

**Personality Disorders in Adolescent Outpatients: a  
Cross-sectional Study of Prevalence, Comorbidity  
and Quality of Life**

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# Abbreviations

ADHD: Attention Deficit Hyperactivity Disorder  
ANCOVA: Analysis of Covariance  
ANOVA: Analysis of Variance  
ASD: Autism Spectrum Disorder  
ASPD: Antisocial Personality Disorder  
ASRS Screener: The Adult ADHD Self-Report Scale Screener version 1.1  
AUD: Alcohol Use Disorder  
BPD: Borderline Personality Disorder  
CD: Conduct Disorder  
CI: Confidence Interval  
CIC: Children In the Community Study  
CUD: Cannabis Use Disorder  
DSM: Diagnostic and Statistical Manual of Mental Disorders  
DUD: Drug Use Disorder  
FFM: Five-Factor Model  
GAD: Generalized Anxiety Disorder  
GAF: Global Assessment of Functioning  
GLM: General Linear Model  
ICD: International Classification of Diseases  
MCMII-III: Millon Clinical Multiaxial Inventory-III  
MINI: Mini International Neuropsychiatric Interview  
OCD: Obsessive-compulsive Disorder  
ODD: Oppositional Defiant Disorder  
OR: Odds Ratio  
PD: Personality Disorder  
PTSD: Post-traumatic Stress Disorder  
QOL: Quality of Life  
SD: Standard Deviation  
SIDP-IV: Structured Interview for DSM-IV  
SUD: Substance Use Disorder  
YQOL-R: Youth Quality of Life Instrument - Research Version

## List of papers

- I. Korsgaard, H., Torgersen, S., Wentzel-Larsen, T., Ulberg, R. (2015). Personality Disorders and Quality of Life in Adolescent Outpatients. *Scandinavian Journal of Child and Adolescent Psychiatry and Psychology*, 3(3): 180-189
- II. Korsgaard, H., Torgersen, S., Wentzel-Larsen, T., Ulberg, R. (2016). Personality Disorders and Axis I Comorbidity in Adolescent Outpatients with ADHD. *BMC Psychiatry*, 16:175. DOI: 10.1186/s12888-016-0871-0
- III. Korsgaard, H., Torgersen, S., Wentzel-Larsen, T., Ulberg, R. (2016). Substance Abuse and Personality Disorder Comorbidity in Adolescent Outpatients – Are Girls More Severely Ill Than Boys? *Child and Adolescent Psychiatry and Mental Health*, 10:8. DOI: 10.1186/s13034-016-0096-5



## Summary

Personality disorders are defined as enduring and maladaptive patterns of experiencing, coping, and relating to others. In DSM-IV as well as ICD-10, personality disorders may be diagnosed in adolescents when the individual's maladaptive personality traits are pervasive, persistent, and unlikely to be limited to a particular developmental state or an episode of an Axis I disorder. Research supports the assumption that pathological personality traits emerge at an early age and are related to health-risk behaviors in adolescence as well as young adulthood. In recent years there has been an increasing focus on the valid existence of personality disorders in adolescents, as well as on the prognostic importance of diagnosing these for the most part long-lasting and agonizing disorders as early as possible.

Personality disorders are common conditions, with prevalences of about 13% in the general adult population, up to 40% in adult outpatient samples, and up to 71% in adult inpatient samples. In adolescents, prevalences range from 6% to 17% in community samples, and in inpatient and more severely ill outpatient samples from 41% to 88%. There are few, if any, reports on the prevalence in less severely ill adolescents who have been referred to general service outpatient clinics.

Previous studies on adults have shown that the number of personality disorder symptoms is negatively correlated to general functioning and quality of life, and that personality disorders are associated with an extensive Axis I comorbidity, such as mood, anxiety, and substance abuse disorders.

### **Objectives:**

The main objective of this thesis was to study the prevalence of personality disorders and clinically relevant Axis I comorbidity, in an unselected sample of adolescents who were referred to a non-specialized (general service) child and adolescent outpatient clinic. The more specific aims were:

- To investigate the relationship of personality disorder symptoms, i.e. the number of personality disorder diagnostic criteria met by the adolescents, with self-perceived quality of life (paper I).
- To investigate the co-occurrence of personality disorders and common Axis I disorders in adolescents with ADHD, including possible gender differences (paper II).

- To investigate the relationship between alcohol and substance use disorders and personality disorders in the referred adolescents, with special regard to gender differences (paper III).

### **Material and methods:**

The three studies included in this thesis are based on an outpatient clinical sample, consisting of 153 adolescents (94 girls, 59 boys), aged 14 to 17 years. Personality disorders were assessed using the Structured Interview for DSM-IV Personality. Quality of life was assessed using the Youth Quality of Life Instrument - Research Version, which is a 41-item questionnaire covering broad aspects of quality of life. ADHD, conduct disorder and other Axis I conditions were assessed using the Mini International Neuropsychiatric Interview (MINI). All assessment work was done by the author of this thesis.

### **Results:**

The girls in our study were overall more severely ill than the boys, with higher prevalences of personality disorders as well as Axis I disorders.

We found that 21.6% of the adolescents fully met the diagnostic criteria for at least one personality disorder. No significant gender differences in the prevalence of each of the personality disorders were revealed. Practically all adolescents with a personality disorder had one or more Axis I disorders.

Quality of life was negatively related to the number of personality disorder criteria met: this finding was comparable to what has previously been reported in adults. Adjustment for the presence of Axis I disorders did not appreciably affect these findings.

More than two thirds of the adolescents met the criteria for at least one Axis I disorder, with significantly more mood and anxiety disorders in girls than in boys.

A total of 13.7% of the adolescents met diagnostic criteria for ADHD, with no significant gender difference; 17.6% had conduct disorder, and 4.6% had both ADHD and a personality disorder. There was a significantly elevated number of personality disorder symptoms in adolescents with ADHD diagnosis, and this relationship was not significantly weakened when adjusted for age, gender and other Axis I disorders. Antisocial and borderline personality disorders were significantly more frequent in girls than in boys with ADHD.

With regard to substance use disorders, 18.3% of the adolescents had either alcohol or cannabis abuse or dependency, also with no significant gender difference. There was a strong association between number of personality disorder symptoms and having one or more

substance use disorders; this relationship was not significantly changed by adjustment for gender, age and presence of Axis I disorders. For boys, no significant associations of substance use disorders and specific personality disorders, conduct disorder, or ADHD were found. For girls, there were significant associations of substance use disorders and borderline personality disorder, negativistic personality disorder, having more than one personality disorder, conduct disorder, and ADHD.

### **Conclusions:**

As expected, the adolescents in our study had more personality disorders than what has been previously found in studies on community samples and primary care patients, but less than in studies on more severely ill outpatients and inpatients. We found the same association as previously reported from studies on adults between personality disorder symptoms and quality of life. This supports the importance of evaluating quality of life when focusing on early detection and treatment of personality disorders in adolescents.

ADHD, conduct disorder, antisocial personality disorder and substance use disorders were equally prevalent in both genders. This suggests that ADHD and possibly conduct disorder may be more prevalent than previously assumed in adolescent girls. In girls with ADHD, antisocial and borderline personality disorders were significantly more frequent than in boys. This highlights the importance of assessing antisocial and borderline personality pathology in adolescent girls presenting with ADHD symptoms.

The highly significant association between the number of personality disorder symptoms and substance use disorders, regardless of adjustment for gender and Axis I comorbidity, suggests that having a personality disorder in itself may constitute a risk factor for developing substance use disorders in adolescence.

# 1 Introduction

## 1.1 Diagnosing personality disorders in adolescence

Personality disorders are defined as relatively enduring and maladaptive patterns of experiencing life, coping with problems, and relating to others. According to the *Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition (DSM-IV)*, personality disorder categories may be applied to adolescents when the individual's particular maladaptive personality traits appear to be pervasive, persistent, and unlikely to be limited to a particular developmental state or an episode of an Axis I disorder. A diagnosis of a personality disorder must satisfy the general criteria presented in table 1.1 in addition to specific criteria for each disorder. With the exception of antisocial personality disorder (ASPD), it is possible to diagnose any personality disorder in a person who is less than 18 years old if the diagnostic features have been present for at least 1 year (American Psychiatric Association, 2000).

**Table 1.** General diagnostic criteria for a personality disorder according to the DSM-IV

- 
- A. An enduring pattern of inner experience and behavior that deviates markedly from the expectations of the individual's culture. This pattern is manifested in two (or more) of the following areas:
    - (1) cognition (i.e., ways of perceiving and interpreting self, other people, and events);
    - (2) affectivity (i.e., the range, intensity, liability, and appropriateness of emotional response);
    - (3) interpersonal functioning;
    - (4) impulse control.
  - B. The enduring pattern is inflexible and pervasive across a broad range of personal and social situations.
  - C. The enduring pattern leads to clinically significant distress or impairment in social, occupational, or other important areas of functioning.
  - D. The pattern is stable and of long duration and its onset can be traced back at least to adolescence or early adulthood.
  - E. The enduring pattern is not better accounted for as a manifestation or consequence of another mental disorder.
  - F. The enduring pattern is not due to the direct physiological effects of a substance (e.g., a drug of abuse, a medication) or a general medical condition (e.g., head trauma).
-

The DSM-IV divides the specific personality disorders into thematic groups with similar behavior. There are 10 main disorders which are classed in three *clusters*, which are:

- *Cluster A personality disorders*: odd or eccentric behavior is considered to be central; schizotypal, schizoid and paranoid personality disorders.
- *Cluster B personality disorders*: dramatic and erratic emotional responses are common; borderline, antisocial, histrionic and narcissistic personality disorders.
- *Cluster C personality disorders*: anxious and fearful behavior are predominant; avoidant, dependent and obsessive-compulsive personality disorders.

In ICD-10 a personality disorder is defined as *a severe disturbance in the characterological constitution and behavioral tendencies of the individual, usually involving several areas of the personality, and nearly always associated with considerable personal and social disruption*. Personality disorders *comprise deeply ingrained and enduring behavior patterns, manifesting themselves as inflexible responses to a broad range of personal and social situations*. These patterns *tend to be stable and to encompass multiple domains of behavior and psychological functioning*. They are frequently, but not always, associated with various degrees of subjective distress and problems in social functioning and performance. With regard to onset of symptoms ICD-10 Clinical descriptions and diagnostic guidelines state that a *personality disorder tends to appear in late childhood or adolescence and continues to manifest into adulthood* (World Health Organization, 1992), whereas the ICD-10 Diagnostic criteria for research specifically require that *there must be evidence that the deviation is stable and of long duration, having its onset in late childhood or adolescence* (World Health Organization, 1993). The general definition of personality disorders in ICD-10 is very similar and for all practical purposes equivalent to DSM-IV, in that both definitions emphasize personality disorders as pervasive, inflexible, maladaptive, and enduring expressions of personality, regardless of the individual's age.

Personality disorders are common conditions, with prevalences of about 13% in the general adult population (Paris, 2010; Torgersen, Kringlen, & Cramer, 2001), up to 40% in adult outpatient samples (Grilo et al., 1998) and up to 71% in adult inpatient samples when using semi-structured diagnostic interviews (Zimmerman, Chelminski, & Young, 2008). In adolescents, prevalences range from 6% to 17% in community samples and from 41% to 86% in clinical samples (Kongerslev, Chanen, & Simonsen, 2015). Most studies on adolescent personality disorders seem to be reporting either from selected samples like incarcerated juvenile delinquents (Kongerslev, Moran, Bo, & Simonsen, 2012) or from specialized

treatment facilities like inpatient clinics for treatment refractory adolescents with personality pathology (Feenstra, Busschbach, Verheul, & Hutsebaut, 2011); little has been published on personality disorders in samples from general outpatient clinics.

Dating back to Kurt Schneider's original description of the so-called *psychopathic personalities*, first published in Germany in 1923 (Schneider, 1923), personality disorder diagnoses have been considered life-long ailments with no or few possibilities of a cure (Schneider, 1934). Recent findings demonstrate that they may have a better prognosis than originally assumed (Newton-Howes, Clark, & Chanen, 2015). However, there are indications that maladaptive personality trait constellations are more stable in their structure than personality disorder diagnoses per se. This implies that maladaptive personality traits may change in severity or expression over time, but they often lead to persistent functional impairment and reduced quality of life, even in cases where the diagnostic threshold for a personality disorder is no longer reached (Arens et al., 2013; Grilo et al., 2004; Skodol, 2008).

An important research focus is on the matter of precursors and possible pathways to personality disorders (De Fruyt & De Clercq, 2014). This research has been limited in part by the fact that both diagnostic systems in their current editions - DSM-5 and especially ICD-10 - do not encourage the recognition of personality disorders before the age of 18 years. This is somewhat self-contradictory, considering that personality disorders are defined as having their onset in late childhood or adolescence, and it is possible in both systems to diagnose these conditions in patients younger than 18 years of age. A further complicating factor may be that childhood symptoms of personality disorders are not necessarily identical to the symptoms of the same disorders as they manifest in adults, and there are at present no diagnostic criteria especially adapted to adolescents (Cicchetti & Crick, 2009).

The last decade has seen an increased interest in the concept and delineation of personality disorders in childhood and adolescence (Guile & Greenfield, 2004; Newton-Howes, Clark, et al., 2015). Research has for some time now supported the assumption that pathological personality traits emerge at an early age and are related to health-risk behaviors in adolescence as well as young adulthood. This has been demonstrated by longitudinal cohort studies like the Dunedin study (Caspi et al., 1997), which was an investigation of a cohort of children studied from age 3 to 21. In the Dunedin study, early appearing temperamental differences were shown to have a pervasive influence on life-course development and to correlate with personality structure, interpersonal relations, psychopathology, and crime in adulthood (Caspi, 2000; Caspi et al., 2003; Poulton & Caspi, 2003). This supports the view

that personality disorders can be traced back to adolescent emotional and disruptive behavior disorders (Helgeland, Kjelsberg, & Torgersen, 2005).

Paulina Kernberg, together with Alan S. Weiner and Karen K. Bardenstein, published the first textbook dedicated to personality disorders in children and adolescents (Kernberg, Bardenstein, & Weiner, 2000). They adhered strictly to the DSM-IV definition of personality disorders, but stressed the importance of taking the child's developmental level into account when making a diagnostic assessment. A diagnostic tool was developed based on the structural interview by Otto Kernberg (Kernberg, 1984). This tool, named the Personality Assessment Interview (PAI), is a 45-minute interview that demonstrates personality function in terms of the variables self- and object-representations, cognition, affects, reflective capacity or observing ego, and empathy with the interviewer (Selzer, Kernberg, Fibel, Cherbuliez, & Mortati, 1987). In 2001, a textbook by Efrain Bleiberg at the Menninger Clinic followed, targeting treatment of BPD with a relational approach, focusing on the patients' capacity for *reflective function* as being paramount both in understanding the developmental trajectory of the disorder and as a target point for therapy (Bleiberg, 2001).

Later, Andrew Chanen and his research group published a seminal paper (Chanen et al., 2004), in which the 2-year stability of personality disorders in an outpatient sample of adolescents was examined. The participants were 15 to 18 years old; personality disorder diagnoses were assessed categorically, i.e. with regard to specific DSM-IV diagnoses, as well as dimensionally, i.e. with regard to any personality disorder versus no personality disorder present. Of those with a categorical personality disorder diagnosis at baseline, 74% still met criteria for a personality disorder at follow-up, with marked gender differences (83% of females and 56% of males). Kappa for specific personality disorders was low for all diagnoses except ASPD. Rank order and mean level dimensional stability ranged from high (antisocial, schizoid) to moderate (borderline, histrionic, schizotypal) to low (other personality disorders), with no decline in personality disorder scores over the 2 years. There was no substantial influence upon stability of dimensional personality disorders from the presence of Axis I disorder at baseline or from outpatient or inpatient treatment. However, categorical personality disorders endured in 100% of the patients receiving inpatient care, indicating more severe psychopathology in this patient group. The study concluded that in late teenage outpatients, the 2-year stability of the global category of personality disorder was high and the stability of dimensionally rated personality disorder appeared to be similar to that found in young adults in a variety of settings, especially for some cluster A and B personality



disorders. It was suggested that diagnosis and early intervention appeared to be justified also in adolescents (Chanen et al., 2004).

Behavior observed in 3-year-old children can be clearly linked to psychiatric problems during early adulthood (Caspi, Moffitt, Newman, & Silva, 1996), with strong links between behavioral qualities observed at the age of 3 years and personality functioning measured at the ages of 18 and 26 years (Caspi et al., 2003).

An important source of knowledge on personality disorders in adolescents is the Children In the Community Study (CIC), which is an ongoing investigation of the course of psychiatric disorders including personality disorders in a general population sample of about 800 youths. In addition to tracking developmental trajectories over 20 years from adolescence into adulthood, the CIC has used prospective data to investigate early risks for Axis II disorders and symptoms, implications of comorbidity with Axis I disorders, and associated negative prognostic risk of adolescent personality disorders into adulthood. The CIC has reported substantial independent impact of adolescent personality disorders on subsequent Axis I disorders, suicide attempts, violent and criminal behavior, interpersonal conflict, and other problematic adult outcomes (Chen, Cohen, Crawford, et al., 2009; Chen, Cohen, Crawford, et al., 2006; Chen, Cohen, Johnson, & Kasen, 2009; Chen, Cohen, Kasen, & Johnson, 2006; Chen, Cohen, Kasen, Johnson, et al., 2006; Cohen, Chen, Crawford, Brook, & Gordon, 2007; Cohen, Crawford, Johnson, & Kasen, 2005).

Borderline personality disorder (BPD) is the most studied single personality disorder. BPD point prevalence in the general adult population has been estimated at between 0.5-3.9% with a female to male predominance (Cramer, Torgersen, & Kringlen, 2003; Crawford et al., 2005; Lenzenweger, Lane, Loranger, & Kessler, 2007; Lenzenweger, Loranger, Korfine, & Neff, 1997; Samuels et al., 2002; Torgersen et al., 2001). A recent large-scale population study found a lifetime prevalence of 2.7%; here, however, BPD was equally prevalent among men and women, and frequently associated with considerable mental and physical disability, especially among women (Trull, Jahng, Tomko, Wood, & Sher, 2010).

A comparison of the prevalence rates of BPD in English 11-year-olds and American adults suggested that late-latency children are about half as likely as adults to meet DSM-IV criteria for BPD and that gender does not play a defining role in symptom expression (Zanarini et al., 2011). Apart from this study of BPD, there have been few reports about gender differences in personality disorders in adolescents (Kongerslev et al., 2015). It has been pointed out that differentiating BPD from other psychiatric disorders in young people can be challenging (Chanen & Kaess, 2012), but there is an increasing awareness with regard



to developmental antecedents and adolescent presentation of BPD (Chanen & Kaess, 2012; Helgeland & Torgersen, 2004; Shiner, 2009). Recent work has demonstrated that the diagnosis of BPD is as reliable and valid among adolescents as it is in adults, which suggests that adolescents with BPD can benefit from early intervention and timely treatment (Kaess, Brunner, & Chanen, 2014; Winsper et al., 2015).

It seems that many clinicians are reluctant to diagnose BPD as well as other personality disorders during adolescence (Laurensen, Hutsebaut, Feenstra, Van Busschbach, & Luyten, 2013), viewing adolescent personality deviations as reflective of given developmental stages, despite evidence that certain adolescents are indeed at risk for the eventual development of personality disorders as adults, and that late identification of these disorders not only prevents timely treatment, but also potentially increases morbidity (Helgeland, 2004; Helgeland & Torgersen, 2004; Kaess et al., 2014; Shiner, 2009).

During the last decade, health authorities in Australia (National Health and Medical Research Council, 2012) and the United Kingdom (National Collaborating Centre for Mental Health, 2009) have issued comprehensive clinical guidelines for diagnosing and treating BPD, with provisions for making BPD diagnoses in adolescents from the age of 12 and 13 years, respectively. The United Kingdom BPD guideline section on young people contains a summary of contemporary research-based knowledge, as well as excellent updated treatment recommendations.

In contrast to this, a 2013 study of experienced clinical psychologists working with young people showed that although a majority of the therapists acknowledged the existence of personality disorders in adolescents, less than 10% actually diagnosed personality disorders in this age group and even fewer offered a treatment specifically aimed at targeting personality pathology. The reasons for not diagnosing personality disorders mainly concerned the belief that adolescent personality problems are transient and the erroneous assumption that the DSM-IV does not allow diagnosing personality disorders in adolescence (Laurensen et al., 2013). In other words: there still seems to be a major discrepancy between the growing body of actual knowledge and routine clinical practice.

## **1.2 Personality disorders and quality of life**

Quality of life is a concept of considerable societal importance (Diener, 2000). As a hypothetical construct, it does not benefit from a universal agreement pertaining to its definition, and the concepts *quality of life*, *health-related quality of life*, *subjective health*, *well-being*, and *life satisfaction* have often been used in similar and overlapping ways

(Mattejat & Remschmidt, 1998). Most researchers, however, agree that a core feature of quality of life is comprised by the concept *subjective well-being* (Diener, 1984), which in turn can be divided into cognitive and affective components (Diener & Larsen, 1984).

Quality of life has been focused upon since the 1960s (Wilson, 1967), but methodologically sound studies of quality of life related to specific somatic and/or psychiatric illnesses have predominantly been performed during the last two decades. In adult patients with personality disorders, the burden of disease has been shown to be considerable. In this context, it is especially noteworthy that the total number of personality disorder diagnoses - rather than the specific type - is most closely related to quality of life. Overall, patients with personality disorders experience a high burden of disease that is comparable to that experienced by patients with severe somatic illnesses like rheumatic disease, lung cancer, or Parkinson's disease (Soeteman, Verheul, & Busschbach, 2008). Findings from the general adult population indicate that personality disorders are important predictors of quality of life, even more so than sociodemographic variables, somatic health, and Axis I disorders (Cramer, Torgersen, & Kringlen, 2006, 2007).

Studies of adults have reported a linear relationship between the number of personality disorder criteria met and the actual impairment of quality of life (Cramer et al., 2003). Personality disorders during adolescence seem to have a negative impact on quality of life in young adults. A combination of Axis I disorders and personality disorders in adolescence may lead to an even poorer quality of life (Chen, Cohen, Johnson, et al., 2009; Chen, Cohen, Kasen, & Johnson, 2006; Chen, Cohen, Kasen, Johnson, et al., 2006; Crawford et al., 2008).

The CIC is an important source of knowledge about long-term outcome and comorbidities of personality disorders in adolescence. In the CIC, personality disorders in 588 young adults were assessed in 1991-1994 at mean age 22, and indicators of quality of life were assessed in 2001-2004 at mean age 33. It was found that personality disorders in young adults in the community had an enduring and adverse impact on subsequent quality of life that could not be attributed to physical illness or comorbid Axis I psychiatric disorders (Chen, Cohen, Crawford, et al., 2006). Another report from the CIC found that comorbid personality disorder accounted for many of the associations of adolescent Axis I disorder with physical health over the ensuing two decades; the conclusion was that comorbid adolescent Axis I disorder and personality disorder represent a particularly high risk for physical health (Chen, Cohen, Crawford, et al., 2009).

In studies of the association between personality disorders and quality of life, one generally uses personality disorder diagnoses as the independent variable; either as single

diagnoses or clusters or as a sum total of personality disorder symptoms/criteria met. In an attempt to study more basic trait dimensions; i.e. factors or symptom domains presumed to be more or less common underlying structures of diverse clinical disorders, one has especially drawn on the well-known Five-Factor Model (FFM).

The FFM describes variations on five broad personality dimensions: (1) extraversion-introversion; (2) neuroticism; (3) openness to experience; (4) agreeableness; and (5) conscientiousness. Of these five factors, neuroticism refers to a tendency to experience negative emotions and emotional instability, whereas extraversion encompasses social extraversion, dominance, and a tendency to experience positive emotions (Costa & Widiger, 2013).

There is a growing literature on the association between the FFM trait dimensions - especially neuroticism - and subjective well-being as well as mood and anxiety disorders, mainly in adults (Costa, Patriciu, & McCrae, 2005; Cuijpers, van Straten, & Donker, 2005; Decuyper, De Clercq, De Bolle, & De Fruyt, 2009; Karsten et al., 2012; Seekles et al., 2012; Soto, 2015; van Straten, Cuijpers, van Zuuren, Smits, & Donker, 2007). Neuroticism has been identified as a strong predictor of quality of life as well as longevity (Lahey, 2009). It has been shown to have a considerable overall effect on the use of somatic and mental health care, with enormous economic costs exceeding those of common Axis I disorders (Cuijpers et al., 2010).

It has been argued that the relatively lower stability of personality disorder symptoms may indicate important differences between pathological behaviors and relatively more stable self-attributed traits: that a full understanding of personality and personality pathology needs to take both traits and symptoms into account. The Five-Factor theory distinction between basic tendencies and characteristic adaptations provides a theoretical framework for the separation of traits and disorders in terms of stability, in which traits reflect basic tendencies that are stable and pervasive across situations, whereas personality disorder symptoms reflect characteristic maladaptations that are a function of both basic tendencies and environmental dynamics (Hopwood et al., 2013). In accordance with this approach, a recent review of personality disorder antecedents recommended that personality differences and emerging personality difficulties in childhood and adolescence preferably should be examined and described along the dimensions of the Five-Factor model, to avoid categorical personality disorder diagnoses or descriptions being made on an amalgam of temperament constructs (De Fruyt & De Clercq, 2014).

### **1.3 ADHD, personality disorders and Axis I comorbidity**

Attention deficit hyperactivity disorder (ADHD) is a common and often lifelong condition (Barkley, Fischer, Smallish, & Fletcher, 2002; Uchida, Spencer, Faraone, & Biederman, 2015) which carries great cost to society (Fredriksen et al., 2014) and has an extensive psychiatric Axis I comorbidity, i.e. anxiety, mood, and disruptive behavioral disorders (Smalley et al., 2007). ADHD is frequently co-occurring with personality disorders (Dalteg, Zandelin, Tuninger, & Levander, 2014; Fischer, Barkley, Smallish, & Fletcher, 2002; Lange, Reichl, Lange, Tucha, & Tucha, 2010; Montejano, Sasane, Hodgkins, Russo, & Huse, 2011), and is therefore of particular interest in a study of personality disorder prevalence and comorbidity in adolescents. Developmental trajectories have been suggested that link ADHD and certain personality disorders, especially BPD, and mood lability has been proposed as a common denominator (Eich et al., 2014).

