centres for adolescents do not assess psychopathic traits even though the importance of this differential diagnosis is now recognized by experts (Rutter, 2012).

Although it has been controversial to assess psychopathy among children and adolescents (Salekin & Frick, 2005), several instruments have been developed to assess psychopathic traits among children and adolescents, for example the Antisocial Process Screening Device (APSD; Frick & Hare, 2001), the Child Psychopathy Scale (CPS; Lynam, 1997), the Youth Psychopathic traits Inventory (Andershed, Kerr, Stattin, & Levander, 2002), and the Psychopathy checklist youth version (PCL:YV; Forth, Kosson, & Hare, 2003). Both the adult version and PCL:YV are assessed by a trained clinician and based on both a clinical interview and a file review. Contrary to the adult version of the PCL there is no recommended cut-off score for use with the PCL:YV (Forth et al., 2003). Instead, the level of psychopathic traits is reported. Thus, the PCL:YV is used to assess the syndrome of psychopathy and as well to measure psychopathic traits among individuals.

1.4.2 Psychopathic traits and mental disorders

Mental disorders are more prevalent among adolescents than adults with high levels of psychopathic traits (Salekin, Leistico, Neumann, DiCicco, & Duros, 2004). Positive associations between psychopathic traits and externalizing disorders are well-documented among children (Enebrink, Andershed, & Langstrom, 2005), in adolescent community samples (Schmidt, McKinnon, Chattha, & Brownlee, 2006), clinical samples (Murrie & Cornell, 2000), and among offenders (Gretton, McBride, Lewis, O'Shaughnessy, & Hare, 1994; Salekin et al., 2004). For example, in a clinical sample of adolescents the level of psychopathic traits assessed by the PCL-R was positively associated with CD, norm-breaking behaviour, and narcissistic PD (Myers, Burket, & Harris, 1995). Similarly, in a sample of male adolescent offenders, positive associations between psychopathic traits measured by the PCL:YV and CD, ODD, and attention deficit/hyperactivity disorder (ADHD) have been reported (Kosson, Cyterski, Steuerwald, Neumann, & Walker-Matthews, 2002). Possibly, these findings can be explained by shared or overlapping etiological factors (Krueger, Markon, Patrick, & Iacono, 2005). Alternately, the development of psychopathic traits may be promoted by the presence of CD. CD is a predictor of stability in psychopathic traits (Pardini, Lochman, & Powell, 2007). The few studies of associations between substance use problems and psychopathic traits in adolescents, mostly conducted in males, show

inconsistent findings. Among male adolescent offenders, a positive association between psychopathic traits and SUDs was reported (Mailloux, Forth, & Kroner, 1997). In another sample of male adolescents with a substance use problems, there was no association between psychopathic traits and drug use (O'Neill, Lidz, & Heilbrun, 2003). In a study of male adolescents with co-occurring SUDs and other mental disorders, those who used multiple types of drugs presented higher levels of psychopathic traits than those with an alcohol use disorder (AUD) (Harvey, Stokes, Lord, & Pogge, 1996). Further, incarcerated adolescents with higher levels of psychopathic traits measured by the PCL:YV were characterized by an earlier age of onset and more drug use. Substance use problems have been positively associated with scores for the behavioural factor of the PCL:YV, but showed no association with scores for the interpersonal and affective factors (Vincent, Vitacco, Grisso, & Corrado, 2003).

While levels of psychopathic traits are consistently found to be positively associated with externalizing disorders, evidence of the association between psychopathic traits and internalizing disorders varies. In early definitions of the syndrome of psychopathy, psychopathy and affective disorders were conceptualized as mutually exclusive. Consistent with this notion, among male delinquents a negative association was found between psychopathic traits and affective disorders (Moeller & Hell, 2003), and among male adolescents with a substance use problem no association between psychopathic traits and depression or anxiety was observed (O'Neill et al., 2003). In contrast, among male adolescent offenders, a positive association between psychopathic traits and anxiety and depression has been reported (Dolan & Rennie, 2007; Kosson et al., 2002; Salekin et al., 2004). Further, mood disorders during childhood have been reported to be predictive of an increased risk of future antisocial behaviour (Harrington, 2001; Kasen et al., 2001). Associations between psychopathic traits and internalizing disorders among adolescents may differ from the associations among adults who present high levels of psychopathic traits and express less negative affect (Stalenheim & von Knorring, 1996). One suggested explanation is that adolescents characterized by psychopathic traits are similar to adults with psychopathy, but the lack of affect is less severe (Kosson et al., 2002). It has been proposed that there are two types of adults presenting the syndrome of psychopathy. Those with primary psychopathy present low levels of anxiety, those with secondary psychopathy present higher levels of anxiety symptoms (Farrington, 2005).

To summarize, consistent positive associations between psychopathic traits and externalizing disorders have been shown though most studies have been conducted among men and/or offenders (Kosson et al., 2002). It has been suggested that the development of psychopathic traits differs among women and men, as ODD is more common in women and CD in men presenting higher levels of psychopathic traits (Salekin, Rogers, & Machin, 2000). The associations between psychopathic traits and substance use problems are less consistent, previous studies have shown both positive associations (Harvey et al., 1996), and no association (O'Neill et al., 2003). Most studies have been conducted on men. The inconsistent findings of the associations between psychopathic traits and internalizing problems may reflect different subtypes of psychopathy (Farrington, 2005), possibly explaining findings of both positive and negative associations, or age-related as it has been suggested that internalizing problems are more prevalent among adolescents than adults (Salekin et al., 2004). More knowledge of gender differences in the association between psychopathic traits and mental disorders is needed both to extend developmental models and to inform prevention and treatment efforts.

1.4.3 Stability of psychopathic traits

The stability of psychopathic traits, like other personality traits, has been studied by using different statistical measures. Rank-order stability estimates the maintenance of individual position's within a group over time. Mean-level stability is defined as the consistency of scores in a sample or population over time, if the sample as a whole increases or decreases over time. In contrast, individual-level stability estimates the magnitude of increases or decreases in scores for each individual over time (Mroczek, 2007). Stability measures are further complicated by different definitions and a variety of measurements used in the assessment of psychopathic traits.

Studies of children have observed high rank-order stability in psychopathic traits across different ages, various time periods, and different samples. There are more studies on community samples (Dadds et al., 2005) but also studies on aggressive children (Barry, Barry, Deming, & Lochman, 2008), and clinical samples (Hawes & Dadds, 2007). For example, one community study of children four to nine years old reported high rank-order stability for callous-unemotional (.55), narcissism (.63), and impulsivity (.64) scores measured by the APSD over one year (Dadds et al., 2005). Most, but not all, studies have used parent and/or teacher ratings of the APSD to assess psychopathic traits (Frick & Hare, 2001). The length of the follow-up periods varied (for example, Lynam et al., 2009; Pardini et al., 2007). Most studies focused only on rank-order stability (Dadds et al., 2005), and there were only three studies that included measures of mean-level or individual-level stability (Frick, Kimonis, Dandreaux, & Farell, 2003; Hawes & Dadds, 2007; Lynam et al., 2009). For example, in a US study of children in the third, fourth, sixth, and seventh grades at the first assessment, parent-rated APSD, showed high rank-order stability ranging from .87 to .92 over four years. Cross-informant rank-order stability coefficients for parent-ratings followed-up with youth-ratings ranged from .65 to .79, while teacher- and youth-ratings ranged from .52 to .76. Further, among those with low scores for psychopathic traits at baseline, 59% obtained low scores four years later, while among those with high scores for psychopathic traits at baseline more change was evident with only 43% obtaining high scores four years later (Frick et al., 2003). No studies were found that estimated the stability of clinically assessed psychopathic traits in children, nor that examined stability separately among girls and boys.

Although there is evidence of stability of psychopathic traits in adolescence from twin (Blonigen, Hicks, Krueger, Patrick, & Iacono, 2006; Forsman, Lichtenstein, Andershed, & Larsson, 2008; Loney, Taylor, Butler, & Iacono, 2007), community (Lynam, Caspi, Moffitt, Loeber, & Stouthamer-Loeber, 2007), and clinical (Burke, Loeber, & Lahey, 2007) studies, the use of different measures limits firm conclusions. For example, in the Pittsburgh Youth Study, boys were assessed at age 13 using the mother-reported CPS and at age 24 using the interviewer-rated PCL: Short Version (PCL:SV). Total scores showed moderate rank-order stability (.31), while the stability of the facet scores was lower: interpersonal facet score (.19), affective facet score (.15), lifestyle facet score (.28) and antisocial facet score (.33) (Lynam et al., 2007). Self-ratings have been used in most studies and few studies included women, with all studies of women using self-reports (Munoz, Kerr, & Besic, 2008). There is a need for longer follow-up times as the two studies that made clinical assessments of psychopathic traits included followed-up periods of six months and one year (Burke et al., 2007; Lee, Klaver, Hart, Moretti, & Douglas, 2009). For example, a sample of clinic-referred men with conduct problems, aged, on average, 18 years, were assessed using the PCL-R (Hare, 2003) administered by a clinician trained to use this instrument

and based on the interview and in some cases clinical files. Over one year, the total PCL-R score showed high rank-order stability (.66) and mean total score at age 18 was 9.92 and at age 19 was 9.06. The socially deviant lifestyle factor score showed high rank-order stability (.73), while the rank-order stability of the interpersonal/affective factor score was lower (.43) (Burke et al., 2007). Despite these issues, rank-order and individual-level stability has been shown in psychopathic traits among adolescents (for example, Forsman et al., 2008). Findings on mean-level stability are inconsistent; a gender difference has been reported, with a decrease in psychopathic traits among women and an increase among men (Blonigen et al., 2006).

To summarize, stability of psychopathic traits have been shown from childhood to adolescence and into early adulthood. However the use of different measurements limits firm conclusions. There is a need for studies of psychopathic traits assessed by validated instruments rated by trained clinicians. Further, studies are needed of samples of adolescents presenting high levels of conduct problems. This is the population, both women and men, that presents the highest risk for persistent antisocial and aggressive behaviour into adulthood, and it is essential to further understanding of the stability of psychopathic traits among them. In a study of male adolescent offenders, assessed by the PCL:YV and the APSD, over six months, rank-order stability was medium to high, for PCL:YV total score, interpersonal factor score, affective factor score, and behavioural factor score. Similar rates were found for the APSD total score, and scores for narcissism, callous-unemotional, and impulsive factors. There was a decrease in mean-level stability in the PCL:YV total score, affective and behavioural factor scores, and in the APSD total and impulsivity scores. While total scores for most of the delinquents remained stable over six months (34%, 54%), others decreased, and a few increased (Lee et al., 2009). In addition, studies of stability of psychopathic traits that include follow-up periods extending through the age-risk period when criminal offending peaks (Moffitt, 1993) are needed.

1.4.4 Factors influencing stability of psychopathic traits

Little is known about factors influencing stability in scores for psychopathic traits among children and adolescents. One study of children in the third, fourth, sixth, and seventh grades at the first assessment reported that children with stable high psychopathic traits scores (teacher, parent, child ratings on the APSD) came from families with low socioeconomic status, had few positive parenting experiences, low intelligence, and a high initial level of conduct problems. By contrast, children with stable low scores or decreasing levels of psychopathic traits came from families with high socioeconomic status and positive parenting practices and presented high intelligence, and few conduct problems (Frick et al., 2003). Among aggressive children aged, on average, 10.7 years, different aspects of social competence moderated change over one year in scores for narcissism and impulsive conduct problems measured by the APSD. The child's self-rated social competence was associated with stability in scores for narcissism, while teacher-rated social competence and peer-rated social preference were associated with stability in impulsive conduct problems (Barry et al., 2008). Furthermore, among men aged, on average, 13.9 years, poor parent-child communication and higher levels of conduct problems were associated with elevated parent-rated scores for interpersonal callousness, as measured by the Interpersonal Callousness Scales, the CPS and additional items from the Child Behavior Checklist (Achenbach, 1991), throughout adolescence (14-18 years) (Pardini & Loeber, 2008). In another study of male adolescents, peer delinquency and physical punishment interacted with mother-rated psychopathy scores on the CPS at age 13 to predict total

score, interpersonal facet and antisocial facet scores on the interviewer-rated PCL:SV at age 24, while family socioeconomic status interacted with age 13 scores to predict affective facet and lifestyle facet scores at age 24. Delinquents with an initial low score for psychopathic traits living in a family with low socioeconomic status, having delinquent peers, and experiencing more physical punishment obtained higher scores for psychopathic traits over time. Those with an initial high score for psychopathic traits continued to obtain high scores regardless of other factors (Lynam, Loeber, & Stouthamer-Loeber, 2008).

Factors that have been found to promote the development of psychopathic traits would be expected to predict stability in psychopathic traits. These factors include criminal activity (Campbell, Porter, & Santor, 2004), instrumental and reactive aggressive behaviour (Frick & White, 2008), victimization by peers (Brendgen et al., 2008), lack of fear (Blair, Peschardt, Budhani, Mitchell, & Pine, 2006), neuroticism (Lynam et al., 2005), substance misuse (O'Neill et al., 2003), parents' antisocial behaviour (Forsman et al., 2008; Hussong et al., 2007), lack of behavioural inhibition, low fearfulness, low level of anxiety (Loeber et al., 2001), conduct problem, ODD, ADHD, ineffective parenting (Lynam, 1996). In a sample of school children aged, on average, 10.4 years, psychopathy was assessed using parent- and teacher-rated APSD while among their mothers psychopathy was measured by the Levenson Self-Report Psychopathy Scale. There was a positive correlation (.22) between scores for psychopathic traits in the child and both emotional detachment and callous-unemotional traits in the mother (Loney, Huntenburg, Counts-Allan, & Schmeelk, 2007). Risk factors such as lack of behavioural inhibition, low fearfulness and low anxiety emerge in childhood (Loeber et al., 2001).

By contrast, there are a number of factors that have been found to prevent the development of psychopathic traits. These factors include intelligence, especially verbal intelligence (Burke et al., 2007), personality traits of extraversion, openness to experience, agreeableness, and conscientiousness (Frick & Viding, 2009), and anxiety (Dolan & Rennie, 2007).

To summarize, family socioeconomic status, poor parenting practices, parent-child communication, physical punishment, initial severity of conduct problems, social competence, and peer delinquency have been associated with stability or change in scores for psychopathic traits. The few studies that have examined factors associated with stability or change in psychopathic traits or other factors associated with psychopathic traits have been conducted among children (Barry et al., 2008; Frick et al., 2003) or male adolescents (Lynam et al., 2008; Pardini & Loeber, 2008). Hence, there are few studies of girls (Frick et al., 2003) and of adolescents with antisocial behaviour who would be expected to have higher scores for psychopathic traits than those in community samples. More knowledge about factors influencing the stability or change in psychopathic traits among both women and men is needed.

1.4.5 Psychopathic traits and antisocial behaviour among parents and grandparents

Antisocial behaviour aggregates in families (Barnow, Ulrich, Grabe, Freyberger, & Spitzer, 2007; Hussong et al., 2007). For example, in a longitudinal study, three generations were studied, 411 boys (G2), their parents (G1) and their children (G3). The presence of antisocial behaviour in G1 parents was associated with conduct

problems both in their children (G2) and grandchildren (G3). Antisocial behaviour in G2 as adults predicted G3 conduct problems. Some of the associations between antisocial parents and antisocial children were mediated by parenting variables such as authoritarian attitudes, poor supervision, inconsistent parenting (Smith & Farrington, 2004). The presence of an antisocial father predicted high scores for self-reported aggression/delinquency, attention problems, and disruptive behaviour among their adolescent sons (Barnow et al., 2007). Also substance use problems in parents and grandparents predicted antisocial behaviour among children and grandchildren (Bailey, Hill, Oesterle, & Hawkins, 2006). Children of parents with alcohol problems had an increased risk for externalizing symptoms (Hussong et al., 2007), and grandparents' substance use has been associated with similar problems among their grandchildren (Bailey et al., 2006). While studies have examined antisocial behaviour including SUDs among parents and their offspring (Bailey et al., 2006; Hussong et al., 2007), few studies have examined psychopathic traits in different generations. One study found that parental drug dependence was not associated with PCL:YV scores among their adolescent sons (O'Neill et al., 2003). One study reported a positive correlation between scores for psychopathic traits among school children and their mothers (Loney et al., 2007).

To summarize, antisocial behaviours are transferred across generations and there are no studies examining problem behaviour across two generations as a predictor of psychopathic traits in a third generation. More knowledge about antisocial behaviour across generations is needed.

1.4.6 The predictive power of psychopathic traits

Few studies have examined associations between psychopathic traits in adolescence and outcomes other than aggressive behaviour and criminality. The results of these few studies are generally inconsistent, for example, those on internalizing problems (Pardini & Loeber, 2008; Schmidt et al., 2006) and suicidal behaviour (Sevecke, Kosson, & Krischer, 2009). A recent study showed that among adolescent boys both CD and psychopathic traits predicted substance use problems three years later, while among girls only CD was associated with subsequent substance misuse (Wymbs et al., 2012). In a meta-analysis of 21 studies, 15 of which focused exclusively on men, the PCL:YV or the PCL-R predicted general and violent recidivism, more strongly among men than women (Edens, Campbell, & Weir, 2007). Similarly, other studies of adolescents have shown that the PCL:YV predicted violent behaviour (Gretton, Hare, & Catchpole, 2004; Murrie, Cornell, Kaplan, McConville, & Levy-Elkon, 2004), violent and non-violent criminal convictions among males, and weakly or not at all among females (Schmidt et al., 2006; Vincent, Odgers, McCormick, & Corrado, 2008). Few studies have examined PCL:YV predictions after controlling for CD. One study showed that the PCL:YV continued to predict future violent offending among adolescent males after controlling for CD (Gretton et al., 2004). To summarize, there are few studies of the predictive power of psychopathic traits for outcomes other than aggressive behaviour and criminality and most existing studies have focused exclusively on men. Results of studies examining the longitudinal associations between psychopathic traits and internalizing problems and suicidal behaviour are inconsistent. More knowledge about the predictive power of psychopathic traits for a wide variety of outcomes is needed to refine developmental models.

1.4.7 Gender differences in psychopathic traits

It is difficult to draw firm conclusions about gender differences in adolescent psychopathic traits since most studies of psychopathic traits have been conducted among men, although there has recently been an increase in studies of women. Studies suggest that in adulthood, women present lower levels of psychopathic traits than men (Cale & Lilienfeld, 2002). Results of studies of adolescents are mixed, with most reporting higher levels of psychopathic traits among boys than among girls (Forth, Brown, Hart, & Hare, 1996; Salekin et al., 2000; Schmidt et al., 2006; Schrum & Salekin, 2006). Some studies, however, report no gender differences (Salekin & Frick, 2005). Gender differences in the levels of psychopathic traits may be explained by real differences in the levels of the traits, or by varying presentation of the traits in the two sexes. For example, it has been suggested that men present overt behavioural manifestations that are diagnosed as ASPD, while women present somatization disorder and histrionic PD (Cale & Lilienfeld, 2002). Importantly, no gender differences have been reported in the factor structure of the PCL:YV (Jones, Cauffman, Miller, & Mulvey, 2006).

Psychopathic traits may develop differently in women and men. In a recent study of the associations between psychopathic traits and aggression and delinquency among girls and boys no significant gender differences were found (Marsee, Silverthorn, & Frick, 2005). However, there was a stronger association between psychopathic traits and relational aggression in women and between psychopathic traits and overt aggression in men (Marsee et al., 2005). In studies of children with psychopathic traits, girls present more internalizing problems and fewer externalizing problems than boys (Schmidt et al., 2006). These gender differences decreased during adolescence (Cale & Lilienfeld, 2002). Further, there may be a gender difference in the predictive validity of the PCL:YV, with weaker prediction of general and violent recidivism by the PCL:YV among girls than among boys (Schmidt et al., 2006). Also, possible differences in the development of psychopathic traits have been suggested (Salekin et al., 2000), with ODD being more common among girls with elevated levels of psychopathic traits, and CD being more prevalent among boys. More knowledge about gender differences in associations between psychopathic traits and mental disorders, the development of psychopathic traits, and factors influencing stability or change are needed to inform developmental models.

2 AIM

This thesis aimed to advance understanding of personality traits, and most particularly psychopathic traits, among adolescents engaging in substance misuse. Knowledge of these traits, their associations with current and future psychopathology and antisocial and criminal behaviour, and their stability as adolescents' transition to adulthood, is needed to further understanding of the development of SUDs and to inform interventions designed to reduce substance misuse.

2.1 SPECIFIC AIM OF EACH PAPER

Paper I. To examine associations between psychopathic traits and mental disorders among adolescents who sought treatment for substance misuse. To examine antisocial behaviour across three generations.

Paper II. To study the concurrent and predictive validity of the Health-relevant personality inventory (HP5i) and the Junior Temperament and Character Inventory (JTCI) among adolescents who sought treatment for substance misuse.

Paper III. To examine stability in psychopathic traits over a five-year period and to identify factors associated with stability of psychopathic traits in individuals who as adolescents sought treatment for substance misuse.

Paper IV. To determine whether psychopathic traits measured in mid-adolescence predict mental health, psychosocial, and antisocial/criminal outcomes five years later, and to determine whether psychopathic traits predict these outcomes more strongly than conduct disorder.

3 METHOD

The present thesis has used data from a follow-up study of adolescents who contacted a clinic in Stockholm for adolescents with a substance use problem. It is the only clinic in Stockholm for adolescents (up to age 20) with a substance use problem, and provides both in- and outpatient treatment. The study was initiated to increase knowledge about adolescents with a substance misuse. Data collection started in 2004 and proceeded during a 7-month period. There were three follow-ups, six months, 12 months, and five years after inclusion (study design, see Figure 2). The present thesis used data from three assessments, the initial assessment, the 12-months follow-up, and the five-year follow-up.

3.1 PARTICIPANTS

3.1.1 Initial assessment

742 adolescents contacted the only substance misuse clinic in a large urban centre in Sweden during a 19 week period in 2003. From among them, a random sample of 373 (50.3%) adolescents and their parents were invited to participate in the study. The final sample included 180 clients (mean age = 16.8, SD= 1.85), 99 women (55%) with their 90 mothers and 52 fathers, and 81 men (45%) with their 72 mothers and 37 fathers. There was a high rate of refusal to participate in the study. Hence comparisons between 61 clients who agreed to participate and 61 clients who refused to participate were conducted. Those who participated in the study were younger at first tobacco use, less likely to have been admitted through the emergency room, more likely to report that their parents had psychiatric problems, and more likely to report being sexually abused (for more detailed information see Hodgins et al., 2007). A majority of them (70%) were Swedish. Most of the clients lived with a single mother (47%) or with both parents (31%). They entered the clinic in different ways: (1) as a follow-up to a previous visit (40%), (2) with a caregiver as an emergency due to intoxication or serious substance use-related problems (31%), (3) for on-going treatment (individual, family, or both; 12%), (4) by police after being found intoxicated in a public place (12%), or (5) for planned inpatient assessment and treatment (3%). For 2% of the cases, no information was available on the referral.

3.1.2 12-month follow-up

After 12 months 156 clients, 86 women (55%) and 70 men (45%) participated in the follow-up by diagnostic interviews and self-assessments. There were no significant differences between those who participated in the follow-up and those who did not regarding sex, age, and depression, anxiety, CD, AUD, DUD and ASPD.

3.1.3 Five-year follow-up

Five years later, 146 clients, 85 women (58 %) and 61 men (42 %), completed interviews. There were no significant differences between those who participated in the follow-up and those who did not regarding sex, PCL:YV total score, proportions with fathers or mothers with antisocial behaviour, scores for parental control and parental solicitation, proportions with family poverty, maltreatment, criminal peers, diagnoses

of CD, AUD, DUD, anxiety disorder, aggressive behaviour, convictions for non-violent crimes, social difficulties, victimization by peers, and fearlessness. At initial assessment, those who participated in the follow-up had reported higher mean scores ($M=2.01$, $SD=0.89$) for parental disclosure than those who did not ($M=1.39$, $SD=0.99$; $t(158) = -3.16$, $p=.002$), and a greater proportion had obtained low verbal IQ scores ($\chi^2(df=1) = 5.47$, $p=.019$).

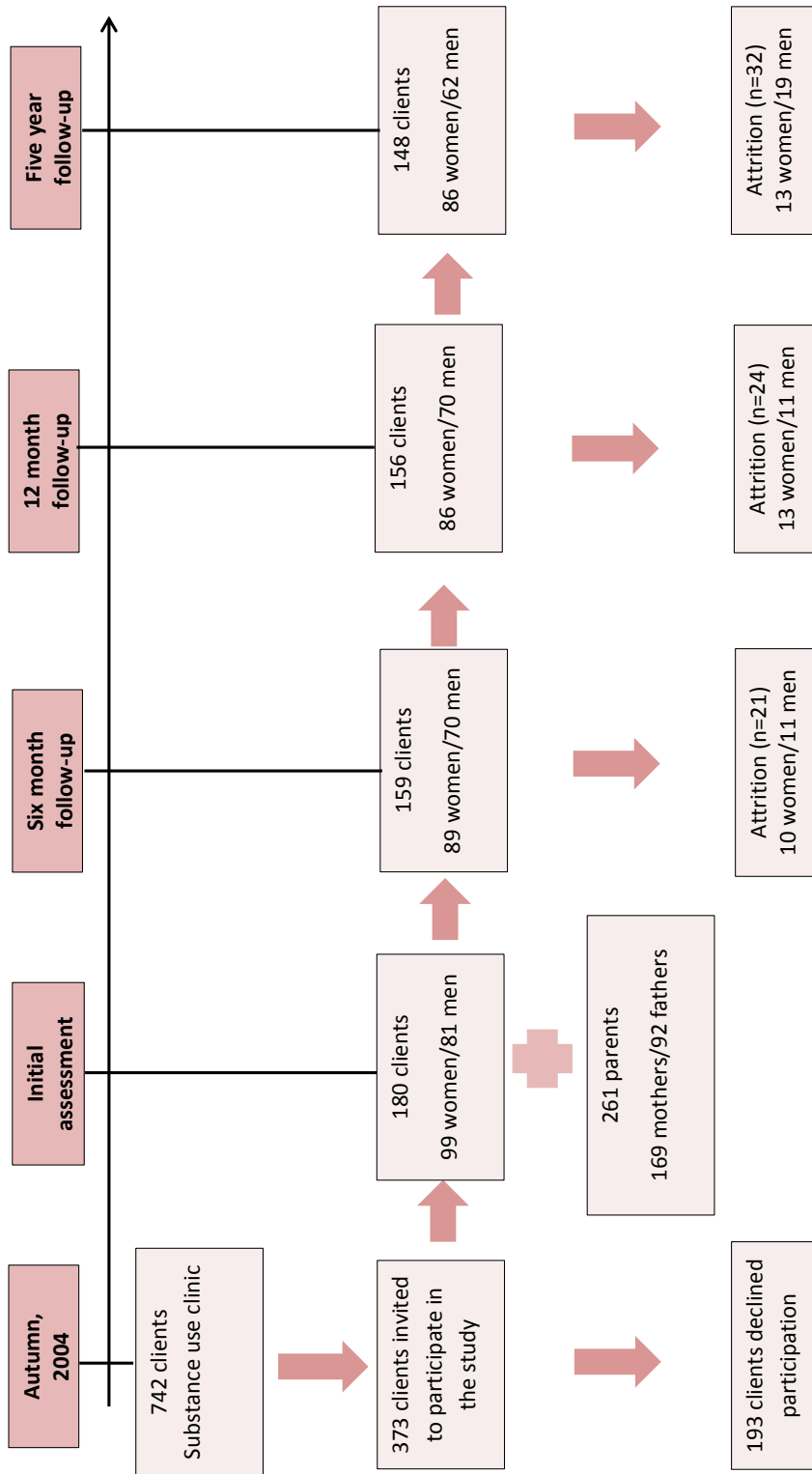


Figure 2. Study design.

3.2 MEASURES

Measures by clinical interviews, self-assessments, and official registers from the initial assessment, the 12-month follow-up, and the five-year follow-up were used. At the initial assessment both clients and their parents were assessed. On the 12-month follow-up and the five-year follow-up the clients were assessed. Assessments covered a variety of areas, for example personality, mental disorders, criminality, leisure time activity, and relations to parents, siblings and friends. The present thesis included measures from the initial assessment, the 12-month follow-up, and the five-year follow-up, for an overview of which measures were used from each assessment see table 1. Below all measures used in each paper of the thesis will be described.

3.2.1 At initial assessment

3.2.1.1 Clients

3.2.1.1.1 Psychopathic traits

The Hare Psychopathy Checklist: Youth Version (PCL:YV: Forth et al., 2003) is a 20-item rating scale measuring psychopathic traits in adolescents (age 12 to 18). Each item is scored 0 (consistently absent), 1 (inconsistently present), or 2 (consistently present). The PCL:YV was rated by clinical psychologists, trained to use this instrument, and, as recommended based on the interview and clinical files. Studies have shown that psychopathic traits can be valid and reliable measured by the PCL:YV in both criminal and non-criminal adolescent samples (for example Vincent et al., 2008; Kosson et al., 2002). Inter-rater reliability calculated on 29 clients (12 women and 17 men) was good for the PCL:YV total score (ICC= .86), acceptable for the interpersonal facet score (ICC =.61), affective facet score (ICC =.74), and lifestyle facet score (ICC =.67); and good for the antisocial facet score (ICC =.87). Total scores of psychopathic traits were used in paper, I, III, and IV. In paper I scores of the three-factor model was used and in paper III and IV scores of the four-factor model was used.

3.2.1.1.2 Mental disorders

Clients age 17 and younger were interviewed by clinical psychologists using the Kiddie-Schedule for Affective Disorders and Schizophrenia for School-Aged Children - Present and Lifetime Version (K-SADS-PL:Kaufman et al., 1997). It is a diagnostic interview covering mental disorders covering DSM-IV disorders (DSM-IV: The Diagnostic and statistical manual of mental disorders, 1995) in children and adolescents. Inter-rater reliability calculated on fifteen clients was high (for example, CD/ODD, kappa = 0.82). Clients age 18 or above were interviewed following the Structured clinical interview for DSM-IV axis I disorders (SCID-I: First, Spitzer, Gibbon, & Williams, 1997) and the Structured Clinical Interview for DSM-IV axis II disorders (SCID-II: First, Gibbon, Spitzer, Williams, & Benjamin, 1997). SCID-I is a structured clinical interview for assessment of DSM-IV axis I disorders in adults. Inter-rater reliability calculated on twelve clients was high (for example, CD/ODD, kappa=0.82). SCID-II is a structured clinical interview for assessment of DSM-IV axis II disorders in adults. Symptoms of mental disorders were used in all four papers.

3.2.1.1.3 Personality

Clients answered the Junior Temperament and Character Inventory (JTCI), a 108-item self-report measure of temperament and emerging personality characteristics used in

children and adolescents, scored either as “true” or “false” (Luby et al., 1999). The instrument consists of four dimensions of temperament: *novelty seeking* (behavioural activation, a genetic predisposition to being excitable, impulsive, quick-tempered), *harm avoidance* (behavioural inhibition, a genetic predisposition to being cautious, apprehensive, overly pessimistic), *reward dependence* (heritable tendency to maintaining behaviours that previously have been associated with reinforcements and a sensibility to social cues) and *persistence* (heritable tendency of maintaining behaviours despite fatigue and lack of reward), and of four dimensions of character: *self-directedness* (individual differences in autonomy), *cooperativeness* (individual differences in identification with and acceptance of others), and *self-transcendence* (individual differences in tolerating ambiguity and uncertainty). Self-transcendence consists of two parts; fantasy (fantasy and daydreaming) and spirituality (spiritual beliefs) (Luby et al., 1999). The JTCI has been validated among children (Asch et al., 2009; Kerekes et al., 2010; Luby et al., 1999) and adolescents (Jonasson, 1999; Lyoo et al., 2004; Schmeck et al., 2001). Scores of each subscales was used in paper II.

3.2.1.1.4 Intelligence

The Wechsler Intelligence Scale for children – third edition (WISC-III: Wechsler, 2003) was used for clients age 17 and below, and the Wechsler adult intelligence scale – revised (WAIS-R) was used for clients age 18 and above (Wechsler, 2008). Two subtests, word list and block design, highly correlated with verbal and performance intelligence were administered. Both instruments have repeatedly shown to be valid and reliable (Wechsler, 2003, 2008). Scores of the two subtest were significantly correlated (0.31, $p=.000$). In paper II, a total score was calculated from the two subtests to create a total score of intelligence and in paper III one subtest, word list was used as a measure of verbal intelligence.

3.2.1.1.5 Poverty

Poverty was defined as the client’s family having received social welfare payments as indicated by the Swedish Social Insurance Administration. Poverty was used in paper III.

3.2.1.1.6 Parenting practices

Clients responded to 16 questions covering three aspects of parenting practices: parental control - parents control over the adolescent’s free time, friends, and money; parental solicitation - if parents initiate conversations about the adolescent’s peers, school, and free time; and parental disclosure - how much adolescents tell their parents about peers, school, and free time. Responses were scored using a 5-point scale ranging from “almost never” to “very often” (Stattin & Kerr, 2000). Item scores were summed to provide total scores. Parenting practices was used in paper III.

3.2.1.1.7 Maltreatment

The revised Conflict Tactic Scales (Straus, Hamby, Boney-McCoy, & Sugarman, 1996) were used to measure physical abuse of the client by mother and/or father. Each parent and the client independently completed the questionnaires. Physical abuse was defined as present if either parent or the client reported that the client was: hit with a fist or kicked hard, hit on a part of the body other than the bottom with a hard object, thrown or knocked down, grabbed around the neck and choked, beaten up, hit repeatedly very hard, burned, threatened with a gun or knife. Item scores for clients and parents were summed up to provide a total score. Maltreatment was used in paper III.

3.2.1.1.8 Social difficulty

Clients answered three questions about social difficulties that were scored present or absent. Social difficulty was defined as having problems getting along with close peers, workmates, and/or non-family members. Social difficulty was used in paper III.

3.2.1.1.9 Fearlessness

Clients completed the Child Fearlessness Scale (Andershed, 2003). It consists of seven items (for example, There are persons I am afraid of; I am not afraid of anything; I am never afraid when someone tries to scare me; Sometimes I am frightened by watching scary things on TV or movies) with response alternatives ranging from 1 (“does not apply at all”) to 4 (“applies completely”). Scores for the seven items were summed to provide a total score. Fearlessness was used in paper III.

3.2.1.1.10 Criminal peers

One item, “do you have criminal peers”, from the Structured Assessment of Violence Risk in Youth (Borum, Bartel, & Forth, 2002), which is a risk assessment instrument of violence, was rated absent or present. Criminal peers was used in paper III.

3.2.1.1.11 Victimization by peers

Clients answered seven questions about experiences of victimization by peers that were scored as absent or present. Experiences of victimization by peers were defined as being threatened or attacked by other adolescents, for example with weapons or without reasons, and was coded present or absent. Victimization by peers was used in paper III.

3.2.1.1.12 Aggressive behaviour

Clients responded to 28 questions about aggressive behaviour in the previous six months including the aggressive behaviour scale of the Youth Self-Report (Achenbach & Rescorla, 2001). Self-reported aggressive behavior was defined as violent and/or threatening behavior including physical threats towards others during the last year, for example, carried weapons, physical abuse, forced others to give you money, or participated in a fight. Item scores were summed to provide total scores. Aggressive behaviour was used in paper III.

3.2.1.1.13 Non-violent crime

Clients reported on non-violent criminal activity over the past year and responses were scored as absent or present. All other offences than violent offences were defined as non-violent. Non-violent crime was used in paper III.

3.2.1.2 *Parents*

3.2.1.2.1 Parent antisocial behaviour

Parents completed an interview with a clinical psychologist trained to use SCID (First, Spitzer, et al., 1997). When only one parent participated in the study, she/he reported on symptoms of the other biological parent following a semi-structured interview, the Family Interview for Genetic Studies (FIGs: Adolfsson & Forsgren, 1998). The FIGs contains general questions about mental disorders and suicidality as well as specific questions covering common mental disorders, and additional questions about criminal behaviour in parents. Information about parents' criminality was extracted from official

files. Fathers' and mothers' antisocial behaviour was defined as the presence of diagnoses of AUD, and/or DUD, and/or convictions for criminal offences. Parent antisocial behaviour was used in paper I and III.

3.2.1.2.2 Grandparent antisocial behaviour

Grandparent antisocial behaviour included measures of criminality, mental disorders and substance use problems. The FIGs, which is a semi-structured interview, was administered to parents to survey psychopathology in grandparents (Adolfsson & Forsgren, 1998). The FIGs contains general questions about mental disorders and suicidality as well as specific questions covering common mental disorders, and additional questions about criminal behaviour in grandparents. A clinical psychologist conducted the interviews. Grandparent antisocial behaviour was used in paper I.

3.2.2 12-month follow-up

3.2.2.1 *Personality*

Clients answered the *Health-relevant Personality Inventory (HP5i)*, a short self-report instrument consisting of 20 items developed for use in health research and rated on a four-point Likert scale ranging from 1 ("does not apply at all") to 4 ("applies completely") with five scales: *antagonism* (hostile behaviour), *impulsivity* (impulsive behaviour), *hedonic capacity* (capacity to experience pleasure), *negative affectivity* (experience of negative feelings), and *alexithymia* (inability to verbally express emotions), for further description of the instrument see Gustavsson et al. (2003). The HP5i has been newly developed and its reliability and validity have been shown, in an adolescent community study (Gunnarsson et al., 2008), adults with long-term sick leave (Gustavsson et al., 2003), and adult diabetes patients (Gustavsson et al., 2008). Item scores were summed up to total scores of each scale, and were used in paper II.

3.2.2.2 *Mental disorders*

Clients were interviewed by clinical psychologists using the SCID (First, Spitzer, et al., 1997). Twelve cases were rated independently by a second clinician and inter-rater reliability was high (for example, CD/ODD, kappa=0.82) (further information, Hodgins et al., 2007). Symptoms of mental disorders were used in paper II.

3.2.3 Five-year follow-up

3.2.3.1 *Psychopathic traits*

The Psychopathy Checklist – revised (PCL-R: Hare, 2003) is a 20-item rating scale for the assessment of psychopathic traits in adults. Each item is scored 0 (consistently absent), 1 (inconsistently present), or 2 (consistently present). Factor analysis identified four factors similar to those composing the PCL:YV, interpersonal facet, affective facet, lifestyle facet, and antisocial facet. PCL-R scores were rated by trained clinical psychologists based on the interview and clinical files. The PCL-R has good validity and reliability (Hare, 2003). Inter-rater reliability calculated on 12 clients (five women and seven men) was good for the PCL-R total score (ICC= .99), acceptable for the interpersonal facet (ICC =.79), affective facet (ICC =.85), and lifestyle facet (ICC =.82); and good for the antisocial facet (ICC =.97). Scores of the PCL-R total score and facet scores were used in paper III.

3.2.3.2 *Mental disorders*

Clients were interviewed following the Structured clinical interview for DSM-IV axis I disorders (SCID-I: First, Spitzer, Gibbon, & Williams, 1997) and the Structured Clinical Interview for DSM-IV axis II disorders (SCID-II: First, Gibbon, Spitzer, Williams, & Benjamin, 1997). SCID-I is a structured clinical interview for assessment of DSM-IV axis I disorders in adults. 12 cases were rated independently by a second clinician and inter-rater reliability was high (for example, CD, kappa=0.82, AUD, kappa=0.83). Symptoms were summed to provide total scores for mental disorders. Symptoms of mental disorders were used in paper IV.

3.2.3.3 *Suicide attempt*

Suicide attempts since the initial assessment were scored absent (0) or present (occurred 1 or more times). Number of suicide attempt was used in paper IV.

3.2.3.4 *Treatment*

Information about treatment since the initial assessment was collected with the Life History Calendar (LHC: Freedman, Thornton, Camburn, Alwin, & Young-demarco, 1988), from SCID I (First, Spitzer, et al., 1997), and from medical records. The clients answered how many days they had been in treatment from 2004 until 2011. Treatment was divided into two categories; treatment for substance misuse and treatment for other mental disorders. Treatment for substance misuse included inpatient, outpatient, and medical treatment for substance misuse. Treatment for other mental disorders covered mental disorders except SUDs and aggressive behavior and included inpatient, outpatient, and medical treatment for other mental disorders. Item scores were summed up to provide total scores of number of days in treatment for substance misuse and other mental disorders. Treatment was used in paper IV.

3.2.3.5 *Admission to psychiatric wards.*

Number of admissions to psychiatric wards since the initial assessment was collected from Patientregistret. Admission to psychiatric wards was defined as admissions to psychiatric wards due to presence of at least one diagnosis of International Statistical Classification of Diseases and Related Health Problems – tenth revision (ICD-10: WHO, 2010) psychiatric diagnoses (f00-f99). It was withdrawn from Patientregistret from 2004 to 2011. Number of admissions to psychiatric wards was used in paper IV.

3.2.3.6 *Psychosocial functioning.*

The Global Assessment of Functioning Scale (GAF: DSM-IV, 1995) assessed psychological, social, and occupational functioning. GAF scores range from 1 to 100. GAF scores was used in paper IV.

3.2.3.7 *Work/studies*

The LHC (Freedman et al., 1988) documented work and studies. The number of months worked/studied more than 30 hours/week since the initial assessment was defined as an outcome. Number of months worked/studied was used in paper IV.

