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Liisa Kantojärvi

PERSONALITY DISORDERS IN THE NORTHERN FINLAND 1966 BIRTH COHORT STUDY

FACULTY OF MEDICINE,
INSTITUTE OF CLINICAL MEDICINE,
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Abstract

Personality disorders (PDs) are relatively common mental disorders associating with other psychiatric disorders and disability.

The aim of the study was to determine the occurrence of PDs in a general population subsample and psychiatric hospital patients, the associations of PDs with childhood family structure, the co-occurrence of PD with common psychiatric disorders, and the associations between PDs and temperament.

The study is part of the Northern Finland 1966 Birth Cohort Project (NFBC 1966), consisting of cohort members living in Oulu (N = 1,609) on 1st January 1997 (the Oulu Study). The study consisted of a two-stage psychiatric field survey with questionnaires and a structured clinical interview and analysis of the patient records in public outpatient care. Information concerning psychiatric illness of all cohort members (N = 12,058) was gathered from the Finnish Hospital Discharge register (FHDR). The best-estimate procedure was used for the assessment of psychiatric morbidity including PDs. Childhood family structure and other sociodemographic variables were drawn from questionnaires of the field study conducted during earlier follow-up studies. In this study PDs were classified into three clusters: Cluster A (paranoid, schizoid and schizotypal PD), Cluster B (antisocial, borderline, histrionic, and narcissistic PD), and Cluster C (avoidant, dependent, obsessive-compulsive, and passive-aggressive PD). The most common PDs in the Oulu Study sample were Cluster C PDs, whereas Cluster B PDs were most common in the hospital-treated sample. PDs were highly associated with mood, anxiety and substance use disorders. Single-parent family type in childhood was associated with PDs, especially Cluster B PDs in adulthood. PD clusters were associated with different profiles of temperament, but the temperament dimensions could not distinguish different PDs very well.

These results indicated that it is important to recognize PDs and their comorbid psychiatric disorders. This will have implications in both general outpatient care and psychiatry. These results indicate the importance of recognition of childhood risk factors for PDs for the prevention of severe PDs. The results suggest a need for more studies about the aetiology and development of PDs.

Keywords: comorbidity, DSM-III-R, family structure, Finland, hospital treatment, personality disorder, population study, SCID, TCI, temperament

Kantojärvi, Liisa, Persoonallisuushäiriöt Pohjois-Suomen vuoden 1966 syntymäkohortissa
Lääketieteellinen tiedekunta, Kliinisen lääketieteen laitos, Psykiatrian klinikka, Terveystieteiden laitos, Oulun yliopisto, PL 5000, 90014 Oulun yliopisto; Terveystieteen laitos, Tampereen yliopisto, 33014Tampere
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Tiivistelmä

Persoonallisuushäiriöt ovat yleisiä mielenterveyden ongelmia, joihin liittyy usein psykiatrista oheissairastavuutta ja toimintakyvyn laskua.

Tämän tutkimuksen tarkoituksena oli arvioida persoonallisuushäiriöiden yleisyyttä nuorilla aikuisilla. tehtävänä oli arvoida yhteyksiä lapsuuden perherakenteeseen ja yleisimpiin psykiatrisiin häiriöihin sekä arvioida persoonallisuushäiriöiden yhteyksiä temperamenttitekijöihin.

Tutkimus on osa Pohjois-Suomen vuoden 1966 syntymäkohortin psykiatrista osaprojektia, Oulu Studyä. Tutkimusaineiston muodostivat Oulu Studyn otokseen kuuluvat kaikki 1. tammikuuta 1997 Oulussa asuneet kohortin jäsenet (N = 1 609) sekä sairaalahoidossa olleiden persoonallisuushäiriö- diagnoosin saaneiden osalta koko alkuperäisen syntymäkohortin (N = 12 058) jäsenet.

Tutkimus koostui kaksivaiheisesta psykiatrisesta kenttätutkimuksesta, jossa tietoja tutkittavilta kerättiin sekä kyselylomakkeiden ja haastattelututkimuksen avulla. Lisäksi tutkittavilta kerättiin tiedot heidän elinaikanaan toteutuneesta julkisten psykiatristen sairaala- ja avohoitopalvelujen käytöstä sairauskertomustietojen perusteella. Niin kutsutun best-estimated -menetelmän avulla arvioitiin tutkittavien psykiatrista sairastavuutta mukaan lukien persoonallisuushäiriöt. Tutkittavien lapsuuden perherakennetta ja sosiodemografisia tekijöitä arvioitiin aiempien seurantatutkimusten tietojen avulla.

Tutkimuksessa persoonallisuushäiriöt luokiteltiin DSM-III-R-diagnoosiluokituksen mukaisesti kolmeen eri pääryhmään ja niiden mukaisiin alaryhmiin: Ryhmä A (epävakaa, eristäytyvä ja psykoosipiirteinen persoonallisuus), ryhmä B (epäsosiaalinen, epävakaa, huomionhakuinen ja narsistinen persoonallisuus) ja ryhmä C (estynyt, riippuvainen, pakko-oireinen ja passiivis-aggressiivinen persoonallisuus). Oulu Studyn väestöotoksessa yleisimpiä näistä olivat ns. C-ryhmän persoonallisuushäiriöt, kun taas sairaalahoidetuilla henkilöillä B-ryhmän persoonallisuushäiriöt olivat yleisimpiä. Persoonallisuushäiriöiden todettiin liittyvän yleisesti masennus- ja ahdistuneisuushäiriöihin sekä päihteiden käyttöön. Vanhemman yksinhuoltajuuden todettiin liittyvän persoonallisuushäiriöihin, etenkin B-ryhmän persoonallisuushäiriöihin. Persoonallisuushäiriöryhmät erosivat toisistaan temperamenttiprofiilien perusteella. Eri persoonallisuushäiriöistä kärsivillä tutkittavilla ei todettu tyypillisiä temperamenttiprofiileja.

Johtopäätöksenä voidaan todeta, että persoonallisuushäiriöiden ja niihin yleisesti liittyvän psykiatrisen oheissairastavuuden tunnistaminen on tärkeää. Havainnot korostavat perusterveydenhuollon ja erikoissairaanhoidon yhteistyön merkitystä persoonallisuushäiriöistä ja psykiatrisista häiriöistä kärsivien henkilöiden tutkimuksessa ja hoidossa. Persoonallisuushäiriöille altistavien lapsuuden tekijöiden tunnistaminen on tärkeää vaikeiden persoonallisuushäiriöiden ehkäisemiseksi. Persoonallisuushäiriöiden etiologian ja kehittymisen selvittämiseksi tarvitaan uusia tutkimuksia.

Asiasanat: DSM-III-R, perherakenne, persoonallisuushäiriö, sairaalahoito, SCID, TCI, väestötutkimus, yhteissairastavuus

To Markku

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Oulu May 5th, 2008 Liisa Kantojärvi

Abbreviations

CI	Confidence Interval
DAPP-BO	Dimensional Assessment of Personality Pathology-Basic Questionnaire
DSM	Diagnostic and Statistical Manual of Mental Disorders
EPQ	Eysenck Personality Questionnaire
FHDR	Finnish Hospital Discharge Register
HA	Harm Avoidance
HSCL	Hopkins Symptom Scheck List
ICD	Manual of the International Statistical Classification of Diseases, Injuries and Causes of Death
IPDE	International Personality Disorder Examination
MCMI-III	Millon Clinical Multiaxial Inventory -III
MMPI	Minnesota Multiphasic Personality Inventory
NEO-PI	NEO Personality Inventory
NFBC	Northern Finland Birth Cohort
NS	Novelty Seeking
OR	Odds ratio
PAS	Personality Assessment Schedule (PAS),
PD	Personality disorder
PDE	Personality Disorder Examination
PD NOS	Personality disorder not otherwise specified
PDQ	Personality Diagnostic Questionnaire
PS	Persistence
RD	Reward Dependence
SADS	Schedule for Affective Disorders and Schizophrenia
SCID-I	Semistructured Clinical Interview for DSM-III-R Axis-I Disorders
SCID-II	Semistructured Clinical Interview for DSM-III-R Personality Disorders
SCID-II-PQ	Structured Clinical Interview for DSM-III-R Personality Disorders Personality Questionnaire-PQ -a self report questionnaire
SIB	Schedule for Interviewing Borderlines
SIDP-IV	Structured Interview for DSM-IV Personality
SWAP	Shedler-Westen Assessment Procedure
TCI	Temperament and Character Inventory
TPQ	Tridimensional Personality Questionnaire

WHO World Health Organization

List of original publications

This thesis is based on the following original publications, which are referred to in the text by the Roman numerals I–IV.

I Kantojärvi L, Veijola J, Läksy K, Jokelainen J, Herva A, Karvonen JT, Kokkonen P, Järvelin M-R & Joukamaa M (2004) Comparison of hospital-treated personality disorders and personality disorders in general population sample. Nord J Psychiatry 58: 357–362.

II Kantojärvi L, Miettunen J, Läksy K, Herva A, Karvonen JT, Taanila A, Joukamaa M & Veijola J (2008) Childhood family structure and personality disorders in adulthood. Eur Psychiatry 23: 205–211.

III Kantojärvi L, Veijola J, Läksy K, Jokelainen J, Herva A, Karvonen JT, Kokkonen P, Järvelin M-R & Joukamaa M (2006) Co-occurrence of personality disorders with mood, anxiety and substance use disorders in young adult population. J Personal Disord 20: 102–112.

IV Kantojärvi L, Miettunen J, Veijola J, Läksy K, Karvonen J, Ekelund J, Järvelin M-R, Lichtermann D & Joukamaa M (in press). TCI temperament profiles in personality disorders. A Population based study. Nord J Psychiatry.

Contents

1 Introduction

The concept of personality (or character) disorder appeared in the psychiatric literature of the nineteenth century (Berrios 1993). All individuals can be characterized by personality traits, which are patterns of behaviours, thought, and emotion that are consistent in many contexts (Paris 1993). Personality disorders (PDs) are related to difficulties in interpersonal relationships, risk factors for Axis I disorders, and problems with working ability. PDs are distinguished from other mental illness by their enduring, potentially lifelong nature and by the assumption that they represent extremes of normal variation of personality traits (Kendell 2002).

During recent decades psychiatric classifications have changed several times and the diagnostic criteria for PDs as well as the number of different PD types have varied in different classifications (Grilo *et al.* 2001). In contrast to the categorical definitions of PDs several dimensional approaches of personality have been developed, focusing on nonclinical populations (Hupric & Bornstein 2007). In spite of the growing number of different interview assessment techniques and self-questionnaires for PDs, there is still a lack of agreement between different instruments, and the cross-instrument reliability is found to be poor (Tyrer *et al.* 2007).

PDs have been seen as representing the extremes of genetically determined traits (Ebstein 2006) that interact transact with the effects of environmental shaping of personality during the early years of development (Lee 2006). Since PDs appear early in adulthood, important risk factors to their development may be derived from childhood experiences and childhood circumstances (Amato 1994, Amato & Keith 1991, Dunn *et al.* 1998, Jaffee *et al.* 2001, Cohen *et al.* 2005).

PDs are common psychiatric disorders in adults. However, valid detection of PDs in an epidemiological setting is more difficult than that of many other mental disorders (Weissman 1993). The prevalence of PDs is thought to vary between 5 and 15% in the general population (Torgersen *et al.* 2001, Coid *et al.* 2006) and to be over 40% in general psychiatric inpatient and outpatient samples (Fossati *et al.* 2000, Zimmerman *et al.* 2005). Comorbidity between PDs and other psychiatric diagnoses is commonplace in clinical practice (Jackson *et al.* 1991, Samuels 1994), and PDs may contribute towards an increased risk for the onset of mood, anxiety and substance use disorders (Fava *et al.* 1996, Johnson *et al.* 1999b). Although the epidemiology and comorbidity of PDs have been widely studied,

the sociodemographic associations with PDs in young adult population have not been studied previously in Finland.