ADHD is also associated with a broad range of other health-related issues, such as impulsive behaviors, greater number of traumas, lower quality of life, reduced social functioning, and homelessness, even after adjusting for additional comorbidity. Treatment is often sought in late adolescence or early adulthood (Bernardi et al., 2011; Salavera et al., 2014).

The DSM-IV classification system differentiates between three subtypes of ADHD: combined type, inattentive type and hyperactive/impulsive type, depending on which symptom pattern has been predominant for the last six months. To be diagnosed with ADHD according to DSM-IV, the patient has to meet six or more symptoms of inattention and/or six or more symptoms of hyperactivity/impulsivity. The symptoms must have been present prior to 7 years of age, and cause clinically significant impairment in social, academic or occupational environments, manifesting themselves in two or more settings (e.g. at home and at school) (American Psychiatric Association, 2000).

The DSM-5 classification system has implemented some changes in the definition of ADHD to more accurately characterize the manifestation of the disorder in adults. As in DSM-IV, symptoms are still divided into two categories of inattention and hyperactivity/impulsivity: children must still have at least six symptoms from either (or both) the inattention group of criteria and the hyperactivity and impulsivity criteria, while older adolescents and adults (over 17 years of age) must present with five. While the criteria per se have not changed from DSM-IV, examples have been included to illustrate the types of behavior children, older adolescents, and adults with ADHD typically exhibit. Considering that research published since 1994 has found no clinical differences between children identified by

7 years of age versus later in terms of course, severity, outcome, or treatment response, DSM-5 now requires ADHD symptoms to be present prior to age 12 years, compared to 7 years as the age of onset in DSM-IV. In DSM-IV, having an autism spectrum disorder (ASD) excluded the diagnosis of ADHD. This has also been changed in DSM-5, which has no exclusion criteria for patients with an ASD, since symptoms of both disorders have been shown to co-occur. The changes in the ADHD diagnostic criteria in DSM-5 are based on almost two decades of research that shows that a significant number of individuals diagnosed with ADHD as children continue to experience the disorder as adults, and that a lower threshold of symptoms (five instead of six) is sufficient for a reliable diagnosis in adults (American Psychiatric Association, 2013).

The ICD-10 classification system, on the other hand, only recognizes the combined form (inattention and hyperactivity/impulsivity must be present simultaneously) as a proper ADHD diagnosis. Fortunately, this does not mean that inattention only or hyperactivity/impulsivity only types of ADHD cannot be diagnosed using ICD-10; instead it incurs the use of other diagnostic codes than ADHD, which is impractical and sometimes creates diagnostic ambiguity when communicating the diagnosis to government welfare agencies or other relevant third parties (World Health Organization, 1992).

The worldwide prevalence of ADHD is generally assumed to be about 3-5%, with the higher estimate reflecting childhood prevalence, and the lower estimate indicating ADHD persistence into adulthood (Polanczyk, de Lima, Horta, Biederman, & Rohde, 2007; Polanczyk & Rohde, 2007). ADHD is generally considered to be more prevalent in boys than in girls, with male/female ratio estimates ranging from 2:1 to 9:1 (Polanczyk et al., 2007; Staller & Faraone, 2006). However, these long-held assumptions have been partly challenged: Prevalence among adolescents in Northern Finland was found to be 8.5%, with a lifetime diagnosis of a broadly defined ADHD estimated at 18.2% (Smalley et al., 2007). A 30-year follow-up of a large untreated sample in the United Kingdom also indicated that ADHD may be more prevalent than earlier reports have shown, and that ADHD may affect more females than has previously been considered (Brasset-Grundy & Butler, 2004). A recent Swedish study suggested that the overall prevalence of ADHD may be increasing, but the apparent increase could also be explained as a consequence of increased clinical alertness and improved diagnostic procedures (Giacobini, Medin, Ahnemark, Russo, & Carlqvist, 2014).

The last decade has seen an increasing interest in ADHD as a complicating factor in other psychiatric disorders. Adults with severe BPD frequently show a history of childhood ADHD symptoms, and persisting ADHD correlates with the frequency of co-occurring Axis I

and personality disorders (Irastorza Eguskiza, Bellon, & Mora, 2016; Matthies & Philipsen, 2016; Philipsen et al., 2008; Rey, Morris-Yates, Singh, Andrews, & Stewart, 1995). Childhood ADHD often precedes adult antisocial traits (Storebø & Simonsen, 2013a), as well as adult BPD (Fossati, Novella, Donati, Donini, & Maffei, 2002), and the presence of ADHD tends to make BPD more disruptive (Speranza et al., 2011). In adolescent and young adult outpatients who were refractory to previous treatments, unrecognized ADHD was found in 6% of the patients, while 32.7% of the sample also presented moderate symptoms of the disorder (Vidal et al., 2014).

Prison inmates have been known to have very high prevalences of ADHD (Kongerslev et al., 2012). A study investigating the type of personality disorders and Axis I conditions that were related to ADHD symptoms among prisoners, found that childhood and adult ADHD symptoms were most strongly related to borderline (positive relationship) and compulsive (negative relationship) personality pathology, with the absence of compulsive personality disorder traits as the single best Axis II predictor of childhood and adult ADHD symptoms. Axis I disorders did not add significantly to the variance in childhood ADHD beyond that of the personality disorder dimensions (Gudjonsson, Wells, & Young, 2010).

A significant overrepresentation of ADHD has also been found among inpatients with psychoactive substance use disorders. More than two thirds of patients with ADHD and co-occurring substance abuse also meet the criteria for conduct disorder (CD) (Schubiner et al., 2000). Prison inmates on probation have been found to have a BPD prevalence rate of 19.8%, and probationers with BPD reported substantially more symptoms of ADHD, anxiety and depression compared to subjects without BPD (Wetterborg, Långström, Andersson, & Enebrink, 2015).

A study targeting trajectories of ADHD and oppositional defiant disorder (ODD) symptoms as precursors of BPD symptoms in adolescent girls, showed that higher levels of ADHD and ODD scores at age 8 predicted BPD symptoms at age 14. Additionally, the rate of growth in ADHD scores from age 10 to 13 and the rate of growth in ODD scores from age 8 to 10 predicted higher BPD symptoms at age 14 (Stepp, Burke, Hipwell, & Loeber, 2011).

Individuals diagnosed with childhood ADHD have been shown to be at increased risk for personality disorders in late adolescence, specifically borderline (OR=13.16), antisocial (OR=3.03), avoidant (OR=9.77), and narcissistic (OR=8.69) personality disorders; those with persistent ADHD were at higher risk for antisocial (OR=5.26) and paranoid (OR=8.47) personality disorders when compared to those in whom ADHD remitted (Miller et al., 2008).

Comorbid ADHD influences the clinical presentation of adolescents with BPD, and is



associated with higher rates of disruptive disorders, with a trend towards a greater likelihood of cluster B personality disorders and with higher levels of impulsivity, especially of the attentional/cognitive type (Speranza et al., 2011).

The mediating role of action-oriented personality traits has been investigated, and it has been found that a combination of impulsivity, aggression, novelty seeking, and juvenile conduct problems completely mediates the relationship between retrospectively assessed ADHD symptoms and current BPD features (Carlotta, Borroni, Maffei, & Fossati, 2013). Prada and colleagues found that ADHD and BPD-ADHD patients show a higher level of impulsivity than BPD and control subjects. BPD-ADHD patients had higher levels of substance abuse/dependence and higher levels of aggression than the other groups (Prada et al., 2014). Interestingly, a recent study addressing the association of personality traits, quality of life, and functioning in adults with ADHD, found that personality traits exert unique associations on quality of life and functional impairment across major life domains, beyond the relations expected of and associated with ADHD symptoms and other associated psychiatric conditions and cognitive vulnerabilities (He, Antshel, Biederman, & Faraone, 2015).

The question has been posed if ADHD can be considered an early stage in the development of BPD. A comprehensive literature review found data that strongly provided a basis for the hypotheses that ADHD is either an early developmental stage of BPD, or that the two disorders share an environmental and genetic etiology. Furthermore, one of the disorders seemed to give a synergic effect, reinforce the other or complicate the disorders (Storebø & Simonsen, 2013b).

Genetic factors are also significant. Personality disorders are prevalent in parents of ADHD children and mothers suffer from personality disorders more than fathers (Dadashzadeh, Amiri, Atapour, Abdi, & Asadian, 2014). Maternal childhood CD has been shown to predict offspring ADHD continuity; maternal childhood CD, lower child IQ and social class seem to predict offspring CD symptoms (Langley et al., 2010). Although comorbidity may differ among ADHD subtypes, an Australian report from a large sample of twins and siblings found no significant gender differences in comorbidity for externalizing disorders (Levy, Hay, Bennett, & McStephen, 2005).

Females with ADHD and BPD seem to share more clinical features than males (Philipsen et al., 2009; van Dijk, Lappenschaar, Kan, Verkes, & Buitelaar, 2012). A recent study of adult outpatients found a significant association between ADHD and BPD symptoms only in the female subsample, where impulsivity and emotion dysregulation fully mediated

the relationship between retrospectively assessed ADHD symptoms and current BPD features (Fossati et al., 2014).

In summary, there is a considerable number of studies linking the developmental trajectories of ADHD and certain personality disorders, but the exact nature of these etiological links is currently not known (Fossati et al., 2002; Kerekes et al., 2013). ADHD seems to portend risk for adult personality disorders, but the risk is neither uniform across disorders, nor uniformly related to child or adult diagnostic status (Miller et al., 2008). Screening for ADHD in young patients with refractory response to primary disorder treatment has been advised, particularly in those with substance use disorders, CD and personality disorders, due to the high frequency of ADHD comorbidity in these disorders (Vidal et al., 2014).

#### **1.4 Substance use disorders, personality disorders, and Axis I comorbidity**

Substance use disorders (SUDs) constitute a major health problem, with estimated prevalence rates of 3.4% for alcohol dependence and 0.3-1.8% for cannabis dependence in the general European population (Wittchen et al., 2011). Drug abuse is associated with an extensive psychiatric comorbidity and carries an increased risk of premature death, especially in male users of opiates or barbiturates (Nyhlen, Fridell, Backström, Hesse, & Krantz, 2011). Estimated lifetime prevalences of SUDs in adolescents and young adults range from 4.6% (Wittchen, Nelson, & Lachner, 1998) to 17.7% (Essau, 2011). SUDs are of considerable importance in the etiology and prognosis of psychiatric disorders such as mood disorders, CD, ASPD, ADHD, and anxiety disorders (van West & Vermeiren, 2015). Generalized anxiety disorder (GAD) and SUDs are highly comorbid, and GAD-SUD comorbidity is associated with a host of poor psychosocial outcomes, including higher rates of hospitalization, disability, functional impairment, and inferior GAD and SUD treatment outcomes (Magidson, Liu, Lejuez, & Blanco, 2012).

Adolescents with SUDs tend to have higher rates of comorbid psychiatric disorders and are more likely to report a history of trauma and physical and/or sexual abuse than adolescents without a SUD (Bukstein, Brent, & Kaminer, 1989; Lieb, 2015). In addition, other psychiatric disorders in adolescents often predate the SUD. Once the SUD develops, the psychiatric disorder may be further exacerbated (Deas, 2006) and associated with substantial functional impairment (Roberts, Roberts, & Xing, 2007). In older adolescence and emerging adulthood, young drug users with comorbid affective disorders have greater mental health and substance use morbidity than those with substance use problems alone (Lubman, Allen,



Rogers, Cementon, & Bonomo, 2007). A study of adolescent SUD inpatients found that 40.5% of the participants met the criteria for at least one comorbid present Axis I disorder, with high prevalences of mood, anxiety, and somatoform disorders. The 37 female participants showed a significantly higher risk for lifetime comorbid disorders; the gender difference was especially pronounced for anxiety and somatoform disorders (Langenbach et al., 2010).

ADHD has been shown to be a significant risk factor for developing SUDs (Biederman et al., 1995); it is frequently present in SUD populations, with prevalence estimates varying between 14% and 23%. In general, patients with this type of comorbidity represent a more severe subgroup of SUD patients with more additional comorbidity and a more disadvantageous prognosis than SUD patients without ADHD (van Emmerik-van Oortmerssen, Konstenius, & Schoevers, 2015). It has been suggested that girls with ADHD might be at slightly higher risk than boys for substance abuse (Disney, Elkins, McGue, & Iacono, 1999). CD is a risk factor for substance abuse of similar magnitude as ADHD, and of equal importance in both genders (Disney et al., 1999).

Personality disorders and SUDs commonly co-occur, with several studies finding a particularly frequent association between SUDs and BPD or ASPD (Langås, Malt, & Opjordsmoen, 2012; Walter, 2015; Wapp et al., 2015). Comorbid personality disorder seems to be more prevalent in drug use disorder (DUD) than in alcohol use disorder (AUD); it is characterized by more severe addiction problems and by an unfavorable clinical outcome (Arnevik et al., 2010). Prevalence rates of personality disorders in patients with SUD range from 24% to 90%, depending on the sample characteristics and setting (Gibbie et al., 2011; Skodol, Oldham, & Gallaher, 1999; Trull et al., 2010; Verheul, 2001). In a Norwegian study of first-admission SUD patients aged 16 years and older, 46% of the patients had at least one personality disorder; cluster C disorders were as prevalent as cluster B disorders; SUD patients with personality disorders were younger at the onset of their first SUD and at admission; they used more illicit drugs; had more anxiety disorders; had more severe depressive symptoms; were more distressed and more impaired in their social functioning (Langås et al., 2012). Comorbid SUD can be diagnosed in approximately every second patient suffering from a personality disorder (Walter, 2015).

Different hypotheses have been proposed to explain the association between personality disorders and SUD. Complementing the assumption of common biological vulnerability factors (Ersche et al., 2012; Makris et al., 2008; Moreno-Lopez et al., 2012), it is often postulated that a primary personality disorder is followed by a secondary development

of a SUD. This notion is not new; in a paper from 1970 the backgrounds of three young male addicts before they began taking drugs were examined, and the possibility that drug addiction was only one manifestation of a much wider personality disturbance was suggested (Kraft, 1970).

It has generally been assumed that boys use more drugs and alcohol than girls. However, recent findings seem to contradict this long-held assumption: male-female differences in adolescent marijuana use seem to have decreased since 1999 (Johnson et al., 2015), and differences in drinking patterns of adolescent boys and girls have been reported to narrow between 2002 and 2012 (White et al., 2015). Interestingly, similar findings were described some forty years ago: a 1976 study of alcohol and drug use among high-school students yielded few consistent differences between boys and girls in patterns of alcohol consumption; boys did not significantly exceed girls in the use of any illicit drug, but girls significantly exceeded boys in the use of amphetamines and barbiturates, as well as in multiple-drug use (Wechsler & McFadden, 1976).

Gender differences to the disadvantage of females have also been reported more recently in adolescents and young adults: when following a large community sample from age 17 to age 29, AUD was found to be a more severe disorder in women than in men (Foster, Hicks, Iacono, & McGue, 2015); despite lower mean levels of overall risk exposure, women were characterized by more adolescent risk factors and a greater magnitude of AUD consequences, with internalizing symptoms appearing to be a gender-specific risk factor for AUD in women. Furthermore, adolescent girls with SUDs tend to have higher rates of comorbid disorders than boys (Roberts et al., 2007). Thus, the question of possible gender differences in SUD prevalence, comorbidity and prognosis is still not fully answered.

## 2 Objectives

The main objective of this thesis was to study the prevalence of personality disorders, with special regard to quality of life, Axis I comorbidity, and possible gender differences, in an unselected sample of adolescents who were consecutively referred to a non-specialized (general service) child and adolescent outpatient clinic. The more specific aims were:

- To investigate whether there were interactions between personality disorder symptoms, i.e. the number of personality disorder criteria met, and the patients' age and gender (paper I).
- To investigate the relationship between personality disorder symptoms and self-perceived quality of life (paper I).
- To determine whether adjustment for Axis I disorders affected the relationship between personality disorders and quality of life (paper I).
- To investigate the prevalence of ADHD and common Axis I disorders, including possible gender differences (paper II).
- To investigate the relationship between ADHD and personality disorders (paper II).
- To assess the influence of adjusting for Axis I disorders, age and gender on this relationship (paper II).
- To investigate the prevalences of alcohol and substance use disorders, including possible gender differences (paper III).
- To investigate the association between personality disorders and alcohol and other substance abuse (paper III).
- To assess the influence of adjusting for other Axis I disorders, age and gender on this association (paper III).

## 3 Material and methods

### 3.1 Research on prevalence using cross-sectional study designs

The present study utilized a cross-sectional design. Cross-sectional studies are generally conducted to estimate the prevalence of the outcome of interest for a given population. They are carried out at a specific time point, or, as in the present study, over a limited period of time. Usually the aim is to find the prevalence of the outcome of interest, for the whole population or for subgroups within the population, at a given timepoint. Even though cross-sectional studies give no indication of the sequence of events, they indicate associations that may exist and can therefore be useful in generating hypotheses for future research (Levin, 2006).

### 3.2 Participants

We used a sample of 153 adolescents aged 14–17 years who were referred to a general service mental health outpatient clinic for children and adolescents in Oslo (The Nic Waal Institute, Lovisenberg Diakonale Hospital). The clinic's catchment area comprised 25,000 children and adolescents from 0 to 17 years of age, and consisted of four city districts with a population of mixed socioeconomic status, representing all social classes including immigrant workers and well-educated middle and upper class families. Study inclusion took place from February 2005 to April 2007, during which time a total of 264 adolescents (59.4% female) were referred to The Nic Waal Institute.

Sixty-three adolescents did not meet the inclusion criteria. They were excluded due to:

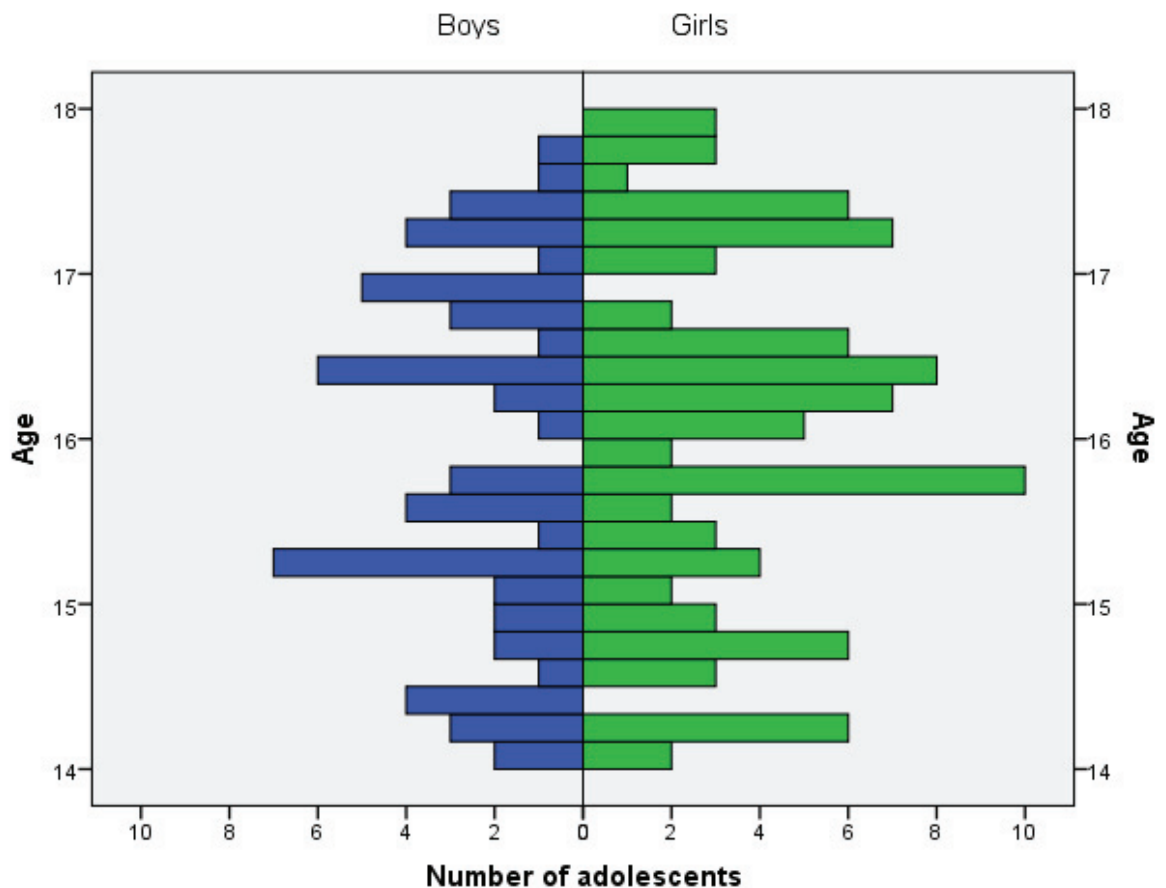
- (1) absence of the evaluator at the time of referral (N=23, 36.5%);
- (2) need of immediate hospitalization (N=19, 30.2%);
- (3) clinically assessed mental retardation (N=15, 23.8%);
- (4) inadequate fluency in the Norwegian language (N=6, 9.5%).

This left 201 adolescents eligible for inclusion in the study. The final attrition was 48 (23.9%), the reasons for which being:

- (1) patient retracted consent during interview (N=19, 39.6%);
- (2) patient did not show up for appointment (N=11, 22.9%);
- (3) lack of consent from the adolescent (N=7, 14.6%);
- (4) referral retracted prior to interview (N=6, 12.5%);
- (5) lack of consent from parents (N=5, 10.4%).

Thus, a total of 153 adolescents were included as participants; mean age 16.0 years (SD=1.1, minimum age 14.1 years, maximum age 18.0 years), 61.4% (N = 94) girls. The age distribution of the included adolescents is illustrated in Figure 1.

**Figure 1.** Age distribution within gender in the sample of adolescents referred to an outpatient clinic (N = 153, Boys N = 59, Girls N = 94)



### 3.3 The inclusion/exclusion criteria

All referred patients in the study's age group were asked to participate. Exclusion criteria were the need for immediate hospitalization or other urgent therapeutic measures, clinically assessed mental retardation, lack of fluency in the Norwegian language, and absence of the evaluator at the time of referral.

### 3.4 Missing data

There were no missing data in the study.

### 3.5 Measures

The instruments used in the present study are described below. Ideally, we would have opted to use diagnostic instruments that were tailor-made and adequately validated for the appropriate age group. However, there are not as many instruments available for adolescents as for adults (Renou, Hergueta, Flament, Mouren-Simeoni, & Lecrubier, 2004). Especially in the case of personality disorders, available test instruments for adolescents are scarce, poorly validated, or focused on specific diagnoses, i.e. BPD (Sharp, Ha, Michonski, & Venta, 2012).

Another consideration was the possibility of conducting future follow-up assessments of the patients; with regard to the internal validity of future studies it would be highly advantageous to continue using the same test instruments. For this reason, we refrained from using the otherwise highly relevant *Schedule for Affective Disorders and Schizophrenia for School Age Children, Present and Lifetime Version* (K-SADS-PL), which has been extensively used in clinical and research settings for diagnosing Axis I disorders in children and adolescents aged 6-18 years (Ambrosini, 2000; Villabø, Ørbeck, Skirbekk, Hansen, & Kristensen, 2016).

Bearing this in mind, we chose to use solid, well-documented diagnostic instruments that have been developed for adults. Regarding quality of life, however, an instrument was made available to us that had been especially developed and validated for use in adolescents.

All assessment work was performed by the same evaluator. To test the feasibility of our chosen test instruments, and also as part of the pre-study training, the evaluator applied them in a clinical setting before commencing the actual study; this was done by using the instruments on 8 adolescent personality disordered patients already in treatment at The Nic Waal Institute.

We did not want to overestimate the prevalence of the disorders we aimed to study. Therefore, we adhered strictly to the diagnostic criteria and did not compensate for the patients' young age by lowering the diagnostic threshold or including special categories for patients that almost met the criteria for specific personality disorders or relevant Axis I disorders like ADHD and SUDs.

#### 3.5.1 DSM-IV and DSM-5

In quantitative research on mental health, it is customary to utilize the latest available revision of the DSM diagnostic system when diagnosing mental disorders. The DSM-IV

diagnostic system was introduced in 1994 and was well established in 2005 - 2007, which was the time period of data collection in the present study.

In 2013, the *Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition* (DSM-5), was published (American Psychiatric Association, 2013). For several years there had been an ongoing discussion in the DSM-5 personality disorder work group about the question whether the fifth revision should incorporate a major change in how personality disorders are to be viewed and diagnosed.

Specifically, the main question was if one should abandon the categorical personality disorder diagnoses and either complement or replace them with a dimensional scoring system (Morey et al., 2007; Skodol, 2010). In the end, it was decided not to implement compulsory major structural changes to the personality disorders section (Newton-Howes, Clark, et al., 2015; Sevecke, Schmeck, & Krischer, 2014; Tyrer, Reed, & Crawford, 2015). Therefore, the personality disorders and their diagnostic codes remain the same in DSM-5 as in DSM-IV. However, in *Section III – Emerging Measures and Models* of the DSM-5, a chapter called *Alternative DSM-5 Model for Personality Disorders* was included. Here, an alternative, dimensional approach to personality disorders is presented for further study; with a greater emphasis on personality functioning and trait-based criteria, this model includes ASPD, BPD, avoidant, narcissistic, obsessive-compulsive, and schizotypal personality disorders, as well as a diagnosis of personality disorder - trait specified (PD-TS) that can be made when a personality disorder is considered present but the criteria for a specific disorder are not met.