3.2.3.8 *School dropout*

School dropout was coded as present if less than 7 years of school were completed. School drop-out was used in paper IV.

3.2.3.9 Having a child at a young age

Clients reported whether or not they had children. Having a child at a young age was used in paper IV.

3.2.3.10 Aggressive behaviour

The MacArthur Community Violence Instrument (Steadman et al., 1998) was administered by interview, to report on all types of physically aggressive behaviours towards others in the past six months. Item scores were summed to provide a total score. Aggressive behaviour was used in paper IV.

3.2.3.11 Violent crime

Eleven questions were asked about violent crimes over the past year. Information about number of violent crime convictions was extracted from official Swedish criminal records. Violent crimes were defined to include: participating in a fight down town, carrying a weapon in school or down town, participating in beating someone up so badly you think/know that the person required hospital treatment, hurting someone with a knife, stiletto or similar, participating in forcing or threatening someone to do something she/he didn't want to do, started a fight without you or your friends being threatened or assaulted first, kicking someone lying on the floor or kicking someone on the head, threatening someone in order to steal, attempted or completed homicide or manslaughter, criminal negligence causing death, assault resulting in death, assault on official, assault, arson, robbery, kidnapping, stalking, harassment, unlawful threats, rape, sexual assault, sexual molestation, sexual abuse of minors, incest, procuring, and child pornography crimes. Item scores and number of convictions were summed. Number of violent crime was used in paper IV.

3.2.3.12 Non-violent crime

Fifteen questions were asked about non-violent crimes over the past year. Information about number of convictions for non-violent offences was extracted from official Swedish criminal records. Offences not defined as violent were defined as non-violent. Item scores and number convictions were summed. Number of non-violent crime was used in paper IV.

Table 1.
List of measures by clinical interview, self-assessments, and official files used in each assessment.

	Initial assessment		12-month follow-up	Five-year follow-up
	Clients	Parents	Clients	Clients
Clinical interview				
Psychopathic traits	<input checked="" type="checkbox"/>			<input checked="" type="checkbox"/>
Mental disorders	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Intelligence	<input checked="" type="checkbox"/>			
Maltreatment	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		
Criminal peers	<input checked="" type="checkbox"/>			
Criminality	<input checked="" type="checkbox"/>			<input checked="" type="checkbox"/>
Parent/grandparent mental disorders		<input checked="" type="checkbox"/>		
Suicide attempt				<input checked="" type="checkbox"/>
Treatment				<input checked="" type="checkbox"/>
Work/studies				<input checked="" type="checkbox"/>
Self-assessments				
Personality	<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>	
Parenting practices	<input checked="" type="checkbox"/>			
Social difficulties	<input checked="" type="checkbox"/>			
The child fearlessness scale	<input checked="" type="checkbox"/>			
Victimization by peers	<input checked="" type="checkbox"/>			
Aggressive behaviour	<input checked="" type="checkbox"/>			<input checked="" type="checkbox"/>
Criminality	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>
Having a child at a young age				<input checked="" type="checkbox"/>
Official files				
Social Insurance Administration		<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>
Patientregistret				<input checked="" type="checkbox"/>
Criminal records		<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>

3.3 PROCEDURE

When the clients first contacted the clinic, they and their parents were invited to participate in the study. After a complete description of the study, and answers to their questions, the client and each parent formally signed consents to complete interviews, and questionnaires, to allow the research team access to their clinical files, official criminal records, and social insurance records. Inclusion required that parents agreed their daughter/son to participate, and at least one parent had to agree to participate. Interviews were then scheduled with clients and each parent separately. The clients were interviewed on average 39 days ($SD=34$ days) after inclusion in the study. None of the clients was intoxicated during the interview. For participation in the study, clients received a gift certificate worth 500 SEK for a department store and a cinema ticket, and parents received a gift certificate worth 300 SEK. After 12 months the former clients were contacted for an agreed follow-up, to complete interviews and questionnaires.

Five years later, the former clients were contacted and asked to again participate in the study. Those who agreed signed formal consents to complete interviews and questionnaires, provide a sample of saliva for DNA extraction, and to allow the research team to access their clinical files, criminal records, health records, and social insurance records. Follow-up interviews were conducted, on average, 5.6 years ($SD=0.85$) after the initial assessment. For participation in the follow-up, the former clients received a gift certificate worth 500 SEK for a department store.

3.4 STATISTICAL ANALYSES

Below the statistical analyses will be described for each paper included in the thesis.

In paper I associations between PCL:YV scores (total score, scores of the interpersonal factor, the affective factor, and the behavioural factor) and number of DSM-IV symptoms (depression, anxiety, mood disorder, phobia, post traumatic stress disorder, eating disorder, psychosis, ADHD, ODD, CD, ASPD, AUD, DUD, PD) assessed at the initial assessment were examined by Pearson's correlations. Regression analyses were used to study if DSM-IV symptoms and parent and grandparent antisocial behaviour was associated with PCL:YV total score and factor scores.

In paper II statistical analyses were conducted separately for HP5i and JTIC. First, the validity of each instrument was tested with Cronbach's alpha and Pearson's correlations of each subscale. Second, the discriminant validity was explored by calculating Spearman's correlations between each subscale and the intelligence mean score. Third, the convergent validity was examined by Spearman's correlations between scales and numbers of symptoms of depression, anxiety, CD, AUD, DUD, and ASPD. In the statistical analyses, measures from the same interview occasion were used, the JTIC was correlated to symptoms of mental disorders from the initial assessment, and the HP5i to symptoms of mental disorder from the 12-month follow-up. Assuming stability in the construct, intelligence measured at the initial assessment, was used for exploring discriminant validity of the HP5i (data collected at the 12-month follow-up). The predictive validity of the JTIC, was studied in two steps. Spearman's correlations were calculated between JTIC scale scores and symptoms of mental disorders at the 12-month follow-up. Next, multiple regression analyses were performed with symptoms of mental disorders (depression, anxiety, CD, AUD, DUD, ASPD) at 12-month follow-up as dependent variable and JTIC scale scores and

symptom of mental disorders at initial assessment. Statistical analyses have been calculated for the total sample and by gender separately. Due to incomplete or missing self-assessments 20-23 cases were omitted from the analyses of the HP5i and 11-15 cases from the analyses of the JTCI. In order to control for type 1 error, the level of significance was adjusted by Bonferroni correction ($\beta=\alpha/n$).

In paper III independent t-test and chi square statistics were used to estimate differences between women and men. Three measures of stability were examined. Rank-order stability in psychopathic traits over five years was calculated by a non-parametric test, Kendall's tau. Mean-level stability was measured by paired sample t-tests. Individual-level stability was calculated to determine if scores had decreased, remained the same, or increased using the reliable change index (RCI) ($RC = (x_2 - x_1) / S_{diff}$, where x_1 = an individual score at time 1, and x_2 = the same individuals score at time 2, and S_{diff} = standard error of difference between the two test scores, computed by $S_{diff} = (2(Se)^2)^{1/2}$. RCI scores below - 1.96 or above 1.96 indicate reliable change (Christensen & Mendoza, 1986; Jacobson & Truax, 1991). RCIs were re-calculated for clients with total PCL-R scores of 0-10, 11-19, and 20 to 40. To study whether factors assessed at the initial assessment predicted psychopathic traits five years later multiple regression models were computed. Because of the small sample size, three initial models were calculated that included family, individual, and antisocial characteristics assessed at the initial assessment as predictors. A final model was calculated that included the significant predictors from the three initial models controlling for the PCL:YV total score. Similar analyses were conducted to examine predictors of PCL-R facet scores. All models were re-run excluding two outliers on PCL:R scores as indicated by studentized residuals > 2 .

In paper IV, characteristics of female and male clients were compared using t-tests and chi square statistics. Binary correlations were calculated between predictor variables (PCL:YV facet scores, number of CD symptoms) and outcome variables using Kendall's Tau. Multiple regression analyses were computed to examine outcomes defined as continuous variables, and logistic regression models were calculated for outcomes defined dichotomously. Due to outliers on the dependent variables, one case was removed from all of the analyses, and six cases from analyses of number of admissions to psychiatric wards. The first series of models estimated the independent associations of PCL facet scores, with outcomes and took account of sex. By specifying the four facet scores as predictors, the overlap between the facets was controlled, thereby providing an independent estimate of the association of each facet with each outcome. Model I included PCL facet scores. Model II included facets scores, sex, and an interaction term of the facet scores with sex. Interaction terms were included one by one. A final model included significant predictors from models I and II. Similar analyses estimated the associations of the number of CD symptoms with outcomes. Finally, one model was calculated to determine whether the PCL facets that were predictive of outcomes in the final model would remain after taking account of the number of CD symptoms. In order to examine interaction terms the following variables were dichotomized (low= score 0-2, high=score 3 or higher): antisocial facet, lifestyle facet, and number of CD symptoms. Independent t-tests were calculated to estimate significance of differences.

3.5 ETHICAL PERMISSIONS

The initial study with was approved by Research ethics Committee Nord (DNR 03-543), and the five-year follow-up was approved by Regionala etikprövningsnämnden in Stockholm (DNR 2008/1934-31/3).

4 RESULTS

The aims and results from each paper included in the thesis will be described below.

4.1 PAPER I ASSOCIATIONS BETWEEN PSYCHOPATHIC TRAITS AND MENTAL DISORDERS AMONG ADOLESCENTS WITH SUBSTANCE USE PROBLEMS

4.1.1 Aim

To examine the association between psychopathic traits and mental disorders, and to study associations between psychopathic traits and familial problems across generations among adolescent who have been treated for a substance use problem.

4.1.2 Results

PCL:YV total score was positively correlated to externalizing symptoms, for example, ODD, CD, ASPD, AUD, DUD and PDs among both women and men. Each of the three factor model (interpersonal, affective, and behavioural factor) showed positive correlations to most externalising symptoms in both women and men. Among men, there was a positive correlation between PCL:YV total score and number of symptoms of depression and anxiety. The affective factor and the behavioural factor were positively correlated to number of symptoms of depression and anxiety, while the interpersonal factor was positively correlated to number of symptoms of depression. Further, the behavioural dimension of psychopathy was predictive of externalizing symptoms across gender. The interpersonal and affective dimension of psychopathy predicted symptoms of ODD among women. Parent externalizing problems and criminality problem predicted PCL:YV total score and affective and behavioural factor score amongst women only.

4.2 PAPER II THE VALIDITY OF THE HEALTH-RELEVANT PERSONALITY INVENTORY (HP5I) AND THE JUNIOR TEMPERAMENT AND CHARACTER INVENTORY (JTICI) AMONG ADOLESCENTS REFERRED FOR A SUBSTANCE MISUSE PROBLEM

4.2.1 Aim

The aim was to study the validity of two personality instruments, the Health-relevant personality inventory (HP5i) and the Junior Temperament and Character Inventory (JTICI) among adolescents with a substance use problem.

4.2.2 Results

Discriminant validity was demonstrated in both instruments' scales lack of correlation to intelligence. Two findings were in support of convergent validity: negative affectivity (HP5i) and harm avoidance (JTICI) were positively correlated to number of symptoms of depression and anxiety ($r = .30 - .41$); and impulsivity (HP5i) and novelty seeking (JTICI) were positively correlated to number of symptoms of CD, AUD, DUD,

and ASPD ($r = .15 - .25$). The predictive validity of JTIC was partly supported. Novelty seeking was positively correlated to CD, AUD and DUD. When symptoms for mental disorders at baseline were controlled for, only one scale, cooperativeness, predicted CD after 12 months.

4.3 PAPER III STABILITY OF PSYCHOPATHIC TRAITS FROM MID-ADOLESCENCE THROUGH EARLY ADULTHOOD AND PREDICTORS OF CHANGE

4.3.1 Aims

To examine stability in psychopathic traits over a five-year period, from mid-adolescence to early adulthood, among women and men who as adolescents had consulted a substance misuse clinic, and to identify factors that are associated with change.

4.3.2 Results

Three measures indicated high stability of psychopathic traits across five years, from mid-adolescence to early adulthood. Moderate to high rank-order stability was observed for PCL total and facet scores among women and men. The mean total score and mean scores for the interpersonal and affective facets decreased over the five-year period among women and men. Lifestyle facet scores were stable among women and increased among men. The scores for the antisocial facet remained stable across gender. Psychopathic traits in early adulthood were predicted by two factors, levels of psychopathic traits in mid-adolescence and aggressive behaviour. A DUD in mid-adolescence independently predicted affective and lifestyle traits five years later.

4.4 PAPER IV DO PSYCHOPATHIC TRAITS ASSESSED IN MID-ADOLESCENCE PREDICT MENTAL HEALTH, PSYCHOSOCIAL, AND ANTISOCIAL/CRIMINAL OUTCOMES OVER THE SUBSEQUENT FIVE YEARS?

4.4.1 Aim

The present study aimed to determine whether psychopathic traits assessed in mid-adolescence predicted mental health, psychosocial, and antisocial/criminal outcomes five years later and would thereby provide advantages over diagnosing CD.

4.4.2 Results

The antisocial facet score positively predicted the number of anxiety symptoms and likelihood of receiving treatment for SUDs. Lifestyle facet and antisocial facet scores negatively predicted GAF scores. By contrast, the interpersonal score and male sex independently and positively predicted number of months worked/studied, as did the interaction of lifestyle*sex indicating that among men, but not women, an increase in lifestyle facet score was associated with less time worked/studied. Interpersonal scores negatively predicted and antisocial scores positively predicted school drop-out. Antisocial facet scores predicted number of ASPD, AUD, DUD, and violent and non-violent criminality but much more strongly among men than women. Predictions from

numbers of CD symptoms were similar. When number of CD symptoms was controlled for lifestyle facet scores and antisocial facet score still negatively predicted GAF-score, antisocial facet score positively predicted alcohol and drug disorder, and antisocial facet score positively predicted aggressive behaviour, violent and non-violent crimes in men.

5 DISCUSSION

This chapter will briefly summarize findings from each paper and then draw conclusions. Methodological considerations and clinical implications follow.

5.1 SUMMARY OF FINDINGS FROM EACH PAPER

5.1.1 Paper I Associations between psychopathic traits and mental disorders among adolescents with substance use problems

Paper I documented associations between psychopathic traits and symptoms of mental disorders among adolescents who consulted a clinic for substance use problems. The PCL:YV total score was positively correlated with the number of concurrent mental disorders, and the number of externalizing symptoms (CD, ODD, ASPD, AUD, and DUD) in both women and men. The PCL:YV interpersonal and affective factors were positively associated with symptoms of AUD and DUD among boys but not girls. By contrast, among girls, the behavioural factor that indexes impulsive and irresponsible behaviour was associated with symptoms of AUD and DUD. Scores for this behavioural factor were associated with all externalizing symptoms except ODD symptoms, among both girls and boys. Among girls, scores for both the interpersonal and affective factors were associated with ODD, while among boys it was scores for the behavioural factor that were associated with ODD symptoms. Few previous studies have examined psychopathic traits and ODD symptoms. These results may be interpreted to suggest that ODD symptoms reflect different psychopathic traits among adolescent girls and boys.

Psychopathic traits and internalizing symptoms (depression, anxiety, and mood disorder) were associated among the boys but not among the girls. Among the boys, PCL:YV total, affective, and behavioural factor scores were positively correlated with the number of symptoms of depression and anxiety, while the interpersonal factor score was only positively correlated with depression symptoms. One possible explanation for this difference between the girls and boys is that most of the girls obtained low PCL:YV scores, thereby limiting the range of scores. Further, the girls presented, on average, twice as many symptoms of depression as the boys. The results might be specific to this sample and fail to generalize to samples with higher PCL scores.

This study showed that total PCL:YV scores, affective factor, and behavioural factor scores, were positively correlated with parents' externalizing problems and parents' criminality among their daughters, but not among their sons. There was less evidence of an association of antisocial behaviour across generations than expected based on the evidence from previous studies that antisocial behaviour aggregates in the families of antisocial males (Smith & Farrington, 2004). The results could be due to several methodological factors including the absence of fathers from the sample, incorrect reports of antisocial and criminal behaviours of the absent fathers by the mothers who participated, and the high levels of antisocial and criminal behaviour among the sons.

5.1.2 Paper II The validity of the Health-relevant Personality inventory (HP5i) and the Junior Temperament and Character Inventory (JTCI) among adolescents referred for a substance misuse problem

Paper II provided new information about a recently developed instrument that assesses the FFM, the HP5i, and extended previous findings of the validity of the JTCI in a clinical sample of adolescents presenting substance use problems. The results of this paper suggest that both the HP5i and the JTCI provide a personality profile in an adolescent clinical sample, though some scales require further investigation. The importance of assessing personality in a clinical sample of adolescents was demonstrated. Traits measuring negative emotions were associated with internalizing (anxiety, depression) symptoms, while traits measuring impulsivity and integration in society were associated with externalizing (CD, AUD, DUD, ASPD) symptoms. Further, adolescents with more symptoms of CD and ASPD rated themselves as more hostile, consistent with previous findings showing a strong association of these traits with aggressive and antisocial behaviour using different assessments of personality. However, there was no correlation between symptoms of AUD and DUD and hostile behaviour. The JTCI weakly predicted symptoms of mental disorders one year later. Harm avoidance predicted symptoms of anxiety but not depression over 12 months. One possible explanation for these results is that more than one-third of the sample presented an anxiety disorder, while only 4.5% presented depression. After controlling for the number of symptoms of mental disorders at first contact with the clinic, only low scores for cooperativeness significantly predicted CD symptoms 12 months later. Possibly, the strong associations between the numbers of symptoms that were present when the adolescents first contacted the clinic and the number present one year later, precluded identifying any associations between personality traits and symptoms of mental disorder.

The findings from this study may have been affected by the low reliability of specific scales of the HP5i (hedonic capacity, alexithymia) and the JTCI (persistence). Previous studies of Swedish samples have reported similar problems with the dimension persistence of the JTCI. Further, the HP5i was developed for use among adults in research settings which may have influenced the validity of the instrument in the present sample.

5.1.3 Paper III Stability of Psychopathic Traits from Mid-adolescence through Early Adulthood and Predictors of Change

Paper III extended knowledge about the stability of psychopathic traits among individuals who as adolescents had sought treatment for substance use problems. Psychopathic traits were shown to be stable over five years from mid-adolescence to early adulthood among both women and men. In mid-adolescence when they first contacted the clinic for substance use problems, the participants obtained scores for psychopathic traits similar to those reported for adolescents with CD (Burke et al., 2007; Forth et al., 2003). The boys obtained higher scores than the girls, consistent with previous studies of adolescents (Penney & Moretti, 2007; Schrum & Salekin, 2006) and adults (Vitale, Smith, Brinkley, & Newman, 2002). While there were no sex differences in the interpersonal and lifestyle facet scores in adolescence, these scores were higher among men than women five years later.

Three measures of stability, rank-order, mean-level, and individual-level were examined. Moderate to high rank-order stability was observed for total PCL and facet scores among both women and men, suggesting that over five years most of the participants maintained their position within the sample. Additionally, mean-level stability was also evident among both women and men, inconsistent with evidence of decreases in maladaptive traits in adolescence. There was stability in lifestyle facet scores among women and an increase among men. Traits such as impulsivity, stimulation seeking, irresponsibility, lack goals, parasitic orientation may not start to decrease until individuals are older. As an individual matures these traits are expected to decrease. Mean-level stability was observed in the antisocial facet scores despite the fact that it would be difficult for young adults, aged on average 22, to obtain high scores on this facet that includes items assessing serious criminal behaviour, serious violations of conditional release, and criminal versatility. Thus, if a pattern of antisocial behaviour was present by mid-adolescence, it persisted into early adulthood and if there was little antisocial behaviour in adolescence it was unlikely to emerge in the subsequent five years. Lastly, in general, individual PCL total and facet scores remained stable over five years, both among women and men. Additionally, individuals with a high PCL-R total score (20-40) at the five-year follow-up showed the greatest stability.

The present study is one of few to have examined both individual and familial factors associated with change in PCL scores. Yet, despite extensive clinical assessments and information about the clients' parents, few factors predicted change in psychopathic traits over five years. The level of psychopathic traits in adulthood was predicted primarily by the level of these traits in adolescence, male sex, and aggressive behaviour. DUDs in adolescence, however, were independently associated with affective and lifestyle facet scores in early adulthood.

5.1.4 Paper IV Do psychopathic traits assessed in mid-adolescence predict mental health, psychosocial, and antisocial/criminal outcomes over the subsequent five years?

Paper IV showed that in a sample of individuals who as adolescents sought treatment for substance use problems, the PCL:YV assessed in mid-adolescence predicted not only antisocial/criminal behaviour but also mental health and psychosocial outcomes in early adulthood. Thus, the PCL:YV may provide useful information to clinicians treating adolescents engaging in substance misuse. Further, facet scores were differentially related to outcomes five years later. The antisocial facet score predicted anxiety symptoms, substance misuse treatment, GAF scores, school drop-out, and all antisocial outcomes including ASPD symptoms, AUD and DUD symptoms, aggressive behaviour, violent and non-violent criminality. The interpersonal factor was associated with time worked/studied, school drop-out, and ASPD symptoms, while the lifestyle factor score was associated with GAF scores and time work/studied. Notably, the affective facet score, often referred to as the core of psychopathy, was not associated with any outcome. Thus the PCL:YV facet scores assessed in mid-adolescence predicted a broad array of outcomes five years later.

The number of CD symptoms assessed in mid-adolescence also predicted outcomes five years later, including anxiety symptoms, inpatient admissions, GAF score, school drop-out, and all antisocial outcomes. Adolescents with the highest levels of antisocial

behaviour indicated by either high antisocial facet scores or numbers of CD symptoms were more likely than those with lower levels to receive treatment. Further, this was one of the first studies of adolescents to examine long-term outcomes associated with scores for psychopathic traits and CD symptoms. Both the PCL:YV facets and CD symptoms predicted antisocial outcomes more strongly among men than women suggesting that among adolescent females other factors may contribute to maintaining, and perhaps extending, antisocial behaviour. In general, the PCL:YV provided added value over and above a diagnosis of CD.

The assessment of CD symptoms in mid-adolescence provides a wealth of information about the onset and development of antisocial behaviour, and as the present study and others, has shown, it predicts future antisocial/criminal behaviours, poor psychosocial functioning and behaviours such as dropping out of school that have long term consequences. The PCL:YV facet scores also predict these same behaviours, and may provide additional information that is clinically useful.

5.2 CONCLUSIONS

This thesis aimed to advance understanding of personality traits, and most particularly psychopathic traits, among adolescents engaging in substance misuse. Knowledge of these traits, their associations with current and future psychopathology, and antisocial and criminal behaviour, and their stability as adolescents' transition to adulthood, is needed to inform interventions designed to reduce substance misuse. Four findings from the thesis are discussed below: (1) the validity of personality assessment of adolescents in treatment for substance misuse; (2) the associations, both concurrent and longitudinal, between psychopathic traits and symptoms of mental disorders among individuals who as adolescents sought treatment for substance misuse; (3) the stability of psychopathic traits from mid-adolescence to early adulthood; and (4) factors associated with stability in psychopathic traits and the prediction of outcomes using the PCL:YV.

5.2.1 Validity of personality assessment in adolescents

Two measures of personality, the HP5i and the JTCL, were shown to present adequate validity when used among adolescents seeking treatment for a substance use problem. Some of the subscales, however, were shown to require further study. As expected, participants with externalizing problems rated themselves as more impulsive, quick-tempered, and easily bored. By contrast, individuals with internalizing problems rated themselves as presenting higher levels of negative feelings. As has previously been suggested in adults (Krueger & Markon, 2006) and adolescents (Tackett, 2006) these results suggest that there are key traits that distinguish adolescents with internalizing and externalizing problems. Interestingly, adolescents with more symptoms of CD and ASPD rated themselves as more hostile. This result is consistent with findings from previous research that established a firm association between aggressive and antisocial behaviour (Frick & White, 2008). Reflected in paper I, as associations between psychopathic traits and CD and ASPD symptoms was shown and in paper III aggressive behaviour was associated to stability in psychopathic traits over five years. However, there was no association between symptoms of AUD and DUD and hostile behaviour. Among adolescents who sought treatment for substance misuse, elevated levels of symptoms of CD, AUD, and ASPD were associated with self-ratings of intolerance, blaming others, and self-oriented (low cooperativeness), possibly reflecting

their antisocial behaviour. While personality traits were only weakly associated with symptoms of mental disorders both concurrently and over one year, they modify the way in which symptomatic adolescents engage with, and respond to, treatment. Assessment of personality traits increases knowledge about individual differences in thinking, feeling and behaviour and may thereby modify the way in which symptomatic adolescents engage with, and respond to, treatment but can also provide information about a developing PD (Gaughan, Miller, & Lynam, 2012). For example, in treatment of individuals presenting externalizing problems the trait impulsivity will be especially important to consider as it may prevent them from participating in treatment, and to complete a treatment program. Similarly, in the treatment of internalizing problems negative emotions will need to be targeted as it may hamper treatment success.

5.2.2 Psychopathic traits and mental disorders

It was shown that PCL:YV scores were positively associated with the number of DSM-IV diagnoses, including both externalizing and internalizing disorders. Positive associations were observed between psychopathic traits and symptoms of externalizing disorders (CD; ODD, ASPD, AUD, DUD) both cross-sectionally and over five years among adolescents seeking treatment for a substance use problem. While some items of the PCL:YV and PCL-R assess symptoms of CD and ASPD other items assess aspects of personality traits not included in the DSM-IV criteria for CD and ASPD, for example grandiosity, callousness, and impression management. Previous studies have consistently found that children and adolescents with both elevated levels of psychopathic traits and symptoms of CD present more severe conduct problems than adolescents with CD and low levels of psychopathic traits, including aggressive behaviour, and an elevated risk of persistent criminal offending (Hodgins et al., 2013; Lawing et al., 2010; Moffitt, 1993).

Elevated levels of psychopathic traits and CD is a combination of conditions with negative a prognosis (Frick, 2009; Hodgins et al., 2013). Findings from the present study suggest that psychopathic traits are important to assess among girls with ODD. There was a stronger association between PCL:YV total scores and ODD symptoms than between ODD and CD symptoms among girls. Only 7% of the girls had a diagnosis of ODD. These girls constitute a subgroup with an early onset of conduct problems. Among girls, the interpersonal and the affective factor scores were correlated with the number of ODD symptoms, while the lifestyle factor was associated with number of CD symptoms. It has been suggested that the interpersonal and affective factors better capture the syndrome of psychopathy in women (Schrum & Salekin, 2006). The findings of the present study support the possible importance of assessing ODD symptoms among adolescent girls as they may reflect psychopathic personality traits. Importantly, girls with high levels of psychopathic traits have been described as less aggressive than boys, though they are defiant and antisocial (Salekin et al., 2000). Different aspects of aggressive behaviour were related to psychopathic traits, relational aggression in girls and overt aggression in boys (Marsee et al., 2005). Possibly, among girls, ODD would be as important as CD for understanding the development of psychopathic traits (Salekin et al., 2000). The present study suggested that different aspects of psychopathy were related to substance misuse symptoms in women and men. In women, the behavioural factor score was positively correlated with both AUD and DUD symptoms. However, among the men all three PCL:YV factor scores were positively correlated with AUD and DUD symptoms.

Among males, a positive association was observed between psychopathic traits and symptoms of internalizing disorders assessed concurrently in mid-adolescence. Mood disorders have been associated with an increased risk for future antisocial behaviour (Harrington, 2001; Kasen et al., 2001) emphasizing the importance of assessing internalizing symptoms among adolescents presenting antisocial behaviour. Co-occurring internalizing disorders may characterize subgroups with psychopathy. It has been suggested that primary psychopaths present low levels of anxiety while secondary psychopaths present high levels of anxiety (Farrington, 2005). Coping with negative emotions is a challenge for individuals with internalizing symptoms, as was shown in Paper I where negative emotions were positively associated with internalizing symptoms. Among individuals with high levels of psychopathic traits, the lack of negative emotions such as remorse and empathy is a problem. Hence, negative emotions are important to assess.

5.2.3 Stability of psychopathic traits

Psychopathic traits, like other personality traits (Roberts & DeVecchio, 2000), showed moderate to high rank-order stability from mid-adolescence to early adulthood among women and men. Adolescent substance misuse treatment programs may benefit from identifying clients presenting high levels of psychopathic traits and providing them with specific interventions that take account of their personality. High levels of these traits are associated with persistent violent criminality (Lawing et al., 2010) but also a failure to engage in and to benefit from offender rehabilitation programs (Salekin, Worley, & Grimes, 2010) and parent-training programs (Hawes & Dadds, 2005). It is urgent to assess and attempt to reduce these traits in order to decrease treatment failure and to prevent negative consequences.

Despite the extensive information available on the present clinical sample and their parents, few factors assessed in mid-adolescence predicted psychopathic traits five years later. Confirming the need to target psychopathic traits in treatment, few predictors other than the initial level of these traits were associated with change in the traits over five years. However, aggressive behaviour did predict psychopathic traits five years later. The interplay between aggressive behaviour and antisocial behaviour is not understood. Does the early onset pattern of aggressive and antisocial behaviour promote these traits or vice-versa? It is known that young children with conduct problems and high levels of psychopathic traits do not respond to punishment, an impairment that also characterizes adults with psychopathy. Possibly, the trait of callousness – the insensitivity to others – needs to be changed in order to reduce conduct problems (Pasalich et al., 2012). Consistent with evidence that men show higher levels of psychopathic traits than women, male sex was another predictor of these traits in early adulthood.

Continuity in a personality trait may result, at least in part, from individuals creating and selecting environments that promote the trait (Roberts et al., 2006). Consistent with a previous study (Lynam et al., 2008), in the present study having peers who were engaging in crime predicted scores for antisocial behaviour. Also, genetic factors have been shown to contribute to individual set points which prevent change in personality traits (Roberts et al., 2006). Twin studies have shown that the combination of psychopathic traits and conduct problems is highly heritable in children age 7 and 9 (Viding, Blair, Moffitt, & Plomin, 2005; Viding, Jones, Frick, Moffitt, & Plomin, 2008). In the present study, no association was detected between parent antisocial

behaviour and change in psychopathic traits; yet parent antisocial behaviour, especially fathers' antisocial behaviour, was common. These results suggest, but do not prove, that the contribution of parent antisocial behaviour to offspring psychopathic traits occurs prior to mid-adolescence.

Further, the expression of genes may be altered by environmental factors (Rutter, Moffitt, & Caspi, 2006), such as physical abuse (McGowan et al., 2009). The present study found no association between parenting practices, including physical maltreatment, and change in psychopathy scores from mid-adolescence to early adulthood. In most children, parenting practices have a strong influence on conduct problems (Brestan & Eyberg, 1998) and maltreatment is associated with a variety of negative outcomes (Scott, McLaughlin, Smith, & Ellis, 2012; Widom, 1989). By contrast, children with high levels of psychopathic traits are less influenced by poor parenting (Oxford, Cavell, & Hughes, 2003; Wootton, Frick, Shelton, & Silverthorn, 1997), fail to learn to modify their behaviour in response to punishment such as time-out (Hawes & Dadds, 2005), and show blunted responses to maltreatment (Silva, Larm, Vitaro, Tremblay, & Hodgins, 2012). The lack of association of parenting and maltreatment with scores for psychopathic traits may simply have resulted from the participants' age – adolescents transitioning to adulthood. Further, the adolescents' relationship with their parents in mid-adolescence was not associated with psychopathic traits five years later. The stability of psychopathic traits from mid-adolescence to early adulthood and the lack of understanding of factors promoting this stability is cause for concern.

5.2.4 Predictive ability of psychopathic traits

The importance of assessing psychopathic traits was further supported by findings that the levels of these traits in mid-adolescence predicted mental health, psychosocial functioning, and antisocial/criminal behaviours five years later. Previous studies were limited to examining PCL:YV predictions of antisocial and criminal behaviour (Gretton et al., 2004; Murrie et al., 2004). However, the present study showed that the antisocial facet score predicted anxiety symptoms, more strongly among women than men. This result concurs with findings from other studies showing that both ASPD and CD are associated with elevated rates of anxiety disorders (Hodgins, De Brito, Chhabra, & Cote, 2010; Polier, Vloet, Herpertz-Dahlmann, Laurens, & Hodgins, 2012). Thus, these co-morbid disorders may be relatively long-standing by adolescence and present a challenge to clinics focused on substance misuse. The PCL:YV facet scores also predicted poor psychosocial functioning and behaviours such as dropping out of school that have long term consequences for the individual. Thus, assessment of these traits may provide additional information over and above that provided by an assessment of CD symptoms that is clinically useful. While maladaptive personality traits generally decline from mid-adolescence to early adulthood (Blonigen et al., 2006; Johnson et al., 2000; McGue, Bacon, & Lykken, 1993; Roberts et al., 2001), emerging evidence including findings from the present thesis suggests that psychopathic traits are relatively stable, and consequently will continue to be associated with anxiety, poor psychosocial functioning, and antisocial/criminal behaviours in adulthood.

5.3 METHODOLOGICAL CONSIDERATIONS

The studies composing this thesis are characterized by several strengths. One, this is a clinical sample that included both women and men who as adolescents sought treatment for substance use problems at the only clinic within a large urban centre in Sweden to offer such service. The sample was previously shown to be representative of the clinic population and the prevalence and types of mental disorders that had onset prior to substance misuse were similar to those reported in both clinical and community samples of adolescents with substance use problems in many countries. Two, gold-standard instruments were used to assess the participants and their parents administered by clinicians specifically trained to use each instrument. Further, the instruments were age appropriate, for example, the K-SAD-PL, SCID, PCL:YV, and PCL-R. Inter-rater reliabilities for the diagnoses were high. Third, extensive clinical assessments of the participants and their parents were available to examine associations between personality traits and mental disorders and to search for factors associated with scores for psychopathic traits. Four, biological measures were used to assure that interviews were not undertaken when participants were intoxicated. Five, subject attrition over five years was low, and some information was available on the ex-clients who did not participate in the five-year follow-up showing that at first contact with the clinic they presented elevated levels of antisocial and criminal behaviour and that they continued to do so throughout the follow-up period. Thus, the results of Papers III and IV may have been affected by the absence of ex-clients with high PCL scores.

Several limitations characterize the studies in the thesis. One, the sample is relatively small, thereby limiting the questions that can be addressed and the types of analyses that are undertaken. Also, the small sample size may have affected predictions of antisocial/criminal behaviour among women. The young age of the participants at follow-up may also have affected PCL-R scores, especially scores on items assessing criminal history at the five-year follow-up. Two, the estimates of the prevalence of mental disorders and criminal behaviour among parents, and most particularly among grandparents, may not have been accurate. When the adolescents first contacted the clinic many fathers refused to participate. Information about these men was obtained from their partners. Similarly, information about grandparents' problem behaviour was obtained from parents and may not be accurate, though assessments were made using a validated instrument (the FIGs: Adolfsson & Forsgren, 1998) that was designed to gather information about mental disorders among relatives. Another weakness of the studies may have been the failure to assess ADHD. However, several considerations lead to the decision not to invest heavily in diagnosing ADHD. Assessment of ADHD is difficult and time consuming. Further, much previous research has shown that ADHD is not associated with substance misuse and other forms of antisocial behaviour except when it is co-morbid with CD (Mannuzza, Klein, & Moulton, 2008; Mordre, Groholt, Kjelsberg, Sandstad, & Myhre, 2011; Satterfield et al., 2007). Four, some sub-scales of the two personality instruments, HP5i and JTIC showed low Cronbach's alphas, thereby demonstrating limited usefulness. In line with previous research, the subscale persistence (JTIC) showed low Cronbach's alpha (Asch et al., 2009). It may be that too few items are included in these sub-scales (John & Soto, 2007), or the problem may be specific to Swedish samples as similar estimates were previously reported (Jonasson, 1999). Five, the predictive ability of HP5i could not be examined. Six, the regression analyses aimed at identifying predictors of PCL-R scores in early adulthood included multiple predictors and few subjects. Most predictors were dichotomized, thereby failing to provide information on severity. Seven, no information

was available about whether treatments in the follow-up period were involuntary, under civil, or criminal court orders. Another limitation evident in Paper II was the large number of correlation analyses that increased the risk of type 1 error. A Bonferroni correction was applied in order to control for type 1 error, but when this correction is applied to small samples it may be too strict.

5.4 CLINICAL IMPLICATIONS

Findings from the present thesis have implications for the assessment of adolescents with antisocial behaviour including substance use problems and also for the training of clinical staff. The assessment of personality traits provides information about the thoughts, feelings, and behaviour of the individual which in turn have consequences for their everyday lives and, as well, for their mental health. Such information may be used to increase engagement with treatment and also to adapt treatments to the adolescents' personality.

The associations that were observed between personality traits and psychopathology highlight the importance of a valid tool to assess personality among adolescents in treatment for substance use problems. The results from Paper II are consistent with those from Papers I and IV in showing that personality traits, even psychopathy traits, are associated with symptoms of disorders. Further, given the stability of psychopathic traits shown in Paper III, screening for personality in addition to assessing mental disorders when adolescents first contact the clinic would provide information useful for tailoring treatments to adolescents' characteristics. Additionally, there is a need for interventions that focus on specific personality traits, for example, interventions that reduce impulsivity might positively impact other externalizing symptoms, while interventions that reduced negative emotions may positively impact symptoms within the internalizing spectrum.

Two measurements of personality, the HP5i and the JTCI, showed sufficient validity to be used with clinical samples of adolescents, but some scales need further refinement. Both instruments are self-assessments and easy to administer. Only the JTCI was developed for use among adolescents. Training clinicians to use information from these instruments may provide them with a better understanding of the personality profiles of the adolescents and may provide information about a developing PD.

The PCL:YV was developed to assess psychopathic traits among adolescents. While it is commonly used in criminal and forensic settings, it is not used in clinics treating adolescents for substance use problems. The results of the present studies show, however, that these adolescents present levels of psychopathic traits that are higher than those in the general population and that these traits do not change after mid-adolescence. Many studies have shown that children (Hawes & Dadds, 2007), adolescents (O'Neill et al., 2003), and adults (Roche, Shoss, Pincus, & Menard, 2011) with psychopathic traits fail to engage in and to benefit from treatment. The findings from Paper IV highlight the importance of assessing psychopathic traits among adolescents seeking treatment for substance use problems so as to isolate the factors associated with a failure to engage with treatment and to provide specific interventions aimed at reducing these factors. Additionally, psychopathic traits are associated with multiple negative outcomes again highlighting the importance of assessing these traits among adolescents with a substance use problem. Interventions are needed to attempt to reduce these traits among adolescents. The results of Paper III indicated that among

men, both aggressive behaviour and DUD may be contributing to the stability of psychopathic traits.

The PCL:YV provides a thorough assessment of psychopathic traits based on both an extensive interview and clinical and criminal files. For example, it assesses pathological lying and manipulation. Knowing about these attributes allows clinicians to better judge the usefulness of adolescents' self-reports. If levels of these and other psychopathic traits are high, scepticism on the part of clinicians may also be warranted with regard to pronouncements of future projects, including participation in treatment. Unrealistic and grandiose plans, and a lack of future goals, are specifically assessed with the PCL:YV. The assessment of psychopathic traits identifies adolescents with an increased risk for persistent antisocial behaviour in adulthood. Further, much research has shown that individuals with psychopathic traits require interventions distinct from other antisocial individuals with low, or no, psychopathic traits.

The results of Paper IV highlight the importance of the results of Papers I, II, and III by showing that psychopathic traits assessed in mid-adolescence remained stable for the next five years among both women and men who as adolescents sought treatment for a substance use problem. Since psychopathic traits remain stable, assessment in mid-adolescence remains relevant for treatment over the coming years. Thus, assessing psychopathy in mid-adolescence provides a great deal of information relevant for treatment. A number of questions emerge for future studies. Are other personality traits as stable in this period as the psychopathic traits? Are some personality traits promoting mental disorders and/or antisocial and criminal behaviours while others are limiting these behaviours?

5.5 FUTURE DIRECTIONS

Clinical services for adolescents with antisocial behaviour need to assess psychopathic traits. Studies must then determine whether the use of psychopathy trait assessments have an impact on the treatments that are provided to such adolescents, and on mental health, psychosocial, and antisocial/criminal outcomes. Additionally, studies are needed to determine whether knowledge of adolescents' psychopathic traits can be used to promote engagement in treatment.

Only prospective investigations will determine which comes first, the psychopathic traits or the symptoms of externalizing and internalizing disorders that were observed among this sample of adolescents seeking treatment for substance misuse and the manner by which the traits and symptoms interact with each other over time. Given the associations between these traits and symptoms of disorders in mid-adolescence that were observed in Paper I, the stability of psychopathic traits shown in Paper III, and the associations of these traits with mental health, psychosocial and antisocial/criminal outcomes in early adulthood shown in Paper IV, prospective studies, beginning in early childhood, are needed to further understanding of the interplay between psychopathic traits and the development of externalizing and internalizing disorders. Does the early onset pattern of aggressive and antisocial behaviour promote these traits or vice-versa?