This thesis is part of the psychiatric follow-up projects of the ongoing Northern Finland 1966 Birth Cohort (NFBC 1966). The aim was to investigate DSM-III-R PDs and their epidemiology and associations in childhood family structure and Axis I disorders, and the associations with temperament factors in young adults. This study has excluded such diagnostic categories as personality change due to the brain damage and disease, reactive personality change after catastrophic experience, enduring personality change after psychiatric illness and chronic pain personality syndrome.

2 Review of the literature

2.1 History of classification of personality disorders

Since early times, personality disorders have been recognized and have been a focus of interest in many cultures. In 400 B.C. Hippocrates first postulated that all illnesses were a result of imbalance between the four humours of yellow bile, black bile, phlegm and blood (Merenda 1987). Galen, the noted Greek physician of the 2nd century A.D. extend this further to personality by describing four temperament types linked to the excess of each of these: choleric (yellow bile), melancholic (black bile), phlegmatic (phlegm), and sanguine (blood) (Tyrer *et al.* 2007). At the beginning of the 1900s Wundt modified this four-category model of temperament types (choleric, melancholic, phlegmatic, and sanguine). A representation of this model has later influenced personality theories such as those of Clarke, Eysenck, Cattell, and Cloninger (Merenda 1987). Similarities have been found between the dimensions of personality as originally described by Hippocrates and Galen and the current cluster model of PDs: Cluster A and phlegmatic, Cluster B and choleric, and Cluster C and melancholic personality dimension (Tyrer *et al.* 2007).

Pinel, in 1801, was the first who distinguished personality disorders (PDs) from other mental illnesses. His term “manie sans déliere” referred to persons who had no delusions but were prone to unexplainable, sudden violent behaviours. Pinel considered PDs to be a degenerative disease, nowadays considered psychopatic or antisocial personality disorder (de Girolamo & Reich 1993, Høyersten 1996).

Prichard coined the term “moral insanity”, a condition in which there was no apparent mental illness but gross disturbance of behaviour. Moral insanity was quickly recognized to be an important part of psychiatric practice and became a common diagnostic label from 1840 onwards. Maudsley emphasized in 1868 that close examination of the mental state of these patients often revealed no abnormalities whatsoever. He gave a description of aggressive and sadistic personality features, describing a group that was “inherently vicious, instinctive liars and thieves, stealing and deceiving with a cunning and a skill which could never be acquired". (Tyrer *et al.* 1991, Berrios 1993). At the beginning of the 1920s Krapelin endorsed the term “psychopathic personality” (Tyrer & Ferguson 1988).

Psychodynamic theory has also made an important contribution to the understanding of PDs, particularly those not associated with conduct disorders. Although early Freudian theory formulated neurosis as a discrete phenomenon that affected people who were generally well, but vulnerable because of early life experience, it was quickly realized that many patients presenting with neurotic problems had a personality abnormality. In 1930, Alexander wrote a description of the neurotic character. Ego psychology has continued to have an influence on the description and classification of PDs, attempting to provide explanations for apparently irrational and unpredictable behaviour. Psychoanalytic object relations theorists, such as Klein, Jackobson, and Kernberg, have had an important impact on the development of the criteria of Cluster B PDs (narcissistic, borderline and passive-aggressive) in DSM-classification (Clarkin *et al.* 2007).

The first *International Classification of Diseases* (ICD) (World Health Organization, WHO) was released in 1900 to provide a standard format for morbidity and mortality statistics, with revisions occurring every ten years thereafter (Sartorius 1993). ICD-6 was the first edition of that series to include mental disorders. It offered 10 categories for psychoses, 9 for neuroses, and 7 for disorders of character, behaviour, and intelligence. In 1952 the American Psychiatric Association (APA) published the first version of the *Diagnostic and Statistical Manual of Mental Disorders* (DSM). In the first DSM there were 27 PDs classified into four categories 1) personality pattern disturbances, 2) personality trait disturbances, 3) sociopathic personality disturbances, and 4) special symptom reactions. There was also a fifth category for brief disturbances, entitled transient situation PDs (analogous to current the conceptualization of adjustment disorders). DSM-II, which was published in 1968, contained 12 different PDs, with a considerable change in classification. Disorders such as sexual deviation and enuresis, which were included in the original DSM among PD categories, were removed (Endler & Kocovski 2002).

Schneider (1959) classified all personality disorders under the label “psychopatic”. Formulated by clinical description, Schneider described ten different personality types. The classification system proposed by Schneider has influenced subsequent classification systems (Tyrer & Ferguson 1987, Kendell 2002). Of the types of personality disorders identified by Schneider, eight are closely related to similar types of PD as classified in DSM-III (*Diagnostic and Statistical Manual of Mental Disorders)* (American Psychiatric Association 1980).

The DSM-III, published in 1980, contained 14 PD diagnoses. PDs were distinguished from normal personality traits. If the personality is inflexible,

maladaptive, and associated with significant impairment, the diagnosis of PD is in order (Endler & Kocovski 2002). The diagnosis schizophrenia, simple type, became schizotypal PD (Tyrer & Ferguson 1987). In the revised version of DSM-III (DSM-III-R) published in 1987 PDs were divided into three clusters. The actual 12 PDs remained the same as in DSM-III, with the exception of the new mixed, atypical, and other PD, which became a category known as PD not otherwise specified. In addition, the self-defeating and sadistic PDs were included in the research section. The Finnish version of ICD-9 contained PDs (schizotypal, narcissistic, dependent and avoidant) including definitions by the DSM-III-R classification system (American Psychiatric Association 1987). Additionally to DSM-III-R, the Finnish version of ICD-9 included among PDs such disorders as cyclothymia and Münchausen syndrome. In Finland the ICD-9 was nationally modified so that the PD categories were essentially the same as in the DSM-III-R (Kuoppasalmi *et al.* 1989).

In DSM-IV-TR there are 11 PDs divided between the three clusters. Passive-aggressive and depressive PDs were placed in the research section. Earlier, a good agreement had been found between DSM-III and ICD-9 classifications (Tyrer *et al.* 1991). However, the DSM tends to be more specific compared to the ICD classification system. Both assume medical concepts and terms, and state that there are categorical disorders that can be diagnosed by set lists of criteria.

2.2 Diagnosing and classification of personality disorders

2.2.1 Diagnostic criteria of personality disorders

PDs are described in the ICD-10 as deeply ingrained and enduring behaviour patterns, manifesting themselves as inflexible responses to a broad range of personal and social situations; they represent “either extreme or significant deviations from the way the average individual in a given culture perceives, thinks, feels, and particularly relates to others” and are “developmental conditions, which appear in childhood or adolescence and continue into adulthood” (World Health Organization 1993).

By definition, personality traits are enduring patterns of perceiving, relating to, and thinking about the environment and oneself that are exhibited in a wide range or social and personal contexts. Only when personality traits are inflexible,

maladaptive, and cause significant functional impairment or subjective distress do they constitute PDs.

The essential six criteria of PDs by the DSM-IV-TR-system are: 1) The enduring pattern of inner experience and behaviour that deviates markedly from expectations of the individual's culture and is manifested in at least two of the following areas: cognition, affectivity, interpersonal functioning and impulse control, 2) The enduring pattern is inflexible and pervasive across a broad range of personal and social situations, 3) The enduring pattern leads to clinical significant distress or impairment in social, occupational, or other important areas of functioning, 4) The pattern is stable and of long duration, and its onset can be traced back at least to adolescence or early adulthood, 5) The enduring pattern is not better accounted for as a manifestation or consequence of another mental disorder, and 6) The enduring pattern is not due to the direct physiological effects of substance (e.g. drug of abuse, a medication, exposure to a toxin) or a general medical condition (e.g. head trauma) (American Psychiatric Association 2000).

The diagnosis of all PDs requires an evaluation of the individual's long-term patterns of functioning, and the particular personality features must be evident by early adulthood. The personality traits that define these disorders must also be distinguished from characteristics that emerge in response to specific situational stressors or more transient mental states (e.g., mood or anxiety disorders, substance intoxication). The clinician should assess the stability of personality traits over time and across different situations. Although a single interview with the person is sometimes sufficient for making the diagnosis, it is often necessary to conduct more than one interview and to space these over time. Assessment can also be complicated by the fact that the characteristics that define a PD may not be considered problematic by the individual (i.e., the traits are often ego-syntonic). To help overcome this difficulty, supplementary information from other informants may be helpful (American Psychiatric Association 2000).

2.2.2 Current classifications of personality disorders

Currently, PDs are usually classified by using categories described in either of the two major classification systems: the Classification of Mental and Behavioural Disorders 10 (ICD-10, World Health Organization 1993) and the Diagnostic and Statistical Manual IV (text revised) DSM-IV-TR (American Psychiatric Association 2000). In the DSM-IV-TR, PDs as well as mental retardation are placed on Axis II, whilst other psychiatric conditions (such as depression, anxiety,

schizophrenia) are placed on Axis I (Tredget 2001). Both diagnostic classifications, DSM-IV-TR and ICD-10, describe ten specific PDs, the former grouping them into three clusters based on descriptive similarities. Individuals with Cluster A (includes paranoid, schizoid and schizotypal PDs) disorders often appear odd or eccentric. Individuals with Cluster B (antisocial, borderline, histrionic and narcissistic PDs) disorders often appear dramatic, emotional, or erratic. Individuals with Cluster C PDs (avoidant, dependent and obsessive-compulsive) often appears anxious or fearful (American Psychiatric Association 2000).

There are some differences between the two latest ICD and DSM-classification systems (See Table 1). The affective PD of the ICD-9 has been replaced in the ICD-10 by two new mood disorders, cyclothymia and dysthymia, which are not PDs. Schizotypal disorder, which is listed as a PD in DSM-IV, is classified with schizophrenia and delusional disorders in the ICD-10. Borderline PD, which is included in DSM-IV, is classified in ICD 10 as emotional unstable PD and divided into impulsive and borderline types. The narcissistic and passive-aggressive PDs, which are present in the DSM-IV classification, are included in ICD-10 under the category “other specific personality disorders”, which is absent from DSM-III-R.

Table 1. Comparison of classification of personality disorders in ICD-9, ICD-10, DSM-III-R and DSM-IV-TR.

ICD-9 [1]	ICD-10	DSM-III-R	DSM-IV-TR
Paranoid personality disorder	Paranoid personality disorder	Paranoid personality disorder	Paranoid personality disorder
Schizoid personality disorder	Schizoid personality disorder	Schizoid personality disorder	Schizoid personality disorder
Personality disorder with predominantly sociopathic or asocial manifestations	Dissocial personality disorder	Antisocial personality disorder	Antisocial personality disorder
Explosive personality disorder	Emotional unstable personality disorder a) Impulsive type b) Borderline type	Borderline personality disorder	Borderline personality disorder
Hysterical personality disorder	Histrionic personality disorder	Histrionic personality disorder	Histrionic personality disorder
Anacastic personality disorder	Anacastic personality disorder	Obsessive-compulsive personality disorder	Obsessive-compulsive personality disorder
†	Anxious (avoidant) personality disorder	Avoidant personality disorder	Avoidant personality disorder
†	Dependent personality disorder	Dependent personality disorder	Dependent personality disorder
Affective personality disorder	†	†	†
†	†	Passive-aggressive personality disorder	†
†	†	Schizotypal personality disorder	Schizotypal personality disorder
†	†	Narcissistic personality disorder	Narcissistic personality disorder
†	Other specific personality disorders [2]	Personality disorder not otherwise specified	Personality disorder not otherwise specified

[1] The Finnish version of ICD-9 also contained schizotypal, narcissistic, dependent and avoidant PDs and such disorders as cyclothymia and Münchausen syndrome

[2] Includes narcissistic and passive-aggressive PDs

† Indicates categories of disorder which do not appear in this particular taxonomy

2.3 Methods for assessing personality

There are two approaches to assessment of personality: the categorical approach, which focuses on personality types, and the dimensional approach, which focuses on personality variables or constructs in a continuum (Huprich & Bornstein 2007). These two approaches to personality assessment may lead to different conclusions (Endler & Kocovski 2002).