Another change in DSM-5 is the abandonment of dividing psychiatric disorders into symptom disorders (Axis I) and personality disorders (Axis II) (Newton-Howes, Mulder, & Tyrer, 2015). The division in two separate diagnostic axes was implemented in 1980 with DSM-III: its declared purpose was to encourage clinicians and researchers to pay more attention to personality disorders, on the more or less explicit supposition that personality disorders pose more serious and chronic psychiatric conditions than most symptomatic disorders. From a clinician's viewpoint it has later been argued that the division of Axis I and Axis II disorders no longer appears justifiable, as it actually seems to present an obstacle to clinicians' timely diagnosing of personality disorders (Paris, 2013). Furthermore, most recent evidence does not support the notion of a fundamental etiological difference between symptom disorders and personality disorders (Røysamb et al., 2011); with regard to chronicity some Axis I disorders seem to be even more enduring than personality disorders (Gunderson et al., 2011).

The tentatively dimensional concept of personality disorder clusters is still used in connection with the categorical DSM-5 diagnoses; in Section III, however, it has been made superfluous by the alternative dimensional model.

To sum up, it would seem that the changes in DSM-5 probably have no bearing on the evaluation or generalizability of the findings presented in this thesis.

### **3.5.2 Measure for personality disorders**

The Structured Interview for DSM-IV (SIDP-IV) (Pfohl B, 1997) in a Norwegian translation was used to assess personality disorders. The SIDP-IV is a comprehensive semi-structured diagnostic interview for DSM-IV personality disorder (Axis II) diagnoses, which has been used in numerous studies in different countries, including Norway (Helgeland et al., 2005; Røysamb et al., 2011; Torgersen et al., 2001).

The SIDP-IV has been previously used in several studies of personality disorders in adolescents (Chabrol et al., 2002; Loas, Speranza, Pham-Scottez, Perez-Diaz, & Corcos, 2012; Speranza et al., 2011). In other comparable studies on adolescents (Chanen et al., 2004; Feenstra et al., 2011; Feenstra et al., 2012; Kongerslev et al., 2012) SCID-II has been used. At this point it should be noted that SCID-II and SIDP-IV utilize exactly the same diagnostic criteria: they differ only in the order of questions related to the diagnostic criteria. In SCID-II, the criteria are assessed consecutively by disorder, whereas in SIDP-IV the questions are organized into topical sections: this allows for a more natural conversational flow of the interview and may increase the likelihood that useful information from related questions is taken into account when rating related criteria within that section.

The SIDP-IV covers 14 DSM-IV Axis II diagnoses as well as CD as a separate Axis I disorder. The Axis II diagnoses comprise the 10 standard DSM-IV personality disorders (paranoid, schizoid, schizotypal, borderline, histrionic, narcissistic, antisocial, obsessive-compulsive, dependent, and avoidant personality disorder), the 3 provisional DSM-IV personality disorders (self-defeating, depressive, and negativistic personality disorder), and mixed personality disorder.

All questions address the typical or habitual behavior of the subjects during the last 5 years. Each diagnostic criterion is rated on a four point scale: “0” = criterion not present; “1” = subthreshold level of the trait present; “2” = criterion being present for most of the last 5 years; and “3” = criterion strongly present. Scores “2” and “3” indicate the presence of a criterion according to DSM-IV (Pfohl B, 1997).



In accordance with diagnostic practice applied in other studies on personality disorders in adolescence, the DSM-IV age criterion for ASPD was waived (Chanen et al., 2004). Due to the participants' age, we also waived the 5 year symptom duration criterion. Instead we used 2 years symptom duration as criterion, which was in accordance with the criterion used in previous studies assessing adolescent personality pathology (Chanen et al., 2004; Kongerslev et al., 2015). We chose not to include the category of mixed personality disorder, but retained the provisional disorders as we felt that this category represents clinically relevant symptom clusters not covered elsewhere in our measures.

### **3.5.3 Measures for Axis I disorders**

Axis I disorders, including SUDs, were assessed using a Norwegian translation of the Mini International Neuropsychiatric Interview version 5.0.0 (MINI) (Lecrubier et al., 1997; Sheehan et al., 1998; Sheehan et al., 1997).

In the assessment of ADHD a primary screening was first performed, using the six-item Adult ADHD Self-Report Scale Screener version 1.1 (ASRS Screener) in a Norwegian translation (Adler et al., 2006). The ASRS Screener was originally designed to screen for and estimate the prevalence of ADHD in community samples, as well as in population surveys and at an individual level. The measure is reliable and valid in clinical settings (Kessler et al., 2005) and has repeatedly been shown to be in strong concordance with clinician diagnoses (Kessler et al., 2007). A recent large-scale international multicenter study comprising 1138 adult SUD patients found the ASRS Screener to be a robust screening instrument for the detection of ADHD in SUD populations (van de Glind et al., 2013).

To the best of our knowledge, no previous studies have used the six-item ASRS 1.1 Screener in adolescents. However, a study by the originators of the ASRS scales examined the reliability and concurrent validity of the full 18-item ASRS version 1.1 Symptom Checklist in adolescents (Adler et al., 2012) and found that although the ASRS version 1.1 Symptom Checklist was originally developed and validated for use in adult ADHD, the preliminary validation of the scale extended its utility beyond adults to include adolescents. On this background we feel that the use of the ASRS Screener is warranted in the present doctoral project.

If the primary screening with the ASRS Screener was positive, the Mini International Neuropsychiatric Interview-PLUS (MINI-PLUS) section W (ADHD in children/adolescents) was used as a diagnostic test instrument (Sheehan et al., 1998) for a final diagnosis of ADHD.

### **3.5.4 Measure for quality of life**

The Youth Quality of Life Instrument - Research Version (YQOL-R) in a Norwegian translation was used for the assessment of quality of life. The YQOL-R is a self-score questionnaire developed with the goal of focusing on the positive aspects of adolescence (Edwards, Huebner, Connell, & Patrick, 2002).

It covers broad aspects of quality of life, with a total of 41 items in 4 topical domains: self; relationships; environment; and general quality of life. Its psychometric properties are satisfactory (Patrick, Edwards, & Topolski, 2002) and it has been used in various clinical and non-clinical settings (Salum, Patrick, Isolan, Manfro, & Fleck, 2012; Topolski, Edwards, & Patrick, 2005; Topolski et al., 2004).

The adolescents rated the YQOL-R items on a scale ranging from 0 (most severe) to 10 (best). The primary outcome with regard to quality of life was the general quality of life domain of the YQOL-R.

### **3.6 Procedures and assessment**

All adolescents who were referred to The Nic Waal Institute while the evaluator was present, were asked to participate in the study. After written consent was obtained, the diagnostic interviews were performed at The Nic Waal Institute as an initial psychiatric assessment.

All assessment work was done by a single evaluator – the author of this thesis - who is a specialist in psychiatry and child and adolescent psychiatry with more than 20 years of clinical experience. After completion of the initial assessment, the patients were assigned to further clinical evaluation and treatment by clinicians other than the evaluator in the outpatient clinic.

The evaluator was trained in the use of the SIDP-IV by Professor Sverre Torgersen, who is an expert rater. Professor Torgersen has previously evaluated patients and reported from comparable studies in adults (Torgersen, 2009; Torgersen et al., 2001). The first twenty ratings were discussed and found to be in accordance with the rating of the expert rater. With respect to the use of the MINI, the evaluator had been trained by attending a two-day course conducted by Professor Ulrik Malt, who is the translator of the Norwegian version of the MINI used in the present study.

### 3.7 Statistics

In the following, a few of the statistical concepts that are of particular relevance to the present study will be briefly explained.

#### 3.7.1 Validity

The concept of validity is often divided into four types; statistical validity, internal validity, external validity, and construct validity (Shadish, Cook, & Campbell, 2001).

*Statistical validity* concerns the question of whether there is a statistically significant relationship between the independent and dependent variable. The significance level balances between Type I and Type II errors; a Type I error is the probability of rejecting a true null hypothesis, i.e. making a false positive finding - finding differences that are not true in the sample; a Type II error is the failing to reject a false null hypothesis, i.e. making a false negative finding - not finding differences that actually exist in the sample (Cohen & Cohen, 1983).

*Internal validity* reflects the extent to which a causal conclusion is warranted. Inferences are said to possess internal validity if a causal relation between two variables is properly demonstrated. A causal inference may be based on a relation when three criteria are satisfied: (1) temporal precedence: the "cause" precedes the "effect" in time; (2) covariation: the "cause" and the "effect" are related; (3) non-spuriousness: there are no plausible alternative explanations for the observed covariation. The internal validity of a study may be threatened by systematic errors or biases.

*External validity* is the extent to which the results of a study can be generalized to other situations and to other people. In many studies and research designs, there may be a "trade-off" between internal validity and external validity: when measures are taken or procedures implemented aiming at increasing the chance for higher degrees of internal validity, these measures may also limit the generalizability of the findings.

*Construct validity* is the degree to which the operationalized independent and dependent variables represent the construct of interest. The construct validity might be threatened if:

- (1) true changes in the construct of interest are not detected;
- (2) other irrelevant constructs are being measured;
- (3) the patients guess the hypothesis and report improvement accordingly;
- (4) the experimenter conveys expectations about desirable responses to the participants.

Validity in prevalence studies is a function of (1) sampling, (2) measurement, and (3) analysis. Important questions to be asked are:

- (1) is the sample of respondents representative of the defined target population?;
- (2) do the survey instruments yield reliable and valid measures of diagnoses and other key concepts (i.e. quality of life)?;
- (3) were special features of the sampling design accounted for in the analysis?

If a study utilizes complex sampling methods, eligible respondents will have different probabilities of selection; these sampling methods introduce design effects that will have an impact on the calculation of variance estimates for testing hypotheses and determining confidence intervals (CIs). A primary objective of prevalence studies is to produce frequency estimates of a disorder overall and for possible population subgroups.

The quality of these estimates derives from the expected closeness between the unobserved value in the target population and the observed value in the sample. CIs quantify this closeness by telling us the chance, usually at a 95% probability level, by which the unobserved target population value will fall within a certain range of the observed sample value. Therefore, estimates in prevalence studies - like the present study - should always be accompanied by CIs.

In clinical studies it is difficult, if not impossible, to define the target populations that give rise to respondents sampled from clinical settings. It is important to bear in mind that the idiosyncrasies of referral to mental health services pose major challenges to the general applicability of prevalence estimates from one setting to the next (Boyle, 1998).

### **3.7.2 Reliability**

The concept of reliability describes the consistency of a measure. The validity of a study in turn depends on the use of reliable measures. Reliability can be estimated in different ways: (1) test-retest reliability of an instrument: the instrument is applied repeatedly at different time points; (2) inter-rater reliability: the instrument is used by more than one rater to measure the degree of agreement, which can be attained through the computation of Kappa or weighted Kappa (categorical data), Pearson correlations (continuous data) or Intraclass Correlations (for continuous scales); (3) internal consistency reliability, usually in the form of Cronbach's alpha.

Cronbach's alpha provides a measure of the internal consistency of a test or scale. It is expressed as a number between 0 and 1 and describes the extent to which all the items in a test measure the same concept or construct (Tavakol & Dennick, 2011).

### 3.7.3 Linear regression analysis

Linear regression analysis is a statistical procedure for estimating relationships among variables. It focuses on the relationship between a dependent variable (criterion variable) and one or more independent variables (predictors). It is widely used for prediction and forecasting, but as correlation does not imply causation, it can only be used in restricted circumstances to infer causal relationships between the independent and dependent variables.

Classical assumptions for linear regression analysis include that:

- (1) the sample is representative of the population for the inference prediction;
- (2) the error is a random variable;
- (3) the independent variables are measured with no error;
- (4) the independent variables are linearly independent;
- (5) the errors are uncorrelated;
- (6) the variance of the error is constant across observations (homoscedasticity).

When the number of measurements  $N$  is larger than the number of unknown parameters  $k$ , and the measurement errors are normally distributed, then the excess of information contained in  $(N-k)$  measurements is used to make statistical predictions about the unknown parameters. This excess of information is referred to as the degrees of freedom of the regression.

There are no universally agreed methods for relating the number of observations to the number of independent variables in the model, but a rule of thumb suggested by Good and Hardin is  $N=m^n$ , where  $N$  is the sample size,  $n$  is the number of independent variables and  $m$  is the number of observations needed to reach the desired precision if the model had only one independent variable (Good & Hardin, 2012).

Statistical models are mathematical representations of population behavior. The General linear model (GLM) is a general multiple regression model, where a normally distributed dependent variable is predicted from a linear combination of independent variables. When using the GLM it is assumed that all observations are independent and have a constant variance.

Variance is a measure of the amount of variation within the observed values of a variable. Analysis of variance is used to test the hypothesis that several means are equal ( $H_0$ ). Regression or analysis of variance (ANOVA) techniques are commonly used to test hypotheses about the association between the dependent and one or more independent

variables; these techniques include One-way ANOVA, repeated measures ANOVA, and analysis of covariance (ANCOVA).

In the present study, satisfactory degrees of freedom were achieved by combining single specific Axis I diagnoses into combined variables that were named *Mood disorders*, *Anxiety disorders*, and *Substance use disorders*. To enable the investigation of the association between ADHD and personality disorders with linear regression, we used the total number of personality disorder symptoms as an outcome variable instead of the individual personality disorder diagnoses.

### **3.7.4 Odds ratios, logistic regression, and confidence intervals**

An odds ratio (OR) is a measure of the association between an exposure and an outcome. ORs are used to compare the relative odds of the occurrence of the outcome of interest (e.g. a particular disease or disorder, for example a SUD), given exposure to the variable of interest (e.g. a personality disorder). The OR can also be used to determine whether a particular exposure is a risk factor for a particular outcome, and to compare the magnitude of various risk factors for that outcome; OR=1: the exposure does not affect the odds of the outcome; OR>1: the exposure is associated with higher odds of the outcome; OR<1: the exposure is associated with lower odds of the outcome.

ORs are commonly used in case-control studies, but they can also be used in cross-sectional and cohort study designs. When a logistic regression is estimated, the regression coefficient ( $b_1$ ) is the estimated increase in the log odds of the *outcome per unit increase* in the value of the *exposure*. In other words, the exponential function of the regression coefficient ( $e^{b_1}$ ) is the OR associated with a one-unit increase in the exposure.

The confidence interval (CI) is used to estimate the precision of the OR. A large CI indicates a low level of precision of the OR, whereas a small CI indicates a higher precision of the OR. In practice, the 95% CI is often used as a proxy for the presence of statistical significance if it does not overlap the null value (e.g. OR=1). However, it would be incorrect to interpret an OR with 95% CI that spans the null value as indicating evidence for lack of association between the exposure and outcome (Szumilas, 2010).

### **3.7.5 Confounding**

A confounding variable is a third variable in a statistical model that correlates with both the dependent variable and the independent variables. A confounding variable is causally associated with the outcome of interest, and non-causally or causally associated with

the exposure, but it is not an intermediate variable in the causal pathway between exposure and outcome. Confounding constitutes a major threat to the validity of causal inferences. Stratification and multiple regression techniques are two methods used to address confounding.

### **3.7.6 Statistical analyses**

Descriptive statistics were calculated for the relevant mental health status variables and expressed in means (standard deviation) and frequencies (%) as appropriate.

The number of participants in the present study was relatively small (N=153); this necessitated the combination of discrete Axis I disorders into diagnostic groups, i.e. to create combined variables to retain satisfactory degrees of freedom in the regression analyses. In the case of the personality disorders, a combined variable may be constituted by the total number of positive personality disorder criteria (scores “2” or “3” in the SIDP-IV), or by the total number of any present personality disorder criteria (scores “1”, “2”, or “3” in the SIDP-IV).

We chose the latter option, as this better encompassed the totality of symptoms and also seemed to be more in accordance with current epidemiological knowledge about personality disorders: there is no indication whatsoever of the existence of categorical breaking points at a given number of personality disorder symptoms. On the contrary, the available literature supports the notion of personality disorders as dimensional entities with arbitrarily defined diagnostic cut-off points deciding whether or not a patient is above the diagnostic threshold for a specific disorder (Kongerslev et al., 2015; Tyrer et al., 2015). In light of the findings of the present study, this question will be commented further in the Results and Discussion sections of this thesis.

In paper I prevalences of personality disorders with 95% Blaker confidence intervals (Blaker, 2000) were estimated for the total sample and for each gender separately, with testing for gender differences and comparison with the general adult population by exact chi square tests. Nonlinearity of the relationship between total number of personality disorder criteria and quality of life was investigated graphically by locally weighted scatterplot smoothing (LOWESS) curves separately for each gender. Within each disorder this relationship was also explored graphically. The association of quality of life with the number of positive personality disorder criteria, gender and age was investigated by multiple linear regression wherein multicollinearity was checked by calculating the variance inflation factor (VIF), with satisfactory values for all covariates. The regression analysis was repeated adjusting for important Axis I diagnoses; subsequently with inclusion of interactions of number of positive



personality disorder criteria with gender and age. As a measure of effect size, partial eta squared was estimated. A mean total score for the YQOL-R was computed, and for use in this study, linearly transformed so that the general quality of life index for each participant was ranging from 0 to 100, with a higher score indicating a higher level of quality of life. Cronbach's alpha was found to be 0.94.

In paper II prevalences of ADHD, other Axis I conditions, and personality disorders with 95% Blaker confidence intervals were estimated for the total sample and for each gender separately, with testing for gender differences by exact chi square tests. The total number of ADHD criteria and personality disorder criteria was investigated graphically by locally weighted smoothing scatterplot (LOWESS) curves. The relationship of personality disorder symptoms with ADHD symptoms, unadjusted and adjusted for gender was investigated by logistic regression. Adjustment for age and Axis I disorders was not performed due to the low number of degrees of freedom available. However, the relationship of the number of personality disorder symptoms with ADHD symptoms, unadjusted and adjusted for gender, age and important Axis I disorders was investigated by linear regressions wherein multicollinearity was checked by calculating the variance inflation factor (VIF). Differences in unadjusted and adjusted ORs and regression coefficients were, when necessary, investigated by a bootstrap BC<sub>a</sub> 95% CIs based on 10 000 bootstrap replicates (Efron & Tibshirani, 1993), with a difference considered as significant if 0 was outside the interval.

In paper III SUD was classified as none, one (either alcohol use disorder (AUD) or cannabis use disorder (CUD)) or two (both AUD and CUD). The association of SUD with number of personality disorder symptoms, unadjusted and adjusted for gender, age and presence of Axis I disorders was investigated by proportional odds ordinal logistic regression. If necessary, differences in unadjusted and adjusted ORs could be investigated by a bootstrap BC<sub>a</sub> 95% CIs based on 10 000 bootstrap replicates (Efron & Tibshirani, 1993).

All data were entered and analysed using the IBM SPSS version 20.0 software, with Blaker confidence intervals computed in the R (The R Foundation for Statistical Computing, Vienna, Austria) package BlakerCI and bootstrapping in the R package boot. Graphical investigations used Microsoft Excel and R.



### **3.8 Ethical aspects of the study**

The study was approved by the Regional Committee for Medical Research Ethics for Eastern Norway (REK: 11395) and by The Norwegian Data Inspectorate. Informed written consent was obtained from all patients, and for patients younger than 16 years consent was additionally obtained from their parents or other legal guardians. All patients who were offered participation in the study were told that whether they consented or declined would not affect the services provided by the clinic; they were also informed that it would be possible to retract their consent at any time.

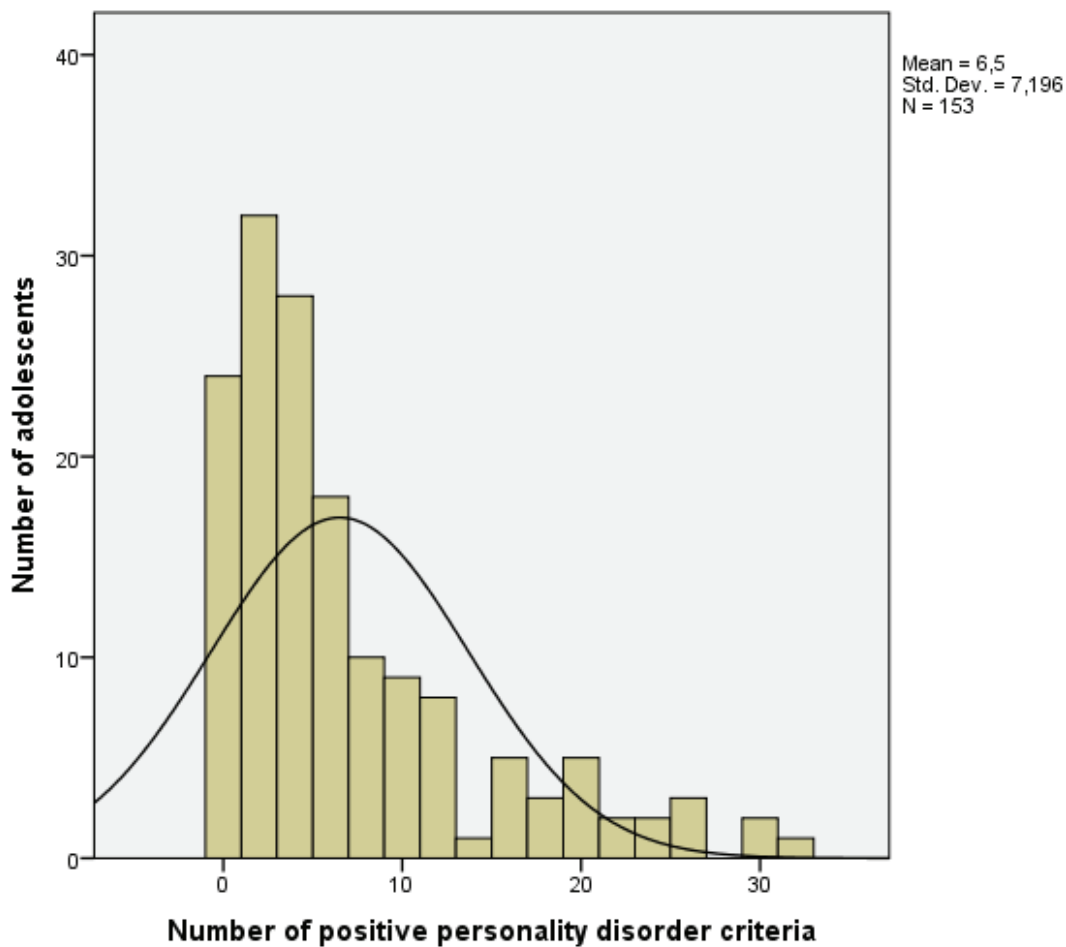
## 4 Summary of results

### 4.1 Paper I

The purpose of this paper was to examine the prevalence of personality disorders in adolescents who were referred to a general service (non-specialized) outpatient clinic, as well as the relationship between the number of personality disorder symptoms and self-perceived quality of life. Further research questions were whether there were interactions of the number of personality disorder symptoms with age and gender, and if adjustment for Axis I disorders affected the relationship between personality disorders and quality of life.

The total prevalence of personality disorders was 21.6%, with girls having more than twice the prevalence of boys. The most common personality disorder was depressive personality disorder (N=10, 6.5%, 95% CI 3.4%-11.5%), followed by avoidant (N=9, 5.9%, 95% CI 3.0%-10.9%), borderline (N=8, 5.2%, 95% CI 2.3%-9.9%), obsessive-compulsive (N=6, 3.9%, 95% CI 1.7%-8.2%), antisocial (N=5, 3.3%, 95% CI 1.3%-7.3%) and histrionic (N=5, 3.3%, 95% CI 1.3%-7.3%) personality disorders. No significant gender differences were found for each of the personality disorders ( $p \geq 0.082$ ). There was, however, a trend toward significance concerning gender and symptom severity: eight of the boys and 25 of the girls (N=33, 21.6%) had at least one personality disorder ( $p=0.070$ ), whereas only one of the boys and ten of the girls (N=11, 7.2%) had more than one personality disorder ( $p=0.052$ ). Figure 2 illustrates the distribution of positive personality disorder criteria in the sample.

**Figure 2.** Number of positive personality disorder criteria in the sample (N=153)



A distinct relationship was found between general quality of life and the total number of personality disorder criteria present in our sample. With linear regression analysis,  $R^2=0.46$ ,  $VIF\leq 1.07$ , no significant age or gender differences ( $p\geq 0.12$ ) were revealed, while there was a significant relationship with the number of personality disorder criteria (coefficient = -0.48, 95% CI -0.57, -0.39, partial eta squared 0.42,  $p<0.001$ ). Adjusted for Axis I disorders,  $R^2=0.50$ ,  $VIF\leq 1.90$ , there were no significant age or gender differences ( $p\geq 0.240$ ), and still a significant and very similar relationship with the number of personality disorder criteria (coefficient = -0.43, 95% CI -0.55, -0.30 partial eta squared 0.27,  $p<0.001$ ).

There were no significant interactions of number of personality disorder criteria with gender and age ( $p\geq 0.27$  without and  $p\geq 0.075$  with adjustment for Axis I disorders). Separate graphical explorations of the relationship between general quality of life and the different personality disorder clusters, including the provisional disorders, were also performed. For each separate cluster, there was mostly a tendency toward reduced quality of life with increasing number of personality disorder criteria.

## 4.2 Paper II

In this paper, we investigated the prevalence of ADHD and common Axis I disorders, including possible gender differences. We also examined the relationship between ADHD and personality disorders, and assessed the influence of adjusting for Axis I disorders, age and gender on this relationship.

Of the participants, 32.7% (N=50) initially screened positive for ADHD using the ASRS Screener. When using the MINI-PLUS as a diagnostic instrument, 13.7% (N=21, 95% CI 8.9%-20.1%) of the adolescents met all diagnostic criteria for ADHD, with no significant gender difference in prevalence. When analysed separately in each gender for hyperactivity/impulsiveness and inattention symptoms, girls had slightly higher overall symptom scores than boys, but the difference was not significant (hyperactivity  $\chi^2=0.181$ ,  $p=0.786$ ; inattention  $\chi^2=0.449$ ,  $p=0.668$ ).