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7 REFERENCES

- Achenbach, T. M. (1991). *Manual for the Child Behavior Checklist/4-18 and 1991 profiles*. Burlington: University of Vermont, Department of Psychiatry.
- Achenbach, T. M., & Rescorla, L. A. (2001). *Manual for the ASEBA School-age forms & profiles*. Burlington VT: University of Vermont, Reserach center for children, youth, & families.
- Adolfsson, R., & Forsgren, T. (1998). *DIGS och FIGS Strukturerad psykiatrisk diagnostik intervju för patienter och anhöriga*. Umeå: UmU Tryckeri.
- Andershed, H. (2003). *The Child Fearlessness Scale (CFS)* Örebro: Center for developmental research. Örebro University.
- Andershed, H., Kerr, M., Stattin, H., & Levander, S. (2002). Psychopathic traits in non-referred youths: Initial test of a new assessment tool. In E. Blaauw & L. Sheridan (Eds.), *Psychopaths: Current international perspectives* (pp. 131-158). The Hague, the Netherlands: Elsevier.
- Anderson, K. G., Tapert, S. F., Moadab, I., Crowley, T. J., & Brown, S. A. (2007). Personality risk profile for conduct disorder and substance use disorders in youth. *Addictive Behaviors* (32), 2377-2382.
- Armstrong, T. D., & Costello, E. J. (2002). Community studies on adolescent substance use, abuse, or dependence and psychiatric comorbidity. *Journal of Consulting and Clinical Psychology*, 70(6), 1224-1239.
- Asch, M., Cortese, S., Perez Diaz, F., Pelissolo, A., Aubron, V., Orejarena, S., . . . Purper-Ouakil, D. (2009). Psychometric properties of a French version of the junior temperament and character inventory. *European Child and Adolescent Psychiatry*, 18(3), 144-153. doi: 10.1007/s00787-008-0713-9
- Bailey, J. A., Hill, K. G., Oesterle, S., & Hawkins, J. D. (2006). Linking substance use and problem behavior across three generations. *Journal of Abnormal Child Psychology*, 34(3), 263-292. doi: 10.1007/s10802-006-9033-z
- Barnow, S., Ulrich, I., Grabe, H. J., Freyberger, H. J., & Spitzer, C. (2007). The influence of parental drinking behaviour and antisocial personality disorder on adolescent behavioural problems: results of the Greifswalder Family Study. *Alcohol and Alcoholism*, 42(6), 623-628. doi: 10.1093/alc/alg051
- Barry, C. T., Frick, P. J., DeShazo, T. M., McCoy, M. G., Ellis, M., & Loney, B. R. (2000). The importance of callous-unemotional traits for extending the concept of psychopathy to children. *Journal of Abnormal Psychology*, 109(2), 335-340.
- Barry, T. D., Barry, C. T., Deming, A. M., & Lochman, J. E. (2008). Stability of psychopathic characteristics in childhood - The influence of social relationships. *Criminal Justice and Behavior*, 35(2), 244-262. doi: 10.1177/0093854807310508
- Blair, R. J., Morris, J. S., Frith, C. D., Perrett, D. I., & Dolan, R. J. (1999). Dissociable neural responses to facial expressions of sadness and anger. *Brain*, 122 (Pt 5), 883-893.
- Blair, R. J. R., Peschardt, K. S., Budhani, S., Mitchell, D. G. V., & Pine, D. S. (2006). The development of psychopathy. *Journal of Child Psychology and Psychiatry*, 47(3-4), 262-275. doi: 10.1111/j.1469-7610.2006.01596.x
- 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. doi: 10.1037/0021-943x.115.1.85
- Borum, R., Bartel, P. A., & Forth, A. E. (2002). *Manual for the Structured Assessment of Violence Risk in Youth (SAVRY). Consultation edition, Version 1*: University of South Florida.
- Brendgen, M., Boivin, M., Vitaro, F., Girard, A., Dionne, G., & Perusse, D. (2008). Gene-environment interaction between peer victimization and child aggression. *Development and Psychopathology*, 20(2), 455-471. doi: 10.1017/S0954579408000229
- Brestan, E. V., & Eyberg, S. M. (1998). Effective psychosocial treatments of conduct-disordered children and adolescents: 29 years, 82 studies, and 5,272 kids. *Journal of Clinical Child Psychology*, 27(2), 180-189. doi: 10.1207/s15374424jccp2702_5
- Burke, J. D., Loeber, R., & Lahey, B. B. (2007). Adolescent conduct disorder and interpersonal callousness as predictors of psychopathy in young adults. *Journal of Clinical Child and Adolescent Psychology*, 36(3), 334-346.
- Cale, E. M., & Lilienfeld, S. O. (2002). Sex differences in psychopathy and antisocial personality disorder. A review and integration. *Clinical Psychology Review*, 22(8), 1179-1207.
- Campbell, M. A., Porter, S., & Santor, D. (2004). Psychopathic traits in adolescent offenders: an evaluation of criminal history, clinical, and psychosocial correlates. *Behavioral Sciences & the Law*, 22(1), 23-47. doi: 10.1002/bsl.572
- Caspi, A., Harrington, H., Milne, B., Amell, J. W., Theodore, R. F., & Moffitt, T. E. (2003). Children's behavioral styles at age 3 are linked to their adult personality traits at age 26. *Journal of Personality*, 71(4), 495-513.
- Caspi, A., Roberts, B. W., & Shiner, R. L. (2005). Personality development: stability and change. *Annual Review of Psychology*, 56, 453-484. doi: 10.1146/annurev.psych.55.090902.141913
- Cho, S. C., Jung, S. W., Kim, B. N., Hwang, J. W., Shin, M. S., Kim, J. W., . . . Kim, H. W. (2009). Temperament and character among Korean children and adolescents with anxiety disorders. *European Child and Adolescent Psychiatry*, 18(1), 60-64. doi: 10.1007/s00787-008-0699-3
- Christensen, L., & Mendoza, J. L. (1986). A method of assessing change in a single subject: An alteration of the RC index. *Behavior Therapy* (17), 305-308.
- Clark, L. A., Watson, D., & Mineka, S. (1994). Temperament, personality, and the mood and anxiety disorders. *Journal of Abnormal Psychology*, 103(1), 103-116.
- Cleckley, H. (1941). *The mask of sanity: an attempt to reinterpret the so-called psychopathic personality*. St. Louis, MO: C.V. Mosby.
- Cloninger, C. R., Przybeck, T. R., Svrakic, D. M., & Wetzel, R. D. (1994). *The Temperament and Character inventory (TCI): a guide to its development and use*. St. Louis: Washington University Centre for Psychobiology of Personality.
- Cloninger, C. R., Svrakic, D. M., & Przybeck, T. R. (2006). Can personality assessment predict future depression? A twelve-month follow-up of 631 subjects. *Journal of Affective Disorders*, 92(1), 35-44. doi: 10.1016/j.jad.2005.12.034
- Cooke, D. J., & Michie, C. (2001). Refining the construct of psychopathy: towards a hierarchical model. *Psychological Assessment*, 13(2), 171-188.
- Copeland, W., Landry, K., Stanger, C., & Hudziak, J. J. (2004). Multi-informant assessment of temperament in children with externalizing behavior problems.

- Journal of Clinical Child and Adolescent Psychology*, 33(3), 547-556. doi: 10.1207/s15374424jccp3303_12
- Costa, P. T., & McCrae, R. R. (1992). *NEO-PI-R Revised NEO Personality Inventory (NEO PI-R) and NEO Five-Factor Inventory (NEO-FFI)*. Florida: Psychological Assessment Resources Inc.
- Couwenbergh, C., van den Brink, W., Zwart, K., Vreugdenhil, C., van Wijngaarden-Cremers, P., & van der Gaag, R. J. (2006). Comorbid psychopathology in adolescents and young adults treated for substance use disorders: a review. *European Child and Adolescent Psychiatry*, 15(6), 319-328. doi: 10.1007/s00787-006-0535-6
- Crawford, T. N., Cohen, P., First, M. B., Skodol, A. E., Johnson, J. G., & Kasen, S. (2008). Comorbid Axis I and Axis II disorders in early adolescence: outcomes 20 years later. *Archives of General Psychiatry*, 65(6), 641-648. doi: 10.1001/archpsyc.65.6.641
- Dadds, M. R., Fraser, J., Frost, A., & Hawes, D. J. (2005). Disentangling the underlying dimensions of psychopathy and conduct problems in childhood: A community study. *Journal of Consulting and Clinical Psychology*, 73(3), 400-410. doi: 10.1037/0022-006x.73.3.400
- 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. doi: 10.1192/bjp.bp.105.018150
- Diagnostic and statistical manual of mental disorders*. (1995). Washington, DC: American Psychiatric Press.
- Digman, J. M. (1990). Personality Structure: Emergence of the five-factor model. *Annual Review of Psychology*(41), 417-440.
- Dolan, M. C., & Rennie, C. E. (2007). Is juvenile psychopathy associated with low anxiety and fear in conduct-disordered male offenders? *Journal of Anxiety Disorders*, 21(8), 1028-1038. doi: 10.1016/j.janxdis.2006.11.008
- Edens, J. F., Campbell, J. S., & Weir, J. M. (2007). Youth psychopathy and criminal recidivism: a meta-analysis of the psychopathy checklist measures. *Law and Human Behaviour*, 31(1), 53-75. doi: 10.1007/s10979-006-9019-y
- Enebrink, P., Andershed, H., & Langstrom, N. (2005). Callous-unemotional traits are associated with clinical severity in referred boys with conduct problems. *Nordic Journal of Psychiatry*, 59(6), 431-440. doi: 10.1080/08039480500360690
- ESPAD (2012). The 2011 ESPAD Report - substance use among students in 36 European countries. (2012). In B. Hibell, U. Guttormsson, S. Ahlström, O. Balakireva, T. Bjarnason, A. Kokkeri & L. Kraus (Eds.). Stockholm: The European School Survey Project on Alcohol and Other Drugs (ESPAD). The Swedish Council for information on alcohol and other drugs (CAN).
- Farrington, D. P. (2005). The importance of child and adolescent psychopathy. *Journal of Abnormal Child Psychology*, 33(4), 489-497.
- First, M. B., Gibbon, M., Spitzer, R. L., Williams, J. B. W., & Benjamin, L. S. (1997). *User's Guide for the Structured Clinical Interview for DSM-IV axis II Personality Disorders*. Washington DC: American Psychiatric Press.
- First, M. B., Spitzer, R. L., Gibbon, M., & Williams, J. B. W. (1997). *User's Guide for the Structured Clinical Interview for DSM-IV axis I Disorders - Clinical version (SCID-CV)*. Washington DC: American Psychiatric Press.

- Forsman, M., Lichtenstein, P., Andershed, H., & Larsson, H. (2008). Genetic effects explain the stability of psychopathic personality from mid- to late adolescence. *Journal of Abnormal Psychology, 117*(3), 606-617. doi: 10.1037/0021-843X.117.3.606
- Forth, A. E., Brown, S. L., Hart, S. D., & Hare, R. D. (1996). The assessment of psychopathy in male and female noncriminals: reliability and validity. *Personality and Individual Differences, 20*(20), 531-543.
- Forth, A. E., Kosson, D. S., & Hare, R. D. (2003). *Hare Psychopathy Checklist: Youth Version (PCL:YV): Technical manual*. Toronto, Canada: Multi-Health Systems.
- Freedman, D., Thornton, A., Camburn, D., Alwin, D., & Young-demarco, L. (1988). The life history calendar: a technique for collecting retrospective data. *Sociological Methodology, 18*, 37-68.
- Frick, P. J. (2009). Extending the construct of psychopathy to youth: implications for understanding, diagnosing, and treating antisocial children and adolescents. *Canadian Journal of Psychiatry, 54*(12), 803-812.
- Frick, P. J., & Hare, R. D. (2001). *Antisocial process screening device*. Toronto, Canada: Multi-health systems.
- Frick, P. J., Kimonis, E. R., Dandreaux, D. M., & Farell, J. M. (2003). The 4 year stability of psychopathic traits in non-referred youth. *Behavioral Sciences & the Law, 21*(6), 713-736. doi: 10.1002/Bsl.568
- 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. doi: 10.1111/j.1469-7610.2007.01862.x
- Frick, P. J., & Viding, E. (2009). Antisocial behavior from a developmental psychopathology perspective. *Development and Psychopathology, 21*(4), 1111-1131. doi: 10.1017/S0954579409990071
- Gaughan, E. T., Miller, J. D., & Lynam, D. R. (2012). Examining the utility of general models of personality in the study of psychopathy: a comparison of the HEXACO-PI-R and NEO PI-R. *Journal of Personality Disorders, 26*(4), 513-523. doi: 10.1521/pedi.2012.26.4.513
- Gothelf, D., Aharonovsky, O., Horesh, N., Carty, T., & Apter, A. (2004). Life events and personality factors in children and adolescents with obsessive-compulsive disorder and other anxiety disorders. *Comprehensive Psychiatry, 45*(3), 192-198. doi: 10.1016/j.comppsy.2004.02.010
- Gretton, H. M., Hare, R. D., & Catchpole, R. E. (2004). Psychopathy and offending from adolescence to adulthood: a 10-year follow-up. *Journal of Consulting and Clinical Psychology, 72*(4), 636-645. doi: 10.1037/0022-006X.72.4.636
- Gretton, H. M., McBride, M., Lewis, K., O'Shaughnessy, R., & Hare, R. D. (1994). Predicting patterns of criminal activity in adolescent sexual psychopaths. *Canadian Psychology, 35*(50).
- Gunnarsson, M., Gustavsson, J. P., Tengstrom, A., Franck, J., & Fahlke, C. (2008). Personality traits and their associations with substance use among adolescents. *Personality and Individual Differences, 45*(5), 356-360. doi: 10.1016/j.paid.2008.05.004
- Gustavsson, J. P., Eriksson, A. K., Hilding, A., Gunnarsson, M., & Ostensson, C. G. (2008). Measurement invariance of personality traits from a five-factor model perspective: multi-group confirmatory factor analyses of the HP5 inventory.

- Scandinavian Journal of Psychology*, 49(5), 459-467. doi: 10.1111/j.1467-9450.2008.00654.x
- Gustavsson, J. P., Jonsson, E. G., Linder, J., & Weinryb, R. M. (2003). The HP5 inventory: definition and assessment of five health-relevant personality traits from a five-factor model perspective. *Personality and Individual Differences*, 35(1), 69-89.
- Hare, R. D. (1980). A research scale for the assessment of psychopathy in criminal populations. *Personality and Individual Differences* (1), 111-119.
- Hare, R. D. (1993). *Without Conscience: The Disturbing World of the Psychopaths Among Us*. New York: Simon & Schuster.
- Hare, R. D. (2003). *The Hare psychopathy checklist - revised* (2nd ed.). Toronto, Canada: Multi-Health Systems.
- Harrington, R. C. (2001). Childhood depression and conduct disorder: different routes to the same outcome? *Archives of General Psychiatry*, 58(3), 237-238.
- Harvey, P. D., Stokes, J. L., Lord, J., & Pogge, D. L. (1996). Neurocognitive and personality assessment of adolescent substance abusers: A multidimensional approach. *Assessment* (3), 241-253.
- Hawes, D. J., & Dadds, M. R. (2005). The treatment of conduct problems in children with callous-unemotional traits. *Journal of Consulting and Clinical Psychology*, 73(4), 737-741. doi: 10.1037/0022-006X.73.4.737
- 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. doi: 10.1080/15374410701444298
- Hodgins, S., De Brito, S. A., Chhabra, P., & Cote, G. (2010). Anxiety disorders among offenders with antisocial personality disorders: a distinct subtype? *Canadian Journal of Psychiatry*, 55(12), 784-791.
- Hodgins, S., Larm, P., Ellenbogen, M., Vitaro, F., & Tremblay, R. E. (2013). Teachers' ratings of childhood behaviours predict adolescent and adult crime among 3016 males and females. *Canadian Journal of Psychiatry-Revue Canadienne De Psychiatrie*, 58(3).
- Hodgins, S., Larm, P., Molero-Samuleson, Y., Tengstrom, A., & Larsson, A. (2009). Multiple adverse outcomes over 30 years following adolescent substance misuse treatment. *Acta Psychiatrica Scandinavica*, 119(6), 484-493. doi: 10.1111/j.1600-0447.2008.01327.x
- Hodgins, S., Tengstrom, A., Bylin, S., Goranson, M., Hagen, L., Janson, M., . . . Pedersen, H. (2007). Consulting for substance abuse: mental disorders among adolescents and their parents. *Nordic Journal of Psychiatry*, 61(5), 379-386. doi: 10.1080/08039480701643423
- Hussong, A. M., Wirth, R. J., Edwards, M. C., Curran, P. J., Chassin, L. A., & Zucker, R. A. (2007). Externalizing symptoms among children of alcoholic parents: Entry points for an antisocial pathway to alcoholism. *Journal of Abnormal Psychology*, 116(3), 529-542. doi: 10.1037/0021-843X.116.3.529
- Jacobson, N. S., & Truax, P. (1991). Clinical-Significance - a Statistical Approach to Defining Meaningful Change in Psychotherapy-Research. *Journal of Consulting and Clinical Psychology*, 59(1), 12-19.

- John, O. P., & Soto, C. J. (2007). The importance of being valid. In R. W. Robins, Fraley, R.C., Krueger, R.F. (Ed.), *Handbook of research methods in personality psychology* (pp. 461-494). New York: Guilford Press.
- Johnson, J. G., Cohen, P., Kasen, S., Skodol, A. E., Hamagami, F., & Brook, J. S. (2000). Age-related change in personality disorder trait levels between early adolescence and adulthood: a community-based longitudinal investigation. *Acta Psychiatrica Scandinavica*, *102*(4), 265-275.
- Jonasson, M. (1999). Personlighetsutveckling hos ungdomar - en svensk nominering av JTCI. (Development of personality in adolescents - a Swedish stadradization of JTCI). Umeå, Sweden: Umeå Univerisity.
- Jones, S., Cauffman, E., Miller, J. D., & Mulvey, E. (2006). Investigating different factor structures of the psychopathy checklist: youth version: confirmatory factor analytic findings. *Psychological Assessement*, *18*(1), 33-48. doi: 10.1037/1040-3590.18.1.33
- Kasen, S., Cohen, P., Skodol, A. E., Johnson, J. G., Smailes, E., & Brook, J. S. (2001). Childhood depression and adult personality disorder: alternative pathways of continuity. *Archives of General Psychiatry*, *58*(3), 231-236.
- Kaufman, J., Birmaher, B., Brent, D. A., Rao, U., Flynn, C., Moreci, P., . . . Ryan, N. (1997). Schedule for affective disorders and schizophrenia for school-age children - present and lifetime version (K-SADS-PL): Initial reliability and validity data. *Journal of the American Academy of Child and Adolescent Psychiatry*, *36*, 980-988.
- Kerekes, N., Brandstrom, S., Stahlberg, O., Larson, T., Carlstrom, E., Lichtenstein, P., . . . Nilsson, T. (2010). The Swedish version of the parent-rated Junior Temperament and Character Inventory (J-TCI). *Psychological Reports*, *107*(3), 715-725.
- Kim, S. J., Lee, S. J., Yune, S. K., Sung, Y. H., Bae, S. C., Chung, A., . . . Lyoo, I. K. (2006). The relationship between the biogenetic temperament and character and psychopathology in adolescents. *Psychopathology*, *39*(2), 80-86. doi: 10.1159/000090597
- Kosson, D. S., Cyterski, T. D., Steuerwald, B. L., Neumann, C. S., & Walker-Matthews, S. (2002). The reliability and validity of the psychopathy checklist: youth version (PCL:YV) in nonincarcerated adolescent males. *Psychological Assessment*, *14*(1), 97-109.
- Kraepelin, É. (1915). *Psychiatire: Ein lehrbuch*. Leipzig: Barth.
- Krueger, R. F., & Markon, K. E. (2006). Reinterpreting comorbidity: a model-based approach to understanding and classifying psychopathology. *Annual Review of Clinical Psychology*, *2*, 111-133. doi: 10.1146/annurev.clinpsy.2.022305.095213
- Krueger, R. F., Markon, K. E., Patrick, C. J., & Iacono, W. G. (2005). Externalizing psychopathology in adulthood: a dimensional-spectrum conceptualization and its implications for DSM-V. *Journal of Abnormal Psychology*, *114*(4), 537-550. doi: 10.1037/0021-843X.114.4.537
- Lahey, B. B. (2004). Commentary: Role of temperament in developmental models of psychopathology. *Journal of Clinical Child and Adolescent Psychology*, *33*(1), 88-93.

- Lawing, K., Frick, P. J., & Cruise, K. R. (2010). Differences in offending patterns between adolescent sex offenders high or low in callous-unemotional traits. *Psychological Assessment, 22*(2), 298-305. doi: 10.1037/a0018707
- Lee, Z., Klaver, J. R., Hart, S. D., Moretti, M. M., & Douglas, K. S. (2009). Short-Term Stability of Psychopathic Traits in Adolescent Offenders. *Journal of Clinical Child and Adolescent Psychology, 38*(5), 595-605. doi: 10.1080/15374410903103536
- Loeber, R., Farrington, D. P., Stouthamer-Loeber, M., Moffitt, T. E., Caspi, A., & Lynam, D. (2001). Male mental health problems, psychopathy, and personality traits: key findings from the first 14 years of the Pittsburgh Youth Study. *Clinical Child and Family Psychology Review, 4*(4), 273-297.
- Loney, B. R., Huntenburg, A., Counts-Allan, C., & Schmeelk, K. M. (2007). A preliminary examination of the intergenerational continuity of maternal psychopathic features. *Aggressive Behavior, 33*(1), 14-25. doi: 10.1002/Ab.20163
- Loney, B. R., Taylor, J., Butler, M. A., & Iacono, W. G. (2007). Adolescent psychopathy features: 6-year temporal stability and the prediction of externalizing symptoms during the transition to adulthood. *Aggressive Behavior, 33*(3), 242-252. doi: 10.1002/ab.20184
- Luby, J. L., Svrakic, D. M., McCallum, K., Przybeck, T. R., & Cloninger, C. R. (1999). The Junior Temperament and Character Inventory: preliminary validation of a child self-report measure. *Psychological Reports, 84*(3 Pt 2), 1127-1138.
- Lynam, D. R. (1996). Early identification of chronic offenders: who is the fledgling psychopath? *Psychological Bulletin, 120*(2), 209-234.
- Lynam, D. R. (1997). Pursuing the psychopath: capturing the fledgling psychopath in a nomological net. *Journal of Abnormal Psychology, 106*(3), 425-438.
- 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 Psychology, 116*(1), 155-165. doi: 10.1037/0021-843X.116.1.155
- Lynam, D. R., Charnigo, R., Moffitt, T. E., Raine, A., Loeber, R., & Stouthamer-Loeber, M. (2009). The stability of psychopathy across adolescence. *Development and Psychopathology, 21*(4), 1133-1153. doi: 10.1017/S0954579409990083
- Lynam, D. R., & Gudonis, L. (2005). The development of psychopathy. *Annual Review of Clinical Psychology, 1*, 381-407. doi: 10.1146/annurev.clinpsy.1.102803.144019
- Lynam, D. R., Loeber, R., & Stouthamer-Loeber, M. (2008). The stability of psychopathy from adolescence into adulthood: The Search for Moderators. *Criminal Justice and Behavior, 35*(2), 228-243.
- Lyoo, I. K., Han, C. H., Lee, S. J., Yune, S. K., Ha, J. H., Chung, S. J., . . . Hong, K. E. (2004). The reliability and validity of the junior temperament and character inventory. *Comprehensive Psychiatry, 45*(2), 121-128. doi: 10.1016/j.comppsy.2003.12.002
- Mailloux, D. L., Forth, A. E., & Kroner, D. G. (1997). Psychopathy and substance use in adolescent male offenders. *Psychological Reports, 81*(2), 529-530.
- Mannuzza, S., Klein, R. G., & Moulton, J. L., 3rd. (2008). Lifetime criminality among boys with attention deficit hyperactivity disorder: a prospective follow-up study

- into adulthood using official arrest records. *Psychiatry Research*, *160*(3), 237-246. doi: 10.1016/j.psychres.2007.11.003
- Marsee, M. A., Silverthorn, P., & Frick, P. J. (2005). The association of psychopathic traits with aggression and delinquency in non-referred boys and girls. *Behavioral Sciences & the Law*, *23*(6), 803-817. doi: 10.1002/bsl.662
- McGowan, P. O., Sasaki, A., D'Alessio, A. C., Dymov, S., Labonte, B., Szyf, M., . . . Meaney, M. J. (2009). Epigenetic regulation of the glucocorticoid receptor in human brain associates with childhood abuse. *Nature Neuroscience*, *12*(3), 342-348. doi: 10.1038/nn.2270
- McGue, M., Bacon, S., & Lykken, D. T. (1993). Personality stability and change in early adulthood: a behavioral genetic analysis. *Developmental Psychology*, *29*(1), 96-109.
- Merenakk, L., Harro, M., Kiive, E., Laidra, K., Eensoo, D., Allik, J., . . . Harro, J. (2003). Association between substance use, personality traits, and platelet MAO activity in preadolescents and adolescents. *Addictive Behaviors*, *28*(8), 1507-1514.
- Moeller, A. A., & Hell, D. (2003). Affective disorder and 'psychopathy' in a sample of younger male delinquents. *Acta Psychiatrica Scandinavica*, *107*(3), 203-207.
- Moffitt, T. E. (1993). Adolescence-limited and life-course-persistent antisocial behavior: a developmental taxonomy. *Psychological Review*, *100*(4), 674-701.
- 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. doi: 10.1186/1471-244X-11-57
- Mroczek, D. K. (2007). The Analysis of Longitudinal Data in Personality Research. In R. W. Robins, R. C. Fraley & R. F. Krueger (Eds.), *Handbook of research methods in personality psychology* (pp. 543-556). New York: The Guilford press.
- Munoz, L. C., Kerr, M., & Besic, N. (2008). The peer relationships of youths with psychopathic personality traits - A matter of perspective. *Criminal Justice and Behavior*, *35*(2), 212-227. doi: 10.1177/0093854807310159
- Murrie, D. C., & Cornell, D. G. (2000). The Millon adolescent clinical inventory and psychopathy. *Journal of Personality Assessment*, *75*(1), 110-125. doi: 10.1207/S15327752JPA7501_8
- Murrie, D. C., Cornell, D. G., Kaplan, S., McConville, D., & Levy-Elkon, A. (2004). Psychopathy scores and violence among juvenile offenders: a multi-measure study. *Behavioral Sciences & the Law*, *22*(1), 49-67. doi: 10.1002/bsl.573
- Myers, W. C., Burket, R. C., & Harris, H. E. (1995). Adolescent psychopathy in relation to delinquent behaviors, conduct disorder, and personality disorders. *Journal of Forensic Science*, *40*(3), 435-439.
- O'Neill, M. L., Lidz, V., & Heilbrun, K. (2003). Adolescents with psychopathic characteristics in a substance abusing cohort: treatment process and outcomes. *Law and Human Behavior*, *27*(3), 299-313.
- Oxford, M., Cavell, T. A., & Hughes, J. N. (2003). Callous/unemotional traits moderate the relation between ineffective parenting and child externalizing problems: a partial replication and extension. *Journal of Clinical Child and Adolescent Psychology*, *32*(4), 577-585. doi: 10.1207/S15374424JCCP3204_10

- Pardini, D. A., Lochman, J. E., & Powell, N. (2007). The development of callous-unemotional traits and antisocial behavior in children: Are there shared and/or unique predictors? *Journal of Clinical Child and Adolescent Psychology, 36*(3), 319-333.
- Pardini, D. A., & Loeber, R. (2008). Interpersonal callousness trajectories across adolescence - Early social influences and adult outcomes. *Criminal Justice and Behavior, 35*(2), 173-196. doi: 10.1177/0093854807310157
- Pasalich, D. S., Dadds, M. R., Vincent, L. C., Cooper, F. A., Hawes, D. J., & Brennan, J. (2012). Emotional communication in families of conduct problem children with high versus low callous-unemotional traits. *Journal of Clinical Child and Adolescent Psychology, 41*(3), 302-313. doi: 10.1080/15374416.2012.668844
- Penney, S. R., & Moretti, M. M. (2007). The relation of psychopathy to concurrent aggression and antisocial behavior in high-risk adolescent girls and boys. *Behavioral Sciences & the Law, 25*(1), 21-41. doi: 10.1002/bsl.715
- Pinel, P. (1962). *A treatise on insanity*. New York: Hafner.
- Polier, G. G., Vloet, T. D., Herpertz-Dahlmann, B., Laurens, K. R., & Hodgins, S. (2012). Comorbidity of conduct disorder symptoms and internalising problems in children: investigating a community and a clinical sample. *European Child and Adolescent Psychiatry, 21*(1), 31-38. doi: 10.1007/s00787-011-0229-6
- Rettew, D. C., Copeland, W., Stanger, C., & Hudziak, J. J. (2004). Associations between temperament and DSM-IV externalizing disorders in children and adolescents. *Journal of Developmental and Behavioral Pediatrics, 25*(6), 383-391.
- Roberts, B. W., Caspi, A., & Moffitt, T. E. (2001). The kids are alright: growth and stability in personality development from adolescence to adulthood. *Journal of Personality and Social Psychology, 81*(4), 670-683.
- Roberts, B. W., & DelVecchio, W. F. (2000). The rank-order consistency of personality traits from childhood to old age: a quantitative review of longitudinal studies. *Psychological Bulletin, 126*(1), 3-25.
- Roberts, B. W., Walton, K. E., & Viechtbauer, W. (2006). Patterns of mean-level change in personality traits across the life course: a meta-analysis of longitudinal studies. *Psychological Bulletin, 132*(1), 1-25. doi: 10.1037/0033-2909.132.1.1
- Roberts, B. W., Wood, D., & Caspi, A. (2008). The Development of Personality Traits in Adulthood. In O. P. John, R. W. Robins & L. A. Pervin (Eds.), *Handbook of Personality* (pp. 375-398). New York: The Guilford Press.
- Roche, M. J., Shoss, N. E., Pincus, A. L., & Menard, K. S. (2011). Psychopathy moderates the relationship between time in treatment and levels of empathy in incarcerated male sexual offenders. *Sex Abuse, 23*(2), 171-192. doi: 10.1177/1079063211403161
- Ruiz, M. A., Pincus, A. L., & Dickinson, K. A. (2003). NEO PI-R predictors of alcohol use and alcohol-related problems. *Journal of Personality Assessment, 81*(3), 226-236. doi: 10.1207/S15327752JPA8103_05
- Ruiz, M. A., Pincus, A. L., & Schinka, J. A. (2008). Externalizing pathology and the five-factor model: a meta-analysis of personality traits associated with antisocial personality disorder, substance use disorder, and their co-occurrence. *Journal of Personality Disorder, 22*(4), 365-388. doi: 10.1521/pedi.2008.22.4.365

- Rutter, M. (2012). Psychopathy in childhood: is it a meaningful diagnosis? *British Journal of Psychiatry*, *200*(3), 175-176. doi: 10.1192/bjp.bp.111.092072
- Rutter, M., Moffitt, T. E., & Caspi, A. (2006). Gene-environment interplay and psychopathology: multiple varieties but real effects. *Journal of Child Psychology and Psychiatry*, *47*(3-4), 226-261. doi: 10.1111/j.1469-7610.2005.01557.x
- Salekin, R. T., & Frick, P. J. (2005). Psychopathy in children and adolescents: the need for a developmental perspective. *Journal of Abnormal Child Psychology*, *33*(4), 403-409.
- Salekin, R. T., Leistico, A. M., Neumann, C. S., DiCicco, T. M., & Duros, R. L. (2004). Psychopathy and comorbidity in a young offender sample: taking a closer look at psychopathy's potential importance over disruptive behavior disorders. *Journal of Abnormal Psychology*, *113*(3), 416-427. doi: 10.1037/0021-843X.113.3.416
- Salekin, R. T., Rogers, R., & Machin, D. (2000). Psychopathy in youth: pursuing diagnostic clarity. *Journal of Youth and Adolescence* (30), 173-195.
- Salekin, R. T., Worley, C., & Grimes, R. D. (2010). Treatment of Psychopathy: A Review and Brief Introduction to the Mental Model Approach for Psychopathy. *Behavioral Sciences & the Law*, *28*(2), 235-266. doi: 10.1002/Bsl.928
- Satterfield, J. H., Faller, K. J., Crinella, F. M., Schell, A. M., Swanson, J. M., & Homer, L. D. (2007). A 30-year prospective follow-up study of hyperactive boys with conduct problems: adult criminality. *Journal of American Academy of Child and Adolescent Psychiatry*, *46*(5), 601-610. doi: 10.1097/chi.0b013e318033ff59
- Schmeck, K., Goth, K., Poustka, F., & Cloninger, R. C. (2001). Reliability and validity of the Junior Temperament and Character Inventory. *International Journal of Methods in Psychiatric Research*, *10*(4), 172-182. doi: 10.1002/mpr.113
- Schmeck, K., & Poustka, F. (2001). Temperament and disruptive behavior disorders. *Psychopathology*, *34*(3), 159-163.
- Schmidt, F., McKinnon, L., Chattha, H. K., & Brownlee, K. (2006). Concurrent and predictive validity of the psychopathy checklist: youth version across gender and ethnicity. *Psychological Assessment*, *18*(4), 393-401. doi: 10.1037/1040-3590.18.4.393
- Schrum, C. L., & Salekin, R. T. (2006). Psychopathy in adolescent female offenders: an item response theory analysis of the psychopathy checklist: youth version. *Behavioral Sciences & the Law*, *24*(1), 39-63. doi: 10.1002/bsl.679
- Scott, K. M., McLaughlin, K. A., Smith, D. A., & Ellis, P. M. (2012). Childhood maltreatment and DSM-IV adult mental disorders: comparison of prospective and retrospective findings. *British Journal of Psychiatry*, *200*(6), 469-475. doi: 10.1192/bjp.bp.111.103267
- Sevecke, K., Kosson, D. S., & Krischer, M. K. (2009). The Relationship Between Attention Deficit Hyperactivity Disorder, Conduct Disorder, and Psychopathy in Adolescent Male and Female Detainees. *Behavioral Sciences & the Law*, *27*(4), 577-598. doi: 10.1002/Bsl.870
- Silva, T. C., Larm, P., Vitaro, F., Tremblay, R. E., & Hodgins, S. (2012). The association between maltreatment in childhood and criminal convictions to age 24: a prospective study of a community sample of males from disadvantaged neighbourhoods. *European Child and Adolescent Psychiatry*, *21*(7), 403-413. doi: 10.1007/s00787-012-0281-x

- Skeem, J. L., & Cooke, D. J. (2010). Is criminal behavior a central component of psychopathy? Conceptual directions for resolving the debate. *Psychological Assessment, 22*(2), 433-445. doi: 10.1037/a0008512
- Smith, C. A., & Farrington, D. P. (2004). Continuities in antisocial behavior and parenting across three generations. *Journal of Child Psychology and Psychiatry, 45*(2), 230-247.
- Stalenheim, E. G., & von Knorring, L. (1996). Psychopathy and Axis I and Axis II psychiatric disorders in a forensic psychiatric population in Sweden. *Acta Psychiatrica Scandinavica, 94*(4), 217-223.
- Stattin, H., & Kerr, M. (2000). Parental monitoring: a reinterpretation. *Child Development, 71*(4), 1072-1085.
- Steadman, H. J., Mulvey, E. P., Monahan, J., Robbins, P. C., Appelbaum, P. S., Grisso, T., . . . Silver, E. (1998). Violence by people discharged from acute psychiatric inpatient facilities and by others in the same neighborhoods. *Archives of General Psychiatry, 55*(5), 393-401.
- Straus, M. A., Hamby, S. L., Boney-McCoy, S., & Sugarman, D. B. (1996). The Revised Conflict Tactic Scales (CTS2): Development & Preliminary Psychometric Data. *Journal of Family Issues (17)*. doi: 10.1177/019251396017003001
- Tackett, J. L. (2006). Evaluating models of the personality-psychopathology relationship in children and adolescents. *Clinical Psychological Review, 26*(5), 584-599. doi: 10.1016/j.cpr.2006.04.003
- Terracciano, A., McCrae, R. R., & Costa, P. T. (2010). Intra-individual change in personality stability and age. *Journal of Research in Personality, 44*(1), 31-37. doi: 10.1016/j.jrp.2009.09.006
- Wechsler, D. (2003). *Wechsler Intelligence Scale for Children* (4th ed.). San Antonio, TX: The Psychological Corporation.
- Wechsler, D. (2008). *Wechsler Adult Intelligence Scale - Fourth Edition*. San Antonio, TX: Pearson.
- Widiger, T. A., & Smith, G. T. (2008). Personality and Psychopathology. In O. P. John, R. W. Robins & L. A. Pervin (Eds.), (pp. 743-769). New York: The Guilford Press.
- Viding, E., Blair, R. J., 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. doi: 10.1111/j.1469-7610.2004.00393.x
- Viding, E., Jones, A. P., Frick, P. J., Moffitt, T. E., & Plomin, R. (2008). Heritability of antisocial behaviour at 9: do callous-unemotional traits matter? *Developmental Science, 11*(1), 17-22. doi: 10.1111/j.1467-7687.2007.00648.x
- Widom, C. S. (1989). Child abuse, neglect, and adult behavior: research design and findings on criminality, violence, and child abuse. *American Journal of Orthopsychiatry, 59*(3), 355-367.
- Vincent, G. M., Odgers, C. L., McCormick, A. V., & Corrado, R. R. (2008). The PCL: YV and recidivism in male and female juveniles: a follow-up into young adulthood. *International Journal of Law and Psychiatry, 31*(3), 287-296. doi: 10.1016/j.ijlp.2008.04.012
- Vincent, G. M., Vitacco, M. J., Grisso, T., & Corrado, R. R. (2003). Subtypes of adolescent offenders: affective traits and antisocial behavior patterns. *Behavioral Sciences & the Law, 21*(6), 695-712. doi: 10.1002/bsl.556

- Vitale, J. E., Smith, S. S., Brinkley, C. A., & Newman, J. P. (2002). The reliability and validity of the Psychopathy Checklist - Revised in a sample of female offenders. *Criminal Justice and Behavior, 29*, 202-231.
- Wootton, J. M., Frick, P. J., Shelton, K. K., & Silverthorn, P. (1997). Ineffective parenting and childhood conduct problems: the moderating role of callous-unemotional traits. *Journal of Consulting and Clinical Psychology, 65*(2), 301-308.
- Wymbs, B. T., McCarty, C. A., King, K. M., McCauley, E., Vander Stoep, A., Baer, J. S., & Waschbusch, D. A. (2012). Callous-unemotional traits as unique prospective risk factors for substance use in early adolescent boys and girls. *Journal of Abnormal Child Psychology, 40*(7), 1099-1110. doi: 10.1007/s10802-012-9628-5
- Young, S. E., Corley, R. P., Stallings, M. C., Rhee, S. H., Crowley, T. J., & Hewitt, J. K. (2002). Substance use, abuse and dependence in adolescence: prevalence, symptom profiles and correlates. *Drug and Alcohol Dependence, 68*(3), 309-322. doi: [http://dx.doi.org/10.1016/S0376-8716\(02\)00225-9](http://dx.doi.org/10.1016/S0376-8716(02)00225-9)

I



Associations between psychopathic traits and mental disorders among adolescents with substance use problems

Malin Hemphälä* and Anders Tengström

Research Centre for Adolescent Psycho-Social Health, Division of Alcohol and Drug Dependence Research, Department of Clinical Neuroscience, Karolinska Institutet, Stockholm, Sweden

Objectives. The aim of this study was to examine the association between psychopathic traits and mental disorders and to study associations between psychopathic traits and familial problems across gender.

Design. This is a cross-sectional study.

Methods. One hundred and Eighty adolescents seeking help at a substance abuse treatment clinic (99 girls, 81 boys) and their parents (165 mothers, 90 fathers) were studied. The assessment included Psychopathy checklist: Youth version (PCL-YV) and SCID I/II or Kiddie-Sads-Present and Lifetime Version (K-SADS-PL).

Results. Across gender, there was a positive correlation between externalizing symptoms and PCL-YV score. Among boys, there was a positive correlation between internalizing symptoms and PCL-YV score. Further, the behavioural dimension of psychopathy was predictive of externalizing symptoms across gender. The interpersonal and affective dimension of psychopathy predicted oppositional defiant disorder (ODD)-symptoms among girls. Parent problem behaviour predicted PCL-YV score amongst girls only.

Conclusions. Psychopathic traits do not only exist among adolescents who are identified because of their criminal behaviour. There were gender differences in the association between symptoms and psychopathic traits. It is suggested that different dimensions of psychopathy predisposed substance use for girls and for boys, and that ODD is particularly important in the expression of psychopathic traits among girls. This study showed transmission of antisocial behaviour between two generations among girls.

Psychopathy can be described as a personality disorder with three dimensions: interpersonal (e.g. egocentric, manipulative), affective (e.g. shallow emotions, lacks anxiety), and behavioural (e.g. impulsive, risk-taker). Although still controversial,

* Correspondence should be addressed to Ms Malin Hemphälä, FORUM, Maria Ungdom, St Görans Sjukhus, PO Box 500, SE-112 81 Stockholm, Sweden (e-mail: malin.hemphala@sll.se).

childhood manifestation of psychopathy has been shown as early as in 6–10 year-olds (Corrado, Vincent, Hart, & Cohen, 2004; Johnstone & Cooke, 2004) with the similar three dimension factor structure found in adults (Hare, 2003; Salekin & Frick, 2005).