2.3.1 Categorical methods

The categorical approaches for assessing personality use self-report inventories, projective tests, interviews, and structured interviews. (Endler & Kocovski 2002). Examples of diagnostic interviews include the Structured Clinical Interview for DSM-IV Axis II (SCID-II; First *et al.* 1995a, 1995b, 1997), the Structured Interview for DSM-IV Personality Disorders (SIDP-IV; Pfohl *et al.* 1997) and the International Personality Disorder Examination (IPDE; Loranger *et al.* 1994). These methods have structural differences and employ different questions, probes, and scoring methods. The SIDP-R and IPDE are topically organized around major themes or domains of personality, whereas the SCID-II proceeds on a disorder-by disorder basis (Loranger 1992, Zimmerman 1994).

The most widespread projective technique is the Rorschach Inkblot Method (Rorschach 1964), which has been reformed by Exner (1986). Projective tests may give additional information for assessing personality, but they should not be used as the only method in differential diagnosis of PDs.

Other categorical methods for assessing personality are self-report inventories; for example the commonly used Millon Clinical Multiaxial Inventory-III (MCMI-III, Millon *et al.* 1997), the Personality Diagnostic Questionnaire (PDQ; Hyler *et al.* 1988) and the Minnesota Multiphasic Personality Inventory-Personality Disorder scales (MMPI-PD; Colligan *et al.* 1994), which also includes scales related to personality and psychopathology.

Self-report inventories have not been found suitable for making PD diagnoses. However, they have been used widely as screening instruments for PDs. The diagnoses obtained with combined use of self-report instruments and semistructured interviews have been considered more reliable and valid than diagnoses obtained by clinicians (Widiger 2003). The self-report methodology has been found to have significant limitations due to the following reasons: Concerns about individuals with a PD being able to describe their personality

traits accurately, deliberate attempts on the part of some individuals to distort their self-presentation in a positive or negative way, lack of correspondence between self-reports and reports of significant others, and lack of insight into problematic aspects of one's characteristic patterns of behavioural or interpersonal relating (Huprich & Bornstein 2007).

2.3.2 Dimensional methods

The dimensional perspective is an alternative to the categorical approach. According to the dimensional perspective, PDs represent maladaptive variants of personality traits that merge imperceptibly into normality and into one another. There have been different attempts to identify the fundamental dimensions that underlie the entire domain of normal and pathological personality functioning (American Psychiatric Association 2000). The dimensional methods frequently use self-report scales, but they can also use ratings scales as well as physiological and behavioural measures (Endler & Kocovski 2002)

One of the well-known personality trait-based models is Eysenck's three-factor model of personality, measured with the Eysenck Personality Questionnaire (EPQ) (Eysenck & Eysenck 1975), which consists of three dimensions: *Neuroticism*, *Extraversion* and *Psychotism*. Costa and McCrae have modified and widened this model of personality. Together with *Neuroticism* and *Extraversion*, Costa and McCrae also integrated *Openness to Experience*, *Agreeableness* and *Conscientiousness* within the five-factor model of personality, measured with the NEO Personality Inventory, NEO-PI (Costa & McCrae 1990). Livesley and his colleagues have established 18 personality trait dimensions that are measured by the Dimensional Assessment of Personality Pathology-Basic Questionnaire (DAPP-BQ) (Livesley 1986, Livesley *et al.* 1998). Furthermore, the DAPP-BQ dimensions relate to other measures of PD symptoms and personality in expected ways, supporting a dimensional approach to the assessment of PDs (Trull 2000). Dimensional models of personality are commonly used in studying the genetic background of personality traits (Ebstein 2006).

Categorical and dimensional methods have been criticized for inadequacy in assessing personality in clinical practice. Another approach is to describe more specific areas of personality dysfunction, including as many as 15-40 dimensions (e.g. affective reactivity, social apprehensiveness, cognitive distortion, impulsivity, insincerity, self-centeredness) (American Psychiatric Association 2000).

There has been an interest to develop new methods for assessing personality in clinical use. Shedler and Westen (2007) have combined categorical and dimensional personality assessment in the Shedler-Westen Assessment Procedure (SWAP). SWAP is a diagnostic method of PD assessment for clinical use providing dimensional and PD diagnosis. Tyrer and Johnson have created the Personality Assessment Schedule (PAS), which records all the ICD-10 personality disorders and scores the overall severity of PD into three levels - personality difficulty, simple PD, and diffuse (complex) PD, - together with no PD (Tyrer & Johnson 1996).

Cloninger's model of personality dimensions

One dimensional model that has been proposed is Cloninger's (1987) general model of personality with dimensional structure, which is compatible with the concepts of DSM-III-R PDs. Cloninger originally developed the Tridimensional Personality Questionnaire (TPQ) to cover three dimensions of behaviour: *Novelty Seeking* (NS), *Harm Avoidance* (HA), and *Reward Dependence* (RD). He subsequently elaborated his model of temperament into a seven-factor model of personality and developed a new questionnaire named Temperament and Character Inventory (TCI), which assesses four temperament dimensions (HA, NS, RD and, P) and three character dimensions (Cloninger *et al.* 1993, 1994).

Cloninger's model of personality (Cloninger 1987, Cloninger *et al.* 1993, 1994) consists of four genetically homogenous and independent dimensions of temperament. NS is a tendency to respond with intense excitement to novel stimuli or cues for potential rewards or potential relief of punishment and thereby activating/initiating behaviour. HA is defined as a tendency to respond intensively to signals of aversive stimuli, thereby inhibiting/stopping behaviour. RD is a tendency to respond intensely to signals of reward, especially social rewards, thereby maintaining/continuing behaviour. *Persistence* (PS) is a tendency to persevere in behaviours that have been associated with reward or relief from punishment. Of the three character dimensions, *Self-Directedness* refers to the ability to control, regulate and adapt one's behaviour in accord with chosen goals and values. *Co-operativeness* reveals a tendency toward social tolerance, empathy, helpfulness and compassion. *Self-Transcendence* reflects a tendency toward spirituality and identifications with the wider world and the ability to accept ambiguity and uncertainty. The TCI has shown good psychometric properties (Cloninger 1994).

Cloninger's psychobiological model has been used in genetic studies of personality. Bond (2001) has levelled criticism at Cloninger's theory, stating that its specificity has not always been confirmed (Bond 2001). HA is thought to be linked to the serotonin system, NS to the dopamine system and RD to the norepinephrine system. Conventional personality variables are viewed as arising from different combinations of the four basic dimensions of temperament (Cloninger 1987). In recent studies an association between type 4 dopamine receptor gene polymorphism and NS has been established (Ekelund *et al.* 1999, Keltikangas-Järvinen *et al.* 2003).

The DSM-III-R PDs have been found to relate to Cloninger's dimensions. Battaglia *et al.* (1996) and Christodoulou *et al.* (1999) showed that Cluster A disorders are inversely correlated with RD, Cluster B disorders are correlated with NS and Cluster C disorders positively correlated with HA. Cloninger himself has presented various combinations of NS, HA and RD to characterize some PDs (antisocial, histrionic, passive-aggressive, borderline, obsessional, schizoid, staid and avoidant) (Cloninger 2000).

Correlations between temperament scales and different PDs have been established in previous studies (Svrakic *et al.* 1993, de la Rie *et al.* 1998*,* Casey & Joyce 1999, Mulder *et al.* 1999, Ha *et al.* 2007). According to these studies, high NS has been found to correlate with paranoid PD, borderline and histrionic PDs. High HA has been found to correlate with avoidant and dependent PDs, as well as with borderline, schizotypal and paranoid PDs. Low RD has been found to associate with schizoid PD and antisocial PD. Combinations between lower PS in avoidant, dependent, and borderline PDs and higher PS in obsessive-compulsive PD have been found in earlier studies (Ball *et al.* 1997, Ha *et al.* 2007).

2.4 Epidemiology of personality disorders

2.4.1 Occurrence

Epidemiological studies suggest that the prevalence of PDs is between 5 and 13% in the general population (Weissman 1993, Torgersen *et al.* 2001; Coid *et al.* 2006), and over 40% in general inpatient and outpatient samples (Fossati *et al.* 2000, Marinangeli *et al.* 2000b, Zimmerman *et al.* 2005). This prevalence, however, incorporates varying degrees of severity, from mild to severe PDs.

The prevalence of different PD clusters varies in the population. For example, in the National Comorbidity Survey Replication (Lenzenweger *et al.* 2007) the prevalence estimates of DSM-IV PDs were 5.7% for Cluster A, 1.5% for Cluster B and 6.0% for Cluster C.

In another large epidemiological study in the U.S. with 43,093 subjects Grant *et al.* (2004) found that the most prevalent PD in general population was obsessive-compulsive PD, 7.8% (95% CI 7.43-8.3), followed by paranoid PD, 4.4% (95% CI 4.1-4.7), schizoid PD, 3.1% (95% CI 2.8-3.3), and avoidant PD, 2.3% (95% CI 2.1-2.5). The prevalences of different PDs in the population based on earlier studies are shown in Table 2.

The prevalence rates of Cluster B PDs in clinical samples are expected to be higher than in general population (Table 3). This might be due to the fact that such Cluster B PD types as borderline and antisocial PD are related in increased need of general medical and mental health services (Zimmerman *et al.* 2005, Lenzenweger *et al.* 2007). The characteristic features of different PDs are divergent; some PDs are closely connected with Axis I disorders, such as depression or substance abuse, which lead to help-seeking from medical centres or hospitals.

2.4.2 Sex differences

Several studies concerning the overall prevalence of PDs have shown a male preponderance among PDs (Jackson *et al.* 1991, Bodlund *et al.* 1993, Samuels *et al.* 1994, Samuels *et al.* 2002). In an epidemiological study Coid *et al.* (2006) found that men had higher PD rates than women (5.4%; 95% CI 3.2-9.1 vs. 3.4%; 95% CI 1.7-6.7). In some studies no significant gender differences have been established in the prevalences of any PD (Dahl 1986, Reich *et al.* 1989, Maier *et al.* 1992, Torgersen *et al.* 2001).

Data from several studies (Golomb *et al.* 1995, Carter *et al.* 1999, Bargenza *et al.* 2001) have indicated sex differences in specific types of PDs. Paranoid, schizoid, schizotypal, antisocial, narcissistic and compulsive PDs have been found to be more common among males, whereas borderline, avoidant and dependent PDs have been found to be more common among females (Table 4.). Grant *et al.* (2004) found that the risk of avoidant, dependent, and paranoid PD was significantly greater among women than men ($p<0.05$). The risk of antisocial PD was greater among men than women ($p>0.05$). No sex differences were observed in the risk of obsessive-compulsive, schizoid or histrionic PDs.

Table 2. The prevalence (%) of personality disorders in population studies.