The male/female ratio was 1.19 (95% CI=1.12-1.30). More than two thirds (68.6%, N=105) of the adolescents met the criteria for at least one Axis I disorder (76.6%, N=72 girls; 56.0%, N=33 boys). Anxiety disorders (33.3%, N=51, 95% CI 26.0%-41.1%) and mood disorders (32.7%, N=50, 95% CI 25.3%-40.5%) were the most frequent Axis I disorders, followed by SUDs (18.3%, N=28, 95% CI 12.6%-25.3%), CD (17.6%, N=27, 95% CI 12.2%-24.4%), obsessive-compulsive disorder (9.2%, N=14, 95% CI 5.3%-14.8%) and psychotic disorders (1.3%, N=2, 95% CI 0.2%-4.6%), as can be seen in Table 2. There were significant gender differences in anxiety ( $p = 0.022$ ) and mood ( $p = 0.033$ ) disorders.

**Table 2.** Prevalence of Axis I disorders in the sample (N=153)

Axis I disorders*	Boys (N = 59)			Girls (N = 94)			Total (N = 153)			p-value <sup>b</sup>
	N	(%)	(CI <sup>a</sup> )	N	(%)	(CI <sup>a</sup> )	N	(%)	(CI <sup>a</sup> )	
Anxiety	13	(22.0%)	(13.0%-34.5%)	38	(40.4%)	(30.7%-50.7%)	51	(33.3%)	(26.0%-41.1%)	<b>0.022</b>
Mood	13	(22.0%)	(13.0%-34.5%)	37	(39.4%)	(29.6%-49.6%)	50	(32.7%)	(25.3%-40.5%)	<b>0.033</b>
SUD	10	(16.9%)	(8.7%-28.5%)	18	(19.1%)	(11.9%-28.5%)	28	(18.3%)	(12.6%-25.3%)	0.831
CD	12	(20.3%)	(11.3%-32.8%)	15	(16.0%)	(9.5%-24.8%)	27	(17.6%)	(12.2%-24.4%)	0.519
ADHD	9	(15.3%)	(7.9%-26.8%)	12	(12.8%)	(7.1%-21.0%)	21	(13.7%)	(8.9%-20.1%)	0.810
OCD	4	(6.8%)	(2.3%-16.4%)	10	(10.6%)	(5.5%-18.3%)	14	(9.2%)	(5.3%-14.8%)	0.568
Psychosis	0	(0.0%)	(0.0%-6.0%)	2	(2.1%)	(0.4%-7.1%)	2	(1.3%)	(0.2%-4.6%)	0.523

<sup>a</sup> Blaker 95% confidence intervals

<sup>b</sup> p-value from exact chi square test

\* *Axis I disorders: Anxiety = Anxiety disorders: Simple phobias, Generalized anxiety disorder, Panic disorder, Agoraphobia, Social phobia, and Post-traumatic stress disorder. Mood = Mood disorders: Dysthymia and Major depressive episode. SUD = Alcohol and drug abuse or dependence. CD = Conduct disorder. ADHD = Attention deficit hyperactivity disorder. OCD = Obsessive-compulsive disorder.*

The prevalence of personality disorders was generally higher in the referred girls. For boys, no significant associations between ADHD and specific personality disorders could be

ascertained. For girls, however, there were significant associations between ADHD and ASPD ( $p=0.002$ ), as well as ADHD and BPD ( $p=0.042$ ). Girls also had a significant relationship between ADHD and CD ( $p=0.003$ ). Only 3.4% ( $N=2$ ) of the boys and 3.2% ( $N=3$ ) of the girls, all with ADHD, matched the criteria for ASPD.

There was no significant relationship between having an ADHD diagnosis and at least one personality disorder, neither in unadjusted analysis (OR=2.0, 95% CI 0.7-5.6,  $p=0.164$ ) nor when adjusted for gender (OR=2.2, 95% CI 0.8-6.1,  $p=0.138$ ). No bootstrap procedure was considered necessary since these CIs overlapped almost completely.

In unadjusted analysis the number of personality disorder criteria was significantly higher (15.7, 95% CI 6.3-25.1,  $p=0.001$ ) when an ADHD diagnosis was also present. In analysis adjusted for gender, age and Axis I disorders the corresponding estimate was 9.6 (95% CI 1.2-18.0,  $p=0.026$ ). There was no significant difference between the unadjusted and adjusted estimate (95% CI -0.52-13.43).

### 4.3 Paper III

The aim of the third paper was to investigate the prevalences of alcohol and substance use disorders (SUDs) in our sample, as well as to examine the relationship between personality disorders and alcohol and other substance abuse, and assess the influence of adjusting for other Axis I disorders, age and gender on this association.

Of the adolescents, 18.3% ( $N=28$ , 95% CI 12.6%-25.3%) were diagnosed with a SUD, with no significant gender difference in prevalence. The only substances in the sample that were used frequently enough to qualify for either an abuse or a dependency diagnosis were alcohol and cannabis. When analysed separately for alcohol- and cannabis-related problems in each gender, boys had slightly more alcohol-related problems, whereas girls had slightly more cannabis-related problems. These differences were not significant (alcohol;  $\chi^2=0.027$ ,  $p=1.000$ , cannabis  $\chi^2 = 0.055$ ,  $p=1.000$ ). The female/male ratio of SUDs was 1.13 (95% CI=1.10-1.17).

No significant associations between SUDs and specific personality disorders, CD, or ADHD could be identified for boys. This was in stark contrast to the findings for girls, who presented significant associations between SUD and BPD ( $p=0.024$ ); negativistic personality disorder ( $p=0.035$ ); more than one personality disorder ( $p=0.020$ ); CD ( $p=0.001$ ); and ADHD ( $p<0.001$ ). Girls with personality disorders had more symptoms than boys in all reported Axis I conditions; the difference was significant for anxiety disorders ( $p=0.022$ ) and mood

disorders ( $p=0.033$ ). SUDs ( $p=0.831$ ) and CD ( $p=0.585$ ) did not yield significant gender differences.

There was a significant positive association between the number of personality disorder symptoms and SUD (OR per 5 points difference in the number of personality disorder symptoms 1.16, 95% CI 1.06-1.26,  $p=0.001$ ). The association was still significant after adjusting for gender, age and presence of one or more Axis I disorders (OR 1.15, 95% CI 1.04-1.27,  $p=0.005$ ). There were no significant deviations from the proportional odds assumption in these analyses ( $p\geq 0.466$ ). No bootstrap procedure for comparing the unadjusted and adjusted ORs was performed due to the almost total overlap between the CIs.

## 5 Discussion

### 5.1 Discussion of the main results

The main finding of the present study was that more than one fifth of the adolescents who were referred to a general service mental health outpatient clinic had one or more personality disorders. Quality of life was inversely related with the number of personality disorder criteria met, and this association was not significantly affected by Axis I comorbidity.

Girls had more than twice the personality disorder prevalence of boys, but the difference was not statistically significant. However, a trend was discernible toward significantly higher prevalence for girls having at least one personality disorder, and even stronger for girls with more than one personality disorder. This specific finding may in part be explained by different referral practices for boys and girls: more boys than girls are referred in pre-adolescence, whereas girls are more frequently referred than boys in adolescence. However, when counting the total outpatient population from 0 – 17 years, both genders are equally represented with equal numbers of referrals to the Nic Waal Institute. To the best of my knowledge this also applies to other comparable Norwegian child and adolescent mental health clinics. When factoring in the well-documented assumption that personality disorders in the adult general population are equally prevalent in both genders, even though gender distribution of specific disorders may vary, we may presume that some of the boys who later develop personality disorders have actually been referred to our clinic before they reach adolescence, thereby not being assessed by the present study and thus adding to the impression of a noticeably higher personality disorder prevalence in adolescent girls than in boys.

The prevalence of ADHD did not differ significantly between boys and girls, but adolescents with ADHD had significantly more personality disorder symptoms, also when adjusted for age, gender and other Axis I disorders.

SUDs were equally prevalent in both genders, with one in six adolescents meeting the diagnostic criteria for either AUD or cannabis use disorder (CUD). As in the case of ADHD, there was a strong association between the number of personality disorder criteria met and having one or more SUDs; this relationship was practically unchanged when adjusting for gender, age and presence of other Axis I disorders. For boys, there were no significant associations between SUDs and specific personality disorders, CD or ADHD. For girls, there

were significant associations between SUDs and BPD, negativistic personality disorder, having more than one personality disorder, CD, and ADHD.

### **5.1.1 Prevalence and gender distribution of personality disorders in the sample**

The prevalence of personality disorders in the present study was higher than previously reported from community samples, and lower than reported from clinical samples (Kongerslev et al., 2015). The participants in the present study were unselected adolescent outpatients from the general population in a defined catchment area, referred to a non-specialized mental health outpatient clinic. Previous studies, however, have mainly reported on samples that are different from the present study. In community samples and primary care settings the prevalence numbers for adolescents have ranged from 6% to 17% (Johnson, 2006). In samples from treatment refractory adolescents admitted for specialized treatment (Feenstra et al., 2011), on inpatients (Grilo et al., 1998), and on juvenile justice samples (Gosden, Kramp, Gabrielsen, & Sestoft, 2003; Kongerslev et al., 2012; Lader, Singleton, & Meltzer, 2003) the prevalence numbers have ranged from 41% to 88%. Thus the participants in the present study had a higher prevalence of personality disorder symptoms than participants in studies on community samples and primary care patients, but lower than participants in studies on more severely ill patients. As recently reviewed by Kongerslev and colleagues, the peak prevalence for personality disorders is reported to occur during early and middle adolescence. Studies that have focused on late adolescence have reported lower prevalence. In our study the participants were mainly middle to late adolescents.

It should also be noted that the present study adhered strictly to the DSM-IV diagnostic criteria for personality disorders. We did not include a group of personality disorder patients with subthreshold diagnoses, customarily defined as being one criterion short of the number of criteria necessary for each diagnosis according to DSM-IV (Langås et al., 2012).

Bearing these factors in mind, the personality disorder prevalence found in the present study seems to be within the expected range: the adolescents had more personality disorders than what has previously been found in studies on community samples and primary care patients, but less than in studies on more severely ill outpatients and inpatients.

The present study disclosed a predominance of cluster B and C disorders, with depressive and avoidant personality disorders being the most prevalent, followed by BPD; this is comparable to corresponding findings from adult mental health clinic outpatients (Torgersen, 2009).



### **5.1.2 Personality disorders and quality of life**

In our sample, we found roughly the same association between personality disorders and quality of life as in adults (Cramer et al., 2003); a close to linear relationship between the total number of personality disorder symptoms and reduced general quality of life. Adjustment for the presence of Axis I diagnoses did not appreciably change this relationship.

Unfortunately, the limited number of data restricted more sophisticated analysis on gender differences and personality disorder clusters. In paper I, when exploring graphically, there was a tendency toward reduced quality of life with an increasing number of personality disorder criteria met for each separate cluster. For the eccentric (cluster A) conditions only schizotypal personality disorder showed an approximately linear relationship between number of personality disorder criteria and general quality of life; for the dramatic (cluster B) conditions there were close to linear relationships for all disorders, especially pronounced for borderline personality disorder, which is generally considered the prototypical dramatic personality disorder; for the fearful (cluster C) conditions there was a close to linear relationship for dependent personality disorder. The finding of apparent non-linearities in the graphic explorations of some of the single personality disorders may be an artefact caused at least in part by the small numbers of patients with the diagnoses in question (paranoid N=0, 0.0%; schizoid N=1, 0.7%; narcissistic N=1, 0.7%; self-defeating N=0, 0.0%; negativistic N=2, 1.3%).

In summary, the finding of a close association between personality disorders and quality of life emphasizes the importance of including a measure for evaluating quality of life when making clinical assessments of adolescents with suspected personality disorders.

### **5.1.3 ADHD, Axis I comorbidity, and personality disorders**

The present study also investigated the prevalence of ADHD, common Axis I disorders, and gender differences. Approximately two thirds of the adolescents had at least one Axis I disorder, with significantly more mood and anxiety disorders in girls than in boys. Most adolescents with a personality disorder had one or more comorbid Axis I disorder (N=28, 84.8%). In fact all Axis I disorders were more prevalent in adolescents with a personality disorder; social phobia (N=11, 33.3%) being the most frequent and obsessive-compulsive disorder (N=4, 12.1%) being the least frequent comorbid Axis I disorder. Detailed analysis of the interactions between Axis I diagnoses and personality disorders per se was not part of the specific aims of the present study; however, it may still be interesting to note the substantial comorbidity (N=8, 88.9%) of avoidant personality disorder (N=9, 5.9%) and social

phobia (N=22, 14.4%), indicative of very similar relationships in adolescents as in adults with respect to Axis I and personality disorder comorbidity and covariation (Eikenæs, Hummelen, Abrahamsen, Andrea, & Wilberg, 2013).

Previous studies of non-referred adolescents have disclosed ADHD prevalence rates of 8.5% (Smalley et al., 2007), and prevalence rates in clinical samples are ranging from 11%-16% (Philipsen et al., 2008; Speranza et al., 2011). We found that 13.7% of the adolescents in our sample met the diagnostic criteria for ADHD, which was in accordance with previous findings. When applying less strict diagnostic criteria than a definite DSM-IV diagnosis, prevalence rates in clinical samples have been reported to be 32.7% for “moderate ADHD” (Vidal et al., 2014). Coincidentally, the present study found the exact same prevalence figure as Vidal (N=50, 32.7%) for adolescents screening positively for ADHD when using the ASRS Screener as outlined in paragraph 3.5.3 in this thesis.

Earlier studies of ADHD have reported considerable prevalence differences in adolescence as well as in childhood and adulthood between genders (Polanczyk et al., 2007; Polanczyk & Rohde, 2007; Staller & Faraone, 2006). The present study, however, failed to find a significant difference in prevalence between boys and girls. There was also no significant prevalence difference between genders when analyzing hyperactivity/impulsiveness and inattention symptoms separately. This unexpected finding probably reflects that our sample had not been preselected due to symptom severity or type, but the discrepancy is still considerable compared to the commonly assumed male/female ratio of 5:1 (Staller & Faraone, 2006).

As a tentative explanation, one might propose that the prevalence numbers of the present study’s sample could have been skewed when compared to other studies, due to the present study using strict diagnostic criteria and only recognizing the combined type of ADHD. However, the present study’s prevalence numbers fit in as expected when compared to previous findings, which seems to contradict the proposition of a skewed sample. One might also draw attention to the fact that the present study comprises new referrals only. As mentioned in paragraph 5.1 it is well known that more boys than girls are referred to mental health outpatient clinics when aged 7-13 years, and more girls than boys are referred when aged 14-17 years.

This might imply that the true prevalence of ADHD in boys aged 14-17 years is higher than what is being reflected in the present study, due to more boys than girls with ADHD being referred at an earlier age. This in turn suggests that these boys either may still be in treatment at the outpatient clinic, or they may no longer be in treatment there; instead they

could be treated by their general practitioners or psychiatrists in private practice. In either case, they would not be included in the present study. Considering that the female/male ratio is 1.5 in the present age group of 14-17-year-olds, and that the male/female ratio in the 7-13 year age group of referred patients is approximately the same, this hypothesis would not seem to be able to fully explain the unexpectedly high female ADHD prevalence of the present study. Thus the possibility cannot be ruled out that the prevalence findings of this thesis might actually reflect the true occurrence of ADHD, at least in our sample of adolescents referred to a general service mental health outpatient clinic with a catchment area in an urban, Norwegian setting. In this context it should be mentioned that one cannot overstate the importance of proceeding with great caution when trying to apply findings like prevalence estimates from a clinical setting to a general population (Boyle, 1998).

Previous studies have reported that the presence of a comorbid ADHD diagnosis influences the clinical presentation of BPD in adolescents (Speranza et al., 2011). We found higher personality disorder prevalences for girls, with ASPD and BPD reaching significant levels. All girls with ASPD also matched the diagnostic criteria for ADHD. This seems to be in accordance with studies of adults, where females with ADHD and BPD shared more clinical features than males (Philipsen et al., 2009; van Dijk et al., 2012) and adult outpatients had a significant association between ADHD and BPD symptoms only in the female subsample (Fossati et al., 2014).

In the present study, ADHD, CD, ASPD, and SUDs were equally prevalent in both boys and girls without ADHD, whereas ASPD and BPD were significantly more prevalent in girls than in boys with ADHD. This not only suggests that ADHD in girls may be more frequent than has been previously assumed; it also highlights the clinical importance of assessing antisocial and borderline personality pathology in adolescent girls presenting with ADHD symptoms.

Overall the girls in the present study were more severely ill than the boys, with higher prevalences of Axis I as well as personality disorder diagnoses. This may in part be explained by a selection bias due to only the most severely affected girls being referred to a mental health outpatient clinic. On the other hand, in general clinical practice there may be more focus on assessing and diagnosing adolescent boys than girls presenting with ADHD symptoms, which suggests the possibility of an underestimation of the prevalence of ADHD in adolescent girls.

The limited data size did not permit us to investigate the relationship between ADHD and single personality disorders. We did, however, find a significantly elevated number of

personality disorder symptoms in adolescents with ADHD ( $p=0.001$ ). When adjusted for age, gender and other Axis I disorders, this relationship was still significant ( $p=0.026$ ). It should be noted that personality disorder symptoms and personality disorders are not the same. However, each personality disorder diagnosis is a categorical entity defined by a number of personality disorder symptoms reaching an arbitrary cut-off score. There are no indications of a qualitative difference between a patient with for instance 4 of 9 BPD criteria fulfilled and a patient with 5 or 6 of 9 BPD criteria fulfilled. In this respect, it would appear justifiable to use the number of personality disorder symptoms present as an indirect measure of the extent of personality disorders in a given sample.

The question if personality disorder diagnoses are sufficiently reliable and valid to be used among adolescents has been discussed for some time; at least in the case of BPD there is now compelling evidence that this disorder is as reliable and valid among adolescents as it is in adults (Kaess et al., 2014). The use of semi-structured diagnostic interviews has proven beneficial even to experienced clinicians when diagnosing personality disorders in adults (Zimmerman & Mattia, 1999). The present study suggests that by using reliability-tested diagnostic interviews like the SIDP-IV, it is also feasible to assess personality disorders in adolescents, even in the presence of one or more comorbid Axis I disorders.

As discussed in paragraph 3.7.6, we used a combined variable comprising all personality disorder symptoms throughout the study, i.e. we included subthreshold criteria according to the DSM-IV (scores “1”, “2”, or “3” in the SIDP-IV). From a theoretical point of view, we found this approach be most in accordance with the current view of personality disorders as dimensional entities without defined categorical breaking-points that can be derived from the inherent structure of the disorders themselves, for distinguishing between having or not having a specific disorder. The findings of the present study support this notion, as can be deduced from Figures 2-5 in paper I which illustrate the covariation of quality of life with the personality disorders in clusters A, B, and C, as well as the provisional disorders. Adhering to this train of thought, we would expect the sum total of all personality disorder criteria including the subthreshold ones, and not just the sum of the positive criteria, to be the covariate of interest. However, the practical consequences of our choice seem to be negligent; we duplicated some of the statistical analyses in papers I and II with a combined personality disorder variable based on the number of positive personality disorder criteria only (scores “2” or “3” in the SIDP-IV): the results were not significantly different from the results obtained when the calculations were based on the variable which also included subthreshold criteria.

#### **5.1.4 Personality disorders and substance use disorders**

Our finding of 18.3% of the adolescents having AUD or CUD seems not to be incongruent with previous findings, considering that studies of non-referred adolescents have found SUD prevalence rates of 4.6% (Wittchen et al., 1998) to 17.7% (Essau, 2011), and the prevalence rate in adolescent and young adult inpatients has been reported to be up to 54% for DUD and 87% for AUD when first admitted to hospital treatment (Langås et al., 2012).

An earlier study has reported significantly higher risk for lifetime comorbid disorders in women with SUDs, with an especially pronounced gender difference for anxiety and somatoform disorders (Langenbach et al., 2010). In the present study, however, significant gender differences in anxiety and mood disorders were found only in the adolescents that did not have SUDs. It has further been suggested that girls with ADHD might be at slightly higher risk than boys for substance abuse (Disney et al., 1999). In our material, girls with SUDs were significantly higher at risk for having ADHD ( $p < 0.001$ ) as well as CD ( $p = 0.001$ ).

Recent findings have contradicted the assumption that boys generally use more drugs and alcohol than girls (Johnson et al., 2015; White et al., 2015). Our findings of non-significant differences between genders in SUD prevalence are in accordance with this trend. Other recent studies have reported AUD to be a more severe disorder in adolescents and young adults, with higher levels of adolescent risk factors and a greater magnitude of AUD consequences (Foster et al., 2015), as well as a tendency in females with SUDs to have higher rates of comorbid disorders (Roberts et al., 2007). The cross-sectional nature of the present study makes it impossible to infer causal relationships, but our findings do support the assumption of a more extensive psychiatric comorbidity in female adolescent SUD patients.

Our main finding with regard to SUDs was a highly significant association between number of personality disorder symptoms and the presence of one or more SUDs ( $p = 0.001$ ), with almost totally overlapping CIs after adjustment for gender, age and presence of one or more Axis I disorders ( $p = 0.005$ ). This finding implies that having a personality disorder in itself may constitute a unique risk factor for the later development of a SUD. The girls had significant associations between SUDs and (1) BPD; (2) negativistic personality disorder; (3) having more than one personality disorder; (4) CD; and (5) ADHD. This could imply that adolescent girls suffering from one or more of the abovementioned Axis I disorders may be especially at risk for developing SUDs; from a clinical point of view, these patients should therefore be closely monitored with regard to their use of psychoactive substances.

## 5.2 Strengths and limitations of the present study

The main limitation of the study is its cross-sectional design, which makes it impossible to infer causal relationships. In principle, cross-sectional studies are limited by the fact that they are carried out at one time point and hence can give no indication of the sequence of events.

The study was performed at a single general service mental health outpatient clinic, receiving referrals of adolescents from a geographically defined urban catchment area. Even though the catchment area had a varied socioeconomic and ethnic population, we do not know if the results can be generalized to another population in other city districts, more rural parts of the country, or other countries or cultures.

The relatively small sample size (N=153) and the attrition (23.9%, N=48) also constitute limitations. The participants were included in a limited time span, and we cannot exclude the possibility of prevalence fluctuations over time.

Each patient was diagnosed individually with well-documented semi-structured interviews by a single, experienced clinician and rater. Due to the fact that just one person performed all assessment work, there were no missing data. However, the use of a single evaluator also constitutes a possible limitation. The evaluator was trained in rating with SIDP-IV and MINI by experienced evaluators and researchers on personality disorder and Axis I diagnoses. The evaluator discussed SIDP-IV ratings with the expert evaluator. This may have strengthened the internal validity, but might have been a threat to the external validity of the diagnoses.

The MINI-PLUS, which utilizes the DSM-IV diagnostic criteria in a strict manner, was used for diagnosing ADHD. This was considered advantageous, as we did not want to overestimate the prevalence of ADHD. The MINI, which was used for the assessment of all other Axis I disorders, is also strictly linked to the DSM-IV diagnostic criteria for the respective disorders.

The gender and age distribution of our sample was close to identical to the gender distribution of all referred adolescents in the study inclusion period, and reflects the real-life clinical situation that in adolescence, as opposed to middle and late childhood, more girls than boys are referred to Norwegian mental health outpatient clinics. Hence, there seems to have been no systematic skewing with regard to gender and age selection of the participants.



## **6 Clinical implications of the main findings and future research**

### **6.1 Implications for clinical practice**

In our sample of adolescents who were referred to a general service outpatient clinic, the girls were overall more severely ill than the boys. Personality disorders as well as Axis I disorders were more prevalent in girls; CD, ASPD and SUDs were equally prevalent in both boys and girls without ADHD. There were no significant gender differences in ADHD prevalence, but girls with ADHD had ASPD and BPD significantly more often than boys with ADHD. This suggests that ADHD in girls may be more common than has been previously assumed; furthermore it highlights the importance of assessing antisocial and borderline personality pathology in girls presenting with ADHD symptoms.

We found the same relationship as in adults between personality disorder symptoms and quality of life; this emphasizes the clinical importance of evaluating quality of life when assessing personality disorders in adolescents.

The strong association between personality disorders and SUDs suggests that having a personality disorder in itself may constitute a risk factor for developing SUDs in adolescence. Additionally, the girls had significant associations between SUDs and BPD; negativistic personality disorder; having more than one personality disorder; CD; and ADHD. This could imply that adolescent girls suffering from the aforementioned disorders may be especially at risk for developing SUDs; from a clinical point of view, they should therefore be particularly monitored with regard to their use of psychoactive substances.

### **6.2 Implications for future research**

The scientific value of longitudinal studies of selected patient groups has been well established (Kringlen, 1965; Noreik, 1973; Opjordsmoen, 1986; Retterstøl & Opjordsmoen, 1994; Vrabel, Rø, Martinsen, Hoffart, & Rosenvinge, 2010); their relevance for personality disorders is underscored by a remark made by the late Professor Gabriel Langfeldt almost sixty years ago: *As will be well known some Swedish colleagues are of the opinion that the term psychopathy should be eliminated from psychiatric nomenclature. I am of the opinion that the only way to decide the question is to follow the neurotic, psychopathic and psychotic children during their whole life* (Brask & Dahl, 1959).

The patient sample from the present study represents an excellent base for long-term follow-up assessments with the aim of studying the natural course of personality disorders as

well as their interaction with comorbid Axis I disorders. The construct validity of personality disorders in adolescence has been sufficiently demonstrated; however long-term studies of these disorders can contribute not only to an understanding of the disorders per se, but also elucidate the impact of gender and different prognostic factors such as treatment type and duration, ADHD persistence (Biederman, Petty, Evans, Small, & Faraone, 2010), SUD comorbidity, psychosocial functioning, GAF scores, marital status etc.

I have already performed a two-year follow-up assessment of 17 of the 33 patients who had one or more personality disorders when they were included in the present study. For the follow-up assessments, I used the same diagnostic measures as in the present study, with the addition of MCMI-III (Millon & Davis, 1997) as an added validation of the SIDP-IV findings. The MCMI-III is a 175-item psychological assessment tool that has been developed and standardized specifically on clinical populations. I hope to be able to analyse and publish data from this initial follow-up assessment in the fall of 2016.

My intention with respect to further studies is to request permission from the Regional Committee for Medical Research Ethics for Eastern Norway for performing a 10-year and a 20-year follow-up study, respectively, of all 153 patients in the present sample.