Cleckley's (1941) conceptualization of psychopathy as a mental disorder where psychopaths are immune from anxiety and worry that regular people encounter and from other co-occurring mental disorders have not found support in recent studies. In childhood/adolescence, prevalence of comorbidity is thought to be more common than in adulthood (Lynam & Gudonis, 2005). A positive association between psychopathy and externalizing rather than internalizing problems has been shown among children, adults (Lynam & Gudonis, 2005) and adolescents (Kosson, Cyterski, Neumann, Steuerwald, & Walker-Matthews, 2002; Murrie & Cornell, 2000). Two studies of adolescent psychiatric inpatients have shown positive associations between psychopathy scores and conduct disorder (CD), delinquent behaviours, impulsiveness, substance abuse and a negative association with anxiety (Murrie & Cornell, 2000; Myers, Burket, & Harris, 1995). Further, two studies on juvenile delinquents, (one of which only included males), revealed positive correlations between scores on The Hare psychopathy checklist: Youth version (PCL-YV) and symptoms of CD, attention-deficit/hyperactivity disorder (ADHD), oppositional defiant disorder (ODD) and anxiety or depression (Kosson *et al.*, 2002; Salekin, Neumann, Leistico, DiCicco, & Duros, 2004). Lastly, a study with male adolescents referred to substance abuse treatment showed no association between psychopathic characteristics and substance use, depression or anxiety (O'Neill, Lidz, & Heilbrun, 2003b). Taken together, the results show some inconsistency, suggesting the need for more research to clarify associations and possible mediating factors between traits of psychopathy and externalizing and internalizing behaviour.

The current gaps could be described in the following way: First, there is limited information about psychopathic traits in different populations with reference to gender, as most studies are carried out among incarcerated male adolescents (e.g. Edens, Campbell, & Weir, 2006; Neumann, Forth, Kosson, & Hare, 2006). Results of recent studies are inconclusive; gender differences have been suggested both in the prevalence of psychopathic traits, and the association between psychopathic traits and mental disorders (Marsee, Silverthorn, & Frick, 2005; Penney & Moretti, 2007; Schmidt, McKinnon, Chattha, & Brownlee, 2006). There is evidence for a different expression of psychopathy in girls where the interpersonal and affective features of psychopathy better capture psychopathy among girls than the behavioural features (Schrum & Salekin, 2006) and the predictive validity of criminal recidivism of the PCL-YV is weaker among girls (Odgers, Reppucci, & Moretti, 2005; Schmidt *et al.*, 2006).

Second, previous studies of the association between psychopathy and mental disorders have showed inconsistent relationships between internalizing disorders and the three dimensions of psychopathy. These findings merit further investigation since, there is a well-documented connection between anxiety and antisocial behaviour in children and adolescents (Frick, Lilenfeld, Ellis, Loney, & Silverthorn, 1999). Previous studies have suggested a positive association between the behavioural dimension of psychopathy and anxiety among males (Das, de Rooter, Lodewijks, & Doreleijers, 2007; Mailloux, Forth, & Kroner, 1997) as well as a negative association between the behavioural as well as the affective dimension and anxiety among males (Dolan & Rennie, 2007; Hale, Goldstein, Abramowitz, Calamari, & Kosson, 2004).

Third, the downward extension of the transmission of psychopathy is uncertain. It has been suggested that the transmission of externalizing disorders can take a different

expression in the next generation (Hicks, Krueger, Iacono, McGue, & Patrick, 2004). Antisocial behaviour are known to run in families (e.g. Barnow, Ulrich, Grabe, Freyberger, & Spitzer, 2007; Hussong *et al.*, 2007) and grandparent substance use has been associated with grandchild problem behaviour (Bailey, Hill, Oesterle, & Hawkins, 2006). However, in one study, parental drug dependence was not correlated to PCL-YV score among male adolescents (O'Neill *et al.*, 2003b) while results of other studies have revealed that family factors contributed to the development of the behavioural and the affective dimension of psychopathy, while the interpersonal dimension was independent of family history (Larsson, Andershed, & Lichtenstein, 2006; Loney, Huntenburg, Counts-Allan, & Schmeelk, 2007). Consequently, antisocial behaviours are transferred across generations and to the best of our knowledge there are no studies examining problem behaviour across two generations as a predictor of psychopathic traits in a third generation.

To summarize, previous research lacks information in three important areas pertaining to adolescents: (1) gender differences in the association between psychopathic traits and a broad array of mental disorders, (2) studies of clinical samples with female and male participants who are not identified because of their criminal behaviour, and (3) studies across three generations regarding mental disorders in relation to psychopathic traits across gender. The aim of the present study was to examine the association between psychopathic traits and mental disorders among adolescents who have been referred to a substance use treatment clinic due to substance use problems. Further aims were to study associations between psychopathic traits and familial problems and possible gender differences across all areas of investigation.

Method

Participants

The present study is part of a larger investigation, a prospective follow-up study of adolescents referred to a substance abuse treatment clinic due to their substance use problems. Seven hundred and forty-two adolescents visited the clinic during a period of 19 weeks in 2004. From this initial population, a random sample was made. Inclusion required that at least one parent agreed to participate. The sample included 180 adolescents (99 girls and 81 boys) and their parents (165 mothers and 90 fathers). The adolescents ranged in age from 12–20 with a mean of 16.8 ($SD = 1.85$). A majority of the adolescents (70%) were Swedish. Most of the adolescents lived with a single mother (47%) or with both parents (31%). The participants entered the clinic in different ways: (1) as a follow-up to a previous visit (40%), (2) with a caregiver as an emergency due to intoxication or serious substance use-related problems (31%), (3) for ongoing treatment (individual, family, or both; 12%), (4) by police after being found intoxicated in a public place (12%), or (5) for planned inpatient assessment and treatment (3%). For 2% of the cases, no information was available on the referral.

Measurements

Adolescents

Psychopathic traits. The Hare PCL-YV (Forth, Kosson, & Hare, 2003) was used to measure psychopathic traits. This is a 20-item rating scale for the assessment of

psychopathic traits in adolescents (age 12–18) based on the adolescent's functioning since, late childhood and early adolescence. The PCL-YV has proven good validity and reliability in non-incarcerated adolescent males (Kosson *et al.*, 2002) and to a less extent among juvenile adolescent girls (Das, de Ruiter, & Doreleijers, 2008). Each item of the PCL-YV scores either zero (the characteristic is consistently absent), one (characteristic is inconsistently present), or two (characteristic is consistently present). Factor analyses of the adult version PCL-R, have produced two-, three- and four-factor models (Cooke & Michie, 2001; Hare, 2003). Factor analysis of the PCL-YV have failed to show support for the two-factor model, though it produced support for the three- and four-factor model (Neumann *et al.*, 2006). The three-factor model is a 13-item version of the PCL-R that places less emphasis on criminality (Cooke & Michie, 2001) and consists of: Factor I (arrogant, deceptive interpersonal) range from score 0 to 8; Factor II (deficient affective experience) range from score 0 to 8; and Factor III (impulsive, irresponsible behaviour) range from score 0 to 10. In this study, the PCL-YV score was rated by a trained clinical psychologist based on the clinical interview and the clinical files when available.

Mental disorders. Mental disorders were assessed according to the *Diagnostic and statistical manual of mental disorders* (DSM-IV; American Psychiatric Association, 1994). Adolescents age 17 or above were assessed by the structured clinical interview for DSM-IV axis I disorders (SCID-I) and DSM-IV axis II disorders in adults (SCID-II; First, Gibbon, Spitzer, Williams, & Benjamin, 1997; First, Spitzer, Gibbon, & Williams, 1997) and for adolescents less than 17 years old, the Kiddie-sads-present and lifetime version (K-SADS-PL) was used (Kaufman *et al.*, 1996). Additionally, as the assessment of ADHD is time-consuming, the adolescents were asked whether she or he had been diagnosed with ADHD, if so, that information was coded as presence of a diagnosis. The assessment of mental disorders was made by either a child psychologist (K-SADS-PL) or a clinical psychologist (SCID I/II).

Parents

Family problem behaviour. Family problem behaviour included measures of criminality, mental disorders and substance abuse. Parent criminal record was collected from the criminal register with national coverage. Parent mental disorders including substance abuse were assessed by the SCID I (First, *et al.*, 1997). The family interview for genetic studies (FIGs), which is a semi-structured interview, was administered to parents to survey psychopathology in absent parent and grandparents (Adolfsson & Forsgren, 1998). The FIGs contains general questions about psychological disorders and suicidality as well as specific questions covering common psychiatric problems, and additional questions about criminal behaviour in grandparents. A clinical psychologist conducted the interviews.

Procedure

The interviews took place at the clinic. Three well-trained clinical psychologists conducted the interviews. The adolescents were, on average, interviewed 39 days ($SD = 34$) after intake into the study. None of the participants was intoxicated during the interview. Self-ratings took place after the interview. Parents were interviewed, and if only one parent consented to be part of the study, the present parent was given

questions about the other parent. Participants were asked for permission to extract information from the criminal register. For participation in the study, all participants were reimbursed with gift certificates.

For the PCL-YV, inter-rater reliability was found to be high ($ICC = .86$). For the analyses, the three-factor model was used. Hence, the total score of PCL-YV was based on the 13-item model. Due to low prevalence rates of specific diagnoses, groups of diagnosis were constructed to enable data analysis. The following groups were constructed: Depression included major depressive disorder, dysthymic disorder, depression nos; Anxiety included panic disorder, separation anxiety disorder, obsessive-compulsive disorder, anxiety nos; Mood disorders included hypomania, bipolar disorders; Phobia included social phobia, specific phobia; Eating disorders included anorexia, bulimia, eating disorder nos; Personality disorders included borderline personality disorder, narcissistic personality disorder, avoidant personality disorder, personality disorder nos. A specific psychiatric diagnosis was only included in the analyses if the prevalence was higher than 5%. Karolinska Institute Research ethics committee Nord at Karolinska hospital 2003-12-01 has approved this study (DNR03-543).

Statistical analyses

A Pearson's correlation was used to examine associations between PCL-YV score and DSM-IV symptoms. Regression analysis was used to explore the association between the three factors of PCL-YV and DSM-IV symptoms as well as familial problem behaviour and PCL-YV score.

Results

PCL-YV score and mental disorders

The distribution of PCL-YV score differed among girls and boys (see Table 1). The PCL-YV scores ranged from 2 to 24 among the girls and from 1 to 24 among the boys.

In Table 2, correlations between DSM-IV symptoms of each diagnosis and PCL-YV total and factor score are shown. Among the girls, PCL-YV correlated with externalizing symptoms while among the boys both internalizing and externalizing symptoms were found to correlate to PCL-YV score. Overall, there was a problem with type 1 errors due to the large amount of correlations made. However, it is thought that the exploratory approach of this study warrants this. Additionally, a regression analysis examined associations between the PCL-YV score and number of DSM-IV diagnoses for girls and boys, respectively (data not shown). A significant model emerged for number of DSM-IV diagnoses for the girls ($F_{1,97} = 13.24, p < .001$), adjusted $R^2 = 0.11$, and for the boys ($F_{1,79} = 29.41, p < .001$), adjusted $R^2 = 0.27$. As an example, for an increase of five-points in total PCL-YV score, the number of DSM-IV diagnoses increased with close to one diagnosis (0.8) for girls and (0.7) for boys. Across gender, the three most common DSM-IV diagnoses were depression, CD, and alcohol use disorder (AUD), suggesting a clear overall connection between psychopathy scores and number of psychological disorders.

By using regression analysis, the PCL-YV scores' capacity to predict the number of DSM-IV symptoms was tested. Only DSM-IV symptoms that correlated significantly with either PCL-YV total score or factor score in Table 2 were included in the analyses. As presented in Table 3, Factor III scores (impulsive, irresponsible behaviour) predicted

Table 1. Characteristics of the adolescents

	Diagnosis (%)			Symptoms <i>M</i> (<i>SD</i>)	
	Girls	Boys	$\chi^2(df = 1)$	Girls	Boys
<i>Mental disorders</i> ¹					
DEP	64	39.5	10.41**	4.10 (2.83)	2.22 (2.43)
ANX	34	10	14.91***	2.88 (4.68)	0.94 (2.23)
MOOD	2	1	0.17	0.43 (0.95)	0.33 (0.84)
PHOBIA	47.5	17.5	18.12***	3.18 (2.92)	1.20 (1.83)
PTSD	13	2.5	6.63*	3.84 (4.15)	1.25 (2.13)
ED	22	1	17.61***	1.15 (1.92)	0.04 (0.25)
PSY	7	6	0.24	0.28 (0.86)	0.19 (0.59)
ADHD	4	11	3.32	0.59 (1.64)	1.45 (3.19)
ODD	7	6	0.06	2.36 (2.42)	2.06 (2.21)
CD	43.5	63	6.15*	2.85 (2.90)	3.90 (3.36)
ASP	1	12.5	7.32**	0.40 (1.04)	1.24 (1.76)
AUD	44.5	48	0.25	2.19 (2.66)	1.84 (2.16)
DUD	36.5	37	0.009	2.23 (3.29)	1.85 (2.68)
PD	8	5	2.54	2.57 (2.83)	1.74 (2.21)
	Girls <i>M</i> (<i>SD</i>)		Boys <i>M</i> (<i>SD</i>)		
<i>PCL-YV</i>					
Total score	9.27 (3.96)		11.63 (5.04)		$t(178) = -3.43^{**}$
Factor I	2.66 (1.42)		3.31 (1.69)		$t(178) = -2.80^{**}$
Factor II	2.33 (1.89)		3.24 (1.99)		$t(178) = -3.13^{**}$
Factor III	4.28 (1.70)		5.08 (2.23)		$t(178) = -2.66^{**}$

Note. DEP, depression; ANX, anxiety; MOOD, mood disorder; PTSD, Posttraumatic stress disorder; ED, eating disorders; PSY, Psychosis; ADHD, Attention deficit/hyperactivity disorder; ODD, oppositional defiant disorder; CD, conduct disorder; ASP, antisocial personality disorder; AUD, alcohol use disorder; DUD, drug use disorder; PD, personality disorder.

¹ DEP included major depressive disorder, dysthymic disorder and depression nos; ANX included panic disorder, separation anxiety disorder, obsessive-compulsive disorder and anxiety nos; MOOD included hypomania, bipolar disorders; Phobia included social phobia and specific phobia; PTSD; ED included anorexia, bulimia, and eating disorder nos; ADHD; CD; ASP; ODD; AUD; DUD; PD included borderline personality disorder, narcissistic personality disorder, avoidant personality disorder. * $p < .05$; ** $p < .01$; *** $p < .001$.

most of the externalizing symptoms across gender. The values of the coefficients revealed that an increase in the PCL-YV Factor III score of 5 units increased the odds of being diagnosed with e.g. AUD by 2.6 times in the girls and drug use disorder (DUD) by 2.35 times in the boys. ODD is predicted by both Factor I (arrogant, deceptive interpersonal) and Factor II (deficient affective experience) in girls. For girls, an increase of 5 units in Factor I or 5 units in Factor II increased the odds of being diagnosed with ODD by 2.5 or 1.9 times, respectively.

Familial problem behaviour and PCL-YV scores

Data on familial problem behaviour were analysed for biological parents ($N = 248$) and grandparents ($N = 78$). Number of parent internalizing problems had a maximum number of five, with a mean of 1.57 ($SD = 1.17$) among the girls and a mean of 1.62

Table 2. Pearson's correlations between psychopathic traits and DSM-IV symptoms

	DSM-IV symptoms													
	DEP	ANX	MOOD	PHOBIA	PTSD	ED	PSY	ADHD	ODD	CD	ASP	AUD	DUD	PD
<i>Girls</i>														
PCL-YV tot	-.11	.04	.10	.002	-.05	-.04	.09	.09	.68**	.51**	.61**	.41**	.31**	.37**
Factor I	-.18	.03	.01	-.19	-.10	-.05	.03	.17	.39**	.20*	.41**	.17	.18	.22*
Factor II	-.10	-.02	.04	.04	.000	-.05	.05	.05	.62**	.46**	.49**	.15	.16	.31*
Factor III	-.002	.10	.17	.12	-.03	.005	.13	-.001	.52**	.51**	.55**	.30**	.37**	.34**
ADHD	.10	.18	.02	-.04	-.004	.17	.12	1.0	.22	.28*	.49**	.21	.18	.33*
ODD	.05	.18	.10	-.04	.26*	-.03	.09	.22	1.0	.65**	.23	.33**	.14	.05
CD	.05	.24*	.24*	-.04	.14	.05	.29*	.28*	.65**	1.0	.49**	.45**	.27**	.21*
<i>Boys</i>														
PCL-YV tot	.30**	.28*	.14	.09	-.006	-.08	.20	.29*	.52**	.70**	.71**	.50**	.41**	.52**
Factor I	.22*	.21	.01	.05	.02	.06	.09	.21	.23	.48**	.49**	.24**	.24**	.44**
Factor II	.25*	.25*	.22*	.07	.03	-.14	.28*	.24	.48**	.61**	.64**	.42**	.39**	.44**
Factor III	.27*	.26*	.12	.10	-.06	-.11	.14	.26	.53**	.68**	.67**	.46**	.47**	.44**
ADHD	.07	-.11	.22	.29	-.04	-.09	.26	1.0	.64**	.36*	.21	.47**	.24	.14
ODD	.22	.02	.25	.08	-.03	-.16	.29	.64**	1.0	.65**	.41**	.45**	.27	.41**
CD	.09	.02	.07	.02	.22	.06	.22	.36*	.65**	1.0	.62**	.39**	.35**	.29*

Note. DEP, depression; ANX, anxiety; MOOD, mood disorder; PTSD, Posttraumatic stress disorder; ED, eating disorders; PSY, Psychosis; ADHD, Attention deficit/hyperactivity disorder; ODD, oppositional defiant disorder; CD, conduct disorder; ASP, antisocial personality disorder; AUD, alcohol use disorder; DUD, drug use disorder; PD, personality disorder.

Table 3. Regression analysis of the three factors of PCL-YV and DSM-IV symptoms

	PCL-YV							
	Girls				Boys			
	r^2	β			r^2	β		
		Factor I	Factor II	Factor III		Factor I	Factor II	Factor III
DEP				.09	0.13	0.10	0.19	
ANX				.08	0.11	0.12	0.14	
PSY				.09	-0.02	0.11*	-0.02	
ADHD				.09	0.24	0.14	0.24	
ODD	.47	0.50**	0.38**	0.27	.31	0.006	0.24	0.40*
CD	.29	0.08	0.32	0.61**	.51	0.26	0.37	0.69***
ASP	.39	0.17**	0.09	0.24**	.52	0.15	0.25*	0.31**
AUD	.11	0.24	-0.16	0.52**	.23	-0.06	0.22	0.33*
DUD	.16	0.31	-0.31	0.88**	.23	-0.05	0.17	0.47**
PD	.14	0.22	0.17	0.41	.27	0.33*	0.20	0.18

Note. DEP, depression; ANX, anxiety; PSY, Psychosis; ADHD, Attention deficit/hyperactivity disorder; ODD, oppositional defiant disorder; CD, conduct disorder; ASP, antisocial personality disorder; AUD, alcohol use disorder; DUD, drug use disorder; PD, personality disorder. * $p < .05$; ** $p < .01$; *** $p < .001$.

($SD = 1.27$) among the boys, and number of parent externalizing problems had a maximum number of three, with a mean of 0.57 ($SD = 0.80$) for the girls and a mean of 0.45 ($SD = 0.67$) for the boys. Number of parents criminality had a maximum number of two with a mean in the girls of 0.46 ($SD = 0.65$) and a mean of 0.51 ($SD = 0.62$) for the boys. As presented in Table 4, parent externalizing problems (diagnosis of either CD, ASP, AUD, and DUD), and a conviction of criminal behaviour, were predictors of the PCL-YV score in the girls. Presence of parent problem behaviour in both parents, e.g. a mother with AUD and a father with CD, increased the PCL-YV score among the girls by three-points. The PCL-YV total score increased by five-points if both parents were convicted of a criminal behaviour. To further study, the association between PCL-YV scores and parent problem behaviour, the three-factors were used as predictors. Results suggested that parent problem behaviour was predictive of both Factor II- and III-score among the girls. In the next analysis, the association between grandparent problem behaviour and adolescent psychopathic traits were studied. Grandparents' mental health problems, substance abuse and criminality were combined into one measure. Prevalence of grandparent problem behaviour was high, 63% across gender. A regression analysis showed that grandparent problem behaviour did not predict the adolescents' PCL-YV score.

Discussion

The aim of the present study was to examine the association between psychopathic traits and mental disorders among adolescents who have been referred to a substance use treatment clinic. Findings from the study suggest that an increase in the PCL-YV score increased the number of concurrent mental disorders across gender, a correlation between psychopathy scores and DSM-IV symptoms of mental disorders, a gender

Table 4. Regression analysis of familial problem behaviour and PCL-YV score

Family problem behaviour	PCL-YV																														
	Girls						Boys																								
	r^2		β		r^2		β		r^2		β																				
Step I Total PCL-YV score																															
Parent internalizing problem ^a	0.002		-0.14		0.000							-0.05																			
Parent externalizing problem ^b	0.13		1.52 ^{**}		0.01							0.59																			
Parent criminality	0.17		2.54 ^{***}		0.01							0.68																			
Grandparent ^c	0.02		-0.20		0.002							-0.21																			
	r^2		Factor I	Factor II	Factor III	r^2		Factor I	Factor II	Factor III	r^2		Factor I	Factor II	Factor III	r^2		Factor I	Factor II	Factor III	r^2		Factor I	Factor II	Factor III	r^2					
Step II Three-factor model of PCL-YV																															
Parent internalizing problem ^a	.01	-0.12	.02	.22	.01	.05	.06	-0.30	.02	.25	.00	-0.004																			
Parent externalizing problem ^b	.03	0.26	.11	0.68 [*]	.10	0.58 [*]	.01	0.21	.005	0.18	.005	0.20																			
Parent criminality	.06	0.51	.12	1.05 [*]	.14	0.98 [*]	.02	0.29	.00	0.02	.02	0.37																			
Grandparent ^c	.002	-0.08	.00	-0.02	.003	-0.10	.001	-0.04	.01	-0.20	.00	0.03																			

^a Parent internalizing problems included diagnosis of depression, anxiety, phobia, posttraumatic stress disorder, psychosis.
^b Parent externalizing problems included diagnosis of alcohol use disorder, drug use disorder, conduct disorder, antisocial personality disorder.
^c Grandparent's problem behaviour included prevalence of mental health problems, criminality and substance misuse problems.
^{*} $p < .05$; ^{**} $p < .01$; ^{***} $p < .001$.

difference in correlations between PCL-YV scores and DSM-IV symptoms, and that parent externalizing problems and criminal behaviour predicted PCL-YV score among the girls in the study.

Community studies have reported that about 60% of adolescents with a substance misuse problem have co-occurring mental disorders (e.g. Armstrong & Costello, 2002). Accordingly, a high proportion of the adolescents in this study were expected to have co-occurring mental symptoms. Further, in support of previous research, in this study, co-occurrence of psychopathic traits and mental disorders in adolescence was found to be common (e.g. Salekin & Frick, 2005). An increase in PCL-YV score was associated to increased numbers of concurrent DSM-IV diagnoses. In order to explain the co-occurrence of the different disorders, it has been suggested that features like irresponsibility, egocentrism and lack of planning which are common among adolescents may contribute to both psychopathic traits and other mental disorders (Salekin & Frick, 2005).

Also in support of previous findings (e.g. Salekin *et al.*, 2004), the current study showed a positive correlation between externalizing symptoms (CD, ADHD, ODD, AUD, and DUD) and PCL-YV score across gender. One potential explanation of this correlation is item overlap between externalizing disorders and the psychopathy construct (Burns, 2000). Some features of psychopathy e.g. impulsivity, are part of externalizing problems, suggesting that various construct measures share the same features. Further, in accordance with Lynam's (1996) developmental model, symptoms of hyperactivity-impulsivity-attention problems and conduct problems in children are precursors of psychopathy and, therefore, are to be expected.

Also consistent with Murrie and Cornell (2000), the current study showed a significant correlation between PCL-YV scores and substance misuse symptoms among the boys. The current study was able to extend this result, suggesting its validity also among girls, where PCL-YV total score, and Factor III score was positively correlated to both AUD- and DUD-symptoms. However, among the boys, all three factors correlated positively. It is possible that different aspects of psychopathy are correlated to girls' and boys' substance use. In this sample, girls' degree of impulsivity within Factor III seemed to be the most prominent dimension, while for boys all three factors seemed to be of importance.

There was a gender difference in correlations between internalizing symptoms and PCL-YV score. Contrary to O'Neill *et al.* (2003b), but consistent with Kosson *et al.* (2002), there was a positive correlation with anxiety- and depression-symptoms and PCL-YV score among the boys. Previous studies among girls have showed both positive and negative correlations between internalizing symptoms and PCL-YV score (Dolan & Rennie, 2007; Schmidt *et al.*, 2006). Results of the current study showed no correlations between internalizing symptoms and PCL-YV score among the girls. One possible explanation was the left-skewed distribution of PCL-YV score among the girls in this study. Most girls had a lower PCL-YV score that, in practice, limited the range of scores used in the analyses, and therefore, the optimal possible performance of the PCL-YV scale. Further, there was a high rate of depressive disorders among the girls. The girls in average had twice as many symptoms of depression as the boys, perhaps producing a ceiling effect. In conclusion, these results might be sample specific and merit further research.

This study showed a stronger correlation between ODD-symptoms and PCL-YV total score (.68**) compared with CD-symptoms (.51**) among the girls. Among the boys, the associations were reversed, ODD (.52**), and CD (.70**). Only 7% of the girls had a diagnosis of ODD. These girls constitute a subgroup of girls with an early onset of

conduct problems. A regression analysis showed that Factors I and II predicted ODD-symptoms and Factor III predicted CD-, AUD-, and DUD-symptoms among the girls. According to Schrum and Salekin (2006), Factors I and II better capture psychopathy among detained girls. This study lends support to that notion and the possible importance of ODD-symptoms should be investigated further in prospective studies in high-risk children. It has been suggested that psychopathic girls are less aggressive though still defiant and antisocial (Salekin, Rogers, & Machin, 2001). Similarly, an association between psychopathic traits and relational aggression is reported in girls, whereas a stronger relationship with overt aggression has been reported in boys (Marsee *et al.*, 2005).

Consistent with previous research, the results of this study showed transmission of antisocial behaviour across two generations among the girls (e.g. Hussong *et al.*, 2007). However, as also found by O'Neill *et al.* (2003b) there was no significant association between parental problem behaviour and PCL-YV scores among the boys. Moreover, as previously shown, there was an association between both Factor II, III, and parent externalizing problems including criminality among the girls (Larsson *et al.*, 2006; Loney *et al.*, 2007) suggesting that both the behavioural and the affective dimensions of psychopathy are influenced by parent problem behaviour in the girls. Prevalence of grandparents' problem behaviour was high among all adolescents, possibly explaining the lack of association between grandparent's problem behaviour and psychopathic traits among the adolescents. Another explanation to the lack of associations between family problem behaviour is the quality of data. Information about absent parent and grandparents were collected from the present parent, which will lower the quality of data due to recall-bias and lack of knowledge of the true circumstances surrounding the relatives.

There were several strengths with the current study. First, it included an array of mental disorders including both externalizing and internalizing disorders, which were assessed using gold standard procedures. Second, it is one of few studies investigating associations with PCL-YV score among adolescents with a substance use problem. Third, it studied adolescent girls and psychopathic traits. Fourth, it examined family problem behaviour over three generations. There were also several limitations of this study. First, the selection of sample limits the generalizability of this study to other groups. Second, the sample size was too small to examine subgroups of different disorders. Low prevalence rates of some disorders and specific familial problem behaviours, e.g. substance misuse, prevented analyses of those disorders, and their possible associations to PCL-YV. Third, grandparent problem behaviour was collected through second-hand information and the assessment of ADHD was incomplete, lowering the quality of the data. Therefore, there is probably an underestimate of problem behaviour among grandparents and prevalence of ADHD. Fourth, although none of the adolescents was intoxicated during the interview, the consequences of their substance use could have effected the results.

All taken into consideration, this study broadens our knowledge and understanding of the psychopathy construct among adolescents. Previous research has shown a negative correlation between psychopathic traits and the treatment process among adolescent boys in a substance abuse treatment programme (O'Neill, Lidz, & Heilburn, 2003a). Specific treatment programs for adolescents with psychopathic traits addressing many aspects, e.g. anger management, social skills, resolving mental problems, family relationships, and substance abuse have been recommended (Caldwell, McCormick, Umstead, & Van Rybroek, 2007). Treatment of adolescents with a substance misuse

problem needs to consider co-occurring mental disorders as well as psychopathic traits, which can affect treatment response and outcome. Future research of the association between mental disorders and psychopathic traits should focus on girls specifically. Further, there is a need for more research in non-criminal samples.

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References

- Adolfsson, R., & Forsgren, T. (1998). *DIGS och FIGS Strukturerad psykiatrisk diagnostisk intervju för patienter och anhöriga*. Umeå: UmU Tryckeri.
- APA (1994). *Diagnostic and statistical manual of mental disorders* (4th ed). Washington, DC: American Psychiatric Association.
- Armstrong, T. D., & Costello, E. J. (2002). Community studies on adolescent substance use, abuse, or dependence and psychiatric comorbidity. *Journal of Consulting and Clinical Psychology, 70*, 1224–1239.
- Bailey, J. A., Hill, K. G., Oesterle, S., & Hawkins, J. D. (2006). Linking substance use and problem behavior across three generations. *Journal of Abnormal Child Psychology, 34*, 273–292.
- Barnow, S., Ulrich, I., Grabe, H.-J., Freyberger, H. J., & Spitzer, C. (2007). The influence of parental drinking behaviour and antisocial personality disorder on adolescent behavioural problems: Results of the Greifswald family study. *Alcohol and Alcoholism, 42*(6), 623–628.
- Burns, G. L. (2000). Problem of item overlap between the psychopathy screening device and attention deficit hyperactivity disorder, oppositional defiant disorder, and conduct disorder rating scale. *Psychological Assessment, 12*, 447–450.
- Caldwell, M. F., McCormick, D. J., Umstead, D., & Van Rybroek, G. J. (2007). Evidence of treatment progress and therapeutic outcomes among adolescents with psychopathic features. *Criminal Justice and Behavior, 34*, 573–587.
- Cleckley, H. (1941). *The mask of sanity: An attempt to reinterpret the so-called psychopathic personality*. St. Louis, MO: C.V. Mosby.
- Cooke, D. J., & Michie, C. (2001). Refining the construct of psychopathy: Towards a hierarchical model. *Psychological Assessment, 13*, 171–188.
- Corrado, R. R., Vincent, G. M., Hart, S. D., & Cohen, I. M. (2004). Predictive validity of the psychopathy checklist: Youth version for general and violent recidivism. *Behavioural Science and the Law, 22*, 5–22.
- Das, J., de Ruiter, C., & Doreleijers, T. (2008). Reliability and validity of the psychopathy checklist: Youth version in Dutch female adolescents. *International Journal of Law and Psychiatry, 31*, 219–228.
- Das, J., de Ruiter, C., Lodewijks, H., & Doreleijers, T. (2007). Predictive validity of the Dutch PCL: YV for institutional disruptive behavior: Findings from two samples of male adolescents in a juvenile justice treatment institution. *Behavioral Sciences and the Law, 25*, 739–755.
- Dolan, M. C., & Rennie, C. E. (2007). Is juvenile psychopathy associated with low anxiety and fear in conduct-disordered male offenders? *Journal of Anxiety Disorders, 21*, 1028–1038.
- Edens, J. F., Campbell, J. S., & Weir, J. M. (2006). Youth psychopathy and criminal recidivism: A meta-analysis of the psychopathy checklist measures. *Law and Human Behaviour, 31*, 53–75.
- First, M. B., Gibbon, M., Spitzer, R. L., Williams, J. B. W., & Benjamin, L. S. (1997). *User's guide for the structured clinical interview for DSM-IV axis II personality disorders*. Washington, DC: American Psychiatric Press.

- First, M. B., Spitzer, R. L., Gibbon, M., & Williams, J. B. W. (1997). *User's guide for the structured clinical interview for DSM-IV axis I disorders - clinical version (SCID-CV)*. Washington, DC: American Psychiatric Press.
- Forth, A. E., Kosson, D. S., & Hare, R. D. (2003). *The Hare PCL-YV*. Toronto, ON: Multi-health systems.
- 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*, 383-392.
- Hale, L. R., Goldstein, D. S., Abramowitz, C. S., Calamari, J. E., & Kosson, D. S. (2004). Psychopathy is related to negative affectivity but not to anxiety sensitivity. *Behaviour Research and Therapy*, *42*, 697-710.
- Hare, R. D. (2003). *The Hare psychopathy checklist - revised* (2nd ed.). Toronto, ON: Multi-health systems.
- Hicks, B. M., Krueger, R. F., Iacono, W. G., McGue, M., & Patrick, C. J. (2004). Family transmission and heritability of externalizing disorders. *Archives of General Psychiatry*, *61*, 922-928.
- Hussong, A. M., Wirth, R. J., Edwards, M. C., Curran, P. J., Chassin, L. A., & Zucker, R. A. (2007). Externalizing symptoms among children of alcoholic parents: Entry points for an antisocial pathway to alcoholism. *Journal of Abnormal Psychology*, *116*, 529-542.
- Johnstone, L., & Cooke, D. J. (2004). Psychopathic-like traits in childhood: Conceptual and measurement concerns. *Behavioral Sciences and the Law*, *22*, 103-125.
- Kaufman, J., Birmaher, B., Brent, D. A., Rao, U., Flynn, C., Moreci, P., *et al.* (1996). Schedule for affective disorders and schizophrenia for school-age children - present and lifetime version (K-SADS-PL): Initial reliability and validity data. *Journal of American Academy of Child and Adolescent Psychiatry*, *36*, 980-988.
- Kosson, D. S., Cyterski, T. D., Neumann, C. S., Steuerwald, B. L., & Walker-Matthews, S. (2002). The reliability and validity of the psychopathy checklist: Youth version (PCL-YV) in nonincarcerated adolescent males. *Psychological Assessment*, *14*, 97-109.
- Larsson, H., Andershed, H., & Lichtenstein, P. (2006). A genetic factor explains most of the variation in the psychopathic personality. *Journal of Abnormal Psychology*, *115*, 221-230.
- Loney, B. R., Huntenburg, A., Counts-Allan, C., & Schmeelk, K. M. (2007). A preliminary examination of the intergenerational continuity of maternal psychopathic features. *Aggressive Behavior*, *33*, 14-25.
- Lynam, D. R. (1996). Early identification of chronic offenders: Who is the fledgling psychopath? *Psychological Bulletin*, *120*, 209-234.
- Lynam, D. R., & Gudonis, L. (2005). The development of psychopathy. *Annual Review of Clinical Psychology*, *1*, 381-407.
- Mailloux, D. L., Forth, A. E., & Kroner, D. G. (1997). Psychopathy and substance use in adolescent male offenders. *Psychological Reports*, *80*, 529-530.
- Marsee, M. A., Silverthorn, P., & Frick, P. J. (2005). The association of psychopathic traits with aggression and delinquency in non-referred boys and girls. *Behavioral Sciences and the Law*, *23*, 803-817.
- Murrie, D. C., & Cornell, D. G. (2000). The Millon adolescent clinical inventory and psychopathy. *Journal of Personality Assessment*, *75*, 110-125.
- Myers, W. C., Burket, R. C., & Harris, H. E. (1995). Adolescent psychopathy in relation to delinquent behaviors, conduct disorder, and personality disorders. *Journal of Forensic Sciences*, *40*, 436-440.
- Neumann, C. S., Forth, A. E., Kosson, D. S., & Hare, R. D. (2006). Factor structure of the Hare psychopathy checklist: Youth version (PCL-YV) in incarcerated adolescents. *Psychological Assessment*, *18*, 142-154.
- O'Neill, M. L., Lidz, V., & Heilbrun, K. (2003a). Adolescents with psychopathic characteristics in a substance abusing cohort: Treatment process and outcomes. *Law and Human Behaviour*, *27*, 299-313.

- O'Neill, M. L., Lidz, V., & Heilbrun, K. (2003b). Predictors and correlates of psychopathic characteristics in substance abusing adolescents. *International Journal of Forensic Mental Health, 2*, 35-45.
- Odgers, C. L., Reppucci, N. D., & Moretti, M. M. (2005). Nipping psychopathy in the bud: An examination of the convergent, predictive, and theoretical utility of the PCL-YV among adolescent girls. *Behavioral Sciences and the Law, 23*, 743-763.
- Penney, S. R., & Moretti, M. M. (2007). The relation of psychopathy to concurrent aggression and antisocial behavior in high-risk adolescent boys and girls. *Behavioral Sciences and the Law, 25*, 21-41.
- Salekin, R. T., & Frick, P. J. (2005). Psychopathy in children and adolescents: The need for a developmental perspective. *Journal of Abnormal and Child Psychology, 33*, 403-409.
- Salekin, R. T., Neumann, C. S., Leistico, A.-M. R., DiCicco, T. M., & Duros, R. L. (2004). Psychopathy and comorbidity in a young offender sample: Taking a closer look at psychopathy's potential importance over disruptive behaviour disorders. *Journal of Abnormal Psychology, 113*, 416-427.
- Salekin, R. T., Rogers, R., & Machin, D. (2001). Psychopathy in youth: Pursuing diagnostic clarity. *Journal of Youth and Adolescence, 30*, 173-195.
- Schmidt, E., McKinnon, L., Chattha, H. K., & Brownlee, K. (2006). Concurrent and predictive validity of the psychopathy checklist: Youth version across gender and ethnicity. *Psychological Assessment, 18*, 393-401.
- Schrum, C. L., & Salekin, R. T. (2006). Psychopathy in adolescent female offenders: An item response theory analysis of the psychopathy checklist: Youth version. *Behavioral Sciences and the Law, 24*, 39-63.

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II

The Validity of the Health-Relevant Personality Inventory (HP5i) and the Junior Temperament and Character Inventory (JTCI) Among Adolescents Referred for a Substance Misuse Problem

MALIN HEMPHÄLLÄ,¹ J. PETTER GUSTAVSSON,² AND ANDERS TENGSTRÖM¹

¹Division of Psychiatry, Research Centre for Adolescent Psycho-Social Health, Department of Clinical Neuroscience, Karolinska Institute, Sweden

²Division of Psychology, Department of Clinical Neuroscience, Karolinska Institute, Sweden

The aim was to study the validity of 2 personality instruments, the Health-Relevant Personality Inventory (HP5i) and the Junior Temperament and Character Inventory (JTCI), among adolescents with a substance use problem. Clinical interviews were completed with 180 adolescents and followed up after 12 months. Discriminant validity was demonstrated in the lack of correlation to intelligence in both instruments' scales. Two findings were in support of convergent validity: Negative affectivity (HP5i) and harm avoidance (JTCI) were correlated to internalizing symptoms, and impulsivity (HP5i) and novelty seeking (JTCI) were correlated to externalizing symptoms. The predictive validity of JTCI was partly supported. When psychiatric symptoms at baseline were controlled for, cooperativeness predicted conduct disorder after 12 months. Summarizing, both instruments can be used in adolescent clinical samples to tailor treatment efforts, although some scales need further investigation. It is important to include personality assessment when evaluating psychiatric problems in adolescents.

There is a growing interest in the interplay between personality and psychopathology (for a review, see, e.g., Widiger & Smith, 2008). Personality refers to a more normative set of behaviors (including thinking, perceiving, and feeling), whereas psychopathology is conceptualized as an extreme set of behaviors that result in functional impairment for the individual (Lahey, 2004). Studies on the development of personality have suggested that personality is quite consistent over time (Roberts & DelVecchio, 2000), and apparent in early childhood (Caspi et al., 2003), but not set until early adulthood (Caspi, Roberts, & Shiner, 2005), although continuing development across the life course (Roberts, Walton, & Viechtbauer, 2006). In contrast to personality traits, psychopathology does not need to be as enduring. In the American Psychiatric Association's (1994) diagnostic system, the *Diagnostic and Statistical Manual of Mental Disorders* (4th ed. [DSM-IV]), mental disorders are divided into two axes: Axis I clinical disorders (e.g., depression, anxiety, conduct disorder, substance use disorders), and Axis II personality disorders (e.g., antisocial personality disorder). It is not recommended to assess or diagnose personality disorders in individuals before age 18 (American Psychiatric Association, 1994). Findings such as a high comorbidity between Axis I and II disorders, and an increased risk for negative psychosocial outcomes across 20 years in adolescents with comorbid Axis I and II disorders (Crawford et al., 2008) have resulted in a shift in the proposed *DSM-5*, by including an assessment of personality characteristics of each individual regardless of presence of personality disorder. All in all, this stresses the importance of valid personality assessment in clinical settings.