	Maier *et al.* 1992	Lenzenweger *et al.* 1997	Torgersen *et al.* 2001	Samuels *et al.* 2002	Crawford *et al.* 2005	Coid *et al.* 2006
Instrument	SCID-II	IPDE	SIDP-R	IPDE	SCID-II	SCID-II
Location	Mainz, Germany	Ithaca, New York, USA	Oslo, Norway	Baltimore, USA	New York, USA	England, Scotland, Wales
Sample	Normal controls, their partners and relatives	University students aged 18-19 years	Individuals from National Register (weighted data)	Individuals aged 34-94 years (weighted data)	Normal controls from a 20-year follow-up study	Normal controls, aged 16-74 years (weighted data)
Sample size, n	452	1,646/258 [1]	2,053	742	644	626
Paranoid	1.8	1.0	2.4	0.7	5.1	0.7
Schizoid	0.4	1.0	1.7	0.9	1.7	0.8
Schizotypal	0.7	1.6	0.6	0.6	1.1	0.06
Antisocial	0.2	0.6	0.7	4.1	1.2	0.6
Borderline	1.1	1.3	0.7	0.5	3.9	0.7
Histrionic	1.3	2.9	2.0	0.2	0.9	NA
Narcissistic	0.0	2.7	0.8	0.0	2.2	NA
Avoidant	1.1	1.0	5.9	1.8	6.4	0.8
Dependent	1.5	0.6	1.5	0.1	0.8	0.1
Obsessive-compulsive	2.2	1.3	2.0	NA	4.7	1.9
Passive-aggressive	1.8	1.6	1.8	NA	NA	NA
Any PD	10.0	11.0	13.4	9.0	15.7	4.4

1 A two-stage case identification approach was used in which all 1,646 respondents were administered screening questions based on the IPDE, and all screen positives plus a probability sample of screen-negatives were administered on the IPDE (N=258)

NA= not available

Table 3. The prevalence (%) of personality disorders in clinical epidemiological studies.

	Koenigsberg *et al.* 1985	Kass *et al.* 1985	Dahl 1986	Jackson *et al.* 1991	Fossati *et al.* 2000	Marinangeli *et al.* 2000a	Zimmerman *et al.* 2005
Interview	Clinical	Clinical	SADS , SIB	SIDP	SCID-II	SCID-II-PQ	SIDP-IV
Location		USA	Norway	Australia	Italy	Italy	USA
Sample		Psychiatric outpatients	Psychiatric inpatients	Psychiatric	Outpatients	Psychiatric inpatients	Psychiatric outpatients
Sample size, n	2,462	609	231	112	431	300	859
Paranoid	0.4	4.9	0.5	9.8	6.3	19.0	4.2
Schizoid	0.0	1.0	2.7	5.4	1.2	3.3	1.4
Schizotypal	1.9	3.9	22.0	17.9	4.6	5.7	0.6
Antisocial	1.9	1.9	18.2	9.8	4.6	9.3	3.6
Borderline	12.3	11.0	20.3	28.6	22.5	30.7	9.3
Histrionic	2.8	6.1	19.3	28.6	13.7	10.0	1.0
Narcissistic	0.9	2.9	1.6	6.3	35.7	16.7	2.3
Avoidant	1.0	4.9	9.1	16.1	5.1	25.3	14.7
Dependent	2.8	8.0	2.1	16.1	3.0	17.0	1.4
Obsessive-compulsive	0.8	1.9	0.5	8.0	5.1	30.7	8.7
Passive-aggressive	NA	1.9	1.6	14.3	12.3	15.0	NA
Any PD	35.9	51.5	44.6	67.0	71.9	66.6	45.5

NA= not available

Table 4. The proportions (%) of females in different personality disorder categories in epidemiological studies.

	General population sample				Outpatient sample				Inpatient sample	
	Zimmerman & Coryell 1989	Maier *et al. 1992*	Torgersen *et al. 2001*	Coid *et al. 2006*	Alnaes & Torgersen 1988	Mulder 1991	Carter *et al.* 1999	Bargenza *et al.2001*	Jackson *et al.1991*	Grilo *et al.* 1996
	n (%)[1]	n (%)[1]	n (%)[1]	n (%)[1]	n (%)[1]	n (%)[1]	n (%)[1]	n (%)[1]	n (%)[1]	n (%)[1]
Method	SIDP	SCID-II	SIDP	SCID-II	SIDP	Register data	SCID-II	MCMI, PDQ	SIDP	PDE
Sample size, n	697	452	2053	626	298	6447	225	184	112	138
Paranoid	7 (75)	8 (50)	46 (54)	15 (40)	15 (53)	202 (38)	4 (25)	3 (66)	11 (45)	8 (38)
Schizoid	7 (29)	2 (0)	32 (38)	7 (29)	NA	343 (39)	12 (0)	12 (25)	6 (0)	1 (0)
Schizotypal	23 (44)	3 (33)	12 (58)	2 (50)	19 (42)	NA	35 (52)	1 (0)	20 (35)	8 (38)
Antisocial	26 (23)	1 (0)	12 (0)	14 (21)	NA	642 (24)	15 (20)	0 (0)	11 (9)	NA
Borderline	13 (54)	5 (60)	14 (71)	16 (44)	44 (79)	392 (41)	43 (42)	25 (32)	32 (50)	68 (56)
Histrionic	24 (58)	6 (67)	39 (72)	NA	41 (76)	604 (85)	16 (44)	18 (100)	32 (47)	9 (44)
Narcissistic	NA	0 (0)	17 (53)	NA	14 (28)	NA	14 (0)	7 (43)	7 (43)	6 (0)
Avoidant	10 (80)	5 (60)	102 (56)	21 (57)	165 (67)	NA	61 (49)	40 (60)	18 (50)	10 (50)
Dependent	14 (100)	7 (86)	31 (74)	3 (33)	140 (67)	NA	20 (60)	49 (78)	18 (65)	7 (43)
Obsessive-compulsive	16 (31)	10 (30)	39 (38)	13 (46)	59 (47)	110 (49)	21 (33)	29 (66)	9 (55)	4 (25)
Passive-aggressive	26 (50)	8 (75)	32 (31)	NA	30 (43)	NA	NA	NA	16 (50)	27 (48)

[1] Number of personality disorders in total (% of females), NA = not available

2.5 Family background and personality disorders

The aetiology of PDs is complex. PDs have been found to have their origins in biological and gene-environment interactions, as well as in psychosocial factors associated with childhood environment and experiences (Amato 1994, Kim-Cohen *et al.* 2005, 2006*,* Lee 2006).

2.5.1 Heritability of personality disorders

The associations of genetic influences and PDs have been the focus of eager scientific interest in the last two decades. In their review, Savitz & Ramesar (2004) stated that in twin studies heritability estimates for the five NEO personality traits has varied between 40 and 60%. In a twin study (92 monozygotic twins and 129 dizygotic twins) with mixed mental DSM-IV disorder diagnoses heritability estimates ranged from 79% to 28% (median 61%) (Torgersen *et al.* 2000). These estimates are more variable compared to estimates of normal personality traits, the consistency of which falls in the 40 to 60% range (Livesley & Jang 2008).

Childhood trauma has provided an important lead regarding the biological mechanism of PDs. 50 to 90% of subjects with PD have reported a history of childhood abuse or neglect. Previous studies have found associations between childhood trauma and borderline, antisocial and schizoid PDs (Caspi *et al.* 2002). Prospective studies also have found that childhood trauma is a risk factor for a range of PD symptoms rather than any single PD. It has been suggested that childhood trauma may affect underlying neurobiological factors common to different PDs (Lee 2006).

In summary, all PD traits have a substantial heritable component, and the phenotypic structure and genetic structure are highly congruent. There is considerable specificity to genetic influences. Behavioural genetics research suggests that primary traits are the main building blocks of personality. Genetic and environmental influences are not independent; rather, they are closely intertwined. Primary traits may be conceptualized as incorporating an adaptive mechanism that is part of universal human nature and associated genetic variability (Livesley & Jang 2008).

2.5.2 Other familial factors

Growing up in single-parent or stepfamilies, young motherhood, maternal depression and financial problems in childhood family have been considered risk factors for the mental health of children (Amato & Keith 1991, Dunn *et al.* 1998, Jaffee *et al.* 2001, Amato, 2001, 2005, Cohen *et al.* 2005)

According to longitudinal studies, childhood conduct disorders have been found to be an independent predictor of PDs (Bernstein *et al.* 1996, Coid 2003, Smith & Farrington 2004). In a large follow-up study of more than 20 years, Cohen *et al.* have established that low family socioeconomic status, single-parent family, parental sociopathy, parental mental illness, and parental death were each independently related to later PD traits (Cohen *et al. 2005).* Other studies have shown family background factors like family structure, functioning, emotional family climate and parent's mental disorder to be potentially implicated in pathogenic processes of personality (Mäkikyrö *et al.* 1998, Pfiffner *et al.* 2001, Grilo & Masheb 2002, Goldstein *et al.* 2006). Especially childhood traumatic experiences, such as maltreatment, sexual abuse and victimization associate with PDs in adulthood (Johnson *et al.* 1999a, Grilo & Masheb 2002, Coid *et al.* 2006).

Coid found that antisocial and borderline PDs of offspring associated with family history of first-degree relative with mental disorder (Coid 1999). According to Paris et al., subjects with borderline PD had increased rates of early separation from or loss of parents (Paris *et al.* 1994). Antisocial behaviour has been found to associate with the absence of biological father (Pfiffner *et al.* 2001) or separation from one or both parents in childhood (Kendler *et al.* 1992, Mäki *et al.* 2003, Perth *et al.* 2004). An Australian longitudinal study found that parent's marital instability doubled the risk for a child's antisocial behaviour (Bor *et al.* 2004). According to Farrington (2000) the most important childhood predictors to adult antisocial personality were convicted parent, large family size, low intelligence or attainment, and child-rearing factors, including a young mother and a disrupted family. However, outside of the context of research on the associations with antisocial and borderline PDs, little is known about childhood family background factors and other PDs in adulthood.

2.6 Comorbidity of personality disorders

There are two types of psychiatric comorbidity among PDs: comorbidity with other mental diorders and comorbidity between different PD types. Epidemiological studies have addressed high rates of psychiatric comorbidity among subjects with PD in both general population and clinical samples.

2.6.1 Mood disorders

The most common and perhaps best-studied comorbidity is between mood disorders and PDs (Oldham *et al.* 1995, Fava *et al.* 1996, Lenzenweger *et al.* 1997, Carter *et al.* 1999, Marinangeli *et al.* 2000a, Lenzenweger *et al.* 2007). In an Australian epidemiological study, Jackson and Burgess (2000) found that subjects with PD were more likely to have mood disorders (OR 3.7; 95% CI 2.6–5.3). According to Zimmerman *et al.* (2005), in a study of 1,500 outpatients the prevalence of major depression was 51.3% among subjects with any PD, compared to 40.8% ($p<0.01$) among those without PD. The most common PDs associating with mood disorders were avoidant, borderline and dependent PDs (Skodol *et al.* 1999, Marinangeli *et al.* 2000a, Rossi *et al.* 2001, Zimmerman *et al.* 2005). An earlier study in Finland established that the comorbidity rate with major depressive disorder and PD was 44% among a patient sample in the Vantaa Depression Study (Melartin *et al.* 2002).

2.6.2 Anxiety disorders

Associations between anxiety disorders and PDs have been found in previous studies (Marinangeli *et al.* 2000a, Bargenza *et al.* 2001). Jackson and Burgess (2000) pointed out that subjects with PD were more likely to have anxiety disorders (OR 4.95; 95% CI 3.8–6.4) than subjects without any PD. Some studies have established that anxiety disorders associate significantly with Cluster C PDs (Oldham *et al.* 1995, Coid *et al.* 2006). In the studies of Maier *et al.* (1992) and Oldham *et al.* (1995) significant associations have been observed between anxiety disorders and avoidant PD. In addition, Oldham *et al.* (1995) found that anxiety disorders associated significantly with avoidant (OR 6.0; 95% CI 2.9–12.8), dependent (OR 4.3; 95% CI 1.8–10.1) and borderline (OR 2.7; 95% CI 1.4–5.1) PDs. Cluster B PDs have been found to associate significantly with anxiety disorders (Lenzenweger *et al.* 2007).