The main purpose of these follow-up assessments would be to compare the 33 patients who had personality disorders in adolescence with the 120 patients who did not. An important research question would be to study the impact on long-term prognosis of having a personality disorder at a young age.

It would also be possible to focus on the 22 patients who constituted the group of subthreshold personality disorder patients in the present study, i.e. the patients who were one criterion short of meeting diagnostic criteria for a personality disorder. If we would have added the subthreshold group (N=22) to the group who met all diagnostic criteria for one or more personality disorders in the present study (N=33), we would have found that 36% of all participants; 43% of girls; 25% of boys had one or more personality disorders as adolescents.

We now have the opportunity to compare the long-term diagnostic and functional outcome of these two groups and the group with no clinically prominent adolescent personality pathology (N=100); the realization of such a research project could provide valuable epidemiological data with regard to long-term diagnostic stability and prognostic impact of adolescent personality disorder diagnoses.



### 6.3 Conclusions

We found personality disorders in more than 20% of adolescents referred to a general service mental health clinic. As in adults, impaired quality of life was strongly associated with the number of personality disorder symptoms fulfilled. Axis I comorbidity showed a similar pattern as in comparable adult populations. Diagnosing personality disorders in adolescents with the help of a well-recognized, semi-structured diagnostic interview proved feasible and clinically relevant.

Both diagnostic systems currently in use allow diagnosing personality disorders in adolescents. It is somewhat paradoxical that they presuppose the manifestation of these disorders in late childhood or adolescence, but at the same time they do not readily recommend diagnosing them in adolescents.

There still seems to be a major discrepancy between the growing body of knowledge about the emergence of personality disorders in adolescence and routine clinical practice, where one often hears arguments to the effect that personality disorder symptoms are not possible to discern from transient, developmentally based, ordinary teen-age problems. Another argument often put forward against diagnosing personality disorders in young people is the possibility of inflicting iatrogenic harm by stigmatizing and medicalizing normal teen-age behavior, and thus worsening their long-term outcome.

Recent research efforts offer little or no support for such assumptions. There is now considerable evidence that personality disorder diagnoses are just as valid and reliable in adolescents as in adults; there are also distinct indications that early detection and intervention may counteract the highly frequent development of serious Axis I comorbidity and thereby improve long-term quality of life and functional outcome.

Without factual information members of the family network often risk burning themselves out in their efforts to help the patient. Accordingly, a further important aspect of early diagnosis is the facilitation of adequate psychoeducative measures for the patient's family members, who often lack realistic expectations with regard to severity and duration of the disorder in question. Last not least adequate diagnostic procedures help securing the patient a good transition from child and adolescent to adult mental health services.

Considering all currently available knowledge about the diagnostic validity and stability of personality disorders in adolescence, mostly acquired during the last decade, I conclude that the time is ripe to start diagnosing these disorders in adolescents. Doing so would honor the severity and duration of the symptoms that a substantial number of referred

adolescents present with, and facilitate adequately tailored help for young patients often in need of long-term case management and therapeutic interventions.

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## The Relationship between Personality Disorders and Quality of Life in Adolescent Outpatients

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### Abstract

**Background:** During recent years, there has been an increasing focus on the benefits of the early detection and treatment of personality disorders in adolescents. Previous studies of adults have shown that the number of personality disorder criteria met is negatively correlated with a patient's quality of life and general functioning.

**Objective:** The aim of the present study was to investigate the prevalence of personality disorders, particularly with regard to the correlation between the number of personality disorder criteria fulfilled and self-perceived quality of life. Distribution according to gender and age in a clinical sample of adolescent outpatients were also considered.

**Method:** This study included 153 adolescents between the ages of 14 and 17 years who were referred to a mental health outpatient clinic. Personality disorders were assessed using the Structured Interview for DSM-IV Personality. Quality of life was assessed using the Youth Quality of Life Instrument - Research Version, which is a 41-item questionnaire that covers broad aspects of quality of life. Axis I disorders were assessed using the Mini International Neuropsychiatric Interview.

**Results:** Results demonstrated that 21.6% of the adolescents met the diagnostic criteria for at least one personality disorder. A relationship between the number of personality disorder criteria met and reduced quality of life was found. No significant gender differences with regard to the prevalence of each of the personality disorders were revealed. Adjustment for the presence of Axis I disorders did not appreciably affect these findings.

**Conclusion:** The present study indicates that reduced quality of life as a result of the number of personality disorder criteria met affects adolescents in much the same way that it does adults. This further emphasizes the clinical importance of including quality of life assessment as part of the general diagnostic procedures used with adolescents.

**Keywords:** Personality disorder; quality of life; adolescent; outpatient

### Introduction

#### *Personality Disorders in Adolescents*

Personality disorders are defined as relatively enduring and maladaptive patterns of experiencing life, coping with problems, and relating to others. In the *Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition* (DSM-IV), personality disorder categories may be applied to adolescents when the individual's particular maladaptive personality traits appear to be pervasive, persistent, and unlikely to be limited to a particular developmental state or to an

episode of an Axis I disorder. With the formal exception of antisocial personality disorder, it is possible to diagnose any personality disorder in a person who is less than 18 years old if the diagnostic features have been present for at least one year (1). This information remains unchanged in the *Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition* (2).

The prevalence of personality disorders in adults has been studied in the general population (3) as well as in different clinical samples (4). Personality

disorders are common conditions, with prevalence of about 13% in the general adult population, up to 40% in adult outpatient samples, and up to 71% in inpatient samples when using semi-structured diagnostic interviews (5). In adolescents, prevalences range from 6% to 17% in community samples and from 41% to 64% in clinical samples (6).

Research supports the assumption that pathological personality traits emerge at an early age and are related to health-risk behaviors (e.g., failing to complete secondary school, alcohol dependence, getting in trouble with police and violent crime, unsafe sex, dangerous driving habits) during adolescence and young adulthood (7,8). This has been demonstrated by longitudinal cohort studies like the Dunedin study, in which early appearing temperamental differences were shown to have a pervasive influence on life-course development and to correlate with personality structure, interpersonal relations, psychopathology, and crime in adulthood (7-9).

There has been increased interest in the concept and delineation of personality disorders during childhood and adolescence (10). Earlier findings support the view that personality disorders can be traced back to adolescent emotional problems and disruptive behavior disorders (11). Caspi and colleagues have shown that behavior observed in 3-year-old children can be clearly linked to psychiatric problems during early adulthood (12). Furthermore, the long-term study of the same population demonstrated strong links between behavioral qualities observed at the age of 3 years and personality functioning measured at the ages of 18 and 26 years (8).

Personality disorders may have a better prognosis than originally assumed (13). However, findings indicate that maladaptive personality trait constellations are more stable in their structure than personality disorder diagnoses per se. Maladaptive personality traits may change in severity or expression over time, but they often lead to persistent functional impairment and reduced quality of life, even though the diagnostic threshold for a personality disorder is no longer reached (14,15).

An important focus is on the matter of precursors and possible pathways: in other words, the interplay of temperament and personality (16). This research is limited in part by the fact that the current diagnostic systems do not readily facilitate the recognition of personality pathology before the age of 18 years. Many clinicians are reluctant to diagnose personality disorders during adolescence; they may view pediatric personality deviations as reflective of given developmental stages, despite evidence that certain adolescents are indeed at risk for the eventual development of personality disorders as adults.

Studies have shown that the late identification of these disorders prevents timely treatment and potentially increases morbidity (17-19).

A further complicating factor may be that the childhood symptoms of personality disorders are not necessarily identical to the symptoms of the same disorders as they manifest in adults (20). One study compared the prevalence rates of DSM-IV borderline personality disorder in English 11-year-olds and American adults. The results suggested that late-latency children are about half as likely as adults to meet DSM-IV criteria for borderline personality disorder and that gender does not play a defining role in symptom expression (21). Few studies have reported about gender differences in personality disorders in adolescents (6).

#### *Personality Disorders and Quality of Life*

Quality of life is a concept of considerable societal importance (22). A study from the Netherlands investigated the burden of disease in a large sample of patients with personality disorders. The results showed that the total number of personality disorder diagnoses—rather than the specific type—was related to quality of life. In this study, patients with personality disorders experienced a high burden of disease that was comparable to that experienced by patients with severe somatic illnesses like rheumatic disease, lung cancer, or Parkinson's disease (23). Findings from the general adult population indicate that personality disorders are important predictors of quality of life, even more so than sociodemographic variables, somatic health, and Axis I disorders (24,25).

Studies of adults have found a linear relationship between the number of personality disorder criteria met and the actual impairment of quality of life (26). Personality disorders during adolescence seem to have a negative impact on quality of life in young adults. A combination of Axis I disorders and personality disorders during adolescence may lead to an even poorer quality of life (27-29).

#### *Aims*

The objectives of the present study, which was performed on a clinical sample of adolescent outpatients, was to do the following:

1. Investigate the prevalence of personality disorders, including possible gender differences.
2. Investigate the relationship between the number of personality disorder criteria met and the patient's self-perceived quality of life. We also wanted to assess age and gender differences to determine whether adjustment for Axis I disorders affected the relationship between personality disorders and quality of

life; and to discover whether there were interactions between the number of personality disorder criteria and the patient's age and gender.

## Materials and Methods

### *Ethics*

This study was approved by the Regional Committee for Medical Research Ethics for Eastern Norway (REK: 11395) and by the Norwegian Data Inspectorate. Informed written consent was obtained from all patients. Consent was also obtained from the parents of patients who were less than 16 years old.

### *Participants*

The sample consisted of adolescents between the ages of 14 and 17 years who had been referred to a mental health outpatient clinic for children and adolescents in Oslo (The Nic Waal Institute, Lovisenberg Diakonale Hospital). The Nic Waal Institute is one of the largest clinics of its kind in Norway; it serves four city districts and a total population of 25,000 children and adolescents from 0 to 17 years old. The Institute serves a population of mixed socioeconomic status comprised of all social classes, including immigrant workers and well-educated middle-class and upper-class families.

Study enrollment took place from February 2005 to April 2007. All referred patients in the study's age group were asked to participate. Exclusion criteria were the need for immediate hospitalization or other urgent therapeutic measures, clinically assessed mental retardation, a lack of fluency in the Norwegian language, and the absence of the evaluator at the time of referral.

### *Measures*

*Axis I disorders.* The Norwegian translation of the Mini International Neuropsychiatric Interview (MINI) version 5.0.0 was used to assess Axis I disorders (30,31).

*Personality disorders.* The Norwegian version of the Structured Interview for DSM-IV (SIDP-IV) (32) was used to assess personality disorders. The SIDP-IV is a comprehensive semi-structured diagnostic interview for DSM-IV personality disorder (Axis II) diagnoses. The SIDP-IV has been used in numerous studies in different countries, including Norway (3,11,33). It covers 14 DSM-IV Axis II diagnoses as well as conduct disorder as a separate Axis I disorder. The Axis II diagnoses comprise the 10 standard DSM-IV personality disorders (paranoid, schizoid, schizotypal, borderline, histrionic, narcissistic, antisocial, obsessive-compulsive, dependent, and avoidant), the three provisional DSM-IV personality disorders (self-defeating, depressive, and negativistic), and mixed personality disorder.

All questions on the SIDP-IV address the typical or habitual behavior of the subjects during the previous five years. Each diagnostic criterion is rated on a four-point scale: 0 = criterion not present; 1 = subthreshold level of the trait present; 2 = criterion being present for most of the last five years; and 3 = criterion strongly present. Scores of 2 and 3 indicate the presence of a criterion according to the DSM-IV (32).

In accordance with the diagnostic practice applied in other studies of personality disorders during adolescence, the DSM-IV age criterion for antisocial personality disorder was waived (34). As a result of the participants' ages, we also waived the 5-year symptom duration criterion, instead opting to use two years of symptom duration as a criterion. This is in accordance with the criterion used in previous studies that assessed adolescent personality pathology (6,34).

*Quality of life.* A Norwegian translation of the Youth Quality of Life Instrument - Research Version (YQOL-R) was used to assess of quality of life. The YQOL-R is a self-scored questionnaire that was developed with the goal of focusing on the positive aspects of adolescence (35). It covers broad aspects of quality of life, with a total of 41 items in four topical domains: self, relationships, environment, and general quality of life. Its psychometric properties are satisfactory (36), and it has been used in various clinical and non-clinical settings (37,38).

The adolescents rated the YQOL-R items on a scale that ranged from 0 (most severe) to 10 (best). The primary outcome with regard to quality of life was the general quality of life domain of the YQOL-R. In the present study, Cronbach's alpha was found to be 0.94.

### *Procedures and Assessment*

One evaluator—the first author—was assigned to the study and assessed all of the participants. All patients referred to the clinic while the evaluator was present were asked to participate in the study. After written consent was obtained from the patients, the diagnostic interviews were performed at the Nic Waal Institute as an initial psychiatric assessment. The evaluator, a male physician with 21 years of clinical experience, was a specialist in both psychiatry and child and adolescent psychiatry. He was trained in evaluation with the SIDP-IV by the second author, an experienced rater who had previously evaluated patients and reported for comparable studies (3,39). Twenty ratings were discussed and found to be in accordance with the ratings of the experienced evaluator. Axis I conditions were assessed by the same evaluator, who had also been trained by the translator of the Norwegian version of the MINI.

After the completion of the initial assessment, the patients were assigned to further clinical evaluation and treatment by clinicians other than the evaluator in the outpatient clinic.

### Statistical Analysis

Descriptive statistics were calculated for the relevant mental health status variables and expressed as means (standard deviation) and frequencies (%) as appropriate. Prevalence of personality disorders with 95% Blaker's confidence intervals were estimated for the total sample and for each gender separately, with testing for gender differences and comparison with the general adult population via exact chi-squared tests (40). The non-linearity of the relationship between the total number of personality disorder criteria met and the quality of life was investigated graphically with separate locally weighted smoothing (LOWESS) curves for each gender. Within each disorder, this relationship was also explored graphically. The relationship of self-perceived quality of life with the number of personality disorder criteria met, gender, and age was investigated with the use of multiple linear regression; multicollinearity was checked by variance inflation factor, which was preferably less than 5 to 10 for all covariates. The regression analysis was repeated after adjusting for important Axis I diagnoses (attention-deficit/hyperactivity disorder, simple phobias, generalized anxiety disorder, psychosis, major depressive episode, dysthymia, panic disorder, agoraphobia, social phobia, obsessive-compulsive disorder, post-traumatic stress disorder, conduct disorder, and abuse and dependency of alcohol and substances) and subsequently with the inclusion of interactions of the number of personality disorder criteria met with gender and age. A mean total score for the YQOL-R was computed, and, for this study, linearly transformed so that the general quality of life index for each participant ranged from 0 to 100, with a higher score indicating a higher quality of life.

All data were entered and mostly analyzed with the use of IBM SPSS software version 20.0, with Blaker's confidence intervals computed in the R package BlakerCI (The R Foundation for Statistical Computing, Vienna, Austria). Graphical investigations for each disorder were created separately with the use of Microsoft Excel.

### Results

#### Participants

During the study enrollment period, a total of 264 adolescents (59.4% female) were referred to the Nic Waal Institute. The 63 adolescents that did not meet

the inclusion criteria were excluded due to mental retardation ( $N = 15$ , 23.8%), need for immediate hospitalization ( $N = 19$ , 30.2%), inadequate fluency in the Norwegian language ( $N = 6$ , 9.5%), and the absence of the evaluator at the time of referral ( $N = 23$ , 36.5%). This left 201 adolescents eligible for the study. The attrition rate was 23.9% ( $N = 48$ ) due to lack of consent from parents ( $N = 5$ , 10.4%), lack of consent from the adolescent ( $N = 7$ , 14.6%), referral being retracted before the interview ( $N = 6$ , 12.5%), not showing up for the appointment ( $N = 11$ , 22.9%), and consent being retracted during the interview ( $N = 19$ , 39.6%).

A total of 153 adolescents (61.4% female; mean age, 15.6 years; standard deviation, 1.07) were included in the study. There were no missing data for items within the MINI, the SIDP-IV, or the YQOL-R.

Table 1 shows the general distribution of personality disorders in the study population. The total prevalence of personality disorders was 21.6%, with girls having rates more than twice as high as those seen in boys. Eight of the boys and 25 of the girls had at least one personality disorder ( $p = .070$ ). One of the boys and 10 of the girls had more than one personality disorder ( $p = .052$ ). No significant gender differences were found for each of the personality disorders ( $p \geq .082$ ).

Figure 1 shows the relationship between general quality of life and the total number of personality disorder criteria present in our sample for each gender. No substantial deviation from a linear relationship was found. With linear regression analysis, the  $R^2$  was 0.46, the variance inflation factor was 1.07 or less, and no significant age or gender differences were revealed ( $p \geq .12$ ), although there was a statistically significant relationship found with regard to the number of personality disorder criteria met (coefficient =  $-0.48$ ; 95% confidence interval,  $-0.57$  to  $-0.39$ ; partial eta squared, 0.42;  $p < .001$ ). After adjustment for Axis I disorders, the  $R^2$  was 0.50, the variance inflation factor was 1.90 or less, and no significant age or gender differences were revealed ( $p \geq .240$ ), although there was still a significant and similar relationship found with regard to the number of personality disorder criteria met (coefficient =  $-0.43$ ; 95% confidence interval,  $-0.55$  to  $-0.30$ ; partial eta squared, 0.27;  $p < .001$ ). There were no significant interactions between the number of personality disorder criteria met and gender and age ( $p \geq .27$  without and  $p \geq .075$  with adjustment for Axis I disorders).

**TABLE 1.** Prevalence of personality disorders in the sample, with 95% confidence intervals\*

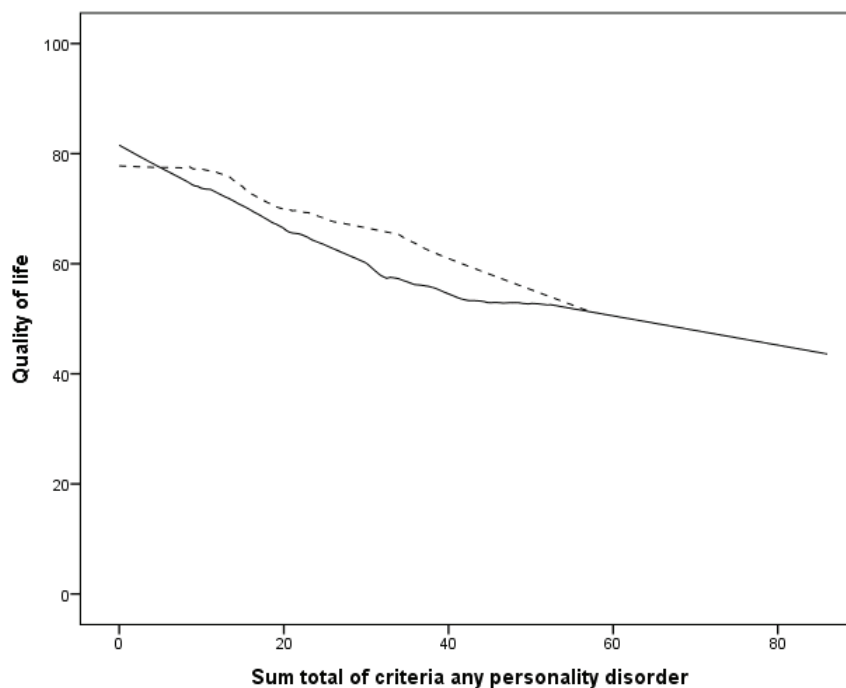
Personality disorder	Boys (N = 59) n (%) (CI*)	Girls (N = 94) n (%) (CI*)	Total (N = 153) n (%) (CI*)	p value <sup>†</sup>
Paranoid	0 (0.0%) (0.0%-6.1%)	0 (0.0%) (0.0%-3.8%)	0 (0.0%) (0.0%-2.3%)	—
Schizoid	1 (1.7%) (0.1%-8.7%)	0 (0.0%) (0.0%-3.8%)	1 (0.7%) (0.0%-3.4%)	0.399
Schizotypal	0 (0.0%) (0.0%-6.1%)	0 (0.0%) (0.0%-3.8%)	0 (0.0%) (0.0%-2.3%)	—
Antisocial	2 (3.4%) (0.6%-11.3%)	3 (3.2%) (0.9%-8.7%)	5 (3.3%) (1.3%-7.3%)	1.000
Borderline	1 (1.7%) (0.1%-8.7%)	7 (7.4%) (3.4%-14.6%)	8 (5.2%) (2.3%-9.9%)	0.153
Histrionic	0 (0.0%) (0.0%-6.1%)	5 (5.3%) (2.1%-11.9%)	5 (3.3%) (1.3%-7.3%)	0.166
Narcissistic	0 (0.0%) (0.0%-6.1%)	1 (1.1%) (0.1%-5.5%)	1 (0.7%) (0.0%-3.4%)	1.000
Avoidant	3 (5.1%) (1.4%-13.9%)	6 (6.4%) (2.8%-13.0%)	9 (5.9%) (3.0%-10.9%)	1.000
Dependent	0 (0.0%) (0.0%-6.1%)	1 (1.1%) (0.1%-5.5%)	1 (0.7%) (0.0%-3.4%)	1.000
Obsessive-compulsive	0 (0.0%) (0.0%-6.1%)	6 (6.4%) (2.8%-13.0%)	6 (3.9%) (1.7%-8.2%)	0.082
Self-defeating	0 (0.0%) (0.0%-6.1%)	0 (0.0%) (0.0%-3.8%)	0 (0.0%) (0.0%-2.3%)	—
Depressive	2 (3.4%) (0.6%-11.3%)	8 (8.5%) (3.8%-15.7%)	10 (6.5%) (3.4%-11.5%)	0.322
Negativistic	0 (0.0%) (0.0%-6.1%)	2 (2.1%) (0.4%-7.1%)	2 (1.3%) (0.2%-4.6%)	0.523
At least one personality disorder	8 (13.6%) (1.3%-7.3%)	25 (26.6%) (6.0%-24.4%)	33 (21.6%) (15.5%-28.6%)	0.070
More than one personality disorder	1 (1.7%) (0.1%-8.7%)	10 (10.6%) (5.5%-18.3%)	11 (7.2%) (3.7%-12.2%)	0.052

CI, Confidence interval

\*Number, prevalence in %, Blaker's 95% confidence intervals

†p value from exact chi-squared tests

**FIGURE 1.** Quality of life among adolescents (N = 153) who meet personality disorder criteria



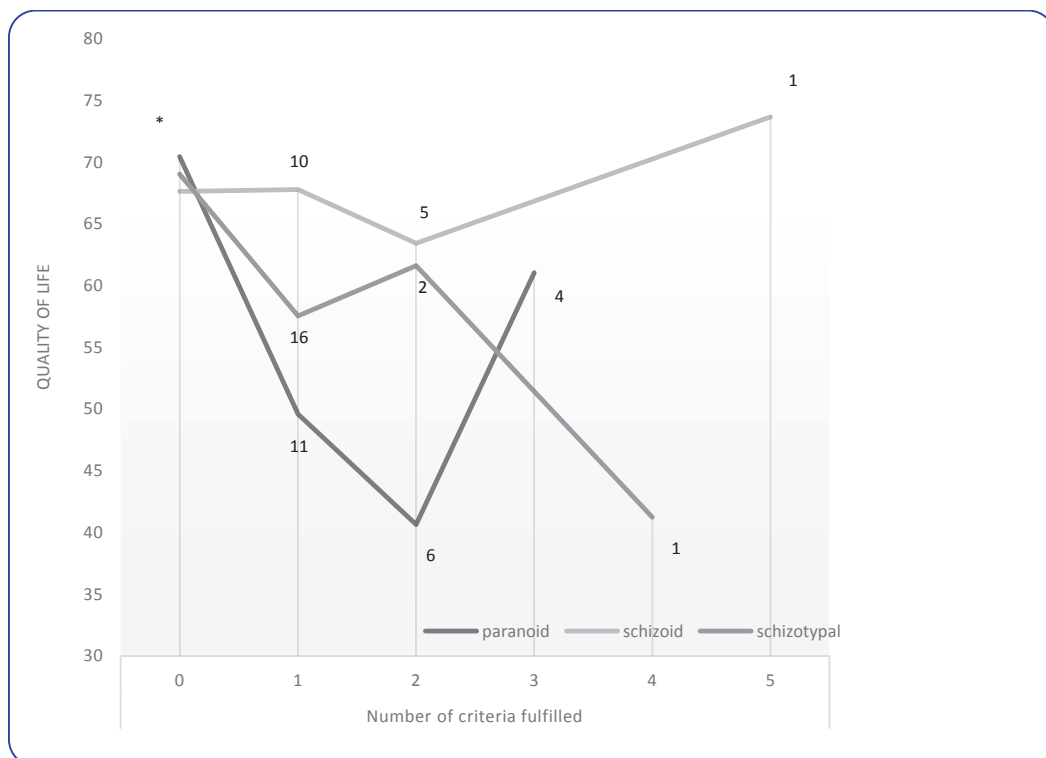
Dotted line, boys (n = 59); solid line, girls (n = 94)



Figures 2 through 5 illustrate quality of life according to the criteria met for eccentric (cluster A: paranoid, schizoid, and schizotypal), dramatic (cluster B: borderline, histrionic, narcissistic, and antisocial), fearful (cluster C: obsessive-compulsive, dependent, and avoidant), and provisional (self-defeating,

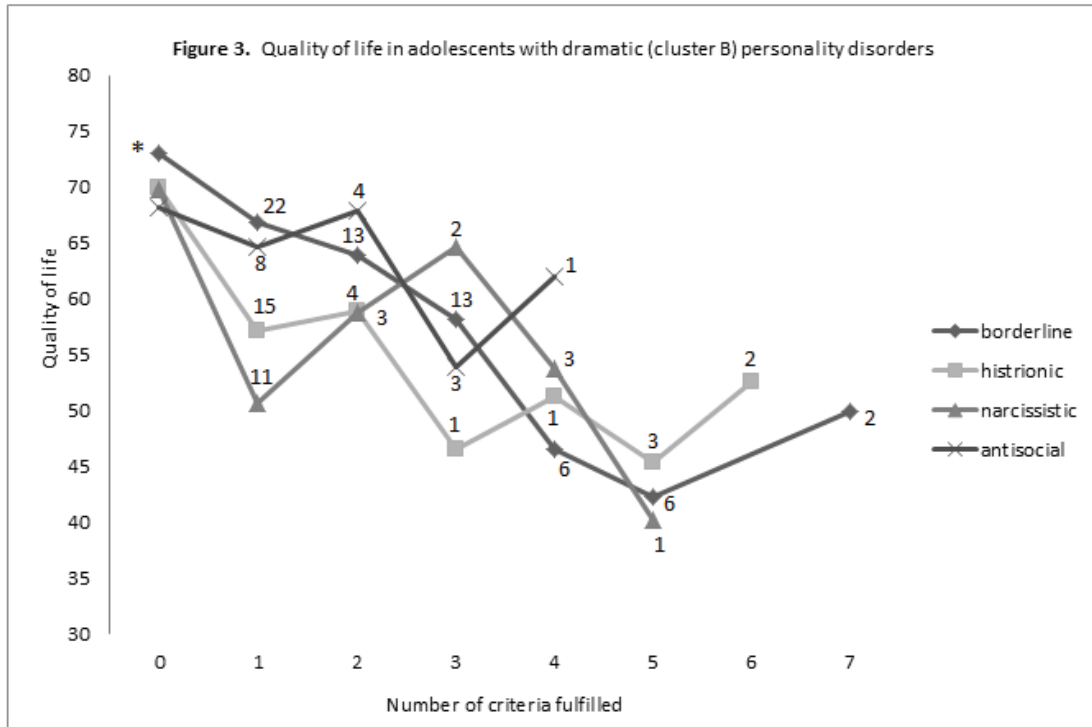
depressive, negativistic) personality disorders. For each separate cluster, there was a tendency toward reduced quality of life with an increasing number of personality disorder criteria met.