Two personality models, the Five-factor model (FFM) and the psychobiological temperament and character model (PTCM), have been suggested to be useful in clinical settings to indicate increased risk for psychopathological behavior, especially personality disorders (Cloninger, Przybeck, Svrakic, & Wetzel, 1994; Costa & McCrae, 1992). The FFM has been factor analytically developed and consists of five factors (neuroticism, extraversion, openness to experience, agreeableness, and conscientiousness; Digman, 1990). Findings from adult studies have shown a profile of high scores of neuroticism and openness, along with lower scores of extraversion, agreeableness, and conscientiousness characterizing individuals diagnosed with a psychiatric disorder (Trull & Sher, 1994), and high scores of neuroticism and low scores of conscientiousness in individuals diagnosed with depression, anxiety, and substance use disorders (Kotov, Gamez, Schmidt, & Watson, 2010). Scores on neuroticism have been suggested to be important in distinguishing clinically disordered individuals from others among adults (McCrae, 1991) and, including conscientiousness, risk factors in the development of psychopathology among adolescents (Tackett, 2006). Two fundamental dimensions of psychopathology, internalization (e.g., depression, anxiety) and externalization (e.g., conduct disorder, substance misuse) have been suggested to map well to high scores of neuroticism and low scores of conscientiousness (Krueger & Markon, 2006). Internalizing problems have been linked to high neuroticism scores, and low scores of extraversion are a suggested risk factor in the development of depression (Clark, Watson, & Mineka, 1994). Externalizing problems have been associated with low scores on agreeableness, conscientiousness, and neuroticism (Ruiz, Pincus, & Schinka, 2008). All in all, associations between FFM factors and psychiatric disorders have been established.

Studies of associations between FFM traits and substance misuse in adolescents have been sparse, but in a study of adult psychiatric patients, a profile with high scores on

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Address correspondence to Malin Hemphälä, Department of Clinical Neuroscience, Karolinska Institute, FORUM, Hus 40, plan 1, Danderyds sjukhus, S-182 87 Danderyd, Sweden; Email: malin.hemphala@sl.se

impulsiveness and excitement seeking, and low scores on agreeableness and conscientiousness characterized those with high alcohol use (Hopwood et al., 2006). Also, among university students, neuroticism and conscientiousness scores were associated with both drinking and alcohol-related problems (Ruiz, Pincus, & Dickinson, 2003). These findings have been replicated in adolescents. In a study of preadolescent and adolescent students, high extraversion scores and low conscientiousness scores predicted frequent alcohol use (Merenäkk et al., 2003). Furthermore, adolescents diagnosed with conduct disorder and substance misuse had higher neuroticism scores and lower agreeableness and conscientiousness scores in comparison to their siblings (Anderson, Tapert, Moadab, Crowley, & Brown, 2007). One study of an adolescent community sample has shown elevated levels of antagonism and impulsivity measured by the Health-Relevant Personality Inventory (HP5i) to increase the risk for hazardous alcohol consumption (Gunnarsson, Gustavsson, Tengstrom, Franck, & Fahlke, 2008). In summary, low neuroticism and conscientiousness scores have been associated with externalizing problems such as conduct disorder and substance misuse, whereas high neuroticism scores have been linked to internalizing problems such as depression and anxiety.

The PTCM has been theoretically generated and consists of four dimensions of temperament (novelty seeking, harm avoidance, reward dependence, persistence) and three dimensions of character (self-directedness, cooperativeness, self-transcendence; Cloninger et al., 1994). Across different samples, similar associations between PTCM scales and psychiatric problems have been established. In adults, externalizing problems have been linked to higher levels of novelty seeking and internalizing problems were linked to higher levels of harm avoidance (Battaglia, Przybeck, Bellodi, & Cloninger, 1996). Studies of children have shown correlations between scores of harm avoidance and parent-reported internalizing problems, whereas scores of novelty seeking were correlated to parent-reported externalizing problems (Copeland, Landry, Stanger, & Hudziak, 2004). Also, in children, high novelty-seeking scores predicted the presence of disruptive behavior disorders and disruptive behavior disorders in combination with internalizing disorders (Rettew, Copeland, Stanger, & Hudziak, 2004). In middle school students, high scores on harm avoidance and self-transcendence and low scores on reward dependence were associated with self-assessed internalizing problems (Kim et al., 2006). In children and adolescents, different temperament profiles have been suggested to be associated with specific anxiety disorders; for example, social phobia was associated with high scores on harm avoidance and low scores on self-directedness (Cho et al., 2009). In conclusion, from studies of the PTCM in adolescent clinical samples, two main findings have emerged: a positive correlation between scores of harm avoidance and internalizing problems (Gothelf, Aharonovsky, Horesh, Carty, & Apter, 2004) and scores of novelty seeking and externalizing problems (Schmeck & Poustka, 2001). Further, few studies have explored the predictive ability of the PTCM, although in adults, high harm avoidance scores and low self-directedness scores predicted changes in depression over one year (Cloninger, Svrakic, one Przybeck, 2006).

There are few studies of associations between the PTCM scales and substance use in adolescents. Results of adult studies have suggested high scores of harm avoidance and novelty seeking to increase the risk for problem drinking (Cloninger,

Sigvardsson, Przybeck, & Svrakic, 1995), a higher score of novelty seeking in alcoholics than in nonalcoholics (Mulder, 2002), and higher levels of novelty seeking associated with more severe substance misuse in patients receiving treatment for substance dependence (Conway, Kane, Ball, Poling, & Rounsaville, 2003). Further, a different personality profile has been suggested in adult drug-dependent inpatients, as they scored higher on novelty seeking and lower on reward dependence than alcohol-dependent inpatients (Evren, Evren, Yancar, & Erkiran, 2007). In adoptees, a high novelty seeking score and a low harm avoidance score predicted alcohol abuse in young adulthood (Cloninger, Sigvardsson, & Bohman, 1988). Similar findings have been shown in adolescents. In nonclinical adolescents, there was a positive correlation between scores of novelty seeking, harm avoidance, and substance use (cigarette, alcohol, and marijuana; Wills, Windle, & Cleary, 1998). In adolescent males, a novelty seeking score was positively correlated and scores of harm avoidance were negatively correlated with symptoms of drug dependence (Gabel, Stallings, Schmitz, Young, & Fulker, 1999). Similarly, in high-risk adolescents, higher levels of novelty seeking were associated with higher alcohol consumption (Lauch, Becker, Blomeyer, & Schmidt, 2007). In summary, there is evidence for an association between substance use or misuse and novelty seeking, along with harm avoidance.

In this study, two instruments developed from the two different personality models will be validated, the HP5i based on the FFM, and the Junior Temperament and Character Inventory (JTCI) based on the PTCM. The HP5i is a Swedish self-report instrument developed by Gustavsson, Jönsson, Linder, and Weinryb (2003) consisting of five subscales developed for use in health research: antagonism, impulsivity, hedonic capacity, negative affectivity, and alexithymia. Each subscale was developed as a health-relevant facet of a higher order factor from the FFM. A negative correlation was found between scores of antagonism and agreeableness, impulsivity and conscientiousness, and alexithymia and openness. A positive correlation was shown between scores of hedonic capacity and extraversion, and negative affectivity and neuroticism (Gustavsson et al., 2003). So far there are few studies of the validity of the HP5i, although preliminary validity has been shown in adult twins and adults with long-term sick leave (Gustavsson et al., 2003), adult diabetes patients (Gustavsson, Eriksson, Hilding, Gunnarsson, & Ostensson, 2008), and a community study of Swedish adolescents (Gunnarsson et al., 2008). The JTCI (Luby, Svrakic, McCallum, Przybeck, & Cloninger, 1999) is a self-report measure of the four temperament dimensions (novelty seeking, harm avoidance, reward dependence, persistence) and three character dimensions (self-directedness, cooperativeness, self-transcendence) for use among children and adolescents, developed from the adult version, the Temperament and Character Inventory (TCI; Cloninger et al., 1994). The JTCI has been validated in community samples of children (Asch et al., 2009; Luby et al., 1999) and adolescents (Jonasson, 1999), in twins ages 9 to 12 (Kerekes et al., 2010), in middle school students (Lyoo et al., 2004), and in a mixed sample of clinical and non-referred adolescents ages 12 to 18 (Schmeck, Goth, Poustka, & Cloninger, 2001). To conclude, no study has validated the HP5i, and only one study has validated the JTCI in an adolescent clinical sample including both females and males. Consequently, the validity of the HP5i and the JTCI in specific adolescent clinical samples have not been thoroughly examined.

Three measures of validity are examined to present a comprehensive picture of the validity of the two personality instruments. To provide evidence for different constructs, the discriminant validity of the HP5i and the JTCl will be examined by another construct often used in psychological assessments, intelligence. Personality traits and intelligence are considered different constructs and minimal overlap is expected between them. JTCl scales were not correlated to scores of intelligence, except for scores of novelty seeking (a negative correlation) and self-directedness (a positive correlation) and verbal intelligence score (Copeland et al., 2004). To provide evidence for similar constructs, the convergent validity of the HP5i and the JTCl is examined by symptoms of psychiatric problems because previous research has found evidence for associations between personality and psychiatric problems. Psychiatric symptoms are also used to examine the predictive ability of the JTCl (predictive validity). The overall aim of this study was to examine the validity of the HP5i and the JTCl among adolescents referred for a substance use problem to a designated clinic. More specifically, the following hypothesis was constructed to examine discriminant validity:

1. There is not a significant correlation between HP5i and JTCl test scores, respectively, and a mean score of intelligence.

The following hypotheses were created to examine convergent validity:

2. There is a positive significant correlation between scores of negative affectivity (HP5i), harm avoidance (JTCl) separately, and symptoms of depression and anxiety.
3. There is a positive significant correlation between scores of antagonism (HP5i), impulsivity (HP5i), novelty seeking (JTCl) separately, and symptoms of conduct disorder, alcohol use disorder, drug use disorder, and antisocial personality disorder.

Finally, the predictive validity of the JTCl was tested by the following hypotheses using psychiatric symptoms measured 12 months later:

4. Harm avoidance scores will predict symptoms of depression and anxiety 12 months later.
5. Novelty seeking scores will predict symptoms of conduct disorder and alcohol use disorder, drug use disorder, and antisocial personality disorder 12 months later.

METHOD

Participants

Baseline assessment. During a 19-week period in 2003, a random sample of 373 (50.3%) individuals fulfilling inclusion criteria were invited to participate in the study drawn from 742 adolescents referred to a substance misuse clinic. To be included in the study, at least one of the adolescents' parents had to agree to participate. There were no exclusion criteria. The final sample included 180 adolescents (99 girls, 81 boys), ages 12 to 20 ($M = 16.8$, $SD = 1.85$). There was a high rate of refusal to participate in the study. A comparison between 61 adolescents who agreed to participate and 61 adolescents who refused participation revealed that those who participated were younger at first tobacco use, less likely to have been admitted through the emergency room, more likely to report that their parents had psychiatric problems, and more likely to report being sexually abused (for

more detailed information, see Hodgins et al., 2007). The participants entered the clinic in various ways: (a) follow-up from a previous emergency visit (40%), (b) emergency visit with a caregiver due to intoxication or substance-use-related problems (31%), (c) ongoing treatment (12%), (d) by police after being found intoxicated in a public place (12%), or (e) planned inpatient assessment and treatment (3%). For 2% of the cases, no such information was available on the referral.

12-month follow-up. After 12 months, 156 adolescents (86 girls, 70 boys) participated in the follow-up by diagnostic interviews and self-assessments. There were no significant differences between those who participated in the follow-up and those who did not regarding sex, age, depression, anxiety, conduct disorder, alcohol use disorder, drug use disorder, and antisocial personality disorder.

Procedure

At the adolescents' first contact with the clinic, a research assistant invited them to participate in the study. The adolescents were given a complete description of the study, and given the opportunity to ask questions. Next, the adolescents, and if under age 18 also their parents, formally consented to interviews, completing questionnaires, and allowing the research team access to their clinical files, official criminal records, and social insurance records. Adolescents were interviewed individually on average 39 days ($SD = 34$ days) after inclusion in the study at the clinic. Self-assessment was conducted at the same occasion. None of the adolescents were assessed as intoxicated during the interview. The most common substance used at least once a month was cannabis (46%), followed by central stimulants (25%), hallucinates (20%), sedatives (19%), other drugs (19%), cocaine (17%), and opioids (12%). For participation in the study, adolescents were given a gift certificate worth 500 SEK for a department store and a cinema ticket.

After 12 months (average 1.30 years, $SD = 0.18$) there was a follow-up of the adolescents by individual clinical interviews and self-assessments. For participation in the study, the adolescents were given coupons for a department store and a cinema ticket. The Karolinska Institute Research Ethics Committee Nord approved the study (DNR 03-543).

Measures

The Health-Relevant Personality Inventory. The HP5i is a short self-report instrument consisting of 20 items developed for use in health research and rated on a 4-point Likert scale ranging from 1 (*does not apply at all*) to 4 (*applies completely*), with five scales: Antagonism (hostile behavior), Impulsivity (impulsive behavior), Hedonic Capacity (capacity to experience pleasure), Negative Affectivity (experience of negative feelings), and Alexithymia (inability to verbally express emotions). For further description of the instrument, see Gustavsson et al. (2003).

The HP5i has been newly developed and hence there are few studies of its reliability and validity. In a community study of Swedish adolescents, reliability estimates from confirmatory factor analyses were as follows: Antagonism = .74, Impulsivity = .81, Hedonic Capacity = .80, Negative Affectivity = .67, and Alexithymia = .69 (Gunnarsson et al., 2008). A study of two samples of adult twins and adults with long-term sick leave reported Cronbach's alphas for Antagonism (.65/.67), Impulsivity (.66/.76), Hedonic Capacity (.54/.65), Negative Affectivity (.69/.70), and Alexithymia (.70/.61; Gustavsson et al., 2003).

TABLE 1.—Descriptives of the Health-Relevant Personality Inventory (HP5i) and the Junior Temperament and Character Inventory (JTCl), and prevalence of psychiatric diagnoses.

	<i>n</i>	No. of Items	Possible Range	<i>M</i>	<i>SD</i>	Cronbach's Alpha	MIIC
HP5i							
Antagonism	136	4	1–4	2.52	0.75	.74	.42
Impulsivity	134	4	1–4	2.64	0.67	.71	.38
Hedonic capacity	136	4	1–4	3.11	0.45	.36	.12
Negative affectivity	135	4	1–4	2.18	0.62	.58	.26
Alexithymia	133	4	1–4	2.00	0.55	.49	.19
JTCl							
Novelty seeking	166	18	0–18	11.83	3.25	.68	.10
Harm avoidance	167	22	0–22	5.42	3.78	.77	.13
Reward dependence	168	9	0–9	5.43	2.02	.58	.13
Persistence	165	6	0–6	2.35	1.26	.24	.06
Self-directedness	167	20	0–20	13.67	3.62	.73	.12
Cooperativeness	166	20	0–20	13.96	3.42	.72	.12
Self-transcendence (1)	169	5	0–5	1.79	1.42	.62	.26
Self-transcendence (2)	168	5	0–5	1.87	1.49	.64	.27
Psychiatric Diagnoses							
		Baseline (%)		12-Month Follow-Up			
Depression	180	17		4.5			
Anxiety	180	32		34			
Alcohol use disorder	180	29		13.5			
Drug use disorder	180	20		11.5			
Conduct disorder	180	26		10			
Antisocial PD	63	17.5		4			

Note. MIIC = mean interitem correlation; PD = personality disorder.

Similarly, in a study of adult diabetes patients, Cronbach's alpha were Antagonism = .68, Impulsivity = .78, Hedonic Capacity = .69, Negative Affectivity = .67, and Alexithymia = .68 (Gustavsson et al., 2008). In line with previous research, in this study antagonism and impulsivity had alphas greater than .70 (see Table 1) and the other three scales had alphas lower than .70. Scales with few items might have a problem with a low Cronbach's alpha. Therefore it is recommended to report mean interitem correlations (MIIC; see Table 1), and coefficients above .20 are considered acceptable for personality scales (Briggs & Cheek, 1986). For hedonic capacity, the MIIC coefficient was low, and three items had an item-total correlation below the recommended .20, suggesting a weak correlation between the items, and removal of an item would not increase alpha (e.g., Item 1, $\alpha = .34$). Also two Alexithymia items had low corrected item-total correlations, suggesting a weaker correlation between items, and removal of an item would not increase alpha (e.g., Item 6, $\alpha = .45$). The HP5i was administered at the 12-month follow-up. Total scores of each scale were used.

The Junior Temperament and Character Inventory. The JTCl is a 108-item self-report measure of temperament and emerging personality characteristics used in children and adolescents, scored either as "true" or "false" (Luby et al., 1999) and developed in accordance with the TCI (Cloninger et al., 1994) and translated into Swedish (Brandorf, 1994). The instrument consists of four dimensions of temperament and four dimensions of character. The four dimensions of temperament are *novelty seeking* (behavioral activation, a genetic predisposition to being excitable, impulsive, quick-tempered), *harm avoidance* (behavioral inhibition, a genetic predisposition to being cautious, apprehensive, overly pessimistic), *reward dependence* (heritable tendency to maintaining behaviors that previously have been associated with reinforcements and a sensibility to social cues), and *persistence* (heritable tendency of maintaining

behaviors despite fatigue and lack of reward). The dimensions of character are *self-directedness* (individual differences in autonomy), *cooperativeness* (individual differences in identification with and acceptance of others), and *self-transcendence* (individual differences in tolerating ambiguity and uncertainty). Self-transcendence consists of two parts: fantasy (fantasy and day-dreaming) and spirituality (spiritual beliefs; Luby et al., 1999).

The JTCl has been validated among children across different countries. A U.S. community sample of children (M age = 12) using self-rated JTCl reported Cronbach's alpha ranging from .44 to .83 (Luby et al., 1999). In a French community sample of children (M age = 12.9), Cronbach's alpha for self-ratings ranged from .31 to .74 and parent ratings ranged from .56 to .82 (Asch et al., 2009). In Swedish 9- and 12-year-old twins, Cronbach's alpha for parent-rated JTCl ranged from .37 to .81 (Kerekes et al., 2010). Further, it has been validated among adolescents across different countries. In Swedish students age 12 to 18 using self-rated JTCl, Cronbach's alpha ranged from .51 to .79 (Jonasson, 1999). A Korean study of middle school students (M age = 13.3) using self-rated JTCl showed similar results (.64–.80) with the exception of persistence that had a Cronbach's alpha of .48 (Lyoo et al., 2004). A German study of a mixed sample of clinical and nonreferred adolescents aged 12 to 18 using self-rated JTCl showed similar results (.48–.81; Schmeck et al., 2001). In line with previous research, Cronbach's alpha for the JTCl in this study ranged from .24 to .77 (see Table 1), three scales had alphas greater than .70, and two scales had alphas below .70. Following results of other Swedish studies (Jonasson, 1999; Kerekes et al., 2010), the low values of Cronbach's alpha on the subscale persistence was analyzed by correlations between items of this subscale. For three items, correlations were lower than the recommended .20 (Briggs & Cheek, 1986). One of the items of this subscale is negatively correlated with the other items: "I do fine in school and athletics, I do not want to do better" (–.19). If this item is removed from the subscale, Cronbach's alpha increases (.43). The JTCl had similar validity to other studies of adolescents except for persistence. In another Swedish study persistence was included in reward dependence (Jonasson, 1999) and had a better alpha. The JTCl was administered at the baseline assessment and a total score for each scale was used.

The Wechsler Intelligence Scale. The Wechsler Intelligence Scale for Children—Third Edition (WISC-III; Wechsler, 2003) was used for adolescents age 17 and younger, and the Wechsler Adult Intelligence Scale—Revised (WAIS-R) was used for adolescents age 18 and older (Wechsler, 2002). Two subtests, Word List and Block Design, highly correlated with verbal and performance intelligence, were administered. Both instruments have repeatedly been shown to be valid and reliable (Wechsler, 2002, 2003). Intelligence was measured at baseline and a score was calculated from the two subtests to create a total score of intelligence. Scores of the two subtests were significantly correlated (.31, $p = .000$).

The Diagnostic and Statistical Manual of Mental Disorders. Psychiatric symptoms were assessed according to the *DSM-IV* (American Psychiatric Association, 1994). Adolescents age 17 or older were assessed by the Structured Clinical Interview for *DSM-IV* Axis I Disorders (SCID-I) and *DSM-IV* Axis II Disorders in adults (SCID-II; First, Gibbon, Spitzer, Williams, & Benjamin, 1997; First, Spitzer, Gibbon,

TABLE 2.—Pearson's correlations within Health-Relevant Personality Inventory (HP5i) scales and Junior Temperament and Character Inventory (JTICI) scales.

	Antagonism	Impulsivity	Hedonic Capacity	Negative Affectivity			
HP5i							
Impulsivity	.40**						
Hedonic capacity	.10	.24**					
Negative affectivity	.26**	.34**	-.12				
Alexithymia	.45**	.11	-.04	.19*			
JTICI							
	Novelty Seeking	Harm Avoidance	Reward Dependence	Persistence	Self-Directedness	Cooperativeness	Self-Transcendence(1)
Harm avoidance	-.18**						
Reward dependence	-.08	-.19**					
Persistence	-.34**	-.02	.09				
Self-directedness	-.27**	-.44**	.29**	.28**			
Cooperativeness	-.21**	-.17*	.29**	.10	.30**		
Self-transcendence (1)	.003	.31**	-.06	-.008	-.28**	-.09	
Self-transcendence (2)	-.28**	.28*	.02	.04	-.16*	-.01	.39**

p* = .05. *p* = .01.

& Williams, 1997) and for adolescents younger than 17, the Kiddie-SADS-Present and Lifetime Version (K-SADS-PL) was used (Kaufman et al., 1996). Interrater reliability was good for each instrument: 12 cases of SCID were rated independently by a second clinician (for conduct disorder, $\kappa = .82$; for depression, $\kappa = 1$; for anxiety, $\kappa = .80$; for alcohol use disorder, $\kappa = .64$; for drug use disorder, $\kappa = 1$), and 15 cases of K-SADS-PL were rated independently by a second clinician (for conduct disorder, $\kappa = .74$; for depression, $\kappa = .60$; for anxiety, $\kappa = 0.42$; for alcohol use disorder, $\kappa = .60$; for drug use disorder, $\kappa = .82$). No kappa was calculated for antisocial personality disorder because there were too few cases. Psychiatric symptoms were assessed at the baseline interview and the 12-month follow-up. Data from the SCID-I and the K-SADS-PL were combined into one measurement of psychiatric symptoms. The following psychiatric symptoms were included: depression (17 symptoms), anxiety (49 symptoms), conduct disorder (15 symptoms), alcohol use disorder (11 symptoms), drug use disorder (11 symptoms), and antisocial personality disorder (7 symptoms).

Statistical Analyses

Descriptive analyses of the HP5i and the JTICI included Cronbach's alpha and Pearson's correlations between scales of the two instruments. Discriminant validity was explored by calculating Spearman's correlations separately between scores of the HP5i, the JTICI scales, and the intelligence mean score. Convergent validity was examined by Spearman's correlations separately for scores of HP5i and JTICI scales and number of symptoms of depression, anxiety, conduct disorder, alcohol use disorder, drug use disorder, and antisocial personality disorder. In the statistical analyses, measures from the same interview occasion were used. Because the JTICI was assessed at baseline, it was correlated with psychiatric symptoms from the baseline interview, whereas the HP5i was assessed at 12-month follow-up and hence correlated with psychiatric symptoms from the follow-up. Assuming stability in the construct, intelligence measured at baseline was used for exploring discriminant validity of the HP5i (data collected at the follow-up).

The predictive validity of the JTICI was studied in two steps. First, Spearman's correlations were calculated between JTICI scale scores and psychiatric symptoms at 12-month follow-up. Second, multiple regression analyses were performed with psychiatric symptoms (depression, anxiety, conduct problems, alcohol use disorder, drug use disorder, antisocial personality disorder) at follow-up as the dependent variable and JTICI scale scores and psychiatric symptom at baseline as covariates.

Statistical analyses have been calculated for the total sample and by gender separately. Due to incomplete or missing self-assessments, 20 to 23 cases were omitted from the analyses of the HP5i and 11 to 15 cases from the analyses of the JTICI (see Table 1). To control for Type 1 error, the level of significance was adjusted by Bonferroni correction ($\beta = \alpha/n$). In the tables, unadjusted correlation coefficients were shown.

RESULTS

Descriptions of the scales of the HP5i and the JTICI and prevalence of psychiatric diagnoses are shown in Table 1. The mean scores of the HP5i ranged from 2.00 to 3.11 ($SD = 0.45-0.75$) and the JTICI mean score ranged from 1.79 to 13.96 ($SD = 1.42-3.42$). The most common diagnosis at baseline and the 12-month follow-up was anxiety. Table 2 shows correlations between scales of each inventory. The matrix indicated that the scales measure different dimensions of personality. Analyses by gender revealed small differences, where girls scored significantly higher on negative affectivity (HP5i) and harm avoidance (JTICI) and significantly lower on alexithymia (HP5i) compared to boys. Consequently, the results do not report gender-specific analyses.

Discriminant Validity

Confirming Hypothesis 1, in general there were no significant correlations between the scores of either HP5i or JTICI scales and intelligence (see Table 3). However, three scales—alexithymia (HP5i), harm avoidance (JTICI), and self-directedness (JTICI)—showed significant correlations with scores of intelligence. The correlations were, however, relatively modest in size. When Bonferroni correction was used,

TABLE 3.—Spearman's correlations between Health-Relevant Personality Inventory (HP5i) scales, Junior Temperament and Character Inventory (JTCI) scales, and measures of intelligence and psychiatric symptoms.

	Discriminant Validity	Convergent Validity			Conduct Disorder	Alcohol Use Disorder	Drug Use Disorder	Antisocial Personality Disorder
		Intelligence	Depression	Anxiety				
HP5i								
Antagonism	-.08	.06	-.05	.35**	.10	.10	.31**	
Impulsivity	.11	.09	.15	.24**	.18*	.18*	.25*	
Hedonic capacity	.13	-.21**	-.11	.08	.11	-.12	.04	
Negative affectivity	.06	.35**	.41**	.05	.08	.04	-.04	
Alexithymia	-.20*	-.08	-.11	.32**	.10	.05	.42**	
JTCI								
Novelty seeking	.10	.09	.04	.19*	.20*	.15*	.20*	
Harm avoidance	-.20**	.30**	.32**	-.06	.03	.09	-.12	
Reward dependence	-.03	-.04	.06	.06	-.04	-.03	.03	
Persistence	-.05	-.15	-.08	-.05	-.17*	-.12	.02	
Self-directedness	.27**	-.14	-.14	-.14	-.06	-.06	-.06	
Cooperativeness	.15	-.14	.03	-.20*	-.15*	-.16*	-.26**	
Self-transcendence (1)	-.05	-.03	.21*	.04	.08	.08	-.09	
Self-transcendence (2)	-.11	.21**	.14	-.02	.03	.09	-.08	

* $p = .05$. ** $p = .01$.

only scores of self-directedness (JTCI) remained significant ($p = .000$).

Convergent Validity

In accordance with Hypothesis 2, there was a positive correlation between scores of negative affectivity (HP5i), harm avoidance (JTCI), and symptoms of depression and anxiety (see Table 3). Adolescents with a high degree of negative emotions and behavioral inhibition experienced more symptoms of depression and anxiety. After adjusting the significance level with Bonferroni correction, the hypothesis was still confirmed. Further, there was a positive correlation between scores of antagonism (HP5i), impulsivity (HP5i), and novelty seeking (JTCI), and symptoms of conduct disorder, alcohol use disorder, drug use disorder, and antisocial personality disorder, with the exception for the correlation between scores of antagonism and alcohol use disorder and drug use disorder, which reported no significant correlations (Hypothesis 3). Adolescents with conduct problems exhibit more hostile behavior, impulsivity, and behavioral activation whereas adolescents with a substance misuse problem are more impulsive and behaviorally activated. Additionally, adolescents with a high degree of antisocial behavior were characterized by high scores on alexithymia and low scores on cooperativeness. However, after correction of the level of significance, antagonism scores were significantly associated with conduct disorder, and alexithymia scores were significantly associated with antisocial personality disorder.

Predictive Validity

As shown in Table 4 the two hypotheses covering the predictive validity of the JTCI were partly supported. Scores on harm avoidance were positively correlated with symptoms of anxiety but showed an insignificant correlation to depression (Hypothesis 4). Novelty seeking scores were positively correlated with both symptoms of conduct disorder, alcohol use disorder, and drug use disorder, but showed an insignificant correlation with antisocial personality disorder (Hypothesis 5). Additionally, low cooperativeness scores were predictive of ex-

ternalizing symptoms, except antisocial personality disorder; explicitly, adolescents who rated themselves as being less part of society had more conduct problems and substance misuse. As expected, there was no significant correlation between scores of intelligence and 12-month follow-up psychiatric symptoms. However, there were expected significant correlations between psychiatric symptoms at baseline and follow-up. When the level of significance was adjusted, only scores on cooperativeness remained negatively correlated with conduct disorder 12 months later, although most of the significant correlations between psychiatric symptoms at baseline and follow-up remained. Further, when psychiatric diagnoses were controlled for only one subscale, cooperativeness significantly predicted conduct disorder (Adj. $R^2 = .208$), $F(2, 102) = 13.401$, $p = .000$.

DISCUSSION

The aim of the study was to investigate the validity of two different measures of personality, the HP5i and the JTCI, among adolescents referred for treatment due to substance use problems. Both instruments demonstrated sufficient validity when used in such a sample. There were weak correlations between the scales of each instrument, suggesting that each scale measures different aspects of personality.

Confirming Hypothesis 1, discriminant validity was demonstrated in the lack of any substantial correlations to the measure of intelligence in both instruments' scales. However, alexithymia (HP5i, negatively correlated to openness of the FFM) showed an expected negative correlation with intelligence because openness is the only factor that has been associated with years of education (Costa & McCrae, 1992) and in line with previous studies, harm avoidance (JTCI) and self-directedness (JTCI) were correlated with intelligence (Copeland et al., 2004).

In general, there was support for the convergent validity of both instruments (Hypotheses 2 & 3). Replicating previous studies, a typical pattern emerged with more negative feelings and behavioral inhibition among adolescents with internalizing problems (Hypothesis 2; e.g. Cho et al., 2008). Adolescents with externalizing problems exhibit high levels of impulsivity

TABLE 4.—Spearman's correlations between the Junior Temperament and Character Inventory (JTCl) scales, intelligence, psychiatric symptoms at baseline, and psychiatric symptoms 12 months later.

	Psychiatric Symptoms at 12-Month Follow-Up					
	Depression	Anxiety	Conduct Disorder	Alcohol Use Disorder	Drug Use Disorder	Antisocial Personality Disorder
Novelty seeking	-.02	.03	.23**	.17*	.21*	.16
Harm avoidance	.13	.25**	-.11	.08	.008	-.08
Reward dependence	-.10	.03	-.08	-.02	-.09	-.06
Persistence	-.001	-.12	-.01	-.11	-.007	.14
Self-directedness	-.003	-.12	-.07	-.06	-.10	-.09
Cooperativeness	.12	-.06	-.29**	-.18*	-.09	-.22*
Self-transcendence (1)	.11	.19*	-.09	.05	-.05	-.04
Self-transcendence (2)	.15	.16	-.03	.03	.001	.11
Intelligence	.10	.02	-.08	.02	-.01	-.16
Depression (baseline)	.40**	.25**	.11	.21**	.19*	.05
Anxiety (baseline)	.41**	.53**	.09	.20*	.23**	-.01
Conduct disorder (baseline)	-.14	-.06	.41**	.23**	.12	.49**
Alcohol use disorder (baseline)	.20*	.18*	.21**	.48**	.28**	.29**
Drug use disorder (baseline)	.04	-.07	.11	.21*	.41**	.38**
Antisocial personality disorder (baseline)	-.06	.01	.54**	.30**	.27**	.77**

*p = .05. **p = .01.

and behavioral activation (Hypothesis 3). Further, adolescents with more symptoms of conduct disorder and antisocial personality disorder rated themselves as hostile, whereas there was no correlation between symptoms of alcohol and drug use disorder and hostile behavior. This is in line with previous research that has established a firm association between aggressive behavior and antisocial behavior (Frick & White, 2008). As noted earlier, adolescents referred for a substance use problem with more symptoms of conduct disorder, alcohol use disorder, and antisocial personality disorder rated themselves as intolerant, blaming others, and self-oriented (low cooperativeness), possibly reflecting their antisocial behavior.

The predictive validity of the JTCl was partly supported (Hypotheses 4 & 5). However, harm avoidance only predicted symptoms of anxiety and not depression over 12 months (Hypothesis 4). One possible explanation is the high prevalence of anxiety diagnosis in the sample (34%), whereas prevalence rates of 1.6% have been reported in nonclinical samples (age 16; e.g., Costello, Mustillo, Erkanli, Keeler, & Angold, 2003). Diagnosis of depression is less common in the sample (4.5%) and there was also less range in number of symptoms that is possibly affecting the association between harm avoidance and symptoms of depression. In addition to the hypotheses, adolescents with continued externalizing problems rated themselves as less a part of society (cooperativeness), possibly reflecting their antisocial attitudes. When psychiatric symptoms were controlled for, only cooperativeness significantly predicted conduct disorder 12 months later. Possibly, the strong correlations between baseline and follow-up psychiatric symptoms exclude correlations between personality traits and psychiatric symptoms.

There are limitations that need consideration. Both instruments report a low Cronbach's alpha in specific scales although in line with previous research (e.g., Asch et al., 2009). One

explanation can be the low number of items in specific scales because alpha increases as the number of items increases (John & Soto, 2007). Another explanation can be sample specific, as in a previous Swedish study persistence was combined with reward dependence (Jonasson, 1999) indicating difficulties with persistence in Swedish samples. Also, the two personality instruments were developed for use in different groups—adults and children or adolescents—and different settings—research and clinical work—that might influence the validity in this sample. Because HP5i was measured at the follow-up, an exploration of the predictive validity was not possible. There was a drop out from baseline to follow-up, although in line with what would be expected in this kind of study sample. When multiple correlation analyses are conducted there is an increased risk of type I error. To control for Type I error, a Bonferroni correction was applied. Bonferroni is a strict measurement to control Type I error, and when used in small samples it can be considered too strict. This has implications for the interpretation of the results and warrants further research on both instruments. The major strengths are a clinical study of adolescents with a substance use problem including clinical interviews, variables used to validate the instruments are not self-reported measures, and a follow-up study, enabling the study of the predictive validity of the JTCl.

To summarize, both instruments show sufficient validity and can give a first picture of personality profiles in an adolescent clinical sample, although there are some psychometric shortcomings warranting further studies. Traits measuring negative emotions were associated with internalizing symptoms, whereas traits measuring impulsivity and integration in society were associated with externalizing symptoms. The JTCl had some ability to predict psychiatric symptoms 1 year later. The results of this study highlight the importance of a valid personality assessment in adolescents. Screening for personality profiles in addition to psychiatric assessment can help in tailoring treatment efforts for adolescents. There is a need for different treatment interventions focusing on specific personality traits; for example, interventions aiming to curb impulsivity can target psychiatric problems in the externalizing spectrum, whereas interventions aiming at negative emotions can target the internalizing spectrum.

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REFERENCES

American Psychiatric Association. (1994). *Diagnostic and statistical manual of mental disorders* (4th ed.). Washington, DC: Author.

Anderson, K. G., Tapert, S. F., Moadab, I., Crowley, T. J., & Brown, S. A. (2007). Personality risk profile for conduct disorder and substance use disorders in youth. *Addictive Behaviors*, 32, 2377–2382. doi:10.1016/j.addbeh.2007.02.006

Asch, M., Cortese, S., Perez Diaz, F., Pelissolo, A., Aubron, V., Orejarena, S., ... Purper-Ouakil, D. (2009). Psychometric properties of a French version of the Junior Temperament and Character Inventory. *European Child and Adolescent Psychiatry*, 18, 144–153. doi:10.1007/s00787-008-0713-9

Battaglia, M., Przybeck, T. R., Bellodi, L., & Cloninger, C. R. (1996). Temperament dimensions explain the comorbidity of psychiatric disorders. *Comprehensive Psychiatry*, 37, 292–298.

Brandorf, M. (1994). *JTCl, Svensk version*. Halmstad, Sweden: Inst för Hälsovetenskap, Högskolan i Halmstad.

- Briggs, S. R., & Cheek, J. M. (1986). The role of factor analysis in the development and evaluation of personality scales. *Journal of Personality, 54*, 106–148.
- Caspi, A., Harrington, H., Milne, B., Amell, J. W., Theodore, R. F., & Moffitt, T. E. (2003). Children's behavioral styles at age 3 are linked to their adult personality traits at age 26. *Journal of Personality, 71*, 495–513.
- Caspi, A., Roberts, B. W., & Shiner, R. L. (2005). Personality development: Stability and change. *Annual Review of Psychology, 56*, 453–484.
- Cho, S. C., Hwang, J. W., Lyoo, I. K., Yoo, H. J., Kim, B. N., & Kim, J. W. (2008). Patterns of temperament and character in a clinical sample of Korean children with attention-deficit hyperactivity disorder. *Psychiatry and Clinical Neuroscience, 62*, 160–166. doi:10.1111/j.1440-1819.2008.01749.x
- Cho, S. C., Jung, S. W., Kim, B. N., Hwang, J. W., Shin, M. S., Kim, J. W., . . . Kim, H. W. (2009). Temperament and character among Korean children and adolescents with anxiety disorders. *European Child and Adolescent Psychiatry, 18*(6), 60–64. doi:10.1007/s00787-008-0699-3
- Clark, L. A., Watson, D., & Mineka, S. (1994). Temperament, personality, and the mood and anxiety disorders. *Journal of Abnormal Psychology, 103*(1), 103–116.
- Cloninger, C. R., Przybeck, T. R., Svrakic, D. M., & Wetzel, R. D. (1994). *The Temperament and Character Inventory (TCI): A guide to its development and use*. St. Louis, MO: Washington University Center for Psychobiology of Personality.
- Cloninger, C. R., Sigvardsson, S., & Bohman, M. (1988). Childhood personality assessment of alcoholism in a national area probability sample. *Cloninger, C. R., Svrakic, D. M., & Przybeck, T. R. (2006). Can personality assessment predict future depression? A twelve-month follow-up of 631 subjects. Journal of Affective Disorders, 92, 35–44. doi:10.1016/j.jad.2005.12.034*
- Conway, K. P., Kane, R. J., Ball, S. A., Poling, J. C., & Rounsaville, B. J. (2003). Personality, substance of choice, and polysubstance involvement among substance dependent patients. *Drug and Alcohol Dependence, 71*, 65–75.
- Copeland, W., Landry, K., Stanger, C., & Hudziak, J. J. (2004). Multi-informant assessment of temperament in children with externalizing behavior problems. *Journal of Clinical Child and Adolescent Psychology, 33*, 547–556. doi:10.1207/s15374424jccp3303_12
- Costa, P. T., & McCrae, R. R. (1992). *NEO PI-R Revised NEO Personality Inventory (NEO PI-R) and NEO Five-Factor Inventory (NEO-FFI)*. Lutz, FL: Psychological Assessment Resources.
- Costello, E. J., 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. doi:10.1001/archpsyc.60.8.837
- Crawford, T. N., Cohen, P., First, M. B., Skodol, A. E., Johnson, J. G., & Kasen, S. (2008). Comorbid Axis I and Axis II disorders in early adolescence: Outcomes 20 years later. *Archives of General Psychiatry, 65*, 641–648. doi:10.1001/archpsyc.65.6.641
- Digman, J. M. (1990). Personality structure: Emergence of the five-factor model. *Annual Review of Psychology, 41*, 417–440.
- Evren, C., Evren, B., Yancar, C., & Erkiran, M. (2007). Temperament and character model of personality profile of alcohol- and drug-dependent inpatients. *Comprehensive Psychiatry, 48*, 283–288. doi:10.1016/j.comppsy.2006.11.003
- First, M. B., Gibbon, M., Spitzer, R. L., Williams, J. B. W., & Benjamin, L. S. (1997). *User's guide for the Structured Clinical Interview for DSM-IV Axis II Personality Disorders*. Washington, DC: American Psychiatric Press.
- First, M. B., Spitzer, R. L., Gibbon, M., & Williams, J. B. W. (1997). *User's guide for the Structured Clinical Interview for DSM-IV Axis I Disorders—Clinical version (SCID-CV)*. Washington, DC: American Psychiatric Press.
- 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*, 359–375. doi:10.1111/j.1469-7610.2007.01862.x
- Gabel, S., Stallings, M. C., Schmitz, S., Young, S. E., & Fulker, D. W. (1999). Personality dimensions and substance misuse: Relationships in adolescents, mothers, and fathers. *The American Journal on Addictions, 8*, 101–113.
- Gothelf, D., Aharonovsky, O., Hoeshe, N., Carty, T., & Apter, A. (2004). Life events and personality factors in children and adolescents with obsessive-compulsive disorder and other anxiety disorders. *Comprehensive Psychiatry, 45*, 192–198. doi:10.1016/j.comppsy.2004.02.010
- Gunnarsson, M., Gustavsson, J. P., Tengstrom, A., Franck, J., & Fahlke, C. (2008). Personality traits and their associations with substance use among adolescents. *Personality and Individual Differences, 45*, 356–360. doi:10.1016/j.paid.2008.05.004
- Gustavsson, J. P., Eriksson, A. K., Hilding, A., Gunnarsson, M., & Ostensson, C. G. (2008). Measurement invariance of personality traits from a Five-factor model perspective: Multi-group confirmatory factor analyses of the HP5 inventory. *Scandinavian Journal of Psychology, 49*, 459–467. doi:10.1111/j.1467-9450.2008.00654.x
- Gustavsson, J. P., Jönsson, E. G., Linder, J., & Weinryb, R. M. (2003). The HP5 Inventory: definition and assessment of five health-relevant personality traits from a Five-factor model perspective. *Personality and Individual Differences, 35*(1), 69–89.
- Hodgins, S., Tengstrom, A., Bylin, S., Goranson, M., Hagen, L., Janson, M., . . . Pedersen, H. (2007). Consulting for substance abuse: Mental disorders among adolescents and their parents. *Nordic Journal of Psychiatry, 61*, 379–386. doi:10.1080/08039480701643423
- Hopwood, C. J., Morey, L. C., Skodol, A. E., Stout, R. L., Yen, S., Ansell, E. B., . . . McGlashan, T. H. (2006). Five-factor model personality traits associated with alcohol-related diagnoses in a clinical sample. *Journal of Studies in Alcohol and Drugs, 68*, 455–460.
- John, O. P., & Soto, C. J. (2007). The importance of being valid. In R. W. Robins, R. C. Fraley, & R. F. Krueger (Eds.), *Handbook of research methods in personality psychology* (pp. 461–494). New York, NY: Guilford.
- Jonasson, M. (1999). *Personlighetsutveckling hos ungdomar—en svensk normering av JTCI*. [Development of personality in adolescents—A Swedish standardization of JTCI]. Umeå, Sweden: Umeå Universitet.
- Kaufman, J., Birmaher, B., Brent, D. A., Rao, U., Flynn, C., Moreci, P., . . . Ryan, N. (1996). Schedule for affective disorders and schizophrenia for school-age children—Present and lifetime version (K-SADS-PL): Initial reliability and validity data. *Journal of the American Academy of Child and Adolescent Psychiatry, 36*, 980–988.
- Kerekes, N., Brandstrom, S., Stahlberg, O., Larson, T., Carlstrom, E., Lichtenstein, P., . . . Nilsson, T. (2010). The Swedish version of the parent-rated Junior Temperament and Character Inventory (JTCI). *Psychological Reports, 107*, 715–725. doi:10.2466/02.09.10.PR.107.6.715-725
- Kim, S. J., Lee, S. J., Yune, S. K., Sung, Y. H., Bae, S. C., Chung, A., . . . Lyoo, I. K. (2006). The relationship between the biogenetic temperament and character and psychopathology in adolescents. *Psychopathology, 39*, 80–86. doi:10.1159/000090597
- Kotov, R., Gamez, W., Schmidt, F., & Watson, D. (2010). Linking “big” personality traits to anxiety, depressive, and substance use disorders: A meta-analysis. *Psychological Bulletin, 136*, 768–821.
- Krueger, R. F., & Markon, K. E. (2006). Reinterpreting comorbidity: A model-based approach to understanding and classifying psychopathology. *Annual Review of Clinical Psychology, 2*, 111–133. doi:10.1146/annurev.clinpsy.2.022305.095213
- Lahey, B. B. (2004). Commentary: Role of temperament in developmental models of psychopathology. *Journal of Clinical Child and Adolescent Psychology, 33*, 88–93.
- Lauch, M., Becker, K., Blomeyer, D., & Schmidt, M. H. (2007). Novelty seeking involved in mediating the association between the dopamine D4 receptor gene exon III polymorphism and heavy drinking in male adolescents: Results from a high-risk community sample. *Biological Psychiatry, 61*, 87–92. doi:10.1016/j.biopsych.2006.05.025
- Luby, J. L., Svrakic, D. M., McCallum, K., Przybeck, T. R., & Cloninger, C. R. (1999). The Junior Temperament and Character Inventory: Preliminary validation of a child self-report measure. *Psychological Reports, 84*, 1127–1138.