2.6.3 Substance use disorders

Several studies have examined the comorbidity of substance use disorders and PDs in clinical and nonclinical samples (Grilo *et al.* 1997, Zimmerman *et al.* 2005, Cohen *et al.* 2007). Subjects with PDs have been found to have substance use disorders (OR 2.3; 95% CI 1.6–3.6) more commonly than subjects without any PD (Jackson and Burgess 2000). Among Cluster B PDs the associations with substance use disorders have been found to be significantly higher (OR 7.9; 95% CI 4.4–14.4) than among Cluster A (OR 1.8; 95% CI 1.0–3.3) or cluster C PDs (OR 2.0; 95% CI 1.1–3.5) (Lenzenweger *et al.* 2007). In addition, well-established links between substance use disorders and antisocial and borderline PDs have been documented in previous studies (Dahl 1986, Oldham *et al.* 1995, Grilo *et al.* 1997, McGlashan *et al.* 2000, Skodol *et al.* 2002, Zimmerman *et al.* 2005). A 30-year follow-up study has suggested that Cluster B PDs (e.g. borderline, histrionic and narcissistic) in early adolescence are independent risks for later substance use disorders (Cohen *et al.* 2007). A Finnish study dealing with mentally ill homicide offenders has found the comorbidity rate of substance use disorders with any PD to be 51%, that with antisocial PD being 47% (Putkonen *et al.* 2004).

2.6.4 Personality disorders

As many as 20 to 50% of the subjects with PD have been found to fulfil the criteria for a comorbid PD (Kass *et al.* 1985, Zimmerman & Coryel 1989, Torgersen *et al.* 2001). Lenzenweger *et al.* (2005) have found Odds Ratios (OR) for comorbid PD diagnosis from 0.3 to 15.2 among psychiatric outpatients. The comorbid PD rate was 2.6% in women and 2.3% in men among an SCID-interviewed population sample (Maier *et al.* 1992). In the Collaborative Longitudinal Personality Disorders Study (McGlashan *et al.* 2000) the mean number of lifetime PD diagnoses was 1.9. Torgersen *et al.* (2001) found that 5.5% of subjects with PD met the criteria for more than three PDs. There is also a high level of comorbidity between PD categories in different clusters and within the clusters. In an outpatient sample the intercorrelation between different PDs has ranged from –0.10 (compulsive vs. antisocial PDs) to 0.42 (schizotypal vs. paranoid PDs) (Kass *et al.* 1985). In a study concerning PD correlates Coid *et al.* (2006) found that the correlation coefficient was 0.25 between Cluster A and Cluster B PDs; 0.29 between Cluster A and Cluster C, and 0.16 between Cluster B

and Cluster C. The comorbidity PDs within clusters has also been shown to be high. For example, the ORs for borderline PD to have comorbid antisocial or paranoid PDs have been found to be significantly high (Zimmerman *et al.* 2005). In addition, significant co-occurrence has emerged among borderline, schizotypal, antisocial, avoidant, histrionic, dependent and passive-aggressive PDs (Zimmerman & Coryell 1989, Marinangeli *et al.* 2000b).

2.7 Summary of the reviewed literature

New diagnostic categories of PDs have been developed over the last few decades. In previous studies, the aetiology of PDs has been found to be complex. The prevalences of different PD types vary a lot among clinical and population samples. Some PDs are found to associate with an increased need for psychiatric hospital treatment. Gender differences have been established among most PDs in earlier studies, but the results are still somewhat inconsistent. No earlier studies have examined the distribution of PDs in a clinical and population sample consisting of subjects of the same age and ethnicity.

Risk factors for the development of PDs are assumed to associate with both genetic variants and childhood experiences. It has been established that traumatic experiences and victimization in childhood may contribute to the development of PDs. There is a lack of studies dealing with the associations between childhood family background and PDs in adulthood.

PDs are found to be highly comorbid with other psychiatric disorders. A large number of studies have addressed the high rates of psychiatric comorbidity among subjects with PDs. Most previous studies have been restricted to clinical samples or certain psychiatric disorders. It has been found that borderline and antisocial PDs are comorbid with substance use disorders. However, the comorbidity of Axis I disorders and PDs may complicate the diagnosis and treatment of PDs or cause functional impairment. More information is therefore needed on the associations between Axis I disorders and PDs in a young adult population.

Temperament dimensions are seen to contribute towards behavioural activation and inhibition, and they are seen as maintenance of behaviour. Previous studies have found that conventional personality variables arise from different combinations of the basic dimensions of temperament. There are some studies in which PDs are found to relate to temperament dimensions. More information

should be gathered on how different PDs are characterized by various combinations of temperament dimensions.

3 Aims of the present study

The purpose of this study was to determine the occurrence of PDs in general population and in psychiatric hospital patients, the associations of PDs with childhood family structure, the co-occurrence of PD with common psychiatric disorders, and the associations between PDs and temperament in a young adult population. Hereafter, the numbers I–IV refer to the original publications:

The specific aims of the present study were:

1. To compare the distribution of personality disorders among hospital-treated subjects and population (I).
2. To study associations of childhood family structure and some childhood background factors with specific PDs in adulthood (II).
3. To examine the co-occurrence of mood, anxiety and substance use disorders among persons with PDs (III).
4. To investigate whether there are associations between temperament profiles and personality disorders (IV).

4 Material and methods

4.1 Study population and data collection

This study forms part of the prospective, longitudinal Northern Finland 1966 Birth Cohort Study (NFBC 1966). The original NFBC 1966 was assembled by professor (emerita) Paula Rantakallio, whose purpose was to investigate the risk factors for perinatal deaths and low birth weight. The original sample was collected from a geographically defined area of the two northernmost provinces of Finland and consisted of an unselected birth cohort of 12,058 live births covering 96.3% of all deliveries in Northern Finland in the year 1966. The majority of the cohort members are Finns, with less than 1% of the subjects being Lapps and Romas.

Information on the sociodemographic characteristics of the mother and the family was collected at the antenatal clinic during midgestation. Information on biological, socioeconomic and health-related conditions as well as living habits and family characteristics of the cohort members have been collected prospectively through prenatal stages up to the age of 31 (Rantakallio 1969, 1988, Rantakallio *et al.* 1992).

To date, three follow-up studies of the NFCB 1966 project have been conducted. The first follow-up was performed when the subjects were 1 year old during a routine postnatal clinic visit (1-year follow-up). Data were gathered on growth, development and health status of the children at that time (Rantakallio 1988).

The second follow-up of the total cohort was performed at the end of 1980 and in early 1980 (14-year follow-up) by sending a postal questionnaire to the subjects. At the age of 14 years, 11,780 subjects were alive; only 14 could not be traced. A postal questionnaire was sent to 11,766 subjects, 11,010 (93.5%) of whom responded, 5,455 girls and 5,555 boys. Information was gathered on health, growth including height and weight, hobbies, living habits, school performance as well as family background variables and the social situation of the family (Rantakallio 1988).

The latest follow-up, called the Northern Finland Health and Well-being Study, was conducted during 1997-98 (Sorri & Järvelin 1998, Järvelin *et al.* 2004). A postal inquiry was sent to 11,541 members of the cohort, 75.3% of whom responded. In addition, 8,465 cohort members who were living in Northern

Finland or in the capital area of Helsinki were invited to a clinical examination; 70.9% of them participated.

4.2 The sample of the Oulu Substudy

As part of the 31-year follow up study, 1,609 cohort members living in the town of Oulu at that time were invited to take part in a psychiatric study called the ”Oulu Study”. It was conducted using a two-stage design, consisting of a screening phase and psychiatric interview. Altogether 1,311 (81.5%) of the cohort members living in Oulu participated in this psychiatric field study and gave a written informed consent.

4.3 Data collection

4.3.1 Data from the 31-year follow-up study

Together with the invitation to the field study the subjects received a questionnaire with the Hopkins Symptom Check List-25 questionnaire (HSCL-25) (Derogatis *et al.* 1973), which was used as a psychiatric screening method for the psychiatric interview. The HSCL-25 is a 25-item shortened version of an originally 90-item questionnaire designed by Derogatis *et al.* (1973). The HSCL has been used in several versions of different lengths (16–90 items), all of which have been shown to have satisfactory validity and reliability as a measure of mental symptoms (Glass *et al.* 1978, Hough *et al.* 1990).

In the HSCL-25 the subjects assessed the presence and intensity of depressive and anxiety symptoms over the previous week. The answers were scored on a scale from 1 (not bothered) to 4 (extremely bothered). The HSCL-score was the sum of the items divided by the number of items answered. In the original publications I to IV, HSCL mean score ≥ 1.55 was used as a screening cut-off (Joukamaa *et al.* 1994, Sandager *et al.* 1998, Veijola *et al.* 2003) for the psychiatric interview. Subjects were excluded from the sample if more than five items of the whole HSCL-25 were missing. Missing data were not replaced.

All HSCL-25-screen positives (N=241, 18% of the sample) were invited to a psychiatric interview. Of the screen positives, 209 (87 men and 122 women) were interviewed; 32 refused or could not be traced. Every tenth screen-negative subject was interviewed as well. If a screen-negative person refused to be

interviewed s/he was replaced with the next consecutive screen-negative subject. The SCID-II self-report personality questionnaire was used prior to administering the interview. The Structured Clinical Interview for DSM-III-R on Axis I and II disorders (SCID I and II) (Spitzer *et al.* 1989a, 1989b) was used as the diagnostic method. SCID is commonly used to characterize a study population in terms of current (previous month) and past psychiatric disorders. Altogether 112 (53 men and 59 women) interviews for screen-negative subjects were performed. The interviews totalled 321. All the interviewers (three psychiatric residents and one child-psychiatric resident and one psychologist) were specially trained for the task. The reliability of the interviewers in this training was good (degree of agreement 0.88–1.00 and kappa 0.43–0.95). The SCID diagnoses were reviewed by senior researchers on the team. The sensitivity of HSCL-25 for any present DSM-III-R axis I psychiatric disorder was 48%. The specificity was 87% (Veijola *et al.* 2003).

The Temperament and Character Inventory (TCI) questions, which are based on Cloninger's (Cloninger 1987, Cloninger *et al.* 1993, 1994) model of personality variables, were administered to the cohort members who participated in the field study. One thousand and nine individuals (467 men, 542 women) completed the temperament questionnaire. Only questionnaires with six or fewer missing items were included. The final control sample was 910 (415 men, 495 women).

4.3.2 Data from the Finnish Hospital Discharge Register

The nation-wide Finnish Hospital Discharge Register (FHDR) covers all mental and general hospitals, as well as the wards of local health centres, military wards, prison hospitals and private hospitals. The ICD-8 was used in Finland between the years 1968–1986. During 1987–1995 the ICD-9 with DSM-III-R criteria was in use; since 1st January 1996 the ICD-10 has been the official classification. All NFBC 1966 cohort members (N=515) with an FHDR diagnosis in the range of 290–309 and 709.20 (ICD-8), 290–316 (ICD-9), or F00–F69 and F99 (ICD-10) were selected for diagnostic re-checking. The detection of subjects and validation of diagnoses have been described earlier in detail (Isohanni *et al.* 1997, Moilanen *et al.* 2003). Individual hospitals were requested to send original hospital records or copies to the study centre in Oulu. Nine of the FHDR diagnoses turned out to be coding errors, and 31 case records were not available. As a result we received the hospital case records of 475 individuals. Clinical information was extracted

from the case records. The researchers introduced the operational DSM-III-R diagnoses to a panel of three experts on psychiatric diagnostics. In this process 28 cases did not meet the criteria of any DSM-III-R diagnoses and three received only a diagnosis of mental retardation or borderline intellectual functioning (DSM-III-R-codes 317.00 or V40.00). Thus, a total of 31 cases were excluded. The remaining 444 cases met the criteria of a DSM-III-R disorder. The case records were reviewed against DSM-III-R criteria by six psychiatrists who had been trained for the validation process.