**FIGURE 2.** Quality of life among adolescents who meet eccentric (cluster A) personality disorder criteria (N = 39): paranoid (n = 21), schizoid (n = 16), and schizotypal (n = 19)



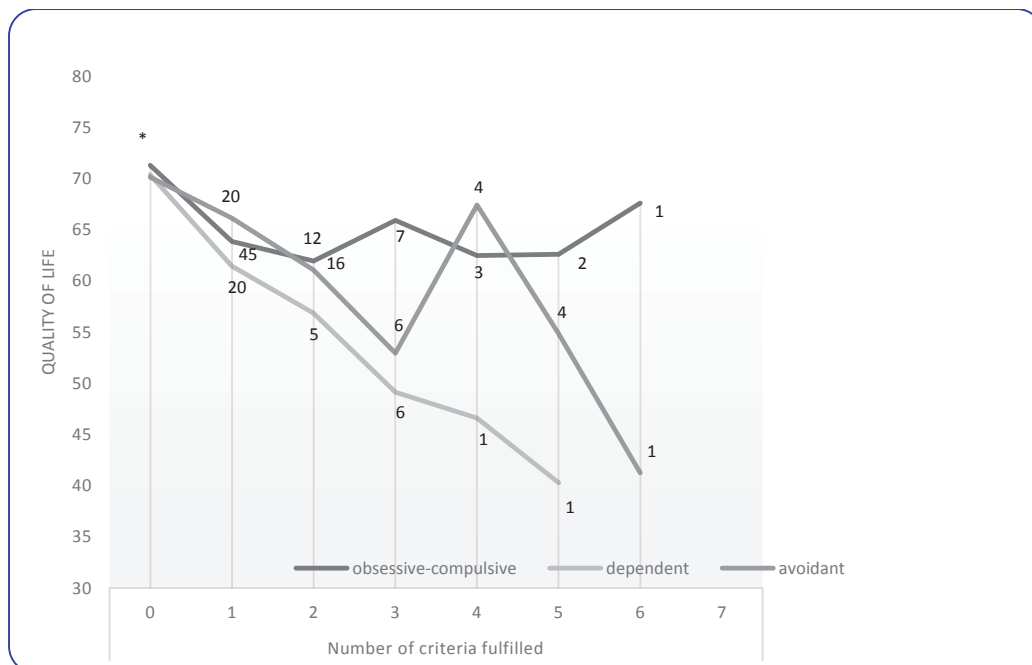
\*Without personality disorder criteria; paranoid (n = 132), schizoid (n = 137), and schizotypal (n = 134), respectively

**FIGURE 3.** Quality of life among adolescents who meet dramatic (cluster B) personality criteria (N = 70): antisocial (n = 17), borderline (n = 62), histrionic (n = 25), and narcissistic (n = 21)



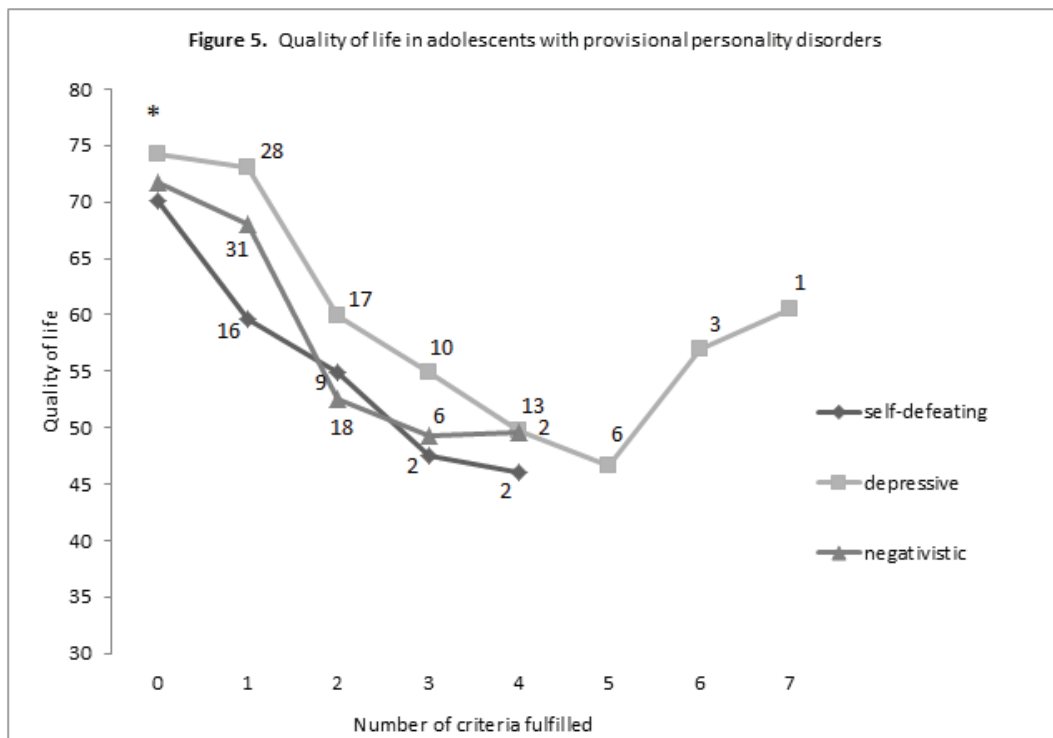
\*Without personality disorder criteria; antisocial (n = 136), borderline (n = 91), histrionic (n = 128), and narcissistic (n = 132), respectively

**FIGURE 4.** Quality of life among adolescents who meet fearful (cluster C) personality disorder criteria (N = 94): avoidant (n = 47), dependent (n = 33), and obsessive-compulsive (n = 74)



\*Without personality disorder criteria; avoidant (n = 106), dependent (n = 120), and obsessive-compulsive (n = 79), respectively

**FIGURE 5.** Quality of life among adolescents who meet provisional personality disorder criteria (N = 107): self-defeating (n = 29), depressive (n = 78), and negativistic (n = 57)



\*Without personality disorder criteria; self-defeating (n = 124), depressive (n = 75), and negativistic (n = 96), respectively

**Discussion**

The total prevalence rate of personality disorders in the study population was 21.6%.

We found a predominance of cluster B and C disorders, which was comparable to corresponding findings from adult mental health clinic outpatients (39).

For the eccentric conditions (cluster A), only schizotypal personality disorder showed an approximately linear relationship between the number of personality disorder criteria met and general quality of life. For the dramatic conditions (cluster B), there was no clear deviation from a linear relationship, especially for borderline personality disorder, which is generally considered the prototypical dramatic personality disorder. It should also be noted that borderline personality disorder was the third most common personality disorder in our sample, surpassed only by depressive and avoidant personality disorder. For the fearful conditions (cluster C), there was a close-to-linear relationship for dependent personality disorder.

The prevalence in our study was higher than that previously reported for community samples and lower than that previously reported for clinical

samples (6). The participants in the present study were unselected adolescent outpatients from the general population in a defined catchment area who had been referred to a non-specialized mental health outpatient clinic. However, previous studies have reported on samples that have a different composition from that of the present study. In community samples and primary care settings, the prevalence numbers for adolescents have ranged from 6% to 17% (41). In samples composed of treatment-refractory adolescents admitted for specialized treatment (42), inpatients (4), and participants in the juvenile justice system (43-45), the prevalence numbers have ranged from 41% to 88%. Thus, the participants in the present study had a higher prevalence of personality disorder symptoms than has been found in studies of community samples and primary care patients but a lower prevalence than that seen in participants in studies of more severely ill patients.

As recently reviewed by Kongerslev and colleagues (6), the peak prevalence for personality disorders is reported to occur during early and middle adolescence. Studies that have focused on late adolescence have reported lower prevalence (6,41).

In our study, the participants were mainly in mid to late adolescence.

The main finding was a relationship between the number of personality disorder criteria met and reduced quality of life, with no significant age or gender differences for each of the personality disorders. Our findings indicate that reduced quality of life accompanies personality disorders in adolescents in much the same way as it does in adults (26). The limited amount of data restricts the more sophisticated analysis of gender differences and personality disorder clusters.

Adjustment for the presence of Axis I diagnoses did not appreciably change the relationship between the total number of personality disorder criteria met and quality of life.

### *Strengths and Limitations*

Each patient was diagnosed individually with a semi-structured interview. The present study enrolled a clinical population (i.e., adolescents who were referred to a mental health outpatient clinic). Of the 201 adolescents eligible for inclusion, 153 were ultimately included. This yields a total attrition rate of 23.9% (N = 48), which is a limitation of this study.

The cross-sectional nature of the study makes it difficult to infer causal relationships. The participants were included during a limited amount of time, and we do not know if there were prevalence fluctuations over time.

The study was performed at a single mental health outpatient clinic that served patients from a defined urban catchment area. Although the catchment area included a varied socioeconomic and ethnic population, we do not know if the results can be generalized to other populations in other city districts, more rural parts of the country, or other countries or cultures.

A further possible limitation is the use of a single evaluator. The evaluator was trained by an experienced evaluator who had also researched personality disorders, and the two of them discussed their ratings. This may have been a threat to the external validity of the diagnoses.

### **Clinical Significance**

There is an increasing focus on the benefits of the early detection and treatment of personality disorders in adolescents. Diagnosing personality disorders in adolescents could facilitate the earlier implementation of adequately tailored treatment interventions and, most likely, more favorable long-term prognoses (19).

The present study shows that quality of life in adolescents is affected by the number of personality disorder criteria met in much the same way as in adults (26). This further emphasizes the clinical

importance of including personality disorders and quality of life assessment in the general diagnostic procedures used to treat adolescents.

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### Disclosure of Interest

The authors report no conflicts of interest. The authors alone are responsible for the content and writing of this article.







RESEARCH ARTICLE

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# Personality disorders and Axis I comorbidity in adolescent outpatients with ADHD



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## Abstract

**Background:** Attention deficit hyperactivity disorder (ADHD) is a lifelong condition which carries great cost to society and has an extensive comorbidity. It has been assumed that ADHD is 2 to 5 times more frequent in boys than in girls. Several studies have suggested developmental trajectories that link ADHD and certain personality disorders. The present study investigated the prevalence of ADHD, common Axis I disorders, and their gender differences in a sample of adolescent outpatients. We also wanted to investigate the relationship between ADHD and personality disorders (PDs), as well as how this relationship was influenced by adjustment for Axis I disorders, age and gender.

**Methods:** We used a sample consisting of 153 adolescents, aged 14 to 17 years, who were referred to a non-specialized mental health outpatient clinic with a defined catchment area. ADHD, conduct disorder (CD) and other Axis I conditions were assessed using the Mini International Neuropsychiatric Interview (MINI). PDs were assessed using the Structured Interview for DSM-IV Personality (SIDP-IV).

**Results:** 13.7 % of the adolescents met diagnostic criteria for ADHD, with no significant gender difference. 21.6 % had at least one PD, 17.6 % had CD, and 4.6 % had both ADHD and a PD. There was a significantly elevated number of PD symptoms in adolescents with an ADHD diagnosis ( $p = 0.001$ ), and this relationship was not significantly weakened when adjusted for age, gender and other Axis I disorders ( $p = 0.026$ ). Antisocial ( $\chi^2 = 21.18, p = 0.002$ ) and borderline ( $\chi^2 = 6.15, p = 0.042$ ) PDs were significantly more frequent in girls than in boys with ADHD.

**Conclusions:** We found no significant gender difference in the prevalence of ADHD in a sample of adolescents referred to a general mental health outpatient clinic. Adolescent girls with ADHD had more PDs than boys, with antisocial and borderline PDs significantly different. The present study suggests that ADHD in girls in a general outpatient population may be more prevalent than previously assumed. It especially highlights the importance of assessing antisocial and borderline personality pathology in adolescent girls presenting with ADHD symptoms.

**Keywords:** ADHD, Axis I, Comorbidity, Conduct disorder, Personality disorder, Adolescent, Outpatient

## Background

### ADHD and personality disorders

Attention deficit hyperactivity disorder (ADHD) is a common and often lifelong condition which carries great cost to society and has an extensive psychiatric comorbidity [1–4]. It manifests during early childhood, previous to other Axis I diagnoses, and is associated with a broad range of other health-related

issues, such as impulsive behaviors, greater number of traumas, lower quality of life, reduced social functioning, and homelessness, even after adjusting for additional comorbidity [5, 6].

The worldwide prevalence of ADHD has been estimated at about 3–5 % [7, 8], but one study reported a prevalence of 8.5 % [9]. ADHD may be more prevalent than previously assumed [10]. A recent study suggested that the prevalence of ADHD may be increasing, but this could also be due to increased clinical alertness and improved diagnostic procedures [11].

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ADHD is generally considered to be more prevalent in boys than in girls, with male/female ratio estimates ranging from 2:1 to 9:1 [8, 12]. However, ADHD may be experienced by larger numbers of females than has previously been considered [10].

ADHD has been associated with anxiety, mood, and disruptive behavioral disorders [9]. In a sample of twins and siblings no significant gender differences in comorbidity for externalizing disorders were found [13]. In a five-year follow-up study of a cohort of children with ADHD, 68.9 % continued to meet full criteria for ADHD, exhibiting high levels of antisocial behavior, criminal activity and substance use problems [14].

In DSM-IV and DSM-5, personality disorder (PD) categories may be applied to adolescents when the individual's particular maladaptive personality traits are pervasive, persistent, and unlikely to be limited to a particular developmental state or an episode of an Axis I disorder. With the exception of antisocial PD (ASPD), any PD can be diagnosed in a person under 18 years of age if the diagnostic features have been present for at least 1 year [15, 16]. However, in studies on PDs in adolescence, the DSM-IV age criterion for ASPD is waived [17–19].

PDs are common, with adult prevalence numbers of 10–15 % in the general population [20], up to 40 % in outpatient samples, and up to 71 % in inpatient samples [21]. In adolescents, prevalences range from 6 to 17 % in community samples, and in clinical samples from 41 to 64 % [18, 19].

Research supports the assumption that PD symptoms emerge at an early age and are related to health-risk behaviors in adolescence as well as young adulthood [22–24], but PDs may have a better prognosis than previously assumed. Maladaptive personality traits may change in severity or expression over time; still they often lead to persistent functional impairment and reduced quality of life even if the diagnostic threshold for a specific PD is no longer reached [25, 26].

Borderline PD (BPD) has a lifetime prevalence of 2.7 % in the general population; it seems to be equally prevalent among men and women [27]. Diagnosing BPD in young persons can be challenging [28], but there is an increasing awareness of predisposing factors and adolescent presentation of BPD [29–33]. Recent work has demonstrated that BPD is as reliable and valid in adolescents as in adults [32, 34, 35]. One study suggested that late-latency children are about half as likely as adults to meet DSM-IV criteria for BPD [36].

Few studies have reported on gender differences [18] and gender might not play a defining role in symptom expression [36].

#### ADHD, PDs, and Axis I comorbidity

The question has been posed if ADHD can be considered an early stage in the development of BPD. A comprehensive literature review found data that provide a basis for the hypotheses that ADHD is either an early developmental stage of BPD, or that the two disorders share an environmental and genetic aetiology [37].

Adults with severe BPD frequently show a history of childhood ADHD symptoms. Persisting ADHD correlates with the frequency of co-occurring Axis I and PDs [38–41]; for example, the presence of ADHD tends to make BPD more disruptive [42]. A study of treatment refractory adolescents and young adults found unrecognized ADHD in 6 % of the patients [43].

In prisoners childhood and adult ADHD symptoms were found to be positively correlated with BPD and negatively correlated with compulsive personality pathology. Axis I disorders were not significantly related to childhood ADHD [44]. A study on probationers with BPD reported substantially more symptoms of ADHD, anxiety and depression compared to subjects without BPD [45].

Several studies have suggested developmental trajectories that link ADHD, bipolar disorder and certain PDs, especially BPD. The exact nature of these aetiological links is not known [41, 46], but mood lability has been suggested as a common denominator [47].

Speranza and colleagues found comorbid ADHD to influence the clinical presentation of adolescents with BPD, and that comorbid ADHD was associated with higher rates of disruptive disorders, with a trend towards a greater likelihood of cluster B PDs and with higher levels of impulsivity, especially of the attentional/cognitive type [42]. Prada and colleagues found that ADHD and BPD-ADHD patients show a higher level of impulsivity than BPD and control subjects [48].

Individuals diagnosed with childhood ADHD were found to be at increased risk for PDs in late adolescence, specifically borderline (OR = 13.16), antisocial (OR = 3.03), avoidant (OR = 9.77), and narcissistic (OR = 8.69) PDs. Those with persistent ADHD were at higher risk for antisocial (OR = 5.26) and paranoid (OR = 8.47) PDs but not the other PDs, when compared to those in whom ADHD remitted. These results suggest that ADHD portends risk for adult PDs, but that the risk is neither uniform across disorders, nor uniformly related to child or adult diagnostic status [49].

Females with ADHD and BPD seem to share more clinical features than males [50, 51]; in adult outpatients a significant association between retrospectively assessed ADHD symptoms and current BPD features was found only in the female subsample [52].

## Aims

The objective of the present study, performed on a clinical sample of consecutively referred adolescent outpatients, was to

1. Investigate the prevalence of ADHD and common Axis I disorders, including possible gender differences.
2. Investigate the relationship between ADHD and PDs. We also wanted to assess the influence of adjusting for Axis I disorders, age and gender on the relationship between ADHD and PDs.

## Methods

### Participants

The sample consisted of adolescents aged 14–17 years who were referred to a mental health outpatient clinic for children and adolescents in Oslo (The Nic Waal Institute, Lovisenberg Diakonale Hospital). The Nic Waal Institute is serving four city districts with a population of mixed socioeconomic status, representing all social classes including immigrant workers and well-educated middle and upper class families. The catchment area comprises a total population of 25, 000 children and adolescents from 0 to 17 years of age.

Study inclusion took place from February 2005 to April 2007. Exclusion criteria were the need for immediate hospitalization or other urgent therapeutic measures, clinically assessed mental retardation, lack of fluency in the Norwegian language, and absence of the evaluator at the time of referral.

### Measures

#### ADHD

A primary screening for ADHD was performed using the six-item Adult ADHD Self-Report Scale Screener version 1.1 (ASRS Screener) in a Norwegian translation [53]. The ASRS Screener is derived from the 18-item ASRS 1.1 Symptom Checklist [54] and is designed to screen for and estimate the prevalence of ADHD in community samples, as well as in population surveys and at an individual level. The measure is reliable and valid in clinical settings [55] and has repeatedly been shown to be in strong concordance with clinician diagnoses [56].

If the primary screening with the ASRS Screener was positive, the Mini International Neuropsychiatric Interview-PLUS (MINI-PLUS) section W (ADHD in children/adolescents) was used as a diagnostic test instrument [57] for a final diagnosis of ADHD.

#### Axis I disorders

The Mini International Neuropsychiatric Interview version 5.0.0 (MINI) in a Norwegian translation was used for assessing Axis I disorders [57, 58].

### Personality disorders

The Structured Interview for DSM-IV (SIDP-IV) [59] in a Norwegian version was used to assess PDs. The SIDP-IV is a comprehensive semi-structured diagnostic interview for DSM-IV PD (Axis II) diagnoses. The SIDP-IV has been used in numerous studies in different countries, including Norway [60–62]. The SIDP-IV covers 14 DSM-IV Axis II diagnoses as well as CD as a separate axis I disorder. The Axis II diagnoses comprise the 10 standard DSM-IV PDs (paranoid, schizoid, schizotypal, borderline, histrionic, narcissistic, antisocial, obsessive-compulsive, dependent, and avoidant PD), the 3 provisional DSM-IV PDs (self-defeating, depressive, and negativistic PD), and mixed PD.

All questions address the typical or habitual behaviour of the subjects during the last 5 years. Each diagnostic criterion is rated on a four point scale: “0” = criterion not present; “1” = subthreshold level of the trait present; “2” = criterion being present for most of the last 5 years; and “3” = criterion strongly present. Scores “2” and “3” indicate the presence of a criterion according to DSM-IV [59].

In accordance with diagnostic practice applied in other studies on PDs in adolescence, the DSM-IV age criterion for ASPD was waived [17]. Due to the participants’ age, we also waived the 5 year symptom duration criterion. Instead we decided to use 2 years symptom duration as criterion. This is in accordance with the criterion used in previous studies assessing adolescent personality pathology [17, 18].

### Procedures and assessment

The first author assessed all participants. The parents or other legal guardians were not involved in the assessment process. The evaluator, male M.D., with 21 years of clinical experience, was specialist in psychiatry and child and adolescent psychiatry. He was trained in evaluation with SIDP-IV by the second author, who was an experienced rater, who had previously evaluated patients and reported from comparable studies [62, 63]. Twenty ratings were discussed and found to be in accordance with the rating of the experienced evaluator. ADHD and other Axis I conditions were also assessed by the same evaluator, who had been trained by the translator of the Norwegian version of the MINI.

After completion of the initial assessment, the patients were assigned to further clinical evaluation and treatment by clinicians other than the evaluator in the outpatient clinic.

### Statistical analysis

Descriptive statistics were calculated for the relevant mental health status variables and expressed in mean (SD) and frequency (%) as appropriate. Prevalences of ADHD, other Axis I conditions and PDs with 95 % Blaker confidence

intervals [64] were estimated for the total sample and for each gender separately, with testing for gender differences by exact chi square tests. The total number of ADHD criteria and PD criteria was investigated graphically by locally weighted smoothing (lowess) curves. The relationship of PD with ADHD symptoms, unadjusted and adjusted for gender was investigated by logistic regression.

Adjustment for age and Axis I disorders was not performed due to the low number of degrees of freedom available. However, the relationship of the number of PD symptoms with ADHD symptoms, unadjusted and adjusted for gender, age and important Axis I disorders (simple phobias, generalized anxiety disorder, psychosis, major depressive episode, dysthymia, panic disorder, agoraphobia, social phobia, obsessive-compulsive disorder, post-traumatic stress disorder, CD, and abuse and dependency of alcohol and substances) was investigated by linear regressions wherein multicollinearity was checked by variance inflation factor (VIF), preferably below 5–10 for all covariates. Differences in unadjusted and adjusted odds ratios and regression coefficients were, when necessary, investigated by a bootstrap BC<sub>a</sub> 95 % confidence intervals based on 10 000 bootstrap replicates [65], with a difference considered as significant if 0 was outside the interval.

Data were analysed using the IBM SPSS version 20.0 software, with Blaker confidence intervals computed in the R (The R Foundation for Statistical Computing,

Vienna, Austria) package BlakerCI and bootstrapping in the R package boot. Graphical investigations also used R.

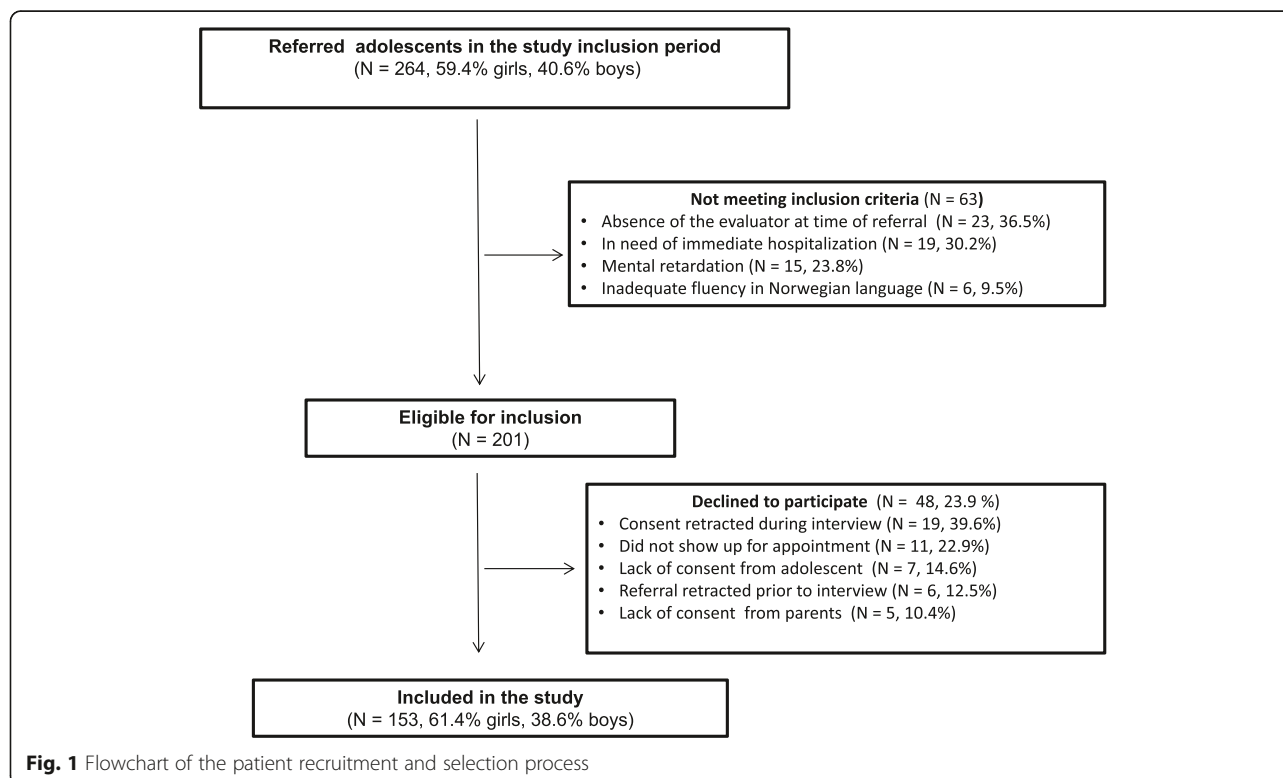
## Results

A total of 153 adolescents; mean age 16.0 years (SD = 1.1, minimum age 14.1 years, maximum age 18.0 years), 61.4 % ( $N = 94$ ) girls were included in the study. There were no missing data on MINI and SIDP-IV. The flowchart in Fig. 1 illustrates the inclusion process and attrition.