- Lyoo, I. K., Han, C. H., Lee, S. J., Yune, S. K., Ha, J. H., Chung, S. J., ... Hong, K. E. (2004). The reliability and validity of the Junior Temperament and Character Inventory. *Comprehensive Psychiatry*, *45*, 121–128. doi:10.1016/j.comppsy.2003.12.002
- McCrae, R. R. (1991). The Five-factor model and its assessment in clinical settings. *Journal of Personality Assessment*, *57*(3), 399–314. doi:10.1207/s15327752jpas5703_2
- Merenäkk, L., Harro, M., Kiive, E., Laidra, K., Eensoo, D., Allik, J., ... Harro, J. (2003). Association between substance use, personality traits, and platelet MAO activity in preadolescents and adolescents. *Addictive Behaviors*, *28*, 1507–1514.
- Mulder, R. T. (2002). Alcoholism and personality. *Australian and New Zealand Journal of Psychiatry*, *36*, 44–52.
- Rettew, D. C., Copeland, W., Stanger, C., & Hudziak, J. J. (2004). Associations between temperament and *DSM-IV* externalizing disorders in children and adolescents. *Development and Behavioral Pediatrics*, *25*, 383–391.
- Roberts, B. W., & DelVecchio, W. F. (2000). The rank-order consistency of personality traits from childhood to old age: A quantitative review of longitudinal studies. *Psychological Bulletin*, *126*(1), 3–25.
- Roberts, B. W., Walton, K. E., & Viechtbauer, W. (2006). Patterns of mean-level change in personality traits across the life course: A meta-analysis of longitudinal studies. *Psychological Bulletin*, *132*(1), 1–25.
- Ruiz, M. A., Pincus, A. L., & Dickinson, K. A. (2003). NEO PI-R predictors of alcohol use and alcohol-related problems. *Journal of Personality Assessment*, *81*, 226–236.
- Ruiz, M. A., Pincus, A. L., & Schinka, J. A. (2008). Externalizing pathology and the Five factor model: A meta-analysis of personality traits associated with antisocial personality disorder, substance use disorder, and their co-occurrence. *Journal of Personality Disorders*, *22*, 365–388. doi:10.1521/pedi.2008.22.4.365
- Schmeck, K., Goth, K., Poustka, F., & Cloninger, R. C. (2001). Reliability and validity of the Junior Temperament and Character Inventory. *International Journal of Methods in Psychiatric Research*, *10*, 172–182. doi:10.1002/mpr.113
- Schmeck, K., & Poustka, F. (2001). Temperament and disruptive behavior disorders. *Psychopathology*, *34*, 159–163.
- Tackett, J. L. (2006). Evaluating models of the personality-psychopathology relationship in children and adolescents. *Clinical Psychological Review*, *26*, 584–599. doi:10.1016/j.cpr.2006.04.003
- Trull, T. J., & Sher, K. J. (1994). Relationship between the Five-factor model of personality and Axis I disorders in a nonclinical sample. *Journal of Abnormal Psychology*, *103*, 350–360.
- Wechsler, D. (2002). *Wechsler Adult Intelligence Scale-Revised*. San Antonio, TX: Psychological Corporation.
- Wechsler, D. (2003). *Manual for the Wechsler Intelligence Scale for Children* (3rd ed.). San Antonio, TX: Psychological Corporation.
- Widiger, T. A., & Smith, G. T. (2008). Personality and psychopathology. In O. P. John, R. W. Robins, & L. A. Pervin (Eds.), *Handbook of personality theory and research* (pp. 743–769). New York, NY: Guilford.
- Wills, T. A., Windle, M., & Cleary, S. D. (1998). Temperament and novelty seeking in adolescent substance use: Convergence of dimensions of temperament with constructs from Cloninger's theory. *Journal of Personality and Social Psychology*, *74*, 387–406.

III

Stability of psychopathic traits from mid-adolescence through early adulthood among individuals
who as adolescents sought treatment for substance misuse

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Abstract

Objective: Maladaptive personality traits decrease from adolescence to adulthood, but some studies show stability in psychopathic traits in this period. Psychopathic traits are associated with a failure to engage and benefit from treatment and violent behavior. The present study examined the stability of psychopathic traits from mid-adolescence to early adulthood and explored adolescent factors that predicted psychopathic traits five years later.

Method: 99 women and 81 men who as adolescents had consulted a clinic for substance misuse, were assessed at a mean age of 16.8 years using the Psychopathy Checklist: Youth Version (PCL:YV) and five years later using the PCL-Revised (PCL-R). Extensive clinical assessments of the adolescents and their parents were completed in mid-adolescence.

Results: Moderate to high rank-order stability was observed for total PCL and facet scores in both genders. Mean total scores and mean scores for the interpersonal and affective facets decreased over the five-year period, the lifestyle facet scores were stable among females and increased among males, while scores for the antisocial facet remained stable among females and males. Multivariate analyses showed that levels of psychopathic traits in mid-adolescence were the strongest predictor of traits five years later, in addition to aggressive behavior. A drug use disorder in mid-adolescence independently predicted affective and lifestyle traits five years later.

Conclusion: Psychopathic traits were stable from mid-adolescence to early adulthood among males and females who sought treatment for substance misuse in adolescence. Treatment programs may benefit from assessing psychopathic traits and providing specific interventions for those with elevated levels.

Key words: psychopathic traits, stability, change, adolescence

Stability of Psychopathic Traits from Mid-adolescence through Early Adulthood and Predictors of Change

Adolescents misusing substances present high levels of conduct disorder that in most cases onset prior to substance misuse (Armstrong and Costello, 2002). Among adolescents with conduct problems, those who additionally present traits of psychopathy display high levels of aggressive behavior (Frick and White, 2008), and in adulthood are at elevated risk for persistent criminal offending (Lawing et al., 2010; Moffitt, 1993), and violence towards others (Leistico et al., 2008). Emerging evidence suggests that these traits are present before age 5 (Dadds et al., 2005). One randomized controlled study has shown that children with conduct problems and high levels of psychopathic traits fail to respond to time-out and require specific interventions that target their empathetic deficits (Hawes and Dadds, 2007). Another study has shown that different dimensions of parenting need to be targeted in interventions for parents of children with conduct problems with and without psychopathic traits (Pasalich et al., 2011). Similarly, adolescents with conduct problems and psychopathic traits are difficult to engage in treatment and respond poorly to offender rehabilitation programs (Salekin et al., 2010). Thus, the presence of psychopathic traits among adolescents engaging in antisocial behavior may indicate the need for a specific treatment approach. Most treatment centers for adolescents engaging in substance misuse, to the best of our knowledge, do not assess psychopathic traits, even though the importance of this differential diagnosis is now recognized by experts (Rutter, 2012). Such assessments and specific treatments may not be necessary, however, if these traits dissipate by early adulthood. The present study examined the stability of psychopathic traits from mid-adolescence to early adulthood among individuals who as adolescents sought treatment for substance misuse.

Change in personality traits from adolescence to early adulthood

Rank-order stability has been observed in personality traits from childhood through late adulthood (Roberts and DelVecchio, 2000). However, mean-level changes in several traits have been observed during key developmental periods (Caspi et al., 2005; Roberts et al., 2006). The period from mid-adolescence through early adulthood is one of change, with a peak in the prevalence of internalizing and externalizing disorders (Kessler et al., 2005), and changes in personality traits indicative of maturity (Meeus et al., 2011). Although few individuals experience a personality transformation, a small percentage show change, particularly increases in constraint or self-control and decreases in aggression and alienation (Blonigen et al., 2006; McGue et al., 1993; Roberts et al., 2001). Maladaptive personality traits tend to decline during adolescence (Johnson et al., 2000). Most studies have not observed gender differences in the stability of personality traits, but some indicate faster maturation in females (Roberts and DelVecchio, 2000). Based on studies of personality traits from mid-adolescence to early adulthood, reductions in psychopathic traits among both males and females in this same period might be expected.

Stability of psychopathic traits

Despite the limited number of studies, differing measures and raters, and few female participants, rank-order¹ and individual-level stability¹ has been observed in psychopathic traits among adolescents over six and 12 months (Burke et al., 2007; Forth et al., 2003; Lee et al., 2009; Loney et al., 2007; Lynam et al., 2007). Findings on mean-level stability¹ using self-report measures are inconsistent; a gender difference has been reported, with a decrease or stability in psychopathic traits among females and an increase among males. Thus, little is known about

stability of psychopathic traits assessed by clinicians using validated instruments among teenage girls and boys seeking treatment for substance misuse as they transition to adulthood.

Factors Influencing Change in Psychopathic Traits

Little is known about factors influencing change and/or stability in scores for psychopathic traits among adolescents. Studies of children show that stability of these traits was associated with low socio-economic status of the family, a lack of positive parenting experiences, low intelligence, a high initial level of conduct problems, and level of social competence (Frick et al., 2003). Among adolescent boys, poor parent-child communication and higher levels of conduct problems were associated with elevated parent-rated scores for interpersonal callousness (Pardini and Loeber, 2008). In another study of male adolescents, psychopathic traits at age 13, peer delinquency, physical punishment, and low socio-economic status of the family predicted psychopathic traits at age 24 (Lynam et al., 2008).

Factors that have been found to promote the development of psychopathy would be expected to predict stability or increases in psychopathic traits over time. These factors include substance misuse (O'Neill et al., 2003), criminal activity (Campbell et al., 2004), aggressive behavior (Frick and White, 2008), victimization by peers (Brendgen et al., 2008), fearlessness (Blair et al., 2006), and parents' antisocial behavior (Forsman et al., 2008; Hussong et al., 2007). By contrast, factors that have been found to limit the development of psychopathy may predict decreases in psychopathy scores over time. These factors include intelligence, especially verbal intelligence (Burke et al., 2007), and anxiety (Dolan and Rennie, 2007).

The present study

The few studies of clinically assessed psychopathic traits suggest moderate to high stability in late adolescence. The stability of high levels of psychopathic traits from adolescence

into adulthood predicts a high risk of persistent violent behavior through adulthood (Leistico et al., 2008), and poor engagement and success in treatment (Salekin et al., 2010). Findings of stability of psychopathic traits among adolescents seeking treatment for substance misuse would indicate a need for a specific treatment approach and thereby present a significant challenge to treatment programs. By contrast, if psychopathic traits decrease as adolescents become independent and adopt adult roles, the risk of persistent antisocial behavior and substance misuse would decrease. Further, knowledge of factors associated with decreases in psychopathic traits could be used to inform changes to current treatment programs. Presently, it is not known if psychopathic traits presented by adolescents seeking treatment for substance misuse remain stable into adulthood, if the stability of such traits is similar among males and females, and the factors that influence change in these traits.

The present study examined stability in psychopathic traits over a five-year period, from mid-adolescence to early adulthood, among women and men who as adolescents had consulted a clinic for substance misuse. Additionally, exploratory analyses were conducted to estimate the independent associations of characteristics assessed in mid-adolescence with change in psychopathy total and facet scores over the next five years.

Method

Sample

Baseline assessment. 742 adolescents contacted the only substance misuse clinic in a large urban center in Sweden during a 19 week period in 2004. From among them, a random sample of 373 (50.3%) adolescents and their parents were invited to participate in the study. The final sample included 180 clients (mean age = 16.8, SD= 1.9), 99 females with their 90 mothers

and 52 fathers, and 81 males with their 72 mothers and 37 fathers. (further information (Hodgins et al., 2007).

Five-year follow-up. Five years later, 146 ex-clients, 85 women (58 %) and 61 men (42 %), completed interviews. Those who participated did not differ from those who did not on PCL:YV scores nor on predictors with one exception. Participants had reported higher mean scores ($M=2.01$, $SD=0.89$) for parental disclosure than non-participants ($M=1.39$, $SD=0.99$; $t(158) = -3.16$, $p=.002$). Characteristics of the sample are presented in Table 1. Both baseline and follow-up studies were approved by the Karolinska Institute Research ethics Committee Nord (DNR 03-543) and Regionala etikprövningsnämnden in Stockholm (DNR 2008/1934-31/3).

Insert Table 1 about here

Measures in mid-adolescence

Psychopathic traits. The Hare Psychopathy Checklist: Youth Version (PCL:YV) (Forth et al., 2003) is a 20-item rating scale for the assessment of psychopathic traits in adolescents. Each item is scored 0 (consistently absent), 1 (inconsistently present), or 2 (consistently present). Factor analysis identify four factors: interpersonal - impression management, grandiose sense of self-worth, pathological lying, manipulation for personal gain; affective - lack of remorse, shallow affect, callous/lack of empathy, failure to accept responsibility; behavioral - stimulation seeking, parasitic orientation, lacks goals, impulsivity, irresponsibility; and antisocial - poor anger control, early behavior problems, serious criminal behavior, serious violations of conditional release, criminal versatility) (Hare, 2003). The PCL:YV has been shown to have high

levels of validity and reliability when used with non-incarcerated adolescent males (Kosson et al., 2002) and to a less extent with adolescent girls (Das et al., 2008).

The PCL:YV was rated by clinical psychologists, who were trained to use this instrument, and, as recommended based on the interview and clinical files. Inter-rater reliability was calculated on 29 adolescents (12 women and 17 men) using Intraclass correlations (ICC): PCL:YV total score .86, interpersonal facet .61, affective facet .74, lifestyle facet .67, antisocial facet .87.

Poverty. Poverty was defined as the participant's family having received social welfare payments as indicated by the Swedish Social Insurance Administration.

Parents' antisocial behavior. Parents completed an interview with a clinical psychologist trained to use the Structured Clinical Interview for DSM-IV (SCID) (First et al., 1997). When only one parent participated in the study, she/he reported on symptoms of the other biological parent following the Family Interview for Genetic Studies (FIGS) (Adolfsson and Forsgren, 1998). Information about parents' criminality was extracted from official files. Fathers' and mothers' antisocial behavior was defined as the presence of diagnoses of alcohol abuse and/or dependence, and/or drug abuse and/or dependence, and/or convictions for criminal offences.

Parenting practices. Adolescents responded to 16 questions covering three aspects of parenting practices: control, solicitation, and disclosure. Responses were scored using a 5-point scale ranging from "almost never" to "very often" (Stattin and Kerr, 2000). Item scores were summed to provide total scores.

Maltreatment. The revised Conflict Tactic Scales (Straus et al., 1996) were used to measure physical abuse of the adolescent by mother and/or father. Each parent and the

adolescent independently completed the questionnaires. Physical abuse was defined as present if either parent or the adolescent reported that the adolescent was: hit with a fist or kicked hard, hit on a part of the body other than the bottom with a hard object, thrown or knocked down, grabbed around the neck and choked, beaten up, hit repeatedly very hard, burned, threatened with a gun or knife.

Verbal intelligence. Participants age 16 or younger were assessed using the Wechsler Intelligence Scale for children – third edition (WISC-III) (Wechsler, 1981) and participants age 17 or older using the Wechsler Adult Intelligence Scale – Revised (WAIS-R) (Wechsler, 1991). One subtest, word list, was used as a measure of verbal intelligence (Wechsler, 2008).

Mental disorders. Participants age 17 and younger were interviewed by clinical psychologists using the Kiddie-Schedule for Affective Disorders and Schizophrenia for School-Aged Children - Present and Lifetime Version (K-SADS-PL) (Kaufman et al., 1997), a diagnostic interview covering DSM-IV disorders in children and adolescents. Fifteen cases were rated independently by a second clinician and inter-rater reliability was high (e.g. conduct disorder/oppositional defiant disorder, kappa = 0.82). Participants age 18 or above were interviewed following the SCID (First et al., 1997). Twelve cases were rated independently by a second clinician and inter-rater reliability was high (e.g. conduct disorder/oppositional defiant disorder, kappa=0.82) (further information (Hodgins et al., 2007)).

Social difficulty. Adolescents answered three questions about social difficulties that was scored present or absent.

Fearlessness. Adolescents completed the Child Fearlessness Scale (Andershed, 2003). Scores for seven items were summed to provide a total score.

Criminal peers. From the Structured Assessment of Violence Risk in Youth (Borum et al., 2002) one item, criminal peers, was rated absent or present.

Victimization by peers. Adolescents answered seven questions about experiences of victimization by peers that were scored as absent or present.

Aggressive behavior. Participants responded to 28 questions about aggressive behavior in the previous six months including the aggressive behavior scale of the Youth Self-Report (YSR) (Achenbach and Rescorla, 2001). Item scores were summed to provide total scores.

Non-violent crime. Adolescents reported on non-violent criminal activity over the past year and responses were scored as absent or present.

Measures at the Five-year-follow-up

Psychopathic traits. The Psychopathy Checklist – revised (PCL-R: (Hare, 2003) is a 20-item rating scale for the assessment of psychopathic traits in adults. Each item is scored 0 (consistently absent), 1 (inconsistently present), or 2 (consistently present). Factor analysis identified four factors similar to those composing the PCLYV: interpersonal, affective, lifestyle, and antisocial. PCL-R scores were rated by trained clinical psychologists based on the interview and clinical files. The PCL-R has good validity and reliability (Hare, 2003). Inter-rater reliability was calculated on 12 participants (five women and seven men) using ICC: PCL-R total score .99, interpersonal .79, affective .85, and lifestyle .82, and antisocial .97.

Procedure

When adolescents first contacted the clinic, they and their parents were invited to participate in the study. After a complete description of the study, and answers to their questions, the adolescent and each parent signed consents to complete interviews, and questionnaires, and to allow the research team access to their clinical files, criminal and social insurance records.

Interviews were then scheduled with adolescents and each parent separately. None of the participants was intoxicated during the interviews. For participation in the study, adolescents received a gift certificate worth 500 SEK for a department store and a cinema ticket, and parents received a gift certificate worth 300 SEK.

Five years later, the ex-clients were asked to again participate in the study. Those who agreed signed formal consents to complete interviews and questionnaires, to allow the research team to access their clinical files, criminal, health, and social insurance records, and provided a sample of saliva for DNA extraction. Interviews were conducted, on average, 5.6 years ($SD=0.85$) after the baseline assessment. For participation in the follow-up, the ex-clients received a gift certificate worth 500 SEK for a department store.

Statistical Analyses

Independent t-test and chi square statistics were used to estimate differences between females and males. A non-parametric test, Kendall's tau, was used to calculate rank-order stability of psychopathic traits over five years. Paired sample t-tests were used to measure mean-level stability. Individual-level stability was calculated to determine if scores had decreased, remained the same, or increased using the reliable change index (RCI) ($RC = (x_2 - x_1) / S_{diff}$, where x_1 = an individual score at time 1, and x_2 = the same individuals score at time 2, and S_{diff} = standard error of difference between the two test scores, computed by $S_{diff} = (2(Se)^2)^{1/2}$. RCI scores below -1.96 or above 1.96 indicate reliable change (Christensen and Mendoza, 1986; Jacobson and Truax, 1991). RCIs were re-calculated for participants with total PCL-R scores of 0-10, 11-19, and 20 to 40.

Multiple regression models were computed to examine factors assessed in mid-adolescence that predicted PCL-R scores in early adulthood. Because of the small sample size,

three initial models were calculated that included family, individual, and antisocial characteristics as predictors. A final model was calculated that included the significant predictors from the three initial models and the PCL:YV total score. Similar analyses were conducted to examine predictors of PCL:R facet scores. All models were re-run excluding two outliers on PCL:R scores as indicated by studentized residuals > 2 . There were no differences in results.

Results

Insert Table 2 about here

Psychopathy scores

PCL:YV scores assessed in mid-adolescence and PCL:R scores assessed five years later are presented in Table 2. The PCL:YV scores of both the females and the males were lower than those reported for female and male adolescent offenders (Sevecke et al., 2009), and the PCL-R total scores were lower than those reported for adult offenders (Hare, 2003). However, the present sample presented higher PCL:YV scores (Sevecke et al., 2009) and PCL-R scores than non-offending women and men in the general population (Neumann and Hare, 2008). Mean scores of the present sample are similar to those reported for clinical samples of adolescent males with conduct disorder (Burke et al., 2007; Forth et al., 2003).

Rank-order Stability of Psychopathic Traits over Five Years

Insert Table 3 about here

Table 3 presents correlation coefficients estimating the rank-order stability of PCL:YV scores in adolescence and PCL-R scores assessed five years later. Among both women and men, the correlations ranged from medium to large for total and facet scores.

Mean-level Stability of Psychopathic Traits over Five Years

From adolescence to early adulthood among women, there was a decrease in the average total score ($t(84) = 11.17, p = .000$), interpersonal facet score ($t(84) = 11.83, p = .000$) and affective facet score ($t(83) = 6.16, p = .000$), while no difference was detected in the mean scores at the two time points for the lifestyle ($t(84) = 1.04, p = .30$) and antisocial facet ($t(84) = -.83, p = .41$). Similarly, among men, the total score ($t(60) = 5.91, p = .000$), interpersonal facet score ($t(60) = 7.72, p = .000$), and affective facet score ($t(60) = 2.15, p = .04$) significantly decreased over time. By contrast, the score for the lifestyle facet increased, ($t(60) = -4.20, p = .000$) and the antisocial facet score remained stable ($t(60) = .06, p = .95$).

Individual-level Stability in Psychopathic Traits over Five Years

 Insert Table 4 about here

Table 4 presents the percentages of women and men whose scores decreased, remained stable, or increased. As can be seen, scores were stable among most of the participants. Approximately one fifth of the women showed a decrease in PCL total scores and interpersonal facet scores over five years and none showed an increase. Seven women obtained higher antisocial facet scores at follow-up than at baseline. Seven men showed a decrease in PCL total score and 10 in the interpersonal facet score. Four men obtained higher lifestyle facet scores at follow-up than at baseline, while three obtained higher antisocial facet scores. The chi-square

statistics were all significant indicating that the percentages of participants whose scores decreased, remained the same, or increased was not random.

There was a slight tendency for those with higher PCL-R scores at follow-up to show less change since baseline. Among men with PCL-R 0-10, 86.5% remained stable since mid-adolescence, as did 86.0% of those with scores from 11-19, and 90.0% of those with scores of 20 or higher. Among women, there was a similar pattern: of those with PCL-R scores of 0-10, 73% were stable since mid-adolescence, as were 83% of those with PCL-R scores of 11-20, and 90.0% of those with scores of 20 or higher. The only participants with increased scores at follow-up obtained total PCL-R scores of 20 or higher at follow-up.

Predictors of Change in PCL Total and Facet scores from Mid-adolescence to Early Adulthood

 Insert Table 5 about here

Four multiple regression analyses were performed to examine factors assessed in mid-adolescence that predicted PCL-R total scores rated five years later. Model 1 included family poverty, father antisocial behavior, mother antisocial behavior, parental control, parental solicitation, parental disclosure, and maltreatment, none of which were significant ($R^2 = .150$). Model 2 included sex, verbal intelligence, anxiety disorder, social difficulties, and fearlessness ($R^2 = .253$). Four of the predictors were significantly associated with PCL-R total score: sex ($\beta=.291$, $p=.001$), anxiety disorder ($\beta=.189$, $p=.031$), social difficulties ($\beta=.203$, $p=.011$), and fearlessness ($\beta=.318$, $p=.000$). Model 3 included conduct disorder, alcohol disorder, drug disorder, criminal peers, victimization by peers, aggressive behavior, and non-violent crimes (R^2

= .520). Four of the predictors were significant: conduct disorder ($\beta=.180$, $p=.012$), drug disorder ($\beta=.194$, $p=.004$), criminal peers ($\beta=.166$, $p=.024$), and aggressive behavior ($\beta=.376$, $p=.000$).

The final model included the significant predictors from the three initial models and the PCL:YV scores. As shown in Table 5, three factors positively predicted PCL-R total score: sex, aggressive behavior, and PCL:YV total score.

Similar analyses were conducted to examine predictors of the PCL-R facet scores. As shown in Table 5, three factors predicted the interpersonal facet score: aggressive behavior, fearlessness, and the PCL:YV interpersonal facet score. The affective facet score was predicted by sex, drug disorder, aggressive behavior, and the PCL:YV affective facet score. The lifestyle facet score was predicted by sex, drug disorder, aggressive behavior, and the PCL:YV. The antisocial facet score was predicted by criminal peers, aggressive behavior, and the PCL:YV antisocial facet score.

Discussion

Both in adolescence and adulthood, individuals who as adolescents had sought treatment for substance misuse obtained scores for psychopathic traits that were higher than those reported for community samples (Forth et al., 2003), lower than those reported for offenders (Forth et al., 2003; Hare, 2003; Lee et al., 2009), and similar to those reported for adolescents with conduct disorder (Burke et al., 2007; Forth et al., 2003). As in some previous studies, both in adolescence (Schrum and Salekin, 2006; Penney and Moretti, 2007) and adulthood (Vitale et al., 2002), females obtained significantly lower total, affective, and antisocial facet scores than males. While there were no sex differences in the interpersonal and lifestyle facet scores in adolescence, these scores were higher among men than women five years later.

Three measures indicated high stability of psychopathy traits from mid-adolescence to early adulthood among females and males seeking treatment for substance misuse. Moderate to high rank-order stability was observed for total PCL and facet scores among both women and men, consistent with previous findings for male adolescents over six (Lee et al., 2009) and 12 months (Burke et al., 2007). The mean total score and mean scores for the interpersonal and affective facets decreased over the five-year period among both females and males consistent with evidence of decreases in maladaptive traits in this key developmental period. There was stability in the lifestyle facet scores among females and an increase in scores among males. By contrast, among both the females and males, the scores for the antisocial facet remained stable. This result is surprising as it would be difficult for young adults to obtain high scores on this factor that includes items assessing serious criminal behavior, serious violations of conditional release, and criminal versatility. Thus, if a pattern of antisocial behavior was present by mid-adolescence, it persisted into early adulthood and if there was little antisocial behavior in adolescence it was unlikely to emerge in the subsequent five years. Individual-level stability was, in general, high and similar among females and males for PCL total score and facet scores. Additionally, individuals with a high PCL-R total score (20-40) at the five-year-follow-up showed the greatest stability.

Thus, the results of the present study concur with previous research showing that psychopathic traits, like other personality traits (Roberts and DelVecchio, 2000), show moderate to high rank-order stability from mid-adolescence to early adulthood among females and males who as adolescents were treated for substance misuse. Given that high levels of these traits are associated with persistent violent criminality (Lawing et al., 2010) and a failure to engage in and to benefit from offender rehabilitation programs (Salekin et al., 2010) and parent-training

programs (Hawes and Dadds, 2005), as has been noted (Rutter, 2012), it is urgent to assess and attempt to reduce these traits. Adolescent substance misuse treatment programs may benefit from identifying clients presenting high levels of these traits and providing them with specific interventions that take account of their personality.

Adolescent Factors Predicting Psychopathic Traits in Early Adulthood

Despite the extensive information available on this clinical sample and their parents, few factors assessed in mid-adolescence predicted psychopathic traits five years later. The strongest predictor of both the total score and the facet scores was the PCL:YV score, again indicative of stability of psychopathic traits in this period. The other consistent predictor was aggressive behavior. At all developmental stages, aggressive behavior characterizes individuals with high levels of psychopathic traits (Frick and White, 2008; Gretton, Hare, & Catchpole, 2004). Future research is needed to understand the interplay between aggressive and antisocial behavior and the personality traits associated with psychopathy at each developmental stage. Does the early onset pattern of aggressive and antisocial behavior promote these traits or vice-versa? Given the failure of young children with conduct problems and high levels of psychopathic traits to respond to punishment, as do adults with psychopathy, some authors have argued recently that the trait of callousness – the insensitivity to others – needs to be changed in order to reduce their conduct problems (Pasalich et al., 2012). Consistent with evidence that males show higher levels of psychopathy traits than females, male sex was the other predictor of these traits in early adulthood. The presence of a drug use disorder in adolescence positively predicted affective and lifestyle facet scores in early adulthood. Thus, in addition to the level of these facet scores in adolescence, and aggressive behavior, the presence of a drug use disorder independently contributed to the level of these traits.

Continuity in a personality trait may result, at least in part, from individuals creating and selecting environments that promote the trait (Roberts et al., 2006). Consistent with a previous study (Lynam et al., 2008), in the present study having peers who were engaging in crime predicted scores for antisocial behavior. Participants reported high levels of victimization by their peers in mid-adolescence. Previous studies have shown that adolescents who are victimized by their peers exhibit more aggressive behavior (Brendgen et al., 2008), higher levels of psychopathic traits (Ragatz et al., 2011), low empathy, and engage in illegal behaviors (Cima and Raine, 2009).

No association was found between parenting practices, including physical maltreatment, and change in psychopathy scores from mid-adolescence to early adulthood. In most children, parenting practices have a strong influence on conduct problems (Brestan and Eyberg, 1998) and maltreatment is associated with a variety of negative outcomes (Scott et al., 2012; Widom, 1989). By contrast, children with high levels of psychopathic traits are less influenced by poor parenting (Oxford et al., 2003; Wootton et al., 1997), fail to learn to modify their behavior in response to punishment such as time-out (Hawes and Dadds, 2005), and show blunted responses to maltreatment (Silva et al., 2012). The lack of association of parenting and maltreatment with psychopathy scores may simply have resulted from the participants' age – adolescents transitioning to adulthood. Further, the adolescents' relationship with their parents in mid-adolescence was not associated with psychopathic traits five years later. Future research is needed to determine whether parenting practices could influence psychopathic traits at a younger age. Additionally, neither poverty nor parents' antisocial behavior predicted psychopathic traits in early adulthood. The stability of psychopathic traits from mid-adolescence to early adulthood and the lack of understanding of factors promoting this stability is cause for concern.

The stability of psychopathic traits from mid-adolescence to early adulthood may reflect, in part, genetic control. Genetic factors have been shown to contribute to individual set points which prevent change in personality traits (Roberts et al., 2006). Twin studies have shown that the combination of conduct problems and psychopathic traits is highly heritable in children age 7 and 9 (Viding et al., 2005; Viding et al., 2008). These same twin studies also show that environmental factors contribute to this combination of conduct problems and psychopathic traits (Forsman et al., 2008; Viding et al., 2008). Future research is urgently needed to identify these environmental factors. In the present study, no association was detected between parent antisocial behavior and change in psychopathy scores; yet parent antisocial behavior, especially fathers' antisocial behavior, was common. These results suggest, but do not prove, that the contribution of parent antisocial behavior to offspring psychopathic traits occurs prior to mid-adolescence. The inter-generational transfer of antisocial behavior likely occurs as a result of susceptibility genes interacting and/or adding to environmental factors (Rutter et al., 2006). Consequently, it is theoretically possible that interventions could be developed to effectively reduce the environmental factors associated with antisocial behavior that impact children carrying susceptibility genes. Further, the expression of genes may be altered by environmental factors, such as physical abuse (McGowan et al., 2009). Given the stability of psychopathic traits from adolescence to early adulthood and the associated negative consequences for those with the traits, as well as for others around them and society in general, research is needed to identify changeable etiological factors. These factors likely operate early in life (Pasalich et al., 2012; Waller et al., 2012).

Strengths and Limitations

The present study was characterized by several strengths. It focused on a clinical sample of both females and males with relatively high PCL scores. Psychopathy was assessed using the PCL:YV and the PCL-R, the gold standards in the assessment of psychopathy. Stability was measured over an important developmental period from mid-adolescence to early adulthood. Further, extensive clinical assessments of the participants and their parents were available to search for factors associated with psychopathy scores. Limitations of the study include the loss of 34 participants from mid-adolescence to adulthood. However, there were no differences in PCL:YV scores of those who took part in the follow-up and those who did not. Two different age appropriate versions of the PCL were used, the youth and the adult version. The young age of the participants at follow-up limited total PCL-R scores especially on items assessing criminal history, for example, revocation of conditional release. The regression analyses aimed at identifying predictors of PCL-R scores included multiple predictors and few subjects. Additionally, most predictors were dichotomized, thereby failing to provide information on severity.

In summary, in a sample of females and males who as adolescents sought treatment for substance misuse, rank-order, mean level, and individual level stability in psychopathic traits over a five-year period from mid-adolescence to young adulthood was observed. The level of psychopathic traits in adulthood was predicted primarily by the level of these traits in adolescence, male sex, and aggressive behavior. Drug use disorders in adolescence, however, were independently associated with affective and lifestyle facet scores in early adulthood.

Authors' Notes

1. Rank-order stability estimates the maintenance of individual position's within a group over time. Mean-level stability is defined as the consistency of scores in a sample or population over

time, if the sample as a whole increases or decreases over time. In contrast, individual-level stability estimates the magnitude of increases or decreases in scores of each individual over time (Mroczek, 2007).

References

- Achenbach, T. M., & Rescorla, L. A. (2001). *Manual for the ASEBA School-age forms & profiles*. Burlington VT: University of Vermont, Reserach center for children, youth, & families.
- Adolfsson, R., & Forsgren, T. (1998). *DIGS och FIGS Strukturerad psykiatrisk diagnostik intervju för patienter och anhöriga*. Umeå: UmU Tryckeri.
- Andershed, H. (2003). *The Child Fearlessness Scale (CFS)* Örebro: Center for developmental research. Örebro University.
- Armstrong, T. D., & Costello, E. J. (2002). Community studies on adolescent substance use, abuse, or dependence and psychiatric comorbidity. *Journal of Consulting and Clinical Psychology, 70*(6), 1224-1239.
- Blair, R. J. R., Peschardt, K. S., Budhani, S., Mitchell, D. G. V., & Pine, D. S. (2006). The development of psychopathy. *Journal of Child Psychology and Psychiatry, 47*(3-4), 262-275. doi: DOI 10.1111/j.1469-7610.2006.01596.x
- 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. doi: Doi 10.1037/0021-943x.115.1.85
- Borum, R., Bartel, P. A., & Forth, A. E. (2002). *Manual for the Structured Assessment of Violence Risk in Youth (SAVRY). Consultation edition, Version 1.*: University of South Florida.
- Brendgen, M., Boivin, M., Vitaro, F., Girard, A., Dionne, G., & Perusse, D. (2008). Gene-environment interaction between peer victimization and child aggression. *Development and Psychopathology, 20*(2), 455-471. doi: Doi 10.1017/S0954579408000229

- Brestan, E. V., & Eyberg, S. M. (1998). Effective psychosocial treatments of conduct-disordered children and adolescents: 29 years, 82 studies, and 5,272 kids. *Journal of Clinical Child Psychology, 27*(2), 180-189. doi: 10.1207/s15374424jccp2702_5
- Burke, J. D., Loeber, R., & Lahey, B. B. (2007). Adolescent conduct disorder and interpersonal callousness as predictors of psychopathy in young adults. *Journal of Clinical Child and Adolescent Psychology, 36*(3), 334-346.
- Campbell, M. A., Porter, S., & Santor, D. (2004). Psychopathic traits in adolescent offenders: an evaluation of criminal history, clinical, and psychosocial correlates. *Behavioral Sciences & the Law, 22*(1), 23-47. doi: 10.1002/bsl.572
- Caspi, A., Roberts, B. W., & Shiner, R. L. (2005). Personality development: stability and change. *Annual Review of Psychology, 56*, 453-484. doi: 10.1146/annurev.psych.55.090902.141913
- Christensen, L., & Mendoza, J. L. (1986). A method of assessing change in a single subject: An alteration of the RC index. *Behavior Therapy (17)*, 305-308.
- Cima, M., & Raine, A. (2009). Distinct characteristics of psychopathy relate to different subtypes of aggression. *Personality and Individual Differences, 47*, 835-840.
- Dadds, M. R., Fraser, J., Frost, A., & Hawes, D. J. (2005). Disentangling the underlying dimensions of psychopathy and conduct problems in childhood: A community study. *Journal of Consulting and Clinical Psychology, 73*(3), 400-410. doi: Doi 10.1037/0022-006x.73.3.400
- Das, J., de Ruiter, C., & Doreleijers, T. (2008). Reliability and validity of the Psychopathy Checklist: Youth Version in Dutch female adolescents. *International Journal of Law and Psychiatry, 31*(3), 219-228. doi: 10.1016/j.ijlp.2008.04.005

- Dolan, M. C., & Rennie, C. E. (2007). Is juvenile psychopathy associated with low anxiety and fear in conduct-disordered male offenders? *Journal of Anxiety Disorders, 21*(8), 1028-1038. doi: DOI 10.1016/j.janxdis.2006.11.008
- First, M. B., Spitzer, R. L., Gibbon, M., & Williams, J. B. W. (1997). *User's Guide for the Structured Clinical Interview for DSM-IV axis I Disorders - Clinical version (SCID-CV)*. Washington DC: American Psychiatric Press.
- Forsman, M., Lichtenstein, P., Andershed, H., & Larsson, H. (2008). Genetic effects explain the stability of psychopathic personality from mid- to late adolescence. *Journal of Abnormal Psychology, 117*(3), 606-617. doi: 10.1037/0021-843X.117.3.606
- Forth, A. E., Kosson, D. S., & Hare, R. D. (2003). *Hare Psychopathy Checklist: Youth Version (PCL:YV): Technical manual*. Toronto, Canada: Multi-Health Systems.
- Frick, P. J., Kimonis, E. R., Dandreaux, D. M., & Farrell, J. M. (2003). The 4 year stability of psychopathic traits in non-referred youth. *Behavioral Sciences & the Law, 21*(6), 713-736. doi: Doi 10.1002/Bsl.568
- 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. doi: DOI 10.1111/j.1469-7610.2007.01862.x
- Gretton, H. M., Hare, R. D., & Catchpole, R. E. (2004). Psychopathy and offending from adolescence to adulthood: a 10-year follow-up. *Journal of Consulting and Clinical Psychology, 72*(4), 636-645. doi: 10.1037/0022-006X.72.4.636
- Hare, R. D. (2003). *The hare psychopathy checklist - revised* (2nd ed.). Toronto, Canada: Multi-Health Systems.