The training in re-checking of psychiatric diagnoses was conducted in the following manner: two psychiatrists and four psychiatric residents underwent training which aimed at reliable diagnostics according to DSM-III-R criteria. Reliability was estimated after the training by diagnosing 40 randomly selected case summaries, prepared specially for reliability exercises. The reliability of the researchers in this training was good. The degree of agreement concerning all psychiatric disorders was 0.92 and mean kappa for all six diagnostic categories 0.65 (range in the six diagnostic categories 0.53–0.78; personality disorders: kappa 0.68, observed agreement 0.84).

4.3.3 Data from public health care

All medical records from public health care of the Oulu study subjects during 1982–1996 were reviewed by a psychiatrist, Juha T Karvonen. The medical records of the subjects were available at the municipal primary and mental health care of Oulu, the A-clinic Foundation clinic (for substance abuse treatment), the Finnish Student Health Service, the Child and Family Guidance Centre and outpatient clinics at Oulu University Hospital. It was not possible to obtain private and occupational health care patient records. According to the acts and instructions from the Ministry of Health the national and local health authorities supervise the comprehensiveness and quality of patient records at both inpatient and outpatient facilities. Only 43 (2.7%) of the 1,609 subjects had not used any of these services by the end of 1996. The data collection procedure used in the original publications I–IV is presented in Figure 1.

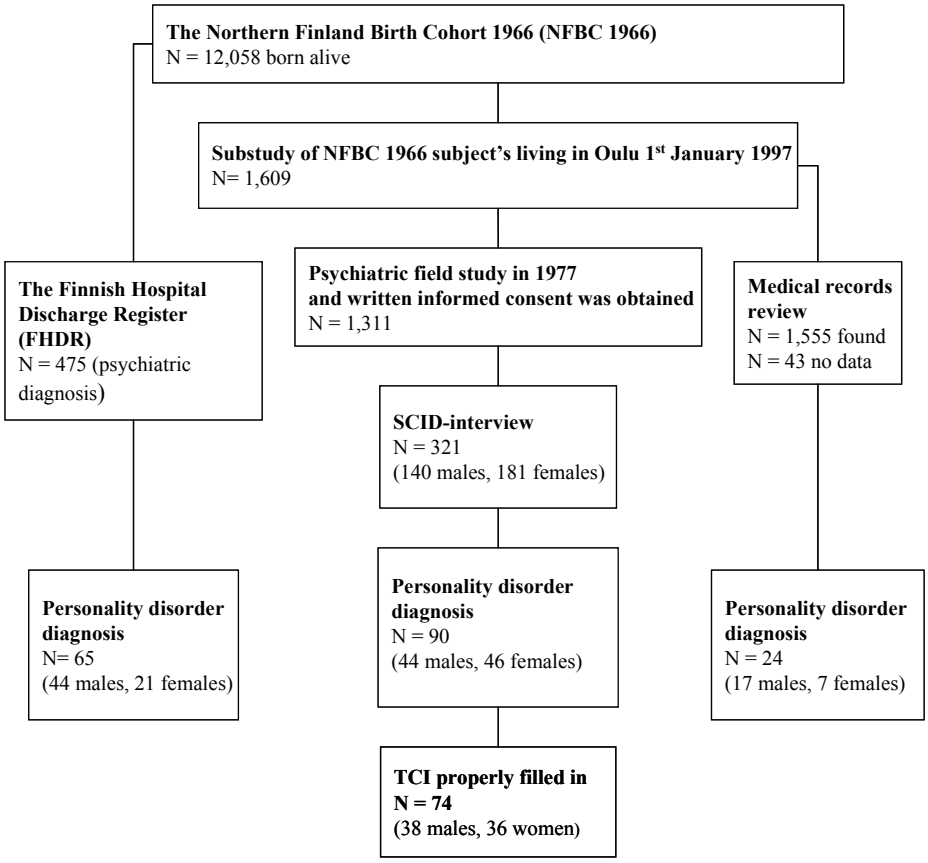

Fig. 1. The flowchart of the data collection procedure in the Oulu Study, subsample of the Northern Finland 1966 Birth Cohort Study and diagnostic data used in the original publications I–IV.

4.4 Variables

4.4.1 Outcome variables

Diagnoses of personality disorder (I–IV)

The DSM-III-R diagnostic criteria were used in this study because the Finnish translation of the Structured Clinical Interview for DSM-IV was not in research

use in Finland at the time when the study was conducted. According to the DSM-III-R (American Psychiatric Association 1987): "The diagnostic criteria for the PDs refer to behaviour or traits that are characteristic of the person's recent (past years) and long term functioning (generally since adolescence or early adulthood). The constellation of behaviours or traits causes either significant impairment in social or occupational functioning or subjective distress. Behaviours or traits limited to episodes of illness are not considered in making diagnosis of PD."

According to the DSM-III-R, PDs are classified into three clusters. Cluster A (labelled odd or eccentric) includes paranoid, schizoid and schizotypal PDs. Cluster B (emotional, dramatic or erratic) includes antisocial, borderline, histrionic and narcissistic PDs. Cluster C (anxious or fearful) includes the diagnoses of avoidant, dependent, obsessive-compulsive, and passive-aggressive PDs. There is also a residual category, personality disorder not otherwise specified (PD NOS). A PD was classified to PD NOS category when the subject had features of more than one specific PD that did not meet the full criteria of any one disorder, yet caused significant impairment in social or occupational functioning or subjective distress. The characteristic features of PDs are shown in Table 5.

Table 5. The characteristic features of personality disorders among DSM-III-R (American Psychiatric Association 1987, Tyrer 1988, Tyrer *et al.* 1991).

Personality disorder	Characteristic features
Cluster A	
Paranoid	Interpretation of people's actions as deliberately demeaning or threatening
Schizoid	Indifference to relationships and restricted range of emotional experience and expression
Schizotypal	Deficit in interpersonal relatedness with peculiarities of ideation, appearance and behaviour
Cluster B	
Antisocial	Evidence of repeated conduct disorder before the age of 15 years
Borderline	Pervasive instability of mood, interpersonal relationships and self-image
Histrionic	Excessive emotionality and attention-seeking
Narcissistic	Pervasive grandiosity, lack of empathy, and hypersensitivity to the evaluation of others
Cluster C	
Avoidant	Pervasive social discomfort, fear of negative evaluation and timidity
Dependent	Persistent dependent and submissive behaviour
Obsessive-compulsive	Pervasive perfectionism and inflexibility
Passive-aggressive	Pervasive passive resistance to demands for adequate social and occupational performance
Personality disorder not otherwise specified	Disorders of personality functioning that are not classifiable as a specific personality disorder. E.g. features of more than one specific personality disorder that do not meet the full criteria for any one disorder, yet cause significant impairment in social or occupational functioning, or subjective distress

SCID interview diagnoses of personality disorders (I–IV)

PDs were determined by the Structured Clinical Interview for DSM-III-R personality disorders (SCID-II), which is a standardized, semistructured clinical interview designed by Spitzer *et al.* (1989b). Before the interview the subjects filled in the SCID-II screen questionnaire.

All SCID diagnoses were reviewed against the DSM-III-R (American Psychiatric Association, 1987) criteria in the expert panel of the research group. In order for a diagnosis to be "definite", all the required minimum DSM-III-R criteria to make a diagnosis had to be met. For a diagnosis to be "probable" the required minimum criteria were not fully met (one of the diagnostic criteria was lacking), but the diagnosis seemed likely on a clinical basis. In the present study

"definite" or "probable" diagnoses were pooled together. PDs were classified into three clusters according to the DSM-III-R criteria. The characteristic features of PDs are shown in Table 5.

Personality disorder diagnoses from FHDR (I, II)

Data on PD hospital diagnoses were gathered from FHDR. The case records of all subjects having been admitted to hospital care due to psychiatric disorders during 1982–1997, i.e. between the age of 16 and 31 years, were collected. The case records were reviewed against DSM-III-R criteria by six psychiatrists (Anne Herva, Liisa Kantojärvi, Juha T Karvonen, Pirkko Kokkonen, Kristian Läksy and Juha Veijola) who had been trained for the validation process.

Consensus diagnoses of personality disorders (II)

The aim was to make best-estimate lifetime PD diagnoses (Leckman *et al.* 1982, Kosten & Rounsaville 1992, Taiminen *et al.* 2001) appearing in the sample. The information on PDs was collected in the field study interview by the SCID-II. In addition, all hospital treatment periods of the subjects due to psychiatric disorders between the years 1982–1997 were identified from the FHDR. Furthermore, all medical records in public health care during 1982–1996 were reviewed (Karvonen *et al.* 2004). All PD diagnoses were reviewed against DSM-III-R criteria in the expert panel using information from all three data sources.

4.4.2 Exposure variables

Family type and marital status (II)

The information on family background was assessed by a questionnaire both in 1966 and 1980. Marital status was assessed in 1966 when mothers filled in the questionnaire at the antenatal clinic during pregnancy. In the 14-year follow-up (Moilanen & Rantakallio 1988, Sauvola *et al.* 2002) the questionnaire was sent to the cohort member, and if s/he did not respond, the questionnaire was forwarded to the custodial parent. The cohort member was asked at the age of 14 years if his/her mother/father was: 1) alive, 2) alive, but not living at home, 3) dead, or 4)

unknown. In the original publication I, the families were divided in this thesis into two- and single-parent families.

A family was coded as a single-parent family if 1) the mother was unmarried at entry to the study during pregnancy and remained so up to the time the child was 14 years old ("all-time single"), 2) the child was born to an unmarried mother who was married by the time the child was 14 years old ("single at birth"), 3) the mother, father or both had died before the child was 14 years ("parental death") and 4) the parents were divorced or not living together by the time the child was 14 years of age ("parental divorce").

Mood, anxiety and substance use disorders (III)

Data on lifetime Axis I diagnoses were gathered from the 31-year follow-up study by SCID-I interview. The Axis I disorders were divided into three major categories: 1) Mood disorders (DSM-III-R codes 296.6X–296.70, 300.40, 301.13, 311.00), 2) Anxiety disorders (300.00–300.02, 300.21–300.23, 300.29, 309.89) and 3) Substance use disorders (304.00–304.60, 304.90, 305.00–305.70, 305.90). No psychotic disorders (295.10–298.90) were found among subjects with PD in the SCID I interview.

Temperament profiles (IV)

Data on temperament profiles were gathered from the Temperament and Character Inventory (TCI), which is based on Cloninger's (Cloninger 1987, Cloninger *et al.* 1993, 1994) model of personality variables arising from different combinations of the four basic dimensions of temperament. TCI is a 240-item questionnaire for the assessment of the seven basic dimensions of personality including the four temperament dimensions Harm Avoidance (HA), Novelty Seeking (NS), Reward Dependence (RD) and Persistence (P) and three character dimensions (Self-Directedness, Co-Operativeness and Self-Transcendence). However, in order to spare probands' time, the character items of the TCI were not collected, because the main goal in using this questionnaire in the NFBC 1966 was to identify genetic factors underlying personality (Ekelund *et al.* 1999, Lichtermann *et al.* 2001), and at the time when the study was done a sufficient degree of hereditability was known only concerning the temperament dimensions. The Finnish version of the questionnaire was prepared by using the translation-back-translation procedure (Ekelund *et al.* 1999, Lichtermann *et al.* 2001). The

psychometric properties of the Finnish version of the scale have been found to be satisfactory. The highest Cronbach's alpha value in the TCI subscales was 0.74 of the extravagance subscale (NS3), and the lowest alpha (0.42) in the disorderliness subscale (NS4) (Miettunen *et al.* 2004).