Of the participants, 32.7 % ( $N = 50$ ) initially screened positive for ADHD using the ASRS Screener. When using the MINI-PLUS as a diagnostic instrument, 13.7 % ( $N = 21$ , 95 % CI 8.9–20.1 %) of the adolescents fulfilled all diagnostic criteria for ADHD according to DSM-IV, with no significant gender difference in prevalence (Table 1).

When analysed separately for hyperactivity/impulsiveness and inattention symptoms in each gender, girls had slightly higher overall symptom scores than boys, but the difference was not significant (hyperactivity;  $\chi^2 = 0.18$ ,  $p = 0.786$ , inattention  $\chi^2 = 0.45$ ,  $p = 0.668$ ). The male/female ratio was 1.19 (95 % CI = 1.12–1.30). The distribution of hyperactivity/impulsiveness and inattention symptoms in different Axis I conditions can be seen in Fig. 2.

More than two thirds (68.6 %,  $N = 105$ ) of the adolescents met the criteria for at least one Axis I disorder (76.6 %,  $N = 72$  girls; 56.0 %,  $N = 33$  boys). There were 16 boys (27.1 %) and 40 girls (42.6 %) with more than one



**Table 1** Prevalence of ADHD (N = 153)

ADHD	Boys (N = 59) N (%) (CI <sup>a</sup> )	Girls (N = 94) N (%) (CI <sup>a</sup> )	Total (N = 153) N (%) (CI <sup>a</sup> )	p-value *
Without ADHD	50 (84.7 %) (73.2–92.0 %)	82 (87.2 %) (79.0–92.9 %)	132 (86.3 %) (79.9–91.0 %)	–
With ADHD	9 (15.3 %) (7.9–26.8 %)	12 (12.8 %) (7.1–21.0 %)	21 (13.7 %) (8.9–20.1 %)	0.810

<sup>a</sup> Blaker 95 % confidence intervals  
\* p-value from exact chi square test

Axis I disorder apart from ADHD ( $p = 0.060$ ). Anxiety disorders; simple phobias, generalized anxiety disorder, panic disorder, agoraphobia, social phobia and post-traumatic stress disorder (33.3 %,  $N = 51$ , 95 % CI 26.0–41.1 %) and mood disorders; dysthymia and major depressive episode (32.7 %,  $N = 50$ , 95 % CI 25.3–40.5 %) were most frequent, followed by substance-related disorders; alcohol and drug abuse or dependence (18.3 %,  $N = 28$ , 95 % CI 12.6–25.3 %), CD (17.6 %,  $N = 27$ , 95 % CI 12.2–24.4 %), obsessive-compulsive disorder (9.2 %,  $N = 14$ , 95 % CI 5.3–14.8 %) and psychotic disorders (1.3 %,  $N = 2$ , 95 % CI 0.2–4.6 %). There were significant gender differences in anxiety ( $p = 0.022$ ) and mood ( $p = 0.033$ ) disorders. There were no bipolar, anorectic or bulimic patients in the sample (Table 2).

Of the adolescents, 21.6 % ( $N = 33$ ) had at least one PD, 7.2 % ( $N = 11$ ) had more than one PD, and 4.6 % ( $N = 7$ ) had both ADHD and a PD. The prevalence of PDs was generally higher in the referred girls. As shown in Table 3, no significant relationships between ADHD and specific PDs could be ascertained for boys. For girls, however,

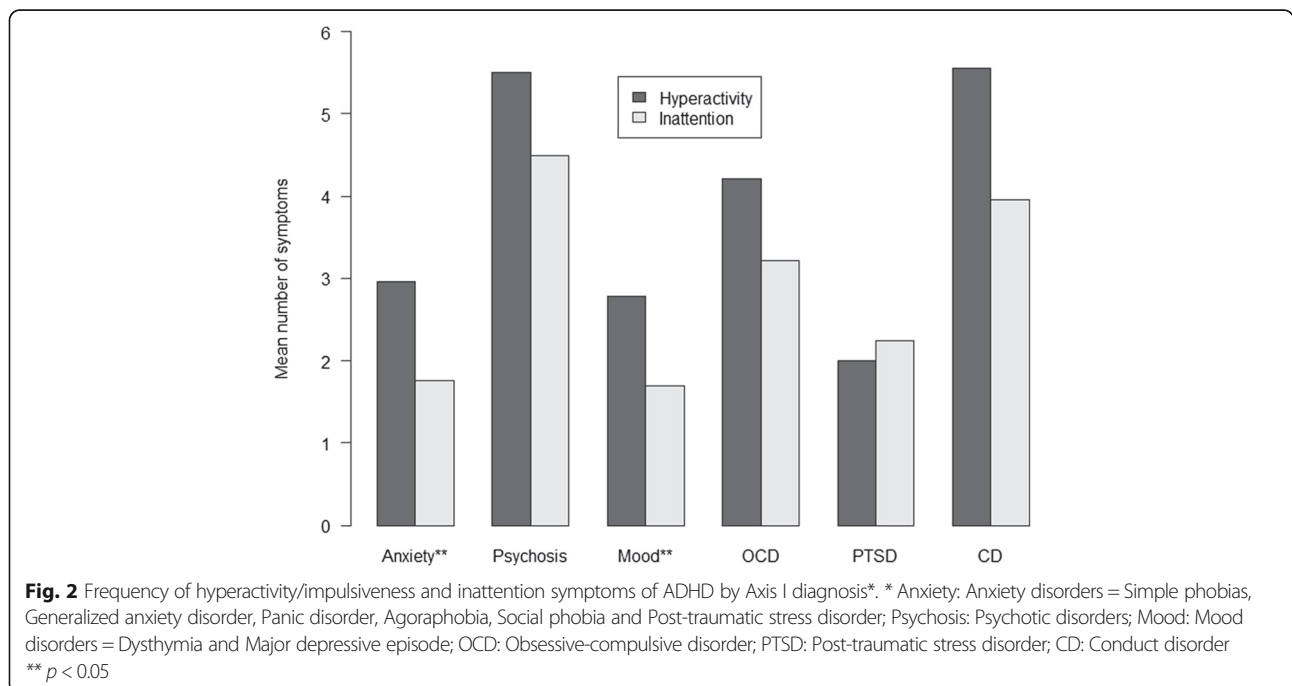
there were significant relationships between ADHD and ASPD ( $p = 0.002$ ) and BPD ( $p = 0.042$ ), as well as between ADHD and CD ( $p = 0.003$ ). Only 3.4 % ( $N = 2$ ) of boys and 3.2 % ( $N = 3$ ) of girls, all with ADHD, matched the criteria for ASPD. There was no significant relationship with any other PDs (Table 3).

An illustration of the relationship between ADHD symptoms and relevant Axis I conditions and PDs is shown in Fig. 3. There were significant gender differences for BPD ( $p = 0.032$ ), depressive PD ( $p = 0.020$ ), anxiety disorders ( $p = 0.022$ ), and mood disorders ( $p = 0.033$ ). ASPD ( $p = 0.409$ ), avoidant PD ( $p = 0.487$ ), substance use disorders ( $p = 0.831$ ), and CD ( $p = 0.585$ ) did not yield significant gender differences.

There was no significant relationship between ADHD diagnosis and at least one PD, neither in unadjusted analysis (OR = 2.0, 95 % CI 0.7–5.6,  $p = 0.164$ ) nor when adjusted for gender (OR = 2.2, 95 % CI 0.8–6.1,  $p = 0.138$ ). No bootstrap procedure was considered necessary since these confidence intervals overlapped almost completely. Also, in unadjusted analysis the number of PD criteria was significantly higher (15.7, 95 % CI 6.3–25.1,  $p = 0.001$ ) when ADHD diagnosis was present. In analysis adjusted for gender, age and Axis I disorders the corresponding estimate was 9.6, 95 % CI 1.2–18.0,  $p = 0.026$ . There was no significant difference between the unadjusted and adjusted estimate (95 % CI –0.52–13.43).

**Discussion**

In the present study the prevalence of ADHD, common Axis I disorders, and gender differences were investigated





**Table 2** Prevalence of Axis I disorders ( $N = 153$ )

Axis I disorders <sup>b</sup>	Boys ( $N = 59$ )		Girls ( $N = 94$ )		Total ( $N = 153$ )		$p$ -value *
	N (%) (CI <sup>a</sup> )		N (%) (CI <sup>a</sup> )		N (%) (CI <sup>a</sup> )		
Anxiety	13 (22.0 %) (13.0–34.5 %)		38 (40.4 %) (30.7–50.7 %)		51 (33.3 %) (26.0–41.1 %)		0.022
Mood	13 (22.0 %) (13.0–34.5 %)		37 (39.4 %) (29.6–49.6)		50 (32.7 %) (25.3–40.5 %)		0.033
Psychosis	0 (0.0 %) (0.0–6.0 %)		2 (2.1 %) (0.4–7.1 %)		2 (1.3 %) (0.2–4.6 %)		0.523
OCD	4 (6.8 %) (2.3–16.4 %)		10 (10.6 %) (5.5–18.3 %)		14 (9.2 %) (5.3–14.8 %)		0.568
SUD	10 (16.9 %) (8.7–28.5 %)		18 (19.1 %) (11.9–28.5 %)		28 (18.3 %) (12.6–25.3 %)		0.831
CD	12 (20.3 %) (11.3–32.8 %)		15 (16.0 %) (9.5–24.8 %)		27 (17.6 %) (12.2–24.4 %)		0.519

<sup>a</sup>Blaker 95 % confidence intervals

<sup>b</sup>Axis I disorders: Anxiety = Anxiety disorders: Simple phobias, Generalized anxiety disorder, Panic disorder, Agoraphobia, Social phobia and Post-traumatic stress disorder. Mood = Mood disorders: Dysthymia and Major depressive episode. OCD Obsessive-compulsive disorder, SUD Substance-related disorders: Alcohol and drug abuse or dependence, CD Conduct disorder

\* $p$ -value from exact chi square test

in an unselected sample of adolescents. The participants were all referred to a non-specialized mental health outpatient clinic with a defined catchment area. We also investigated the relationship between ADHD and PD symptoms, as well as how this relationship was influenced by adjustment for Axis I disorders, age and gender.

We found that 13.7 % of the adolescents met the diagnostic criteria for ADHD. This was in accordance with previous findings, where studies of non-referred adolescents have found prevalence rates of 8.5 % [9], and prevalence rates in clinical samples are ranging from 11 to 16 % [39, 42]. When applying less strict diagnostic criteria than a definite DSM-IV diagnosis, prevalence rates in clinical samples of more than 30 % have been reported [43]. A similar discrepancy between screening

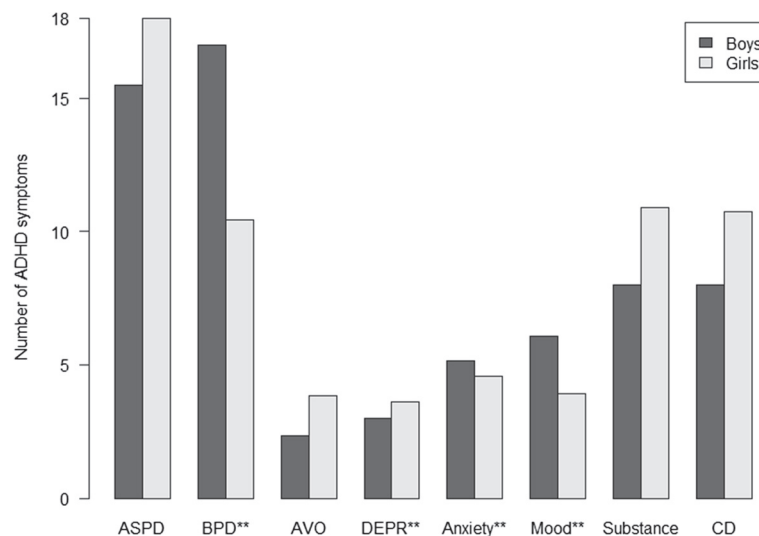
and adherence to strict diagnostic criteria was found in the present study, in which 32.7 % of the adolescents screened positively for ADHD when using the ASRS Screener.

Earlier studies of ADHD have reported considerable prevalence differences between boys and girls [7, 8, 12]. In our material, however, there was no significant ADHD prevalence difference between the male and female adolescents. There was also no significant prevalence difference between genders when we analyzed hyperactivity/impulsiveness and inattention symptoms separately. This probably reflects that our sample was not preselected due to symptom severity or type, but the discrepancy is still considerable compared to the commonly assumed male/female ratio of 5:1 [12].

**Table 3** Prevalence of specific personality disorders and conduct disorder in adolescents with ADHD ( $N = 153$ )

Personality Disorder (PD)	Boys with ADHD ( $N = 9$ )	Boys without ADHD ( $N = 50$ )	$\chi^2$	$p$ -value*	Girls with ADHD ( $N = 12$ )	Girls without ADHD ( $N = 82$ )	$\chi^2$	$p$ -value*
Paranoid	0	0	–	–	0	0	–	–
Schizoid	0	1	0.183	1.000	0	0	–	–
Schizotypal	0	0	–	–	0	0	–	–
Antisocial	1	1	–	–	3	0	21.176	0.002
Borderline	1	0	1.933	0.284	3	4	6.150	0.042
Histrionic	0	0	5.651	0.153	2	3	3.517	0.121
Narcissistic	0	0	–	–	0	1	0.148	1.000
Avoidant	0	3	0.569	1.000	0	6	0.938	0.598
Dependent	0	0	–	–	0	1	0.148	1.000
Obsessive-compulsive	0	0	–	–	0	6	0.938	0.598
Self-defeating	0	0	–	–	0	0	–	–
Depressive	0	2	0.373	1.000	0	8	1.280	0.383
Negativistic	0	0	–	–	1	1	2.544	0.240
At least one PD	1	7	0.054	1.000	6	19	3.860	0.076
More than one PD	1	0	5.651	0.153	2	8	0.526	0.611
Conduct disorder	3	8	1.107	0.369	6	8	11.887	0.003

\* $p$ -values from exact chi square tests



**Fig. 3** ADHD symptoms in adolescents with Axis I and personality disorders\*. \* ASPD = Antisocial personality disorder. BPD = Borderline personality disorder. AVO = Avoidant personality disorder. DEPR = Depressive personality disorder. Anxiety = Anxiety disorders; Simple phobias, Generalized anxiety disorder, Panic disorder, Agoraphobia, Social phobia and Post-traumatic stress disorder. Mood = Mood disorders; Dysthymia and Major depressive episode. Substance = Substance-related disorders; Alcohol and drug abuse and/or dependence. CD = Conduct disorder \*\* $p < 0.05$

More than two thirds of the adolescents met the criteria for at least one Axis I disorder, with anxiety and mood disorders being most frequent. There were significant Axis I gender differences only in anxiety ( $p = 0.022$ ) and mood ( $p = 0.033$ ) disorders, with girls having the highest prevalence.

Previous studies have reported that the presence of a comorbid ADHD diagnosis influences the clinical presentation of BPD in adolescents [42]. The total prevalence of PDs in our material was 21.6 %, which was higher than previously reported from adolescent community samples and primary care settings [66], but lower than reported from selected, difficult-to-treat adolescent clinical and juvenile justice samples [18, 19, 67–70]. We found higher PD prevalences for girls, with ASPD and BPD reaching significant levels. All girls with ASPD also matched the diagnostic criteria for ADHD. This seems to be in accordance with studies of adults, where females with ADHD and BPD shared more clinical features than males [50, 51], and adult outpatients had a significant association between ADHD and BPD symptoms only in the female subsample [52].

Girls with ADHD were more severely ill than boys, with more Axis I and PD diagnoses. This may in part be explained by a selection bias due to only the most severely affected girls being referred to a mental health outpatient clinic. Also, in general clinical practice there may be more focus on assessing and diagnosing adolescent boys than girls presenting with ADHD symptoms, which suggests the possibility of an underestimation of the prevalence of ADHD in adolescent girls. One might speculate that boys are diagnosed with ADHD at a younger age, and that

adolescent girls' ADHD symptoms may be camouflaged by their PD symptoms.

The limited data size did not permit us to investigate the relationship between ADHD and single PDs. We did, however, find a significantly elevated number of PD symptoms in adolescents with an ADHD diagnosis ( $p = 0.001$ ). When adjusted for age, gender and other Axis I disorders, this relationship was still significant ( $p = 0.026$ ). Hence, the present study suggests that by using reliability-tested diagnostic interviews like the SIDP-IV, it is feasible to assess PDs in adolescents with ADHD, also in the presence of one or more comorbid Axis I disorders.

#### Strengths and limitations

The study was performed at a single general service mental health outpatient clinic, receiving adolescents from a geographically defined urban area of varied socioeconomic and ethnic population. However, the results from the present study may not be generalizable to other populations. The attrition (23.9 %,  $N = 48$ ) and the relatively small sample size constitute limitations. In particular, a limited number of degrees of freedom prevented the inclusion and investigation of interactions of potentially important adjustment variables like ADHD subtype. The participants were included in a limited time span, and we do not know if there were prevalence fluctuations over time.

The gender distribution of our sample was close to identical to the gender distribution of all referred adolescents in the study inclusion period, and reflects the fact that more adolescent girls than boys are referred to Norwegian mental health outpatient clinics.



Each patient was diagnosed individually with well-documented semi-structured interviews by a single, experienced clinician and rater. The MINI-PLUS, which utilizes the DSM-IV diagnostic criteria in a strict manner, was used for diagnosing ADHD. This was considered advantageous, as we did not want to overestimate the prevalence. The evaluator was trained in rating with SIDP-IV and MINI by experienced evaluators and researchers on PD and Axis I diagnoses. Still, the use of a single evaluator constitutes a possible limitation. This may have strengthened the internal validity, but might have been a threat to the external validity of the diagnoses.

## Conclusions

ADHD is an often lifelong condition with an extensive psychiatric comorbidity [2, 3].

It has been assumed that ADHD is 2 to 5 times more frequent in boys than in girls [7, 8]. We did, however, not find a significant gender difference with regard to the prevalence of ADHD in a typical sample of adolescents referred to a non-specialized mental health outpatient clinic. There was a significantly elevated number of PD symptoms in adolescents with an ADHD diagnosis, and this relationship did not significantly weaken when adjusted for age, gender and other Axis I disorders.

Girls with ADHD were more severely ill than boys with ADHD; we found higher PD prevalences for girls, with significant differences for ASPD and BPD. All girls with ASPD met the diagnostic criteria for ADHD.

The present study suggests that ADHD in girls in a general outpatient population may be more prevalent than previously assumed. It especially highlights the importance of assessing antisocial and borderline personality pathology in adolescent girls presenting with ADHD symptoms.

## Abbreviations

ADHD: attention deficit hyperactivity disorder; ASPD: antisocial personality disorder; BPD: borderline personality disorder; CD: conduct disorder; ODD: oppositional defiant disorder; PD: personality disorder.

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## Availability of data and materials

The data set supporting the results of this article is available upon request from the first author, Hans Ole Korsgaard.

## Authors' contributions

All authors have contributed to the background, design, and drafting of the manuscript. HOK did all the assessment work. HOK, TWL and RU performed the statistical analysis. All authors have read and approved the final manuscript.

## Competing interests

The authors declare that they have no financial or non-financial competing interests.

## Consent for publication

The ethical approval and consent to participate included consent for publication.

## Ethics approval and consent to participate

The study was approved by the Regional Committee for Medical Research Ethics for Eastern Norway (REK: 11395) and by The Norwegian Data Inspectorate. Informed written consent was obtained from all patients, and for patients younger than 16 years written consent was additionally obtained from their parents or other legal guardians.

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RESEARCH ARTICLE

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# Substance abuse and personality disorder comorbidity in adolescent outpatients: are girls more severely ill than boys?

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## Abstract

**Background:** Substance use disorders (SUDs) constitute a major health problem and are associated with an extensive psychiatric comorbidity. Personality disorders (PDs) and SUDs commonly co-occur. Comorbid PD is characterized by more severe addiction problems and by an unfavorable clinical outcome. The present study investigated the prevalence of SUDs, PDs and common Axis I disorders in a sample of adolescent outpatients. We also investigated the association between PDs and SUDs, and how this association was influenced by adjustment for other Axis I disorders, age and gender.

**Methods:** The sample consisted of 153 adolescents, aged 14–17 years, who were referred to a non-specialized mental health outpatient clinic with a defined catchment area. SUDs and other Axis I conditions were assessed using the mini international neuropsychiatric interview. PDs were assessed using the structured interview for DSM-IV personality.

**Results:** 18.3 % of the adolescents screened positive for a SUD, with no significant gender difference. There was a highly significant association between number of PD symptoms and having one or more SUDs; this relationship was practically unchanged by adjustment for gender, age and presence of Axis I disorders. For boys, no significant associations between SUDs and specific PDs, conduct disorder (CD) or attention deficit hyperactivity disorder (ADHD) were found. For girls, there were significant associations between SUD and BPD, negativistic PD, more than one PD, CD and ADHD.

**Conclusions:** We found no significant gender difference in the prevalence of SUD in a sample of adolescents referred to a general mental health outpatient clinic. The association between number of PD symptoms and having one or more SUDs was practically unchanged by adjustment for gender, age and presence of one or more Axis I disorders, which suggested that having an increased number of PD symptoms in itself may constitute a risk factor for developing SUDs in adolescence. The association in girls between SUDs and PDs, CD and ADHD raises the question if adolescent girls suffering from these conditions may be especially at risk for developing SUDs. In clinical settings, they should therefore be monitored with particular diligence with regard to their use of psychoactive substances.

*Trial registration* The regional committee for medical research ethics for eastern Norway approved the study protocol in October 2004 (REK: 11395). Address correspondence and reprint requests to: Hans Ole Korsgaard, The Nic Waal Institute, Lovisenberg Diakonale Hospital, P.O. Box 2970 Nydalen, N-0440 Oslo, Norway; E-mail [hansole.korsgaard@tele5.no](mailto:hansole.korsgaard@tele5.no)

**Keywords:** ADHD, Adolescent, Alcohol use disorder, Axis I, Comorbidity, Conduct disorder, Outpatient, Personality disorder, Substance use disorder

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## Background

Personality disorders (PDs) are defined as enduring and maladaptive patterns of experiencing, coping, and relating to others. In DSM-IV, as well as DSM-5, PD categories may be applied to adolescents when the individual's particular maladaptive personality traits appear to be pervasive, persistent, and unlikely to be limited to a particular developmental state or an episode of an Axis I disorder. With the exception of antisocial PD (ASPD), any PD can be diagnosed in a person under 18 years of age, as long as the diagnostic features have been present for at least 1 year [1, 2].

PDs are common conditions, with prevalences of about 13 % in the general adult population, up to 40 % in adult outpatient samples, and up to 71 % in inpatient samples when diagnosed with comprehensive semi-structured interviews [3]. In adolescents, prevalences range from 6 to 17 % in community samples, and in clinical samples from 41 to 64 % [4]. Pathological personality traits emerge at an early age and are related to health-risk behaviors in adolescence as well as young adulthood [5–7], but PD diagnoses may be less stable than previously assumed [8]. Maladaptive personality trait constellations, however, seem to be more stable in their structure than PD diagnoses. They may change in severity or expression over time; still they often lead to persistent functional impairment and reduced quality of life, even if the diagnostic threshold for a specific PD is no longer reached [9, 10].

Borderline PD is the single most studied PD, and is generally considered as the prototypical cluster B disorder. BPD may be more prevalent than previously recognized, with a lifetime prevalence of up to 2.7 % in the general adult population [11]. A large population study found BPD equally prevalent among men and women, and frequently associated with considerable mental and physical disability, especially among women [12]. There is an increasing awareness of developmental antecedents and adolescent presentation of BPD [13–15], with several studies pointing out prognostic advantages of early identification and timely treatment of PDs [16, 17]. It has recently been shown that the diagnosis of BPD is as reliable and valid in adolescents as it is in adults, and that adolescents with BPD can benefit from early intervention [18].