- 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. doi: 10.1080/15374410701444298
- Hawes, D. J., & Dadds, M. R. (2005). The treatment of conduct problems in children with callous-unemotional traits. *Journal of Consulting and Clinical Psychology*, 73(4), 737-741. doi: 10.1037/0022-006X.73.4.737
- Hodgins, S., Tengstrom, A., Bylin, S., Goranson, M., Hagen, L., Janson, M., . . . Pedersen, H. (2007). Consulting for substance abuse: mental disorders among adolescents and their parents. *Nordic Journal of Psychiatry*, 61(5), 379-386. doi: 10.1080/08039480701643423
- Hussong, A. M., Wirth, R. J., Edwards, M. C., Curran, P. J., Chassin, L. A., & Zucker, R. A. (2007). Externalizing symptoms among children of alcoholic parents: Entry points for an antisocial pathway to alcoholism. *Journal of Abnormal Psychology*, 116(3), 529-542. doi: 10.1037/0021-843X.116.3.529
- Jacobson, N. S., & Truax, P. (1991). Clinical-Significance - a Statistical Approach to Defining Meaningful Change in Psychotherapy-Research. *Journal of Consulting and Clinical Psychology*, 59(1), 12-19.
- Johnson, J. G., Cohen, P., Kasen, S., Skodol, A. E., Hamagami, F., & Brook, J. S. (2000). Age-related change in personality disorder trait levels between early adolescence and adulthood: a community-based longitudinal investigation. *Acta Psychiatrica Scandinavica*, 102(4), 265-275.
- Kaufman, J., Birmaher, B., Brent, D. A., Rao, U., Flynn, C., Moreci, P., . . . Ryan, N. (1997). Schedule for affective disorders and schizophrenia for school-age children - present and lifetime version (K-SADS-PL): Initial reliability and validity data. *Journal of the American Academy of Child and Adolescent Psychiatry*, 36, 980-988.

- Kessler, R. C., Berglund, P., Demler, O., Jin, R., Merikangas, K. R., & Walters, E. E. (2005). Lifetime prevalence and age-of-onset distributions of DSM-IV disorders in the National Comorbidity Survey Replication. *Archives of General Psychiatry*, *62*(6), 593-602. doi: 10.1001/archpsyc.62.6.593
- Kosson, D. S., Cyterski, T. D., Steuerwald, B. L., Neumann, C. S., & Walker-Matthews, S. (2002). The reliability and validity of the psychopathy checklist: youth version (PCL:YV) in nonincarcerated adolescent males. *Psychological Assessment*, *14*(1), 97-109.
- Lawing, K., Frick, P. J., & Cruise, K. R. (2010). Differences in offending patterns between adolescent sex offenders high or low in callous-unemotional traits. *Psychological Assessment*, *22*(2), 298-305. doi: 10.1037/a0018707
- Lee, Z., Klaver, J. R., Hart, S. D., Moretti, M. M., & Douglas, K. S. (2009). Short-Term Stability of Psychopathic Traits in Adolescent Offenders. *Journal of Clinical Child and Adolescent Psychology*, *38*(5), 595-605. doi: Doi 10.1080/15374410903103536
- Leistico, A. M., Salekin, R. T., DeCoster, J., & Rogers, R. (2008). A large-scale meta-analysis relating the hare measures of psychopathy to antisocial conduct. *Law and Human Behavior*, *32*(1), 28-45. doi: 10.1007/s10979-007-9096-6
- Loney, B. R., Taylor, J., Butler, M. A., & Iacono, W. G. (2007). Adolescent psychopathy features: 6-year temporal stability and the prediction of externalizing symptoms during the transition to adulthood. *Aggressive Behavior*, *33*(3), 242-252. doi: 10.1002/ab.20184
- 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 Psychology*, *116*(1), 155-165. doi: 10.1037/0021-843X.116.1.155

- Lynam, D. R., Loeber, R., & Stouthamer-Loeber, M. (2008). The stability of psychopathy from adolescence into adulthood: The Search for Moderators. *Criminal Justice and Behavior, 35*(2), 228-243.
- McGowan, P. O., Sasaki, A., D'Alessio, A. C., Dymov, S., Labonte, B., Szyf, M., . . . Meaney, M. J. (2009). Epigenetic regulation of the glucocorticoid receptor in human brain associates with childhood abuse. *Nature Neuroscience, 12*(3), 342-348. doi: 10.1038/nn.2270
- McGue, M., Bacon, S., & Lykken, D. T. (1993). Personality stability and change in early adulthood: a behavioral genetic analysis. *Developmental Psychology, 29*(1), 96-109.
- Meeus, W., Van de Schoot, R., Klimstra, T., & Branje, S. (2011). Personality types in adolescence: change and stability and links with adjustment and relationships: a five-wave longitudinal study. *Developmental Psychology, 47*(4), 1181-1195. doi: 10.1037/a0023816
- Moffitt, T. E. (1993). Adolescence-limited and life-course-persistent antisocial behavior: a developmental taxonomy. *Psychological Review, 100*(4), 674-701.
- Mroczek, D. K. (2007). The Analysis of Longitudinal Data in Personality Research. In R. W. Robins, R. C. Fraley & R. F. Krueger (Eds.), *Handbook of research methods in personality psychology* (pp. 543-556). New York: The Guilford press.
- Neumann, C. S., & Hare, R. D. (2008). Psychopathic traits in a large community sample: links to violence, alcohol use, and intelligence. *Journal of Consulting and Clinical Psychology, 76*(5), 893-899. doi: 10.1037/0022-006X.76.5.893
- O'Neill, M. L., Lidz, V., & Heilbrun, K. (2003). Adolescents with psychopathic characteristics in a substance abusing cohort: treatment process and outcomes. *Law and Human Behavior, 27*(3), 299-313.

- Oxford, M., Cavell, T. A., & Hughes, J. N. (2003). Callous/unemotional traits moderate the relation between ineffective parenting and child externalizing problems: a partial replication and extension. *Journal of Clinical Child and Adolescent Psychology, 32*(4), 577-585. doi: 10.1207/S15374424JCCP3204_10
- Pardini, D. A., & Loeber, R. (2008). Interpersonal callousness trajectories across adolescence - Early social influences and adult outcomes. *Criminal Justice and Behavior, 35*(2), 173-196. doi: 10.1177/0093854807310157
- Pasalich, D. S., Dadds, M. R., Hawes, D. J., & Brennan, J. (2011). Do callous-unemotional traits moderate the relative importance of parental coercion versus warmth in child conduct problems? An observational study. *Journal of Child Psychology and Psychiatry, 52*(12), 1308-1315. doi: 10.1111/j.1469-7610.2011.02435.x
- Pasalich, D. S., Dadds, M. R., Vincent, L. C., Cooper, F. A., Hawes, D. J., & Brennan, J. (2012). Emotional communication in families of conduct problem children with high versus low callous-unemotional traits. *Journal of Clinical Child and Adolescent Psychology, 41*(3), 302-313. doi: 10.1080/15374416.2012.668844
- Ragatz, L. L., Anderson, R. J., Fremouw, W., & Schwartz, R. (2011). Criminal thinking patterns, aggression styles, and the psychopathic traits of late high school bullies and bully-victims. *Aggressive Behavior, 37*(2), 145-160. doi: 10.1002/ab.20377
- Roberts, B. W., Caspi, A., & Moffitt, T. E. (2001). The kids are alright: growth and stability in personality development from adolescence to adulthood. *Journal of Personality and Social Psychology, 81*(4), 670-683.

- Roberts, B. W., & DelVecchio, W. F. (2000). The rank-order consistency of personality traits from childhood to old age: a quantitative review of longitudinal studies. *Psychological Bulletin*, *126*(1), 3-25.
- Roberts, B. W., Walton, K. E., & Viechtbauer, W. (2006). Patterns of mean-level change in personality traits across the life course: a meta-analysis of longitudinal studies. *Psychological Bulletin*, *132*(1), 1-25. doi: 10.1037/0033-2909.132.1.1
- Rutter, M. (2012). Psychopathy in childhood: is it a meaningful diagnosis? *British Journal of Psychiatry*, *200*(3), 175-176. doi: 10.1192/bjp.bp.111.092072
- Rutter, M., Moffitt, T. E., & Caspi, A. (2006). Gene-environment interplay and psychopathology: multiple varieties but real effects. *Journal of Child Psychology and Psychiatry*, *47*(3-4), 226-261. doi: 10.1111/j.1469-7610.2005.01557.x
- Salekin, R. T., Worley, C., & Grimes, R. D. (2010). Treatment of psychopathy: a review and brief introduction to the mental model approach for psychopathy. *Behavioral Sciences & the Law*, *28*(2), 235-266. doi: 10.1002/bsl.928
- Scott, K. M., McLaughlin, K. A., Smith, D. A., & Ellis, P. M. (2012). Childhood maltreatment and DSM-IV adult mental disorders: comparison of prospective and retrospective findings. *British Journal of Psychiatry*, *200*(6), 469-475. doi: 10.1192/bjp.bp.111.103267
- Sevecke, K., Kosson, D. S., & Krischer, M. K. (2009). The Relationship Between Attention Deficit Hyperactivity Disorder, Conduct Disorder, and Psychopathy in Adolescent Male and Female Detainees. *Behavioral Sciences & the Law*, *27*(4), 577-598. doi: 10.1002/Bsl.870
- Silva, T. C., Larm, P., Vitaro, F., Tremblay, R. E., & Hodgins, S. (2012). The association between maltreatment in childhood and criminal convictions to age 24: a prospective study of a

- community sample of males from disadvantaged neighbourhoods. *European Child and Adolescent Psychiatry*, 21(7), 403-413. doi: 10.1007/s00787-012-0281-x
- Stattin, H., & Kerr, M. (2000). Parental monitoring: a reinterpretation. *Child Development*, 71(4), 1072-1085.
- Straus, M. A., Hamby, S. L., Boney-McCoy, S., & Sugarman, D. B. (1996). The Revised Conflict Tactic Scales (CTS2): Development & Preliminary Psychometric Data. *Journal of Family Issues* (17). doi: 10.1177/019251396017003001
- Waller, R., Gardner, F., Hyde, L. W., Shaw, D. S., Dishion, T. J., & Wilson, M. N. (2012). Do harsh and positive parenting predict parent reports of deceitful-callous behavior in early childhood? *Journal of Child Psychology and Psychiatry*, 53(9), 946-953. doi: 10.1111/j.1469-7610.2012.02550.x
- Wechsler, D. (1981). *Wechsler Adult Intelligence Scale - Revised*. San Antonio, TX: The Psychological Corporation.
- Wechsler, D. (1991). *Manual for the Wechsler Intelligence Scale for Children -third edition*. San Antonio, TX: The Psychological Corporation.
- Wechsler, D. (2008). *Wechsler Adult Intelligence Scale - Fourth Edition*. San Antonio, TX: Pearson.
- Viding, E., Blair, R. J., 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. doi: 10.1111/j.1469-7610.2004.00393.x
- Viding, E., Jones, A. P., Frick, P. J., Moffitt, T. E., & Plomin, R. (2008). Heritability of antisocial behaviour at 9: do callous-unemotional traits matter? *Developmental Science*, 11(1), 17-22. doi: 10.1111/j.1467-7687.2007.00648.x

- Widom, C. S. (1989). Child abuse, neglect, and adult behavior: research design and findings on criminality, violence, and child abuse. *American Journal of Orthopsychiatry*, 59(3), 355-367.
- Vitale, J. E., Smith, S. S., Brinkley, C. A., & Newman, J. P. (2002). The reliability and validity of the Psychopathy Checklist - Revised in a sample of female offenders. *Criminal Justice and Behavior*, 29, 202-231.
- Wootton, J. M., Frick, P. J., Shelton, K. K., & Silverthorn, P. (1997). Ineffective parenting and childhood conduct problems: the moderating role of callous-unemotional traits. *Journal of Consulting and Clinical Psychology*, 65(2), 301-308.

Table 1. Characteristics of the participants and their parents

Characteristics of the clients			
	Women	Men	Difference
Born in Sweden	90.9%	70.7%	$\chi^2(1, n=141)=0.144, p=.704$
Mean (SD) verbal intelligence score	8.47 (2.51)	8.07 (2.65)	$t_{144}=0.940, p=.349$
% diagnosed with an anxiety disorder	62.4%	26.2%	$\chi^2(1, n=146)=17.172, p=.000$
% with social difficulties	11.8%	8.9%	$\chi^2(1, n=132)=0.063, p=.802$
Mean (SD) fearlessness score	9.95 (4.14)	12.65 (4.25)	$t_{139}=-3.755, p=.000$
% diagnosed with a conduct disorder	45.9%	65.6%	$\chi^2(1, n=144)=4.183, p=.041$
% diagnosed with an alcohol disorder	43.5%	50.8%	$\chi^2(1, n=146)=0.494, p=.482$
% diagnosed with a drug disorder	34.1%	34.4%	$\chi^2(1, n=146)=0.000, p=1.00$
% with criminal peers	63.5%	68.9%	$\chi^2(1, n=146)=0.242, p=.623$
% reporting victimization by peers	47.6%	63.2%	$\chi^2(1, n=139)=2.695, p=.101$
Mean (SD) aggressive behavior score	14.48 (7.24)	15.42 (9.07)	$t_{108.57}=-0.663, p=.509$
% reporting non-violent criminality	77.6%	91.7%	$\chi^2(1, n=145)=4.042, p=.044$
Characteristics of parents			
% poverty	13.2%	9.1%	$\chi^2(1, n=131)=0.197, p=.657$
% of fathers with antisocial behavior	52.9%	62.3%	$\chi^2(1, n=146)=0.914, p=.339$
% of mothers with antisocial behavior	30.6%	34.4%	$\chi^2(1, n=146)=0.096, p=.757$
Mean (SD) score parental control	1.68 (1.09)	1.47 (1.02)	$t_{137}=1.121, p=.264$
Mean (SD) score parental solicitation	1.66 (.81)	1.63 (.73)	$t_{137}=0.205, p=.838$
Mean (SD) score parental disclosure	2.03 (.85)	1.97 (.95)	$t_{132}=0.380, p=.705$
% Maltreatment	36.6%	24.6%	$\chi^2(1, n=139)=1.726, p=.189$

Table 2. Comparisons of PCL:YV scores in mid-adolescence and PCL-R scores five years later among males and females

	PCL:YV				PCL-R			
	Women	Men	Difference		Women	Men	Difference	
Mean (SD) PCL total score	12.39 (5.91)	15.86 (8.05)	$t_{104,21}=-2.86, p=.005$		7.73 (5.57)	12.40 (8.42)	$t_{96,84}=-3.77, p=.000$	
Mean (SD) interpersonal facet score	2.72 (1.42)	3.21 (1.73)	$t_{144}=-1.90, p=.060$		1.16 (1.27)	1.66 (1.61)	$t_{109,90}=-1.98, p=.050$	
Mean (SD) affective facet score	2.37 (1.90)	3.22 (2.06)	$t_{144}=-2.58, p=.011$		1.33 (1.58)	2.77 (2.27)	$t_{100,59}=-4.26, p=.000$	
Mean (SD) lifestyle facet score	2.55 (1.30)	2.94 (1.75)	$t_{144}=-1.54, p=.127$		2.38 (1.79)	3.89 (2.63)	$t_{98,74}=-3.88, p=.000$	
Mean (SD) antisocial facet score	2.12 (1.80)	3.56 (2.67)	$t_{98,11}=-3.64, p=.000$		2.26 (2.02)	3.54 (2.63)	$t_{107,70}=-3.19, p=.002$	
% with score 0-9	35.5%	26%			66%	47%		
% with score 10-19	54%	39%			29%	25%		
% with score 20-29	9.5%	30%		$\chi^2(3, n=146)=12.41, p=.006$	5%	23%		$\chi^2(3, n=146)=16.12, p=.001$
% with score 30-	1%	5%			0%	5%		

Table 3. Rank-order correlations between PCL:YV scores in mid-adolescence and PCL-R scores five years later

	Women	p	Men	p
PCL Total score	.58	.000	.68	.000
Interpersonal facet score	.44	.000	.41	.000
Affective facet score	.48	.000	.60	.000
Lifestyle facet score	.43	.000	.60	.000
Antisocial facet score	.54	.000	.60	.000

Table 4. Percentages of women and men with decreases, stability, and increases in PCL-R scores relative to PCL:YV scores obtained five years earlier based on the reliable change index^a (RCI)

	Women			χ^2 ^b	p
	Decrease	Stable	Increase		
	%				
PCL Total score	14.0	86.0	0	(1, n = 85) = 23.82	.000
Interpersonal facet score	22.0	78.0	0	(1, n = 85) = 25.99	.000
Affective facet score	14.5	84.5	1.0	(2, n = 84) = 101.21	.000
Lifestyle facet score	1.0	98.0	1.0	(2, n = 85) = 158.21	.000
Antisocial facet score	3.5	89.5	7.0	(2, n = 85) = 120.45	.000
	Men				
PCL Total score	11.5	87.0	1.5	(2, n = 61) = 79.61	.000
Interpersonal facet score	16.0	84.0	0	(1, n = 61) = 27.56	.000
Affective facet score	3.0	95.0	2.0	(2, n = 61) = 104.69	.000
Lifestyle facet score	0	93.0	7.0	(1, n = 61) = 46.05	.000
Antisocial facet score	5.0	90.0	5.0	(2, n = 61) = 88.66	.000

^aA change greater than 1.96 or less than -1.96 is considered reliable change. ^bThe chi-square statistics tested if the observed distribution differed from the expected distribution (e.g. 2.5% decrease, 95% stable, 2.5% increase).

Table 5. Results of multiple regression analyses predicting PCL-R total and facet scores in early adulthood

		PCL-R											
		Total score		Interpersonal facet		Affective facet		Lifestyle facet		Antisocial facet			
Final model R^2		.744	.487	.600	.563	.618							
	β	p	β	p	β	p	β	p	β	p	β	p	
Sex	.127	.008	.216	.000	.216	.000	.216	.000	.102	.123	.100	.081	
Alcohol disorder					.102	.123							
Drug disorder	.048	.338	.156	.007	.165	.009	.028	.643					
Criminal peers	.060	.253					.152	.011					
Aggressive behavior	.219	.000	.335	.000	.255	.000	.168	.008	.287	.000			
Fearlessness	.095	.051	.184	.004	.078	.190	.123	.054					
PCL: YV score	.602	.000											
PCL: YV interpersonal facet score			.449	.000									
PCL: YV affective facet score			.465	.000									
PCL: YV lifestyle facet score					.424	.000							
PCL: YV antisocial facet score							.465	.000					

IV

Do psychopathic traits assessed in mid-adolescence predict mental health, psychosocial, and antisocial/criminal outcomes over the subsequent five years?

Malin Hemphälä Cl Psych¹

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Sheilagh Hodgins, Ph.D Cl.Psych., F.R.S.C. ^{2,3}

1. MSc, Department of Clinical neuroscience, Karolinska Institute, Stockholm, Sweden
2. Département de Psychiatrie, Université de Montréal, Montréal, Canada
3. Professor, Institute of Psychiatry, King's College London, United Kingdom

Abstract

Objective: The present study aimed to determine whether psychopathic traits assessed in mid-adolescence predicted mental health, psychosocial, and antisocial/criminal outcomes five years later and would thereby provide advantages over diagnosing conduct disorder.

Method: 86 women and 61 men were assessed in mid-adolescence when they first contacted a clinic for substance misuse and re-assessed five years later. Assessments in adolescence included the Psychopathy Checklist: Youth Version (PCL:YV), and depending on their age, either the Kiddie-Schedule for Affective Disorders and Schizophrenia or the Structured Clinical Interview for DSM-IV (SCID). Assessments in early adulthood included the SCID, self-reports of psychosocial functioning, aggressive behavior, and criminality, and official criminal records.

Results: The antisocial facet score positively predicted the number of anxiety symptoms and likelihood of receiving treatment for substance use disorders. Lifestyle and antisocial facet scores negatively predicted GAF scores. By contrast, the interpersonal score and male sex independently and positively predicted number of months worked/studied, as did the interaction of lifestyle*sex indicating that among men, but not women, an increase in lifestyle facet score was associated with less time worked/studied. Interpersonal and antisocial scores positively predicted school drop-out. Antisocial facet scores predicted number of symptoms of ASPD, alcohol and drug use disorders, and violent and non-violent criminality, much more strongly among males than females. Predictions from numbers of CD symptoms were similar.

Conclusions: Psychopathy traits among adolescent substance misusers predict an array of outcomes over the subsequent five years. Information on the levels of these traits may be useful for planning treatment.

Clinical Implications

- Training clinicians working with adolescent substance misusers to use the PCL:YV may contribute to a better understanding of the adolescents.
- Psychopathic traits assessed in adolescence were associated with anxiety, treatment use, and substance misuse in the subsequent five years.
- The number of conduct disorder symptoms present before age 15 was also associated with these outcomes.

Limitations

- The small sample size may have affected predictions of antisocial/criminal behavior among females.
- No information was available about whether treatments in the follow-up period were involuntary, under civil or criminal court orders.

Key words

Psychopathy, conduct disorder, assessment, adolescence, substance misuse

List of abbreviations

ASPD Antisocial Personality Disorder

CD conduct disorder

GAF Global Assessment of Functioning

PCL:YV Psychopathy Checklist: youth version

SCID I Structured Clinical Interview for DSM-IV axis I disorders

SCID II Structured Clinical Interview for DSM-IV axis II disorders

Most adolescents who misuse substances present mental disorders that onset prior to substance misuse, most commonly CD^{1,2}. CD is associated with an elevated risk of persistent antisocial behavior, substance misuse, school drop-out, unwanted pregnancy³, criminal convictions⁴, anxiety and depression^{5,6}, and by definition ASPD⁷. Some children/adolescents with CD present elevated levels of psychopathic traits. These children present more severe conduct problems, than other children with CD, including aggressive behavior, and an elevated risk of persistent criminal offending^{8,9}. Additionally, they show distinct impairments of cognition and emotion processing similar to adults with psychopathy. Emerging evidence suggests that these traits are present as early as age 5¹⁰.

Children with CD and high levels of psychopathic traits are relatively insensitive to punishment and tend to behave inappropriately regardless of negative consequences^{11,12}. One randomized controlled study has shown that children with conduct problems and high levels of psychopathic traits fail to respond to time-out¹³, and other studies propose that they require specific interventions that target their empathetic deficits^{10,14}. Similarly, adolescents with conduct problems and psychopathic traits are difficult to engage in treatment and respond poorly to offender rehabilitation programs^{15,16}. Thus the presence of psychopathic traits among adolescents engaging in antisocial behavior may indicate the need for a specific treatment approach. Most services for adolescents engaging in substance misuse, to the best of our knowledge, do not assess psychopathic traits, even though the importance of this differential diagnosis is now recognized by experts¹⁷. The present study aimed to determine whether psychopathic traits in mid-adolescence predicted mental health, psychosocial, and antisocial/criminal outcomes five years later and would thereby provide advantages over the usual procedure of diagnosing CD.

The Psychopathy Checklist: Youth Version (PCL:YV)¹⁸ was designed to assess psychopathic traits among adolescents. Factor analysis identifies four factors: interpersonal -

impression management, grandiose sense of self-worth, pathological lying, manipulation for personal gain; affective - lack of remorse, shallow affect, callous/lack of empathy, failure to accept responsibility; lifestyle - stimulation seeking, parasitic orientation, lacks goals, impulsivity, irresponsibility; and antisocial - poor anger control, early behavior problems, serious criminal behavior, serious violations of conditional release, criminal versatility¹⁹. In a meta-analysis of 21 studies, 15 of them focusing exclusively on males, the PCL:YV or the Psychopathic Checklist- Revised¹⁹ for adults predicted general and violent recidivism, more strongly among men than women²⁰. Similarly, other studies of adolescents have shown that the PCL:YV predicted violent and non-violent criminal convictions among males and weakly or not at all among females^{21, 22}, and violent behavior^{23, 24}. We found only one study examining PCL:YV predictions after controlling for CD and it showed that the PCL:YV continued to predict future violent offending among adolescent males²³.

Few studies have examined associations between psychopathic traits in adolescence and outcomes other than aggressive behavior and criminality. The results of these few studies are generally inconsistent, for example those on internalizing problems^{21, 25} and suicidal behavior²⁶. A recent study showed that among adolescent boys both CD and psychopathic traits predicted substance misuse three years later, while among girls only CD was associated with subsequent substance misuse²⁷.

The present study aimed to determine whether psychopathic traits assessed by the PCL:YV in mid-adolescence among girls and boys attending a clinic for substance misuse predicted mental health, psychosocial, and antisocial/criminal outcomes five years later and would thereby provide advantages over the usual procedure, that of diagnosing CD. Four questions were addressed: (1) Do scores for psychopathic traits assessed in mid-adolescence predict mental health (depression symptoms, anxiety symptoms, suicide attempts, treatment of substance abuse, treatment of other mental disorders, number of admissions to psychiatric

wards), psychosocial functioning (Global Assessment of Functioning score, time spent working or studying, school drop-out, having a child at a young age), and antisocial and criminal behavior (symptoms of ASPD, alcohol use disorders, drug use disorders, self-reported aggressive behavior, convictions and/or self-reports for violent and non-violent crimes) five years later? (2) Does the number of CD symptoms prior to age 15 predict these mental health, psychosocial, and antisocial/criminal outcomes five years later? (3) Do psychopathic traits predict any of these mental health, psychosocial, and antisocial/criminal outcomes five years later after controlling for CD symptoms? (4) Do predictions differ among females and males?

Method

Participants

In 2004, a sample of 99 females and 81, aged on average, 16.8 years ($SD = 1.9$) who contacted the only substance misuse clinic in a large urban area in Sweden participated in a study (further information,²⁸). Five years later, 86 women and 61 men from the original sample completed interviews. There were no significant differences between those who participated in the follow-up and those who did not regarding sex, PCL:YV total and facet scores, and number of CD symptoms.

Measures in mid-adolescence

Psychopathic traits. The Hare Psychopathy Checklist: Youth Version (PCL:YV¹⁸) is a 20-item rating scale measuring psychopathic traits in adolescents. Each item is scored 0 (consistently absent), 1 (inconsistently present), or 2 (consistently present). The PCL:YV was rated by clinical psychologists, trained to use this instrument, and, as recommended based on the interview and clinical files. Inter-rater reliability was calculated on 29 clients using Intraclass correlation: total score .86; interpersonal facet .61; affective facet .74; lifestyle facet .67; antisocial facet score .87.

Mental disorders. Participants age 17 and younger were assessed using the Kiddie-Schedule for Affective Disorders and Schizophrenia for School-Aged Children - Present and Lifetime Version²⁹. Fifteen cases were rated independently by a second clinician and inter-rater reliability was high (CD/oppositional defiant disorder, kappa = 0.82). Participants age 18 or older were interviewed using the Structured Clinical Interview for DSM-IV (SCID I and II)^{30,31}. Twelve cases were rated independently by a second clinician and inter-rater reliability was high (CD/oppositional defiant disorder, kappa=0.82) (further information,²⁸).

Measures in early adulthood

Mental disorders. Ex-clients were assessed using the SCID I and II^{30,31} 12 cases were rated independently by a second clinician and inter-rater reliability was high (e.g. CD, kappa=0.82, alcohol abuse/dependence, kappa=0.83). Symptoms were summed to provide total scores for depression, anxiety, alcohol abuse and/or dependence, drug abuse and/or dependence, and ASPD.

Suicide attempt. Suicide attempts since the initial assessment were scored absent (0) or present (occurred 1 or more times).

Treatment. Information about treatment since the initial assessment was collected with the Life History Calendar³², from SCID I³⁰, and from medical records.

Admission to psychiatric wards. Number of admissions to psychiatric wards since the initial assessment was collected from Patientregistret.

Psychosocial functioning. The Global Assessment of Functioning Scale (GAF)³³ assessed psychological, social, and occupational functioning. GAF scores range from 1 to 100.

Work/studies. The Life History Calendar³² documented work and studies. The number of months worked/studied more than 30 hours/week since the initial assessment was defined as an outcome.

School dropout. School drop-out was coded as present if less than 7 years of school were completed.

Having a child at a young age. Participants reported whether or not they had children.

Aggressive behavior. The MacArthur Community Violence Instrument³⁴, was administered by interview, to report on all types of physically aggressive behaviors towards others in the past six months. Item scores were summed to provide a total score.

Violent crime. Eleven questions were asked about violent crimes over the past year. Information about number of violent crime convictions was extracted from official Swedish criminal records. Item scores and number of convictions were summed. Definitions are provided in the on-line material.

Non-violent crime. Fifteen questions were asked about non-violent crimes over the past year. Information about number of convictions for non-violent offences was extracted from official Swedish criminal records. Item scores and number convictions were summed.

Procedure

When adolescents first contacted the clinic, they were invited to participate in the study. After a complete description of the study, and answers to their questions, the adolescent and each parent formally signed consents to complete interviews and questionnaires, and to allow the research team access to their clinical files, official criminal records, and social insurance records. Interviews were then scheduled with adolescents and each parent separately. For participation in the study, adolescents received a gift certificate worth 500 SEK for a department store and a cinema ticket.

Five years later, the ex-clients were asked to again participate in the study. Those who agreed signed formal consents to complete interviews and questionnaires, to allow the research team to access their clinical files, criminal, health, and social insurance records, and provided a sample of saliva for DNA extraction. Interviews were conducted, on average, 5.6

years ($SD=0.85$) after the baseline assessment. For participation in the follow-up, the ex-clients received a gift certificate worth 500 SEK for a department store.

Both the initial and the follow-up study were approved by the Karolinska Institute Research ethics Committee Nord (DNR 03-543) and Regionala etikprövningsnämnden in Stockholm (DNR 2008/1934-31/3).

Statistical Analyses

Characteristics of female and male participants were compared using t-tests and chi square statistics. Binary correlations were calculated between predictor variables (PCL:YV facet scores, number of CD symptoms) and outcome variables using Kendall's Tau (see Table e1 online). Multiple regression analyses were computed to examine outcomes defined as continuous variables: numbers of depression and anxiety symptoms and admissions to a psychiatric wards, months of worked/studied, numbers of symptoms of ASPD, alcohol and drug use disorders, incidents of aggressive behavior, convictions and self-reports of violent crime and non-violent crime, and GAF scores. Logistic regression models were calculated for outcomes defined dichotomously: suicide attempts, treatment for substance abuse, other mental health treatment, school drop-out, and having a child at a young age. Due to outliers on the dependent variables, one case was removed from all of the analyses, and six cases from analyses of number of admissions to psychiatric wards. The first series of models estimated the independent associations of PCL facet scores with outcomes and controlled for sex. By specifying the four facet scores as predictors, the overlap between the facets was controlled, thereby providing an independent estimate of the association of each facet with each outcome. Model I included PCL facet scores. Model II included facets scores, sex, and an interaction term of the facet scores with sex. Interaction terms were included one by one. A final model included significant predictors from models I and II. Similar analyses estimated the associations of the number of CD symptoms with outcomes. Finally, one model was

calculated to determine whether the PCL facets that were predictive of outcomes in the final model would remain after taking account of the number of CD symptoms. In order to examine interaction terms the following variables were dichotomized: antisocial facet, low 0-2, high 3 or more; lifestyle facet, low 0-2, high 3 or more, and number of CD symptoms, low 0-2, high 3 or more. Independent t-tests were calculated to estimate significance of differences.

Results

Table 1 about there

Characteristics of the sample

As shown in Table 1, women had significantly lower PCL total, interpersonal, affective, and antisocial scores, and number of CD symptoms than men. Within each domain of functioning, sex differences were observed. Women presented more depressive and anxiety symptoms, and more reported having children, but women had fewer symptoms of ASPD and drug use disorders, and fewer violent and non-violent crimes than men.

Do psychopathic traits assessed in mid-adolescence predict mental health, psychosocial functioning, and antisocial/criminal behavior five years later?

Table 2 about there

Table 2 presents the results of the final regression model using PCL:YV facet scores in mid-adolescence, and interactions of these scores with sex, to predict mental health, psychosocial functioning, and antisocial/criminal behavior five years later. (see Table 2e for results of initial models). The antisocial score positively predicted the number of anxiety symptoms and likelihood of receiving treatment for substance use disorders.

Lifestyle and antisocial facet scores negatively predicted GAF scores. By contrast, the interpersonal score and male sex independently and positively predicted number of months worked/studied, as did the interaction of lifestyle*sex indicating that among men, but not women, an increase in lifestyle facet score was associated with less time worked/studied. Men with high, as compared to low, lifestyle scores worked/studied significantly fewer months (high: M= 18.24, SD=17.63, low: M=32.98, SD=19.02, $t(58)=2.76$, $p=.008$). Among women, there was no difference in time worked/studied between those with high and low scores. Interpersonal and antisocial scores positively predicted school drop-out.

All six antisocial outcomes in early adulthood were predicted by psychopathic traits assessed in mid-adolescence. The number of ASPD symptoms was predicted by interpersonal and antisocial scores. The number of symptoms of alcohol use disorders was predicted by male sex and the antisocial score, while the number of symptoms of drug disorders was predicted only by the antisocial score. Aggressive behavior was predicted by male sex and the interaction antisocial*sex, while violent and non-violent crimes were predicted by the interaction antisocial*sex. These significant interaction terms, plus follow-up t-tests, indicate that high antisocial facet scores were associated with aggressive behavior, violent and non-violent crimes, much more strongly among men than women (see on-line Results).

Do the number of CD symptoms assessed in mid-adolescence predict mental health, psychosocial functioning, and antisocial/criminal behavior five years later?

Table 3 about there

Table 3 presents the results of the final model predicting outcomes by CD symptoms and symptoms*sex (see Table3e for results of initial models). The number of CD symptoms positively predicted number of anxiety symptoms, as did the interaction CD symptoms*sex.

Women with high, as compared to low, numbers of CD symptoms presented significantly more anxiety symptoms (high: $M=7.00, SD=6.26$; low: $M=4.02, SD=5.06$; $t(84)=-2.44$, $p=.017$). Among men, no difference in anxiety symptoms was detected for those with high and low numbers of CD symptoms. The number of CD symptoms positively predicted the numbers of admissions to psychiatric wards. CD symptoms negatively predicted GAF score and positively predicted school drop-out.

Additionally, and as expected, CD symptoms positively predicted number of symptoms of ASPD as did the interaction term CD symptoms*sex indicating, and confirmed by follow-up t-tests that among men the association was much stronger than among women. The number of CD symptoms positively predicted the number of symptoms of alcohol and drug use disorders. Only the interaction CD symptoms*sex predicted aggressive behavior, and number of violent and non-violent crimes. Follow-up t-tests confirmed that men with high, as compared to low, numbers of CD symptoms obtained significantly higher scores for aggressive behavior, and significantly more convictions/self-reports of violent and non-violent crimes. Among women, those presenting high and low numbers of CD symptoms did not differ on scores for aggression or violent crimes, but they did commit significantly more non-violent offences.

Table 4 about there

Table 4 presents a summary of the results of the final regression models reported above that predicted mental health, psychosocial functioning, and antisocial behavior using the PCL:YV facet scores in one series of analyses and the number of CD symptoms in another. As can be seen, PCL facets and CD symptoms predicted indices of antisocial behavior

similarly, while the PCL facets predicted two mental health and several psychosocial outcomes.

Are psychopathic traits a better predictor of outcomes after five years than number of CD symptoms?

Insert Table 5 about there

Table 5 presents results of the regression model in which PCL facet scores were entered in addition to the number of CD symptoms, in order to estimate the independent contributions of the PCL facet scores and CD symptoms. No mental health outcomes were predicted, and one psychosocial outcome, GAF score was negatively predicted by the lifestyle and antisocial facets. The number of ASPD symptoms was positively predicted by the lifestyle and antisocial facets in addition to CD symptoms. The numbers of symptoms of alcohol and drug use disorders were predicted only by the antisocial facet scores, while aggressive behavior, violent and non-violent crimes were only predicted by the interaction antisocial facet*sex.

Discussion

The present study sought to determine the utility of the PCL:YV in predicting mental health, psychosocial, and antisocial outcomes in early adulthood among females and males who had sought treatment for substance misuse in mid-adolescence. In general, the PCL:YV provided added value over and above a diagnosis of CD. Multivariate analyses were computed in order to determine the independent associations of each of the PCL:YV facets to outcomes. The antisocial facet predicted anxiety symptoms, substance misuse treatment, GAF scores, school drop-out, and all antisocial outcomes including ASPD, symptoms of alcohol and drug use disorders, aggressive behavior, violent and non-violent criminality. Additionally, the interpersonal factor was associated with time worked/studied, school drop-out, and ASPD,

while the lifestyle factor was associated with GAF scores and time work/studied. Notably, the affective facet, often referred to as the core of psychopathy, was not associated with any outcome. Thus³⁵, the PCL:YV facet scores assessed in mid-adolescence predicted a broad array of outcomes five years later.

The number of CD symptoms assessed in mid-adolescence also predicted outcomes five years later, including anxiety symptoms, inpatient admissions, GAF score, school drop-out, and all antisocial outcomes.

Adolescents with the highest levels of antisocial behavior indicated by either high antisocial facet scores or numbers of CD symptoms were more likely than those with lower levels to receive treatment. The data did not allow further investigation of these associations. It could be that clinicians in this clinic for adolescent substance misusers selected the most severely antisocial youth for treatment. However, previous studies of adolescents and adults report that psychopathic traits are associated with a failure to engage and benefit from treatment^{15, 16, 36}. It could be that these adolescents with high scores for manipulation and other psychopathy traits use mental health services for their own ends, such as negotiating with police not to charge them if they go into treatment, or detoxing in hospital in order to use less drugs to get high. These findings warrant further study.

Both the PCL:YV facets and CD symptoms predicted antisocial outcomes more strongly among males than females suggesting that among adolescent females other factors are contributing to maintaining, and perhaps extending, antisocial behavior. Both the antisocial facet and CD symptoms predicted anxiety symptoms, more strongly among females than males. This result concurs with findings from other studies showing that both ASPD and CD are associated with elevated rates of anxiety disorders^{37, 38}. Thus, these co-morbid disorders may be relatively long-standing by adolescence and present a challenge to clinics focused on substance misuse.

The assessment of CD symptoms in mid-adolescence provides a wealth of information about the onset and development of antisocial behavior, and as the present study and others, have shown, it predicts future antisocial/criminal behaviors, poor psychosocial functioning and behaviors such as dropping out of school that have long term consequences. The PCL:YV facets also predicted these same behaviors, and may provide additional information that is clinically useful. While maladaptive personality traits generally decline from mid-adolescence to early adulthood^{39,42}, emerging evidence suggests that psychopathic traits are relatively stable, and consequently will continue to be associated with anxiety, poor psychosocial functioning, antisocial/criminal behaviors in adulthood. Based on both an extensive interview and clinical and criminal files, the PCL:YV assesses pathological lying and manipulation. Knowing about these attributes allows clinicians to better judge the usefulness of adolescents' self-reports. If levels of these and other psychopathic traits are high, skepticism on the part of clinicians may also be warranted with regard to pronouncements of future projects, including participation in treatment. Unrealistic and grandiose plans, and a lack of future goals, are specifically assessed with the PCL. All of these characteristics are important for developing a treatment program likely to reduce substance misuse and for implementing measures to promote engagement with treatment. Further, studies of children presenting psychopathic traits indicate that they require different interventions from those that are effective with other children with CD and their parents^{14,43}. One randomized controlled trial has shown that children with CD and high levels of psychopathic traits learn from reward, not time-out^{13,14,44}, and proposals suggest that interventions focus on their insensitivity to others¹⁰. Given the evidence that psychopathic traits are relatively stable by mid-adolescence, and that in the present study the affective facet was not associated with any outcomes, research is needed to determine whether adolescents misusing substances who present medium to high levels of these traits would benefit from a specific treatment approach.

Conclusion

The PCL:YV may provide useful information to clinicians treating adolescents engaging in substance misuse as it predicted mental health, psychosocial, and antisocial/criminal behavior into early adulthood. Future trials are needed to determine whether specific treatment approaches would benefit adolescents presenting these traits.

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References

1. Armstrong TD, Costello EJ. Community studies on adolescent substance use, abuse, or dependence and psychiatric comorbidity. *J Consult Clin Psychol.* 2002;70(6):1224-39.
2. Couwenbergh C, van der Brink W, Vreugdenhil C, et al. Comorbid psychopathology in adolescents and young adults treated for substance use disorders: a review. *Eur Child Adolesc Psychiatry.* 2006;15(6):319-28.
3. Bardone AM, Moffitt TE, Caspi A, et al. Adult physical health outcomes of adolescent girls with conduct disorder, depression, and anxiety. *J Am Acad Child Adolesc Psychiatry.* 1998;37(6):594-601.
4. Harrington R, Fudge H, Rutter M, et al. Adult outcomes of childhood and adolescent depression: II. Links with antisocial disorders. *J Am Acad Child Adolesc Psychiatry.* 1991;30(3):434-9.
5. Angold A, Costello EJ, Erkanli A. Comorbidity. *J Child Psychol Psychiatry.* 1999;40(1):57-87.
6. Marmorstein NR, Iacono WG. Major depression and conduct disorder in a twin sample: gender, functioning, and risk for future psychopathology. *J Am Acad Child Adolesc Psychiatry.* 2003;42(2):225-33.
7. Lahey BB, Pelham WE, Loney J, et al. Instability of the DSM-IV Subtypes of ADHD from preschool through elementary school. *Arch Gen Psychiatry.* 2005;62(8):896-902.
8. Lawing K, Frick PJ, Cruise KR. Differences in offending patterns between adolescent sex offenders high or low in callous-unemotional traits. *Psychol Assess.* 2010;22(2):298-305.
9. Moffitt TE. Adolescence-limited and life-course-persistent antisocial behavior: a developmental taxonomy. *Psychol Rev.* 1993;100(4):674-701.
10. Dadds MR, Allen JL, Oliver BR, et al. Love, eye contact and the developmental origins of empathy versus psychopathy. *Br J Psychiatry.* 2012; 200(3):191-6.