4.4.3 Confounding variables (II)

Mother's age at delivery

Mother's age at time of delivery was obtained from a questionnaire filled in at the maternity clinic. In the original publication I, mother's age at delivery was dichotomized as under 19 years and 19 years or more, since young motherhood is considered to be a potential risk factor influencing the development of offspring (Christ *et al.* 1990, Nagin & Tremblay 2001).

Social class in 1966

The cohort members' social class in 1966 was determined by father's occupation and its prestige (Sosiaaliryhmitys 1954, Rantakallio 1969, Mäkikyrö *et al.* 1997). In the highest class I the father's occupation had the highest prestige and required academic education, such as elementary school teachers, general practitioners, professional engineers and clergymen. Class II included professionals with lower esteem and shorter education than in class I, such as office managers. Class III consisted of skilled workers, such as clerks and stewards, and class IV consisted of unskilled workers, e.g. office boys and night watchmen. Class V comprised farmers. In the original publications, father's social class was re-categorized to three groups: classes I–II/classes III–IV/farmers. In this study class IV (unskilled workers and persons on disability pension) was used as a reference class and it was compared with other social classes. When the father's occupational status was not known the mother's information was used.

Childhood residence

In the 1980 follow-up (Moilanen & Rantakallio 1988) the living place was asked in a questionnaire. Place of childhood residence was dichotomized as town or rural in the original publication II.

Parent's psychiatric hospital-treatment

The parent's mental disorders were operationalized with diagnoses from psychiatric hospital treatment during 1972–1982 from the FHDR. Parent's psychiatric disorder was dichotomized as yes or no.

Only child position

In the original study I the birth order status was defined at the age of 14 through a questionnaire (Moilanen & Rantakallio 1988). The family size was enquired as follows: "How many children are there or have been in your family?" The birth order status was dichotomized as "only child" or "not only child" in the family since the only child position has been found to be a risk for violent behaviour (Kemppainen *et al.* 2001).

4.5 Statistical methods

In the original study I, differences in the prevalence of PD distributions were tested by the Chi square test and when appropriate, by Fisher's exact test. Statistical significance was tested using p-values (5% level) and 95% CIs.

In the original study II, specific PDs were analysed in clusters and in PD categories with more than 10 cases. Chi-square tests, Fisher's exact test (as appropriate), and Odds Ratios (ORs) with 95% confidence intervals (95% CIs) were used for statistical analysis in group comparisons of categorical variables. Logistic regression analysis with ORs was used to study the independent associations between the explanatory variables and the outcome. In logistic regression analysis, social class in 1966 (IV vs. other) and parental mental disorders were used as covariates.

In the original study III, data analysis was carried out using STATA (Stata, 2001). All analyses used weights calculated to approximate the inverse probability of selection into the final (second phase) sample. Stata's Surveys Estimation command provided a weight estimate for proportions. Weighted percentages and 95% CIs were calculated that way. For those positive or negative according to the HSCL-25 criterion (first phase cases), weight was calculated as the inverse of the participation rate at phase two. The sampling weight is thus an indicator of how many phase one subjects are represented by each of the phase two records (Dunn *et al.* 1999).

In the original study IV, specific PDs were analysed in clusters and in PD categories with more than five cases. The mean TCI scores of subjects with and without PD were compared with one another using Student's t-test. The level of significance was set at $p < 0.05$. The standard deviations (SD) in each PD cluster of temperament dimensions were calculated and presented. When comparing temperament profiles between personality disorders and controls, high and low in the temperament dimensions were based on mean values separately for genders from the total sample (n=984). Only two categories were used because of the small sample size in PD subcategories.

The statistical programs used were the SPSS software for Windows (SPSS Inc., 2006) in original publications I-II and IV; in the original study III the STATA (Stata 2001) was used as well.

4.6 Ethical considerations and personal involvement

Permission for gathering register data for the entire Cohort was obtained from the Ministry of Social Welfare and Health Affairs in 1993. The 31-year follow-up survey design of Northern Finland Health and Well-being Study 1966 was approved by the Ethics Committee of the Faculty of Medicine, University of Oulu. During the 31-year follow-up, the cohort members have been given a complete description of the study and they have had the possibility to refuse to participate in the study. This doctoral thesis study was approved by the Postgraduate Research Committee of the Faculty of Medicine, University of Oulu on 18 December 1998. The permission granted by the Ethics Committee of the Faculty of Medicine on 17 June 1996 also covers the present study. The author of this thesis has participated in the NFCB 1966 as a researcher since 1997.

The author of this thesis has participated in the field study as an SCID interviewer (N=36) and has reviewed over 300 hospital notes of the cohort members from FHDR. The author has been accorded permission to use the data and has participated in study design, data analysis and reporting the results in all original publications I – IV. The contribution of the author in all original studies has been central. The author has had original ideas for the studies and has written the first and final versions of papers I–IV.

5 Results

5.1 Distribution of personality disorders

Since the number of subjects in this study and in the original articles varies, the samples characteristics will be presented in this chapter. The results of chapter 5.1 are not presented in this form in the original publications I–IV.

5.1.1 Personality disorders in the SCID interview

Of the 321 SCID-interviewed subjects 90 (28%) met the criteria of at least one PD (44 men, 46 women). For SCID interviewed PD diagnoses the rate was 31.4% in men and 25.4% in women. Sixteen (9 men, 7 women) subjects met the criteria for two or more comorbid PDs. Altogether 107 PD were diagnosed among these subjects. The most common were Cluster C PDs, which accounted for 47.7% (N=51), compared with Cluster B, 27.1% (N=29), Cluster A, 14.0% (N=15), and PD NOS, 11.2% (N=12). In both genders the most common types were avoidant and obsessive-compulsive PDs. A statistically significant gender difference was found only in the case of antisocial PD, which was more common among males than females (P=0.002). The distribution of PDs is shown in Table 6.

The weighted prevalence of PDs in the SCID-II-interviewed sample was 18.9%. The weighted prevalences in the clusters were 3.8% in Cluster A (95% CI 1.0–8.0), 4.8% in Cluster B (95% CI 2.6 –8.8) and 10.5% in Cluster C (95% CI 6.8–15.9). The most prevalent PD in this study was obsessive-compulsive PD (6.5%, 95% CI 3.6–11.4), followed by avoidant PD (5.1%, 95% CI 2.7–9.5), paranoid PD (2.9%, 95% CI 1.2–6.8), antisocial PD (1.5%, 95% CI 0.7–3.0) and borderline PD (0.9%, 95% CI 0.5–1.7). No gender differences were found in this study, except in the case of antisocial PD, in which all subjects were men.

Of the subjects who met the criteria of PDs in the SCID interview 81% (N=73) were HSCL screen positive and 19% (N=17) HSCL screen negative. HSCL-negative subjects made up 29% of Cluster A, 15% of Cluster B and 19% of Cluster C PD diagnoses. Of all PD diagnoses 50% were definite. 67% of Cluster A PD diagnoses were definite. The definite/probable rate of single PD diagnosis is in brackets (8/3 paranoid, 0/2 schizoid and 2/0 schizotypal PD). 48% of Cluster B PD diagnoses were definite (4/4 antisocial, 5/6 borderline, 5/3 histrionic and 0/2 narcissistic PD). Among Cluster C PDs, 46% of diagnoses were

definite (13/10 avoidant, 0/2 dependent, 9/14 obsessive-compulsive and 1/1 passive-aggressive PD). In the case of PD NOS, 50% of diagnoses were definite.

5.1.2 Personality disorders in the Finnish Hospital Discharge Register

In the whole cohort sample of 444 hospital-treated subjects 65 (14.6%) met the criteria of at least one PD (44 men, 21 women). Three of the subjects with hospital-treated PD were also SCID-interviewed and they were included in both SCID-interviewed and hospital-treated study samples. Cluster B PDs made up 69.1% (N=47) of all PDs. Cluster A made up 5.9% (N=4), Cluster C 4.4% (N=3), and PD NOS 20.6% (N=14) of all PD diagnoses. Antisocial PD was more common in hospital-treated males than females (P=0.003), constituting 40.4% of all hospital-treated PDs in men. Borderline PD diagnosis was more common in hospital-treated females than in males (P=0.004), making up 61.9% of all hospital-treated PD diagnoses in women. The distribution of different PDs is shown in Table 6.

Of the hospital-treated subjects with PD, 48 (73.8%) had at least one comorbid Axis I psychiatric disorder. 43 of them (89.6%) had substance use disorders, 12 (25.0%) mood disorders, 7 (14.6%) psychotic disorders and 6 (12.5%) anxiety disorders.

5.1.3 Personality disorders from public health care

There were 24 subjects (17 men, 7 women) who met the criteria of PD in the public health care register data. Three subjects met the criteria of two PDs. The most common PD diagnoses were borderline (N=15), antisocial (N=3) and PD NOS (N=3). Nine of the subjects were also treated in hospital. Four of the subjects with PD had met PD diagnosis criteria in the SCID interview, too.

5.1.4 Consensus diagnosis of personality disorders

In the original article II the consensus diagnosis of PDs was used. The consensus PD sample consisted of 90 subjects with PD diagnosis in the SCID interview, in addition to 20 subjects with PD diagnosis from the FHDR or from the outpatient register data. In this sample one subject may have more than one PD diagnosis. Of the 131 PD diagnoses 36.7% (N=48) were Cluster C PDs, 32.8% (N=43) were

Cluster B PDs and 12.2% (N=16) Cluster A PDs. The most common PD diagnoses were borderline (N=25), avoidant (N=23), obsessive-compulsive (N=23) and PD NOS (N=24).

Table 6. The distribution of personality disorder (PD) diagnosis [1] in the Finnish Hospital Discharge Register (FHDR), the SCID-interviewed sample, and outpatient register data in Oulu (percentages of subjects with PDs) [2].

Personality Disorder	Men						Women					
	FHDR (n=44)		SCID interview (n=44)		Outpatient register data (n=17)		FHDR (n=21)		SCID interview (n=46)		Outpatient register data (n=7)	
	n	%	n	%	n	%	n	%	n	%	n	%
Cluster A	2	4.2	5	9.6	2	10.6	2	9.5	10	18.6	1	12.5
Paranoid	1	2.1	3	5.8	1	5.3	0	0	8	14.8	1	12.5
Schizoid	0	0	1	1.9	0	0	0	0	1	1.9	0	0
Schizotypal	1	2.1	1	1.9	1	5.3	2	9.5	1	1.9	0	0
Cluster B	32	68.0	17	32.7	12	63.0	15	71.4	12	22.2	7	87.5
Antisocial	19	40.4	8	15.4	3	15.7	1	4.7	0	0	0	0
Borderline	12	25.5	4	7.7	9	47.3	13	61.9	7	12.9	6	75.0
Histrionic	0	0	3	5.8	0	0	1	4.7	5	9.3	1	12.5
Narcissistic	1	2.1	2	3.8	0	0	0	0	0	0	0	0
Cluster C	2	4.2	23	42.3	2	10.6	1	4.8	28	51.8	0	0
Avoidant	2	4.2	9	17.3	1	5.3	0	0	13	24.0	0	0
Dependent	0	0	1	1.9	1	5.3	1	4.8	1	1.9	0	0
Obsessive-Compulsive	0	0	10	17.3	0	0	0	0	13	24.0	0	0
Passive-Aggressive	0	0	3	5.8	0	0	0	0	1	1.9	0	0
PD NOS	11	23.4	8	15.4	3	15.7	3	14.3	4	7.4	0	0

1 One person may have personality disorder diagnoses in more than one data

2 One person may have more than one personality disorder diagnosis

5.2 Comparison of hospital-treated personality disorders and personality disorders in a general population sample (I)

This part of the study included 90 subjects who had met PD diagnosis in the SCID interview whose characteristics have been presented in paragraph 5.1.1, and 65 hospital-treated subjects with PD whose characteristics have been presented earlier in paragraph 5.1.2.