Substance use disorders (SUDs) constitute a major health problem, with estimated prevalence rates of 3.4 % for alcohol dependence and 0.3–1.8 % for cannabis dependence in the general European population [19]. It has generally been assumed that boys use more drugs and alcohol than girls. However, recent findings seem to contradict this long-held assumption; Johnson and colleagues found that male–female differences

in adolescent marijuana use have decreased since 1999 [20], and another study reports that the differences in drinking patterns of adolescent boys and girls narrowed between 2002 and 2012 [21]. Drug abuse is associated with an extensive psychiatric comorbidity and carries an increased risk of premature death, especially in male users of opiates or barbiturates [22]. Estimated lifetime prevalences of SUDs in adolescents and young adults range from 4.6 [23] to 17.7 % [24]. In adolescents, SUDs are of considerable importance in the etiology and prognosis of psychiatric disorders such as mood disorders, conduct disorder (CD), attention-deficit hyperactivity disorder (ADHD), and anxiety disorders [25]. In adults, generalized anxiety disorder (GAD) and SUDs are highly comorbid, and GAD–SUD comorbidity is associated with a host of poor psychosocial outcomes, including higher rates of hospitalization, disability, functional impairment, and inferior GAD and SUD treatment outcomes [26].

Adolescents with SUDs tend to have higher rates of comorbid psychiatric disorders and are more likely to report a history of trauma and physical and/or sexual abuse than adolescents without a SUD [27, 28]. In addition, psychiatric disorders in adolescents often predate the SUD. Once the SUD develops, the psychiatric disorder may be further exacerbated [29] and associated with substantial functional impairment [30]. In older adolescence and emerging adulthood, young drug users with comorbid affective disorders have greater mental health and substance use morbidity than those with substance use problems alone [31]. A study of adolescent SUD inpatients found that 40.5 % of the participants fulfilled criteria for at least one comorbid present Axis I disorder, with high prevalences of mood, anxiety, and somatoform disorders. The 37 female participants showed a significantly higher risk for lifetime comorbid disorders; the gender difference was especially pronounced for anxiety and somatoform disorders [32].

ADHD has been shown to be a significant risk factor for developing SUDs [33]. It is frequently present in SUD populations, with prevalence estimates varying between 14 and 23 %. In general, patients with this type of comorbidity represent a more severe subgroup of SUD patients with more additional comorbidity and a more disadvantageous prognosis than SUD patients without ADHD [34]. It has been suggested that girls with ADHD might be at slightly higher risk than boys for substance abuse [35]. CD is a risk factor of similar magnitude as ADHD, and of equal importance in both genders [35].

PDs and SUDs commonly co-occur, with many studies finding a particularly frequent association between SUDs and BPD or ASPD [25, 36–38]. Comorbid PD seems to be more prevalent in drug use disorder (DUD) than in alcohol use disorder (AUD) [37]. Comorbid PD is



characterized by more severe addiction problems and by an unfavorable clinical outcome [39]. Prevalence rates of PDs in patients with SUD range from 24 to 90 %, depending on the sample characteristics and setting [11, 40–42]. A Norwegian study of first-admission SUD patients aged 16 years and older, found that 46 % of the patients had at least one PD. In this sample, cluster C disorders were as prevalent as cluster B disorders; SUD patients with PDs were younger at the onset of their first SUD and at admission; they used more illicit drugs; had more anxiety disorders; had more severe depressive symptoms; were more distressed and more impaired in their social functioning [37]. Comorbid SUD can be diagnosed in approximately every second patient suffering from a PD [36].

Some studies have reported gender differences in adolescents and young adults; Foster and colleagues found AUD to be a more severe disorder in women than in men. Despite lower mean levels of overall risk exposure, women were characterized by higher levels of adolescent risk factors and a greater magnitude of AUD consequences. Furthermore, internalizing symptoms appeared to be a gender-specific risk factor for AUD in women [43]. Roberts and colleagues found a tendency in females with SUDs to have higher rates of comorbid disorders, as did older youths [30]. Thus, the question of possible gender differences in SUD prevalence, comorbidity and prognosis has not yet been fully answered.

## Aims

The objective of the present study, performed on a clinical sample of consecutively referred adolescent outpatients, was to

1. Investigate the prevalences of alcohol and substance abuse and common Axis I disorders, including possible gender differences.
2. Investigate the association between PDs and alcohol and other substance abuse. We also wanted to assess the influence of adjusting for other Axis I disorders, age and gender on this association.

## Methods

### Participants

The present study used a sample of adolescents aged 14–17 years who were referred to a mental health outpatient clinic for children and adolescents in Oslo (The Nic Waal Institute, Lovisenberg Diakonale Hospital). The catchment area of the clinic comprises 25,000 children and adolescents from 0 to 17 years of age, and consists of four city districts with a population of mixed socio-economic status, representing all social classes including immigrant workers and well-educated middle and upper class families. Study inclusion took place from February

2005 to April 2007. All referred patients in the study's age group were asked to participate. Exclusion criteria were the need for immediate hospitalization or other urgent therapeutic measures, clinically assessed mental retardation, lack of fluency in the Norwegian language, and absence of the evaluator at the time of referral [44].

### Measures

As in other comparable studies on the prevalence of Axis I and Axis II disorders in adolescents, well validated adult diagnostic tools have been used [45–48].

### Axis I disorders

Axis I disorders, including SUDs, were assessed using a Norwegian translation of the mini international neuropsychiatric interview version 5.0.0 (MINI) [49, 50]. The MINI has not been validated for adolescents, but has previously been used in studies on adolescents [51] and was chosen for its excellent feasibility [50].

In the assessment of ADHD a primary screening was first performed, using the six-item adult ADHD Self-Report Scale Screener version 1.1 (ASRS Screener) in a Norwegian version [52]. The ASRS Screener is reliable and valid in adult clinical settings, with excellent specificity [53]. It has repeatedly been shown to be in strong concordance with clinician diagnoses [54]. The ASRS Screener has not been validated for use in adolescents, but the full 18-item ASRS symptom checklist, from which it is derived, has been found to be reliable and valid in adolescents [55].

If the primary screening with the ASRS Screener was positive, the Mini International Neuropsychiatric Interview-PLUS (MINI-PLUS) section W (ADHD in children/adolescents) was used as a diagnostic test instrument [50] for a final diagnosis of ADHD.

### Personality disorders

The Structured Interview for DSM-IV (SIDP-IV) [56] in a Norwegian version was used to assess PDs. The SIDP-IV is a comprehensive semi-structured diagnostic interview for DSM-IV PD (Axis II) diagnoses, which has been used in numerous studies in different countries, including Norway [57–59]. The SIDP-IV has been extensively used in research on PDs in adolescence [51, 60, 61]. The SIDP-IV covers 14 DSM-IV Axis II diagnoses as well as CD as a separate axis I disorder. The Axis II diagnoses comprise the ten standard DSM-IV PDs (paranoid, schizoid, schizotypal, borderline, histrionic, narcissistic, antisocial, obsessive–compulsive, dependent, and avoidant PD), the three provisional DSM-IV PDs (self-defeating, depressive, and negativistic PD), and mixed PD.

All questions address the typical or habitual behavior of the subjects during the last 5 years. Each diagnostic

criterion is rated on a four point scale: “0” = criterion not present; “1” = subthreshold level of the trait present; “2” = criterion being present for most of the last 5 years; and “3” = criterion strongly present. Scores “2” and “3” indicate the presence of a criterion according to DSM-IV [56]. In the following text, we will be using the term “PD symptoms” when a diagnostic criterion meets a score of 1, 2 or 3. “PD” is used when a sufficient number of diagnostic criteria for a specific DSM-IV diagnosis are fulfilled, as measured with the SIDP-IV.

In accordance with diagnostic practice applied in other studies on PDs in adolescence, the DSM-IV age criterion for ASPD was waived [45]. Due to the participants’ age, we also waived the 5 year symptom duration criterion. Instead we used 2 years symptom duration as criterion. This is in accordance with the criterion used in previous studies assessing adolescent personality pathology [4, 45].

#### Procedures and assessment

All patients were assessed immediately upon referral by the first author, who was a male specialist in psychiatry and child and adolescent psychiatry, with 21 years of clinical experience. He was trained in evaluation with SIDP-IV by the second author, who was an experienced rater, who had previously evaluated patients and reported from comparable studies in adults [59, 62]. Twenty ratings were discussed and found to be in accordance with the rating of the experienced evaluator. Axis I conditions were also assessed by the first author, who had been trained by the translator of the Norwegian version of the MINI.

After completion of the initial assessment, the patients were assigned to further clinical evaluation and treatment by clinicians other than the first author in the outpatient clinic.

#### Statistical analysis

Descriptive statistics were calculated for the relevant mental health status variables and expressed in mean [with standard deviation (SD) in parentheses] and frequency (percentages in parentheses) as appropriate. Prevalences of PDs, SUDs and other Axis I conditions with 95 % Blaker confidence intervals [63] were estimated for the total sample and for each gender separately, with testing for gender differences by exact Chi square tests. SUD was classified as none, one [either AUD or cannabis use disorder (CUD)] and two (both AUD and CUD). The association of SUD with number of PD symptoms, unadjusted and adjusted for gender, age and presence of Axis I disorders was investigated by proportional odds ordinal logistic regression. Differences in unadjusted and adjusted odds ratios were, if necessary, investigated by a bootstrap BC<sub>a</sub> 95 % confidence intervals based on 10,000

bootstrap replicates [64], with a difference considered as significant if 0 was outside the interval. Data were analysed using the IBM SPSS version 20.0 software, with Blaker confidence intervals and bootstrapping using the R (The R Foundation for Statistical Computing, Vienna, Austria) packages BlakerCI and boot.

#### Ethical statement

The study was approved by the regional committee for medical research ethics for eastern Norway (REK: 11395) and by The Norwegian Data Inspectorate. Informed written consent was obtained from all patients, and for patients younger than 16 years consent was additionally obtained from their parents.

#### Results

In the study inclusion period a total of 264 adolescents (59.4 % female) were referred to The Nic Waal Institute. Sixty-three patients did not meet the inclusion criteria; they were excluded due to inadequate fluency in the Norwegian language (N = 6, 9.5 %), mental retardation (N = 15, 23.8 %), need of immediate hospitalization (N = 19, 30.2 %), and absence of the evaluator at the time of referral (N = 23, 36.5 %). This left 201 adolescents eligible for inclusion in the study. The attrition was 48 (23.9 %); lack of consent from parents (N = 5, 10.4 %), referral retracted prior to interview (N = 6, 12.5 %), lack of consent from the adolescent (N = 7, 14.6 %), did not show up for appointment (N = 11, 22.9 %), and consent retracted during interview (N = 19, 39.6 %) [44].

A total of 153 adolescents (61.4 % girls, mean age 16.0 years; SD = 1.1, range 14.1–18.0 years) were finally included in the study. There were no missing data in any items within the ASRS Screener, MINI, MINI-PLUS section W, or SIDP-IV.

Of the adolescents, 18.3 % (N = 28, 95 % CI 12.6–25.3 %) were diagnosed with a SUD using the MINI, with no significant gender difference in prevalence (Table 1). Apart from alcohol, cannabis was the only drug in the sample that qualified for either an abuse or a dependency diagnosis. When analysed separately for alcohol and cannabis problems in each gender, boys had slightly more alcohol-related problems, whereas girls had slightly more cannabis-related problems; the differences were not significant (alcohol;  $\chi^2 = 0.027$ ,  $p = 1.000$ , cannabis  $\chi^2 = 0.055$ ,  $p = 1.000$ ). The female/male ratio of SUDs was 1.16 (95 % CI = 0.49–2.72,  $p = 0.73$ ).

Two thirds (63.4 %, N = 97) of the adolescents met the criteria for at least one Axis I disorder (68.1 %, N = 64 girls; 56.0 %, N = 33 boys). Anxiety disorders; simple phobias, GAD, panic disorder, agoraphobia, social phobia and post-traumatic stress disorder (33.3 %, N = 51, 95 % CI 26.0–41.1 %) and mood disorders; dysthymia and

**Table 1** Prevalence of SUD, other Axis I disorders and personality disorders (N = 153)

	Boys (N = 59) N (%) (CI <sup>a</sup> )	Girls (N = 94) N (%) (CI <sup>a</sup> )	Total (N = 153) N (%) (CI <sup>a</sup> )	p value <sup>b</sup>
Without SUD	49 (83.1 %) (71.5–91.3 %)	76 (80.9 %) (71.5–88.1 %)	125 (81.7 %) (74.6–87.3 %)	–
With SUD	10 (16.9 %) (8.7–28.5 %)	18 (19.1 %) (11.9–28.5 %)	28 (18.3 %) (12.6–25.3 %)	0.831
With AUD	7 (11.9 %) (5.38–22.5 %)	10 (10.6 %) (5.46–18.3 %)	17 (11.1 %) (6.73–17.1 %)	1.000
With CUD	7 (11.9 %) (5.38–22.5 %)	12 (12.8 %) (7.08–21.0 %)	19 (12.4 %) (7.93–18.5 %)	0.540
Anxiety	13 (22.0 %) (13.0–34.5 %)	38 (40.4 %) (30.7–50.7 %)	51 (33.3 %) (26.0–41.1 %)	0.022
Mood	13 (22.0 %) (13.0–34.5 %)	37 (39.4 %) (29.6–49.6)	50 (32.7 %) (25.3–40.5 %)	0.033
Psychosis	0 (0.0 %) (0.0–6.0 %)	2 (2.1 %) (0.4–7.1 %)	2 (1.3 %) (0.2–4.6 %)	0.523
OCD	4 (6.8 %) (2.3–16.4 %)	10 (10.6 %) (5.5–18.3 %)	14 (9.2 %) (5.3–14.8 %)	0.568
CD	12 (20.3 %) (11.3–32.8 %)	15 (16.0 %) (9.5–24.8 %)	27 (17.6 %) (12.2–24.4 %)	0.519
ADHD	9 (15.3 %) (7.9–26.8 %)	12 (12.8 %) (7.1–21.0 %)	21 (13.7 %) (8.9–20.1 %)	0.810
PD diagnosis	8 (13.6 %) (1.3–7.3 %)	25 (26.6 %) (6.0–24.4 %)	33 (21.6 %) (15.5–28.6 %)	0.070
No diagnosis <sup>c</sup>	23 (39.0 %) (26.8–52.2 %)	28 (29.8 %) (21.0–39.8 %)	51 (33.3 %) (26.0–41.1 %)	0.168

SUD substance use disorders: alcohol and/or drug abuse or dependence. SUD is equivalent to AUD and/or CUD, since no other substances were used in our data; AUD alcohol use disorders: alcohol abuse or dependence; CUD Cannabis use disorders: Cannabis abuse or dependence; Anxiety anxiety disorders: simple phobias, generalized anxiety disorder, panic disorder, agoraphobia, social phobia and post-traumatic stress disorder; Mood mood disorders: dysthymia and major depressive episode; OCD obsessive-compulsive disorder; CD conduct disorder; ADHD attention deficit hyperactivity disorder

<sup>a</sup> Blaker 95 % confidence intervals

<sup>b</sup> p value from exact Chi square test

<sup>c</sup> No diagnosis no Axis I or personality disorder diagnosis

major depressive episode (32.7 %, N = 50, 95 % CI 25.3–40.5 %) were most frequent, followed by SUD (18.3 %, N = 28, 95 % CI 12.6–25.3 %), CD (17.6 %, N = 27, 95 % CI 12.2–24.4 %), obsessive-compulsive disorder (9.2 %, N = 14, 95 % CI 5.3–14.8 %) and psychotic disorders (1.3 %, N = 2, 95 % CI 0.2–4.6 %). There were significant gender differences in anxiety ( $p = 0.022$ ) and mood ( $p = 0.033$ ) disorders (Table 1).

Of the adolescents, 21.6 % (N = 33) had at least one PD, 7.2 % (N = 11) had more than one PD, and 4.6 % (N = 7) had both ADHD and a PD. The prevalence of PDs was generally higher in the referred girls. Girls showed significant associations between SUD and BPD ( $p = 0.024$ ), negativistic PD ( $p = 0.035$ ), more than one PD ( $p = 0.020$ ) as well as between SUD and CD ( $p = 0.001$ ) and ADHD ( $p < 0.001$ ) (Table 2).

Figure 1 illustrates the association between PD symptoms and SUD and other frequent Axis I disorders. As can be seen, girls had more symptoms than boys in all reported Axis I conditions; the difference was significant for anxiety disorders ( $p = 0.022$ ) and mood disorders ( $p = 0.033$ ). Substance disorders ( $p = 0.831$ ) and CD ( $p = 0.585$ ) did not yield significant gender differences.

There was a significant positive association between the number of PD symptoms and SUD (OR per five points difference in the number of PD symptoms 1.16, 95 % CI 1.06–1.26,  $p = 0.001$ ). The association was still significant after adjustment for gender, age and presence of one or more Axis I disorders (OR 1.15, 95 % CI 1.04–1.27,

$p = 0.005$ ). There were no significant deviations from the proportional odds assumption in these analyses ( $p \geq 0.466$ ). No bootstrap procedure for comparing the unadjusted and adjusted ORs was performed due to the almost total overlap between the confidence intervals.

## Discussion

The present study investigated the prevalence of SUDs and common Axis I disorders in an unselected sample of adolescents. The participants were all referred to a non-specialized mental health outpatient clinic with a defined catchment area. We also investigated the association between PD symptoms and SUDs, as well as how this relationship was influenced by adjustment for other Axis I disorders, age and gender.

Our finding of 18.3 % of the adolescents having AUD or CUD seems not to be incongruent with previous findings, considering that studies of non-referred adolescents have found SUD prevalence rates of 4.6 % [23] to 17.7 % [24], and the prevalence rate in adolescent and young adult inpatients has been reported to be up to 54 % for DUD and 87 % for AUD when first admitted to hospital treatment [37]. As was to be expected, the participants in the present study had a higher prevalence of SUDs than has been found in studies of community samples and primary care patients but a lower prevalence than that seen in participants in studies of more severely ill patients.

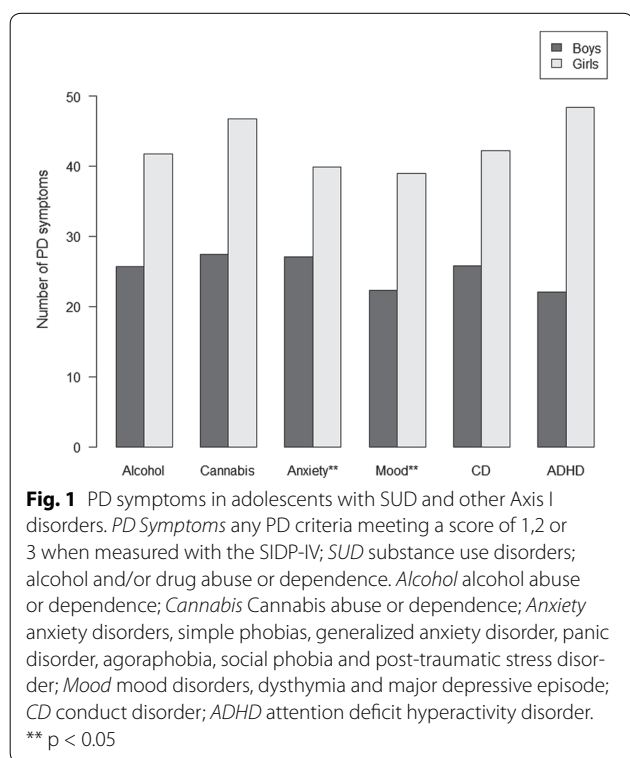
An earlier study of adolescents has reported significantly higher risk for lifetime comorbid disorders in

**Table 2 Prevalence of specific personality disorders, conduct disorder, and ADHD in adolescents with SUD (N = 153)**

Personality disorder (PD)	Boys with SUD (N = 10)	Boys without SUD (N = 49)	$\chi^2$	p value <sup>a</sup>	Girls with SUD (N = 18)	Girls without SUD (N = 76)	$\chi^2$	p value <sup>a</sup>
Paranoid	0	0	–	–	0	0	–	–
Schizoid	0	1	0.183	1.000	0	0	–	–
Schizotypal	0	0	–	–	0	0	–	–
Antisocial	1	1	1.606	0.313	1	2	4.519	0.093
Borderline	1	0	4.984	0.169	4	3	7.052	0.024
Histrionic	0	0	–	–	2	3	1.483	0.243
Narcissistic	0	0	–	–	0	1	0.239	1.000
Avoidant	0	3	0.645	0.638	1	5	0.026	1.000
Dependent	0	0	–	–	0	1	0.239	1.000
Obsessive–compulsive	0	0	–	–	0	6	1.518	0.350
Self-defeating	0	0	–	–	0	0	–	–
Depressive	0	2	0.422	1.000	2	6	0.193	1.000
Negativistic	0	0	–	–	2	0	8.628	0.035
At least one PD	1	7	0.130	1.000	7	18	1.723	0.237
More than one PD	1	0	4.984	0.169	5	5	6.880	0.020
Conduct disorder	4	8	2.873	0.189	8	7	13.472	0.001
ADHD	2	7	0.210	1.000	8	4	20.062	<0.001

SUD substance use disorders: alcohol and/or drug abuse or dependence

<sup>a</sup> p values from exact Chi square tests



women, with an especially pronounced gender difference for anxiety and somatoform disorders [32]. In the present study, however, significant gender differences in anxiety

and mood disorders were found only in the adolescents that did not have SUDs.

It has been suggested that girls with ADHD might be at slightly higher risk than boys for substance abuse [35]. In accordance with this, the present study found significantly more ADHD as well as CD in girls than in boys with SUDs.

Recent findings have contradicted the assumption that boys generally use more drugs and alcohol than girls [20, 21]. Our findings of non-significant differences between genders in SUD prevalence are in accordance with this trend. Other recent studies have reported AUD to be a more severe disorder in adolescents and young adults, with higher levels of adolescent risk factors and a greater magnitude of AUD consequences in women [43], as well as a tendency in females with SUDs to have higher rates of comorbid disorders [30]. The cross-sectional nature of the present study makes it impossible to infer causal relationships, but our findings do support the assumption of a more extensive psychiatric comorbidity in female adolescent SUD patients.

The main finding of the present study is a highly significant association between number of PD symptoms and the presence of one or more SUDs (p = 0.001), with almost totally overlapping confidence intervals after adjustment for gender, age and presence of one or more Axis I disorders (p = 0.005). This finding implies that having an increased number of PD symptoms in



itself is a unique risk factor for the later development of a SUD.

### Strengths and limitations

The study was performed at a single general service mental health outpatient clinic, receiving adolescents from a geographically defined urban area with a varied socio-economic and ethnic population. Still, the results from the present study may not be generalizable to other outpatient populations. The participants were included in a limited time span, and we cannot exclude the possibility of prevalence fluctuations over time.

The attrition (23.9 %,  $N = 48$ ) and the relatively small sample size also constitute limitations. In particular, the sample size limits the degrees of freedom available, so that analysis of single PDs in some cases may be statistically underpowered. Therefore, we have mainly focused on the total number of PD symptoms rather than on specific PDs. This might constitute a limitation. However, in light of current epidemiological knowledge about PDs, the differentiation between having or not having a PD is clearly more relevant than the differentiation between specific PDs. It should also be pointed out that specific PD diagnoses merely reflect the presence of an arbitrarily stipulated number of PD symptoms; there is no indication whatsoever of the existence of categorical breaking points at a given number of PD symptoms. On the contrary, recent literature supports the notion of PDs as dimensional entities with arbitrarily defined diagnostic cut-off points deciding whether or not a patient is above the diagnostic threshold for a specific disorder [4, 65].

The gender distribution of our sample was close to identical to the gender distribution of all referred adolescents in the study inclusion period, and reflects the fact that in adolescence, as opposed to middle and late childhood, more girls than boys are referred to Norwegian mental health outpatient clinics.

Each patient was diagnosed individually with well-documented and semi-structured test instruments by a single, experienced clinician and rater. Due to the fact that just one person performed all assessment work, there was no missing data. The evaluator was trained in rating with SIDP-IV and MINI by experienced evaluators and researchers on PD and Axis I diagnoses. Notwithstanding, the use of a single evaluator constitutes a possible limitation; it may have strengthened the internal validity, but might have been a threat to the external validity of the diagnoses.

### Conclusions

The present study comprised 153 adolescents referred to a non-specialized mental health outpatient clinic. Of

these adolescents, 18.3 % screened positive for AUD or CUD, with no significant gender difference in prevalence. The female/male ratio of SUDs was 1.13 (95 % CI = 1.10–1.17). More than two-thirds of the adolescents met the criteria for at least one Axis I disorder, with significant gender differences in anxiety ( $p = 0.022$ ) and mood ( $p = 0.033$ ) disorders; 21.6 % of the patients had at least one PD and 7.2 % had more than one PD. The prevalence of PDs was generally higher in the referred girls. For boys, no significant associations between SUDs and specific PDs or Axis I disorders could be ascertained. For girls, there were significant associations between SUD and BPD, negativistic PD, more than one PD, CD and ADHD.

There was a highly significant association between number of PD symptoms and the presence of one or more SUDs. This association was practically unchanged when adjusted for gender, age and having one or more Axis I disorders, suggesting that having an increased number of PD symptoms in itself may constitute a unique risk factor for developing SUDs in adolescence. These findings are in accordance with earlier reports of increased co-occurrence of PDs and SUDs in adolescence [36–38].

However, the girls in the study were overall more severely ill than the boys; girls with SUDs differed even more so, with significant associations between SUDs and BPD ( $p = 0.024$ ), negativistic PD ( $p = 0.035$ ), more than one PD ( $p = 0.020$ ), as well as between SUDs and CD ( $p = 0.001$ ) and ADHD ( $p < 0.001$ ). This indicates that adolescent girls suffering from these disorders may be especially at risk for developing SUDs. In clinical practice, it might therefore be suggested that girls presenting with BPD, negativistic PD, more than one PD, ADHD, or CD should be monitored with particular diligence with regard to their use of psychoactive substances.

### Abbreviations

ADHD: attention deficit hyperactivity disorder; ASPD: antisocial personality disorder; AUD: alcohol use disorder; BPD: borderline personality disorder; CD: conduct disorder; CUD: Cannabis use disorder; DUD: drug use disorder; GAD: generalized anxiety disorder; ODD: oppositional defiant disorder; PD: personality disorder; SUD: substance use disorder.

### Authors' contributions

All authors have contributed to the background, design, and drafting of the manuscript. HOK did all the assessment work. HOK and TWL performed the statistical analysis. All authors read and approved the final manuscript.

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**Competing interests**

The authors declare that they have no competing interests.

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