11. Frick PJ, White SF. Research Review: The importance of callous-unemotional traits for developmental models of aggressive and antisocial behavior. *Journal of Child Psychology and Psychiatry*. 2008;49(4):359-375.
12. Hawes DJ, Dadds MR. The treatment of conduct problems in children with callous-unemotional traits. *J Consult Clin Psychol*. 2005;73(4):737-41.
13. Hawes DJ, Dadds MR. Stability and malleability of callous-unemotional traits during treatment for childhood conduct problems. *J Clin Child Adolesc Psychol*. 2007;36(3):347-55.
14. Pasalich DS, Dadds MR, Hawes DJ, et al. Do callous-unemotional traits moderate the relative importance of parental coercion versus warmth in child conduct problems? An observational study. *J Child Psychol Psychiatry*. 2011;52(12):1308-15.
15. Salekin RT, Worley C, Grimes RD. Treatment of Psychopathy: A Review and Brief Introduction to the Mental Model Approach for Psychopathy. *Behavioral Sciences & the Law*. 2010;28(2):235-266.
16. O'Neill ML, Lidz V, Heilbrun K. Adolescents with psychopathic characteristics in a substance abusing cohort: treatment process and outcomes. *Law Hum Behav*. 2003;27(3):299-313.
17. Rutter M. Psychopathy in childhood: is it a meaningful diagnosis? *Br J Psychiatry*. 2012;200(3):175-6.
18. Forth AE, Kosson DS, Hare RD. Hare Psychopathy Checklist: Youth Version (PCL:YV): Technical manual. Toronto Canada: Multi-Health Systems; 2003.
19. Hare RD. The Hare psychopathy checklist - revised 2nd ed. Toronto Canada: Multi-Health Systems; 2003.
20. Edens JF, Campbell JS, Weir JM. Youth psychopathy and criminal recidivism: a meta-analysis of the psychopathy checklist measures. *Law Hum Behav*. 2007;31(1):53-75.

21. Schmidt F, McKinnon L, Chattha HK, et al. Concurrent and predictive validity of the psychopathy checklist: youth version across gender and ethnicity. *Psychol Assess.* 2006;18(4):393-401.
22. Vincent GM, Odgers CL, McCormick, et al. The PCL: YV and recidivism in male and female juveniles: a follow-up into young adulthood. *Int J Law Psychiatry.* 2008;31(3):287-96.
23. Gretton HM, Hare RD, Catchpole RE. Psychopathy and offending from adolescence to adulthood: a 10-year follow-up. *J Consult Clin Psychol.* 2004;72(4):636-45.
24. Murrie DC, Cornell DG, Kaplan S, et al. Psychopathy scores and violence among juvenile offenders: a multi-measure study. *Behavioral Sciences & the Law.* 2004;22(1):49-67.
25. Pardini DA, Loeber R. Interpersonal callousness trajectories across adolescence - Early social influences and adult outcomes. *Crim Justice Behav.* 2008;35(2):173-196.
26. Sevecke K, Kosson DS, Krischer MK. The Relationship Between Attention Deficit Hyperactivity Disorder, Conduct Disorder, and Psychopathy in Adolescent Male and Female Detainees. *Behavioral Sciences & the Law.* 2009;27(4):577-598.
27. Wymbs BT, McCarty CA, King KM, et al. Callous-unemotional traits as unique prospective risk factors for substance use in early adolescent boys and girls. *J Abnorm Child Psychol.* 2012;40(7):1099-110.
28. Hodgins S, Tengstrom A, Bylin S, et al. Consulting for substance abuse: mental disorders among adolescents and their parents. *Nord J Psychiatry.* 2007;61(5):379-86.
29. Kaufman J, Birmaher B, Brent DA, et al. Schedule for affective disorders and schizophrenia for school-age children - present and lifetime version (K-SADS-PL): Initial reliability and validity data. *Journal of the American Academy of Child and Adolescent Psychiatry.* 1997;36:980-988.

30. First MB, Spitzer RL, Gibbon M, et al. User's Guide for the Structured Clinical Interview for DSM-IV axis I Disorders - Clinical version (SCID-CV). Washington DC: American Psychiatric Press;1997.
31. First MB, Gibbon M, Spitzer RL, et al. User's Guide for the Structured Clinical Interview for DSM-IV axis II Personality Disorders. Washington DC: American Psychiatric Press;1997.
32. Freedman D, Thornton A, Camburn D, et al. The life history calendar: a technique for collecting retrospective data. *Sociol Methodol.* 1988;18:37-68.
33. Diagnostic and statistical manual of mental disorders. Washington, DC: American Psychiatric Press;1995.
34. Steadman HJ, Mulvey EP, Monahan J, et al. Violence by people discharged from acute psychiatric inpatient facilities and by others in the same neighborhoods. *Arch Gen Psychiatry.* 1998;55(5):393-401.
35. Dadds MR, Hawes DJ, Frost AD, et al. Learning to 'talk the talk: the relationship of psychopathic traits to deficits in empathy across childhood. *J Child Psychol Psychiatry.* 2009;50(5):599-606.
36. McGuire J. A review of effective interventions for reducing aggression and violence. *Philos Trans R Soc Lond B Biol Sci.* 2008;363(1503):2577-97.
37. Hodgins S, DeBrito SA, Chhabra P, et al. Anxiety disorders among offenders with ASPDs: a distinct subtype? *Can J Psychiatry.* 2010;55(12):784-91.
38. Polier GG, Vloet TD, Herpertz-Dahlmann B, et al. Comorbidity of conduct disorder symptoms and internalising problems in children: investigating a community and a clinical sample. *Eur Child Adolesc Psychiatry.* 2012;21(1):31-8.

39. Blonigen DM, Hicks BM, Krueger RF, et al. Continuity and change in psychopathic traits as measured via normal-range personality: A longitudinal-biometric study. *J Abnorm Psychol.* 2006;115(1):85-95.
40. McGue M, Bacon S, Lykken DT. Personality stability and change in early adulthood: a behavioral genetic analysis. *Developmental Psychology.* 1993;29(1):96-109.
41. Roberts BW, Caspi A, Moffitt TE. The kids are alright: growth and stability in personality development from adolescence to adulthood. *J Pers Soc Psychol.* 2001;81(4):670-83.
42. Johnson JG, Cohen P, Kasen S, et al. Age-related change in personality disorder trait levels between early adolescence and adulthood: a community-based longitudinal investigation. *Acta Psychiatr Scand.* 2000;102(4):265-75.
43. Pasalich DS, Dadds MR, Hawes DJ, et al. Attachment and callous-unemotional traits in children with early-onset conduct problems. *J Child Psychol Psychiatry.* 2012;53(8):838-45.
44. Pasalich DS, Dadds MR, Vincent LC, et al. Emotional communication in families of conduct problem children with high versus low callous-unemotional traits. *J Clin Child Adolesc Psychol.* 2012;41(3):302-13.

Table 1. Characteristics of the clients

	Women n = 86	Men n = 61	Difference
Mean (SD) PCL total score	12.36 (5.88)	15.86 (8.05)	$t_{103,5}=-2.893, p=.005$
Mean (SD) interpersonal facet score	2.70 (1.42)	3.21 (1.73)	$t_{145}=-1.975, p=.050$
Mean (SD) affective facet score	2.36 (1.89)	3.22 (2.06)	$t_{145}=-2.625, p=.010$
Mean (SD) lifestyle facet score	2.57 (1.30)	2.94 (1.75)	$t_{145}=-1.472, p=.143$
Mean (SD) antisocial facet score	2.11 (1.80)	3.56 (2.67)	$t_{97,5}=-3.680, p=.000$
Mean (SD) number of CD symptoms	2.85 (2.98)	4.10 (3.47)	$t_{116,7}=-2.277, p=.025$
Mental health			
Mean (SD) number of depression symptoms	4.31 (3.18)	2.07 (2.54)	$t_{142,8}=4.757, p=.000$
Mean (SD) number of anxiety symptoms	5.23 (5.74)	2.23 (3.85)	$t_{144,6}=3.795, p=.000$
% of suicide attempts	8.1%	6.6%	$\chi^2(1,n=147)=0.002, p=.967$
% treatment for substance misuse	49.4%	45.9%	$\chi^2(1,n=146)=0.063, p=.802$
% of treatment for other mental disorders	71.8%	68.9%	$\chi^2(1,n=146)=0.039, p=.844$
Number of admissions to psychiatric wards	0.74 (1.37)	0.67 (1.47)	$t_{132}=0.262, p=.794$
Psychosocial functioning			
Mean (SD) GAF score	66.36 (11.31)	64.49 (11.93)	$t_{145}=0.925, p=.356$
% of drop out school	3.5%	6.7%	$\chi^2(1,n=146)=0.241, p=.624$
Mean (SD) months worked/studied	30.34 (18.15)	28.69 (19.52)	$t_{145}=0.526, p=.600$
A child	29.1%	13.3%	$\chi^2(1,n=146)=4.144, p=.042$
Antisocial/criminal behavior			
Mean (SD) number of ASPD symptoms	0.50 (1.07)	1.59 (2.02)	$t_{83,96}=-3.849, p=.000$
Mean (SD) number of alcohol disorder symptoms	2.08 (2.74)	2.13 (2.90)	$t_{145}=-0.106, p=.916$
Mean (SD) number of drug disorder symptoms	1.63 (2.86)	2.64 (3.16)	$t_{145}=-2.022, p=.045$

Mean (SD) self-reported aggressive behavior	1.05 (1.63)	1.41 (2.01)	$t_{111.79}=-1.165, p=.246$
Mean (SD) number of violent criminality	0.47 (1.22)	2.03 (3.05)	$t_{73.83}=-3.775, p=.000$
Mean (SD) number of non-violent criminality	2.80 (2.68)	8.03 (13.77)	$t_{63.23}=-2.928, p=.005$

Table 2. Results of regression analyses using PCL:YV scores assessed in mid-adolescence, and interaction terms by sex, to predict mental health, psychosocial functioning, and antisocial outcomes five years later

	Mental health				Psychosocial functioning				
	Numbers of anxiety symptoms	Treatment for SUD	Other mental health treatment	GAF	Months worked/studied	Dropped out of school			
	<i>Standardized</i>	<i>OR</i>	<i>OR</i>	<i>Standardized</i>	<i>Standardized</i>	<i>OR</i>			
	<i>Beta</i>	<i>P</i>	<i>(95% CI)</i>	<i>P</i>	<i>Beta</i>	<i>P</i>	<i>(95% CI)</i>	<i>P</i>	
Final model R ²	0.04				0.12				
Sex					0.35	0.03			
Interpersonal facet					1.24	0.11	0.24	0.007	0.49
					(0.95-1.62)		(0.25-0.96)		
Lifestyle facet					-0.26	0.01	-0.006	0.96	
Antisocial facet	0.19	0.02	1.24	0.005	-0.29	0.004	2.07	0.001	
	(1.07-1.44)				(0.99-1.46)		(1.35-3.17)		
Lifestyle facet*sex					-0.55	0.006			
	Antisocial/criminal behavior								

	Number of symptoms of				Score for		Number of convictions/self-reports					
	ASPD	Alcohol Disorder	Drug Disorder	Aggressive behavior	Violent crimes	Non-violent crimes						
Final model R ²	0.59	0.17	0.20	0.17	0.31	0.24						
Sex	-0.25	0.07	-0.49	0.005	-0.25	0.05	-0.04	0.73	-0.09	0.42		
Interpersonal facet	0.17	0.04	-0.08	0.51								
Affective facet		-0.19	0.14									
Lifestyle facet	0.09	0.31										
Antisocial facet	0.35	<0.001	0.39	0.001	0.44	<0.001	0.15	0.26	0.19	0.13	0.28	
Interpersonal facet*sex	0.24	0.10	0.25	0.26								
Lifestyle facet*sex	0.28	0.06	0.27	0.16								
Antisocial facet*sex							0.41	0.02	0.42	0.009	0.44	0.009

Table 3. Results of regression analyses using number of conduct disorder symptoms assessed in mid-adolescence, and interaction terms by sex, to predict mental health, psychosocial functioning, and antisocial outcomes five years later

	Mental health			Psychosocial functioning		
	Numbers of anxiety symptoms	Admissions to psychiatric wards	GAF	Months worked/studied	Dropped out of school	
	<i>Standardized</i>	<i>Standardized</i>	<i>Standardized</i>	<i>Standardized</i>	<i>OR</i>	
	<i>Beta</i>	<i>Beta</i>	<i>Beta</i>	<i>Beta</i>	<i>P</i>	<i>P</i>
					<i>(95% CI)</i>	
Final model R ²	0.18	0.06	0.15	0.04		
Sex	-0.16	0.16	0.11	0.35	0.11	0.36
Number of CD symptoms	0.43	<0.001	0.21	0.01	-0.06	0.59
					1.35	0.009
					(1.08-	
					1.69)	
CD symptoms*sex	-0.30	<0.001	-0.17	0.24	-0.14	0.18
Antisocial/criminal behavior						
	Number of symptoms of			Score for		
ASPD	Alcohol	Drug	Aggressive	Violent	Non-violent	Convictions/self-reports

	disorder	disorder	disorder	Behavior	crimes	crimes
Final model R ²	0.49	0.09	0.13	0.13	0.28	0.24
Sex	-0.05	-0.10	0.41	0.003	0.98	0.86
Number of CD symptoms	0.34	0.29	0.01	0.22	0.05	0.39
CD symptoms*sex	0.46	0.05	0.76	0.17	0.26	<0.001
				0.37	0.01	0.47
				0.49	0.49	0.001

Table 4. Summary of PCL:YV scores and CD symptoms assessed in mid-adolescence that predicted outcomes five years later.

	PCL:YV Facet scores				Number of CD symptoms
	Interpersonal	Affective	Lifestyle	Antisocial	
Mental Health					
Depression					
Anxiety				↑	↑ women stronger
Suicide attempts					
Treatment for substance misuse				↑	
Other treatment					
Inpatient admissions					↑
Psychosocial Functioning					
GAF-score			↓	↓	↓
Time worked/studied	↑		↓ men stronger		
School drop out	↓			↑	↑
Child at young age					
Antisocial/Criminal Behavior					
ASPD	↑			↑	↑ men stronger
Alcohol Disorder				↑	↑
Drug Disorder				↑	↑
Aggressive behavior				↑ men only	↑ men only
Violent crimes				↑ men stronger	↑ men only
Non-violent crimes				↑ men stronger	↑ men stronger

Footnote: ↑ positive prediction; ↓ negative prediction

Table 5. Results of regression analyses predicting mental health, psychosocial functioning, and antisocial/criminal behavior outcomes by psychopathic traits accounting of conduct disorder symptoms.

	Mental health			Psychosocial functioning		
	Numbers of anxiety symptoms <i>Standardized</i>	Treatment for SUD <i>OR</i>	Other mental health treatment <i>OR</i>	GAF	<i>Beta</i>	<i>P</i>
Final model R ²	0.05				0.25	
Sex						
Interpersonal facet						
Lifestyle facet					-0.25	0.01
Antisocial facet	0.07	0.54			-0.26	0.03
Lifestyle facet *sex						
Number of conduct disorder	0.16	0.19			-0.04	0.71

Antisocial/criminal behavior						
	Number of symptoms		Score for		Convictions/self-reports	
	ASPD	Alcohol disorder	Drug disorder	Aggressive Behavior	Violent crimes	Non-violent crimes
Final model R ²	0.55	0.12	0.20	0.17	0.31	0.26
Sex				-0.25	-0.04	0.73
Interpersonal facet	0.28	<0.001		0.05	0.45	0.003
Antisocial facet	0.40	<0.001	0.26	0.03	0.44	<0.001
Antisocial facet*sex				0.10	0.52	0.11
Number of conduct disorder	0.22	0.008	0.11	0.34	0.01	0.93
				0.06	0.62	0.10
				0.42	0.02	0.43
				0.06	0.62	0.32
				0.46	0.008	0.46
				0.06	0.62	0.16
				0.46	0.007	0.13

Supplementary On-line Material

Method

Criminal convictions. Violent crimes were defined to include: participating in a fight down town, carrying a weapon in school or down town, participating in beating someone up so badly you think/know that the person required hospital treatment, hurting someone with a knife, stiletto or similar, participating in forcing or threatening someone to do something she/he didn't want to do, started a fight without you or your friends being threatened or assaulted first, kicking someone lying on the floor or kicking someone on the head, threatening someone in order to steal, attempted or completed homicide or manslaughter, criminal negligence causing death, assault resulting in death, assault on official, assault, arson, robbery, kidnapping, stalking, harassment, unlawful threats, rape, sexual assault, sexual molestation, sexual abuse of minors, incest, procuring, and child pornography crimes. All other offences were defined as non-violent.

Results

Do psychopathic traits assessed in mid-adolescence predict mental health, psychosocial functioning, and antisocial/criminal behavior five years later?

Interaction terms in the final model. Men with high, as compared to low, antisocial scores obtained significantly higher scores for aggressive behavior, high: $M=2.15$ ($SD=2.27$), and low: $M=0.35$ ($SD=0.85$), ($t(44.14)=-4.25$, $P < .001$), and more convictions/self-reports of violent crimes, high: $M=2.79$ ($SD=3.19$), low: $M=0.73$ ($SD=1.95$), ($t(55.62)=-3.09$, $P = 0.003$), and non-violent crimes, high: $M=11.53$ ($SD=17.33$), low: $M=2.85$ ($SD=1.93$), ($t(34.07)=-2.90$, $P = 0.007$). Women with high, as compared to low, antisocial scores did not differ as to aggression scores, but had acquired significantly more convictions for violent crimes, high: $M=1.07$ ($SD=1.84$), low: $M=0.16$ ($SD=0.50$), ($t(31.37)=-2.64$, $P = 0.01$), and

for non-violent crimes, high: $M=3.97$ ($SD=3.18$), low: $M=2.20$ ($SD=2.16$), ($t(44.00) = -2.72$, $P = 0.009$).

Men with high, as compared to low, CD symptoms presented significantly more ASPD symptoms, high $M=2.53$ ($SD=1.97$), and low $M=0.32$ ($SD=0.91$), ($t(44.80)=-5.70$, $P < 0.001$). Women with high, as compared to low, CD symptoms presented significantly more ASPD symptoms, high ($M=1.00$ ($SD=1.41$), and low ($M=0.16$ ($SD=0.54$), ($t(40.94)=-3.361$, $P = 0.002$).

Men with high, as compared to low, CD symptoms presented significantly more aggressive behavior, high $M=2.03$ ($SD=2.35$), and low $M=0.61$ ($SD=1.13$), ($t(45.96)=-3.05$, $P = 0.004$); more convictions/self-reports of violent crimes, high $M=2.78$ ($SD=3.14$), and low $M=0.89$ ($SD=2.23$), ($t(58)=-2.65$, $P = 0.01$); and more non-violent crimes high $M=12.31$ ($SD=17.60$), and low $M=2.57$ ($SD=1.83$), ($t(31.77)=-3.11$, $P = 0.004$). Among women, there was no difference in aggressive incidents and violent crimes for those with high and low numbers of CD symptoms. However, women with high numbers of CD symptoms engaged in significantly more non-violent crimes $M=3.49$ ($SD=2.75$) than those with low numbers of symptoms $M=2.33$ ($SD=2.55$), ($t(84)=-1.99$, $P = 0.05$).

Tables

Table e1. Binary correlations between PCL:YV facet scores, and number of conduct disorder symptoms and mental health, psychosocial, and antisocial outcomes

	Women																						
	PCL:YV			Interpersonal			Affective			Lifestyle			Antisocial										
	total score	P	facet	facet	P	facet	facet	P	facet	facet	P	facet	facet	P	facet	facet	P	facet	facet	Number of CD symptoms	P		
Number of depression symptoms	0.04	0.58	0.008	0.006	0.93	0.006	0.94	0.01	0.88	0.11	0.19	0.08	0.31	0.03	0.18	0.03	0.03	0.18	0.13	0.18	0.41	0.37	0.26
Number of anxiety symptoms	0.21	0.008	0.000	0.15	0.07	0.13	0.07	0.13	0.12	0.08	0.08	0.13	0.08	0.17	0.08	0.18	0.08	0.13	0.08	0.08	0.41	0.37	0.26
Suicide attempts	0.17	0.06	0.10	0.15	0.29	0.15	0.12	0.17	0.08	0.17	0.08	0.13	0.08	0.17	0.08	0.18	0.08	0.13	0.08	0.08	0.41	0.37	0.26
SUD treatment	0.18	0.05	-0.10	0.09	0.32	0.09	0.36	0.23	0.02	0.28	0.004	0.08	0.41	0.08	0.08	0.41	0.37	0.26	0.08	0.08	0.41	0.37	0.26
Other mental disorders treatment	0.25	0.006	0.05	0.18	0.62	0.18	0.06	0.07	0.47	0.29	0.002	0.09	0.37	0.29	0.002	0.37	0.26	0.09	0.09	0.09	0.37	0.26	0.26
Number of admissions to psychiatric wards	0.07	0.44	0.04	-0.04	0.69	-0.04	0.67	0.03	0.79	0.05	0.64	0.11	0.26	0.05	0.64	0.26	0.26	0.11	0.11	0.11	0.26	0.26	0.26
GAF-score	-0.26	0.001	0.03	-0.25	0.72	-0.25	0.002	-0.27	0.001	-0.34	<0.001	-0.19	0.02	-0.34	<0.001	0.02	0.02	-0.19	-0.19	-0.19	0.02	0.02	0.02
School drop out	0.001	0.99	-0.16	0.07	0.09	0.07	0.50	0.09	0.33	0.08	0.43	0.18	0.06	0.08	0.43	0.06	0.06	0.18	0.18	0.18	0.06	0.06	0.06
Time worked/studied	0.05	0.53	0.16	-0.02	0.05	-0.02	0.84	0.001	0.99	-0.03	0.74	-0.15	0.10	-0.03	0.74	0.10	0.10	-0.15	-0.15	-0.15	0.10	0.10	0.10
Having a child	0.13	0.16	0.13	0.07	0.19	0.07	0.49	0.11	0.28	0.11	0.27	0.09	0.37	0.11	0.27	0.37	0.37	0.09	0.09	0.09	0.37	0.37	0.37
Number of ASPD symptoms	0.45	<0.001	0.30	0.36	0.002	0.36	<0.001	0.36	<0.001	0.47	<0.001	0.35	<0.001	0.47	<0.001	<0.001	<0.001	0.35	0.35	0.35	<0.001	<0.001	<0.001
Number of alcohol disorder symptoms	0.10	0.23	-0.06	-0.02	0.47	-0.02	0.82	0.17	0.05	0.19	0.03	0.14	0.11	0.19	0.03	0.11	0.11	0.14	0.14	0.14	0.11	0.11	0.11
Number of drug disorder symptoms	0.24	0.005	0.06	0.14	0.49	0.14	0.13	0.24	0.009	0.27	0.003	0.13	0.19	0.27	0.003	0.19	0.19	0.13	0.13	0.13	0.19	0.19	0.19
Aggressive behavior	0.11	0.18	0.08	0.09	0.40	0.09	0.32	0.20	0.03	0.10	0.29	0.11	0.21	0.10	0.29	0.21	0.21	0.11	0.11	0.11	0.21	0.21	0.21

Table e2. Results of initial regression analyses using PCL:YV scores assessed in mid-adolescence, and interaction terms by sex, to predict mental health, psychosocial functioning, and antisocial outcomes five years later

	Mental health																	
	Numbers of depression symptoms			Number of anxiety symptoms			Suicide attempts			Treatment for SUD			Other mental health treatment			Admissions to psychiatric wards		
	Standardized Beta	P	Standardized Beta	P	OR (95% CI)	P	OR (95% CI)	P	OR (95% CI)	P	OR (95% CI)	P	Standardized Beta	P	Standardized Beta	P		
Model 1. R ²	0.01		0.04														0.03	
Interpersonal facet	0.06	0.51	-0.02	0.85	1.38 (0.89-2.12)	0.15	0.90 (0.70-1.15)	0.34	1.28 (0.97-1.70)	0.08	0.03	0.73						
Affective facet	0.002	0.99	-0.01	0.91	1.35 (0.84-2.17)	0.22	1.00 (0.77-1.29)	0.99	0.99 (0.74-1.32)	0.94	-0.11	0.41						
Lifestyle facet	-0.07	0.58	-0.09	0.45	10.02 (0.59-1.77)	0.95	0.98 (0.70-1.36)	0.90	0.79 (0.53-1.15)	0.22	0.06	0.64						
Antisocial facet	-0.02	0.85	0.27	0.03	0.96 (0.66-1.41)	0.84	1.29 (1.03-1.62)	0.03	1.34 (1.03-1.74)	0.03	0.16	0.22						
Model 2a. R ²	0.15		0.18														0.07	
Sex	-0.56	0.001	-0.56	0.001	0.004 (0.00-1.42)	0.07	0.29 (0.06-1.35)	0.12	0.22 (0.04-1.15)	0.07	-0.47	0.01						
Interpersonal facet	-0.005	0.97	-0.09	0.46	1.05 (0.61-1.84)	0.85	0.81 (0.59-1.13)	0.21	1.11 (0.77-1.61)	0.57	-0.17	0.19						
Affective facet	0.03	0.84	0.009	0.94	1.43 (0.88-2.32)	0.15	1.00 (0.78-1.30)	0.96	1.00 (0.74-1.35)	0.99	-0.10	0.45						
Lifestyle facet	-0.16	0.18	-0.18	0.12	0.84 (0.47-1.51)	0.56	0.93 (0.66-1.30)	0.67	0.73 (0.49-1.09)	0.12	0.004	0.97						
Antisocial facet	0.12	0.32	0.41	0.001	1.06 (0.71-1.59)	0.77	1.35 (1.07-1.72)	0.01	1.42 (1.08-1.87)	0.01	0.19	0.16						
Interpersonal facet*sex	0.23	0.24	0.23	0.23	2.85 (0.89-9.16)	0.078	1.25 (0.80-1.96)	0.325	1.37 (0.81-2.32)	0.24	0.53	0.02						
b. R ²	0.14		0.18														0.07	
Sex	-0.43	0.003	-0.28	0.05	0.02 (0.00-3.59)	0.14	0.55 (0.16-1.91)	0.35	0.99 (0.26-3.69)	0.99	-0.34	0.03						
Interpersonal facet	0.08	0.36	0.02	0.87	10.43 (0.92-2.22)	0.11	0.90 (0.70-1.16)	0.42	1.34 (1.00-1.78)	0.05	0.02	0.88						

Affective facet	0.001	0.99	0.06	0.65	1.18	0.512	1.00	0.99	1.10	0.58	-0.23	0.10
					(0.72-1.92)		(0.75-1.33)		(0.79-1.53)			
Lifestyle facet	-0.14	0.22	-0.15	0.20	1.01	0.968	00.95	0.74	0.76	0.18	0.009	0.94
					(0.59-1.73)		(0.67-1.32)		(0.51-1.13)			
Antisocial facet	0.12	0.35	0.42	0.001	0.98	0.930	1.35	0.01	1.45	0.009	0.16	0.24
					(0.64-1.50)		(1.07-1.72)		(1.10-1.91)			
Affective facet*sex	0.07	0.70	-0.17	0.32	1.98	0.174	1.01	0.94	0.77	0.23	0.41	0.03
					(0.74-5.28)		(0.71-1.46)		(0.50-1.18)			
c. R ²			0.14	0.19								0.06
Sex	-0.30	0.07	-0.19	0.23	0.70	0.829	1.77	0.44	0.88	0.88	-0.36	0.05
					(0.03-18.25)		(0.41-7.58)		(0.18-4.23)			
Interpersonal facet	0.09	0.30	0.02	0.83	1.45	0.108	0.92	0.54	1.32	0.06	0.02	0.86
					(0.92-2.27)		(0.72-1.19)		(0.99-1.75)			
Affective facet	0.01	0.90	-0.009	0.94	1.31	0.291	0.98	0.88	1.00	0.98	-0.08	0.53
					(0.79-2.15)		(0.75-1.28)		(0.75-1.35)			
Lifestyle facet	-0.09	0.55	-0.05	0.72	1.09	0.816	1.17	0.46	0.81	0.38	-0.12	0.43
					(0.52-2.28)		(0.77-1.78)		(0.51-1.29)			
Antisocial facet	0.14	0.28	0.44	0.000	1.03	0.873	1.42	0.006	1.45	0.01	0.14	0.31
					(0.69-1.56)		(1.11-1.82)		(1.09-1.92)			
Lifestyle facet*sex	-0.10	0.52	-0.28	0.16	0.87	0.744	0.65	0.08	0.81	0.45	0.41	0.06
					(0.36-2.06)		(0.40-1.05)		(0.47-1.39)			
d. R ²			0.15	0.19								0.06
Sex	-0.27	0.04	-0.21	0.10	0.47	0.59	0.81	0.72	0.92	0.89	-0.29	0.05
					(0.03-7.14)		(0.25-2.25)		(0.28-3.03)			
Interpersonal facet	0.09	0.31	0.01	0.90	1.43	0.11	0.91	0.45	1.32	0.06	0.03	0.75
					(0.92-2.22)		(0.71-1.16)		(0.99-1.75)			
Affective facet	0.001	0.99	-0.03	0.83	1.34	0.25	0.99	0.94	0.98	0.91	-0.07	0.61
					(0.82-2.19)		(0.76-1.29)		(0.73-1.33)			
Lifestyle facet	-0.12	0.31	-0.13	0.25	1.01	0.97	0.96	0.83	0.75	0.16	0.01	0.94
					(0.58-1.77)		(0.69-1.35)		(0.50-1.12)			
Antisocial facet	0.24	0.13	0.60	<0.001	1.03	0.90	1.47	0.02	1.71	0.01	-0.04	0.82
					(0.62-1.73)		(1.07-2.02)		(1.12-2.61)			
Antisocial facet*sex	-0.21	0.24	-0.33	0.07	0.98	0.94	0.88	0.45	0.76	0.22	0.40	0.05
					(0.54-1.76)		(0.63-1.23)		(0.50-1.17)			

		Psychosocial functioning			
GAF		Months worked/ studied		Having a child	
Standardized Beta	p	Standardized Beta	p	OR	p
				(95% CI)	

Model 1. R ²	0.25	0.37	0.49	0.04	0.20	0.03	1.17	0.26
Interpersonal facet	0.07	0.37	(0.25-0.96)	0.04	0.20	0.03	(0.89-1.55)	0.26
Affective facet	-0.07	0.53	0.97	0.93	0.02	0.86	0.94	0.67
Lifestyle facet	-0.25	0.02	(0.55-1.71)	0.49	-0.23	0.05	(0.70-1.26)	0.68
Antisocial facet	-0.28	0.01	(0.62-2.74)	0.04	-0.05	0.69	(0.75-1.56)	0.75
Model 2a. R ²	0.25		(1.03-3.26)		0.08		(0.81-1.34)	
Sex	0.31	0.05	0.007	0.07	0.18	0.30	0.29	0.26
Interpersonal facet	0.20	0.08	(0.00-1.41)	0.03	0.32	0.009	(0.03-2.44)	0.25
Affective facet	-0.08	0.48	0.10	0.75	0.02	0.88	(0.86-1.74)	0.73
Lifestyle facet	-0.21	0.05	(0.01-0.77)	0.79	-0.22	0.08	(0.71-1.27)	0.89
Antisocial facet	-0.30	0.008	1.10	0.04	-0.04	0.78	1.03	0.31
Interpersonal facet *sex	-0.32	0.08	(0.61-2.00)	0.07	-0.30	0.15	(0.70-1.50)	0.94
Model 2b. R ²	0.26		1.12		0.07		(0.88-1.52)	
Sex	0.04	0.79	(1.07-5.73)	0.52	0.009	0.95	0.98	0.30
Interpersonal facet	0.07	0.42	(0.84-43.79)	0.04	0.21	0.03	(0.56-1.71)	0.17
Affective facet	-0.09	0.47	0.21	0.75	0.05	0.74	0.40	0.85
Lifestyle facet	-0.24	0.03	(0.002-22.88)	0.60	-0.23	0.06	(0.07-2.24)	0.84
Antisocial facet	-0.30	0.008	0.47	0.04	-0.03	0.82	1.23	0.29
Affective facet *sex	0.05	0.77	(0.23-0.96)	0.66	-0.07	0.69	(0.92-1.65)	0.60
Model 2c. R ²	0.26		0.90		0.12		(0.71-1.32)	
Sex	0.08	0.60	(0.47-1.73)	0.59	0.36	0.04	1.04	0.35
Interpersonal facet	0.07	0.40	1.23	0.04	0.24	0.01	(0.71-1.52)	0.17
			(0.58-2.59)				1.16	
			(1.03-3.98)				(0.88-10.53)	
			1.25				0.89	
			(0.47-3.36)				(0.56-1.40)	
			0.27				0.41	
			(0.02-33.58)				(0.06-2.67)	
			0.47				1.23	

	(0.23-0.95)	0.51	0.93	-0.007	0.96	(0.92-1.66)	0.68
Affective facet	0.98	0.51	0.93	-0.007	0.96	(0.92-1.66)	0.68
Lifestyle facet	(0.56-1.71)	0.09	0.80	-0.02	0.91	(0.70-1.26)	0.71
Antisocial facet	(0.42-3.13)	0.01	0.04	0.03	0.81	(0.70-1.68)	0.28
Lifestyle facet*sex	(1.02-3.90)	0.91	0.76	-0.56	0.007	(0.88-1.54)	0.62
Model 2d. R ²	(0.38-3.79)			0.07		(0.50-1.52)	
Sex	0.00	0.91	0.13	-0.01	0.93	0.30	0.15
Interpersonal facet	(0.00-13.94)	0.41	0.03	0.21	0.03	(0.06-1.53)	0.18
Affective facet	(0.15-0.93)	0.57	0.65	0.02	0.88	(0.91-1.63)	0.72
Lifestyle facet	(0.58-2.38)	0.03	0.88	-0.24	0.06	(0.70-1.28)	0.88
Antisocial facet	(0.39-2.26)	0.02	0.42	-0.007	0.97	(0.71-1.50)	0.35
Antisocial facet*sex	(0.61-3.30)	0.57	0.11	-0.05	0.80	(0.84-1.61)	0.89
	(0.75-22.65)					(0.66-1.43)	

Antisocial/criminal behavior

	Number of symptoms		Score for		Number of convictions/self-reports	
	ASPD	Alcohol Use Disorder	Drug Use Disorder	Aggressive behavior	Violent crimes	Non-violent crimes
Model 1 R ²	0.55	0.12	0.22	0.15	0.25	0.21
Interpersonal facet	0.26	0.03	0.09	-0.003	0.09	0.29
Affective facet	0.09	-0.11	-0.08	0.11	0.07	0.54
Lifestyle facet	0.17	0.04	0.16	0.05	0.02	0.88
Antisocial facet	0.39	<0.001	0.35	0.26	0.40	<0.001
Model 2a R ²	0.58	0.16	0.22	0.15	0.31	0.24
Sex	-0.13	-0.42	-0.07	-0.14	-0.07	0.64
Interpersonal facet	0.12	-0.12	0.03	-0.06	-0.06	0.57
Affective facet	0.09	-0.10	-0.08	0.11	0.06	0.55
Lifestyle facet	0.16	-0.01	0.16	0.04	0.02	0.84
Antisocial facet	0.35	0.42	0.34	0.27	0.33	0.003
Interpersonal facet*sex	0.34	0.39	0.14	0.15	0.35	0.05
Model 2b. R ²	0.57	0.16	0.22	0.18	0.29	0.24

Sex	0.02	0.86	-0.38	0.008	-0.08	0.55	-0.27	0.05	0.07	0.58	0.06	0.68
Interpersonal facet	0.25	<0.001	0.01	0.88	0.08	0.36	-0.02	0.80	0.07	0.41	0.04	0.65
Affective facet	0.03	0.73	-0.22	0.10	-0.13	0.28	-0.004	0.98	0.003	0.98	-0.20	0.11
Lifestyle facet	0.18	0.03	-0.01	0.90	0.15	0.17	0.02	0.90	0.03	0.75	0.22	0.65
Antisocial facet	0.33	<0.001	0.39	0.002	0.33	0.006	0.25	0.04	0.32	0.005	0.29	0.01
Affective facet*sex	0.17	0.17	0.37	0.03	0.17	0.29	0.37	0.03	0.18	0.26	0.17	0.31
<i>Model 2cd. R²</i>	0.59		0.14		0.23		0.15		0.31		0.26	
Sex	-0.14	0.22	0.02	0.91	0.04	0.80	-0.15	0.36	-0.08	0.58	-0.14	0.36
Interpersonal facet	0.24	<0.001	0.05	0.62	0.09	0.30	-0.01	0.91	0.06	0.48	0.03	0.76
Affective facet	0.11	0.21	-0.11	0.35	-0.08	0.48	0.12	0.31	0.08	0.46	-0.12	0.27
Lifestyle facet	0.04	0.70	0.10	0.46	0.17	0.20	-0.02	0.87	-0.10	0.41	0.06	0.63
Antisocial facet	0.30	0.001	0.44	0.001	0.34	0.005	0.25	0.04	0.29	0.01	0.25	0.03
Affective facet*sex	0.38	0.007	-0.21	0.30	-0.007	0.97	0.17	0.38	0.38	0.04	0.43	0.02
<i>Model 2dd. R²</i>	0.57		0.13		0.22		0.18		0.32		0.26	
Sex	0.03	0.72	-0.15	0.25	0.06	0.64	-0.26	0.04	-0.05	0.68	-0.05	0.68
Interpersonal facet	0.25	<0.001	0.03	0.71	0.09	0.30	-0.009	0.92	0.07	0.38	0.04	0.62
Affective facet	0.10	0.24	-0.10	0.42	-0.08	0.47	0.15	0.20	0.10	0.35	-0.10	0.33
Lifestyle facet	0.18	0.04	0.02	0.89	0.17	0.12	0.008	0.94	0.01	0.92	0.20	0.07
Antisocial facet	0.24	0.03	0.40	0.02	0.36	0.02	0.03	0.86	0.08	0.56	0.08	0.59
Affective facet*sex	0.18	0.17	0.04	0.84	-0.05	0.80	0.43	0.02	0.44	0.008	0.19	0.02

Table e3. Results of initial regression analyses using numbers of CD symptoms assessed in mid-adolescence, and interaction terms by sex, to predict mental health, psychosocial functioning, and antisocial outcomes five years later

		Mental health															
		Numbers of depression symptoms			Number of anxiety symptoms			Suicide attempts			Treatment for SUD		Other mental health treatment		Admissions to psychiatric wards		
		<i>Standardized</i>	<i>P</i>	<i>Beta</i>	<i>Standardized</i>	<i>P</i>	<i>Beta</i>	<i>OR</i>	<i>(95% CI)</i>	<i>P</i>	<i>OR</i>	<i>(95% CI)</i>	<i>P</i>	<i>OR</i>	<i>(95% CI)</i>	<i>Standardized</i>	<i>P</i>
Model 1. R^2		0.05															
Number of CD symptoms		0.01	0.88	0.21	0.01	0.01	1.18	1.18	(0.99-1.40)	0.06	1.06	1.06	0.30	1.08	1.08	0.13	0.13
Model 2. R^2		0.18															
Sex		-0.27	0.02	-0.16	0.16	0.16	1.38	1.38	(0.15-12.29)	0.78	0.66	0.66	0.41	0.68	0.68	-0.30	0.02
Number of CD symptoms		0.17	0.13	0.43	<0.001	<0.001	1.27	1.27	(1.02-1.58)	0.04	1.04	1.04	0.61	1.07	1.07	-0.08	0.49
Number of CD symptoms*sex		-0.17	0.25	-0.30	0.04	0.04	0.86	0.86	(0.60-1.23)	0.40	1.05	1.05	0.64	1.04	1.04	0.43	0.008
		(0.82-1.32)															
		Psychosocial functioning															
		GAF			Dropped out of school			Months worked/studied			Having a child						
		<i>Standardized</i>	<i>P</i>	<i>Beta</i>	<i>OR</i>	<i>(95% CI)</i>	<i>Standardized</i>	<i>P</i>	<i>Beta</i>	<i>pP</i>	<i>OR</i>	<i>(95% CI)</i>	<i>P</i>				
Model I. R^2		0.03															
Number of CD		-0.37	<0.001	1.35	0.009	0.009	-0.18	-0.18	0.03	0.03	1.07	1.07	0.26				