Cluster B PDs were more common in the hospital-treated sample than in general population sample in both men (P=0.0004) and women (P<0.0001). Cluster C PDs were more common in the general population sample than in hospital-treated sample in both men (p<0.0001) and women (p<0.0001). Antisocial (40.4%, p=0.0052) and borderline (25.5%, p=0.0016) PDs appeared more commonly in men, and borderline PD (61.9%, p<0.0001) in women in the hospital-treated sample than in the general population sample. Among the general population sample dependent PD in men (17.3%, p=0.0391) and in women (24.0, p=0.0146) and obsessive-compulsive PD in men (17.3%, p=0.0029) and in women (24.0%, p=0.0146) were more common than in the hospital-treated sample (Table 1 in Study I).

5.3 Childhood family structure and personality disorders in adulthood (II)

There were 110 subjects with PD diagnoses in this sample. The sample has been presented earlier in paragraph 5.1.4.

Single-family type at birth predicted any PD, and Cluster B PDs in adulthood. Family type at the age of 14 years had no associations with PD in adulthood. Being an only child predicted any PD in adulthood, especially Cluster A PDs. No associations were found with mother's age at delivery, father's social class in 1966, childhood residence or parent's psychiatric disorders and PDs in adulthood (Table 1 in Study II).

The prevalence of any PD was 8.7% among subjects originating from single-parent families and 6.5% among full families (p=0.16). Among Cluster B PDs the prevalence of antisocial PD was 1.3% among subjects originating from any kind of single-parent family and 0.5% among full families (p=0.24), and for borderline PD 2.9% and 1.3% (p=0.04), respectively. In Cluster C PDs the prevalence of obsessive-compulsive PD was 0.6% among subjects originating from single-parent families and 1.6% among full families, while the corresponding figures for

avoidant PD were 1.6% and 1.4%, respectively. The most prevalent PDs in all-time single families were Cluster B PDs (e.g. antisocial, borderline, histrionic and narcissistic PD) (Table 2 in Study II).

5.4 Co-occurrence of personality disorders with mood, anxiety and substance use disorders in young adult population (III)

This part of the study included 90 subjects who met the diagnosis of PD in the SCID interview. The characteristics of the sample have been presented earlier in paragraph 5.1.1.

A total of 172 (54%) (67 men and 105 women) of the 321 subjects interviewed met the criteria for at least one Axis I disorder in their lifetime. 75 (44%) of them had pure mood disorder, 20 (12%) had pure anxiety disorder and 16 (9%) had pure substance use disorder. 31 (18%) had both mood and anxiety disorder, 14 (8%) had mood and substance use disorder, 4 (2%) had anxiety and substance use disorder and 12 (7%) had all three disorders. 84% of the Axis I diagnoses were definite. The distribution of mood disorder was 73% (N=96) major depression, 20% other depressions (N=27) and 7% bipolar disorders (N=9). Panic disorder at 43% (N=29) and social phobia at 39% (N=26) made up the majority of the anxiety disorders. In the substance use disorders category the diagnosis was alcohol dependence in 85% (N=39), alcohol abuse in 13% (N=6) and drug use in 2% (N=1) of the cases.

72 (41%) of the subjects with an Axis I disorder met the criteria for at least one comorbid PD. 38 of them had one comorbid Axis II disorder, 26 had two and 8 had three Axis II comorbid disorders. The comorbidity PD rate among subjects with one Axis I disorder was 34%, whereas the comorbidity PD rate was 53% among subjects with two and 67% among subjects with all three Axis I disorders.

The weighted percentage of any comorbid PD varied from 28% (with mood disorders) to 47% (with anxiety disorders). Cluster C PDs predominated in all Axis I disorder classes. Cluster A and B PDs were less common in each Axis I disorder class. Subjects with Cluster A or B PD did not have statistically more commonly an Axis I disorder compared to subjects without analysed disorder; an exception from this was Cluster A with anxiety disorder (Table 1 in Study III).

The weighted percentage of any comorbid PD among men varied from 34% (with anxiety disorders) to 50% (with mood disorders) and among women from 22.1% (with mood disorders) to 54% (with anxiety disorders). PDs of any kind were significantly more common among men with mood disorders (51%)

compared to women with mood disorders (22%) (p=0.032). The highest comorbid rates in men were seen among mood disorders and Cluster C PDs (41%), whereas in women the highest co-occurrence rate was among anxiety disorders and Cluster C PDs (43%). Only in the case of mood disorders were comorbid Cluster C PDs more common among men than among women (p=0.020).

5.5 TCI Temperament profiles in personality disorders (IV)

Altogether 74 (38 men, 36 women) of the 321 SCID-interviewed subjects met criteria of at least one PD and had filled in the TCI. 88% (n=65) of them were HSCL-screen positive and 12% (n=9) HSCL screen-negative subjects. Fourteen subjects (9 men, 5 women) met the criteria of two PD diagnoses, and one woman met the criteria of three different PD diagnoses. Thirteen subjects (18%) met the criteria for Cluster A PD, 20 (28%) subjects met the criteria for Cluster B PD and 38 (54%) subjects met the criteria for Cluster C PD. Twelve (17%) subjects met the criteria of PD NOS. HSCL-positive subjects made up 77% of Cluster A, 90% of Cluster B and 86% of Cluster C PD diagnoses. Subjects with schizoid, antisocial, borderline, dependent, and passive-aggressive PD diagnoses were all HSCL-screen positive.

The rate of definite PD diagnoses was 69% in Cluster A, 55% in Cluster B and PD 55% in Cluster C. Sixty percent of the HSCL-screen positive subject and 22% of the screen-negative subjects met the criteria of a definite PD diagnosis (Fisher's exact test, p=0.07). The rates of lifetime Axis I disorders in our sample were as follows (subjects with PD vs. controls): mood disorders (65.9% vs. 6.6%), anxiety disorders (37.8% vs. 3.0%), substance use disorders (29.7% vs. 1.4%), and psychotic disorders (2.7% vs. 0.05%).

The mean score of NS among Cluster B PDs was statistically significantly higher than among controls, whereas the mean score of NS was significantly lower in Cluster C than in controls. The mean score of HA was significantly higher in Cluster C PD than in controls. As for the specific PDs, the mean score of NS was significantly lower in avoidant PD (Table 2 in Study IV).

The percentages of subjects with over two SD of the mean score were found among Cluster B in NS (25%, n=5), among Cluster A in HA (31%, n=4) and Cluster B in PS (20%, n=4), whereas the percentages of subjects under two SD of the mean scores were found in Cluster C in the cases of NS (10.5% n=4), HA (10.5%, n=4) and PS (11.6%, n=5). The mean scores among HSCL-positive subjects were 20.0 ± 6.9 in NS, 17.3 ± 6.7 in HA, 13.9 ± 3.9 in RD, and 4.2 ± 2.0

in PS. The mean scores among HSCL screen-negatives were 18.5 ± 8.0 in NS, 17.5 ± 7.2 in HA, 12.5 ± 3.1 in RD, and 4.6 ± 2.5 in PS, respectively.

When examining the different temperament profiles of PD clusters, Clusters A and C had similar temperament profiles. Low NS ($p<0.05$), high HA ($p<0.05$) and low RD ($p<0.05$) were associated with Cluster A, while high NS, low HA and low RD were associated with Cluster B. Low NS ($p<0.01$), high HA ($p<0.001$) and low RD ($p<0.05$) were associated with Cluster C.

The correspondence to Cloninger's theory among subjects with PDs was as follows: 42% (N=8/19) obsessive-compulsive (low NS, high HA, low RD), 33% (N=2/6) antisocial (high NS, low HA, low RD), 24% (N=4/17) avoidant (low NS, high HA, high RD), 10% (N=1/10) borderline (high NS, low HA, low RD) and , 40% (N=2/5) histrionic (high NS, low HA, high RD) (Table 3 in Study IV).

6 Discussion

6.1 Main findings

The results of study I showed that the spectrum of diagnosed PDs among hospital-treated patients differed markedly from that in population. The proportion of Cluster B PDs was higher in the hospital-treated sample than in the general population sample both among men and women. In the hospital-treated sample, the most common PDs were borderline and antisocial PD. Cluster C PDs, especially avoidant and obsessive-compulsive PDs were more common in the population sample. Cluster A PDs were rare both in the population sample and among the hospital-treated sample.

The findings of study II established that both single-parent family type at birth and being an only child associated significantly with PDs in adulthood. A single-parent family type at all times in childhood associated especially with Cluster B PDs. Furthermore, only child position was a risk for any PD, especially Cluster A PDs. No special childhood family risk factors were found for Cluster C PDs.

As presented in study III, PDs associated with mood, anxiety and substance use disorders at the age of 31 years. Mood disorders associated especially with Cluster C PDs, anxiety disorders with Cluster A and C PDs and substance use disorders with Cluster B PDs.

In study IV the temperament profiles according to the Cloninger's model of personality were similar among Cluster A and C. Low NS, high HA and low RD characterized both Cluster A and C. Cluster B differentiated from Cluster A and C by displaying high NS and low HA. Subjects with a Cluster B PD did not differ from subjects without any PD, except for NS, which was high. On the other hand, Cluster B PDs were not well characterized by HA or RD. In this study PD clusters were partly associated with different profiles of temperament, lending some but limited support for Cloninger's typology.

6.2 Discussion of the results

6.2.1 Comparison of hospital-treated personality disorders and personality disorders in a general population sample (I)

A total of 14.6% of hospital-treated subjects fulfilled the diagnosis of PD. The range of any PDs in previous studies among clinical populations has varied a lot, between 10.8–66.6% (Oldham & Skodol 1991, Marinangeli *et al.* 2000a). The spectrum of diagnosed PDs among hospital-treated sample differed markedly from that in population sample.

In this study, Cluster B PDs were most prevalent in the hospital-treated sample in both genders, consisting over 70% of all PDs. This finding is in accordance with previous clinical studies (Fossati *et al.* 2000, Marinangeli *et al.* 2000a). Oldham and Skodol (1991) found in an inpatient sample that Cluster B PDs formed more than half of all PDs. Contrary to our results, Mors (1994) found in his study of PDs among hospital-treated psychiatric patients that Cluster C PDs were nearly twice as common as Cluster A and Cluster B diagnoses. The high frequency of Cluster B PDs in hospital-treated samples has been presumed to be caused by comorbidity and treatment-seeking (Moran *et al.* 2000, Bender *et al.* 2001, Zimmerman *et al.* 2005).

The data on hospital treatment of the cohort sample in this study are restricted to adolescence and young adulthood, which may bias the results. It is generally believed that subjects with Cluster B PDs have severe behavioural problems in early adulthood, and that many of these subjects show a clear improvement after middle age (Reich *et al.* 1998, Cohen *et al.* 1994, Zanarini *et al.* 2003). For example, in a 27-year follow-up study Paris & Zweig-Frank (2001) established that only 7.8% of patients who met the criteria for borderline PD at the beginning of the study still met the same criteria 27 years later.

In this study definite and probable PD cases were pooled together. The weighted prevalence of PDs in the SCID-II-interviewed sample was 18.9%, which is somewhat higher than in previous population studies using the SCID interviews. The prevalence of any PD has varied in these studies between 4.4 and 15.7% (Maier *et al.* 1992, Crawford *et al.* 2005, Coid *et al.* 2006). A general population survey in the U.S. found that the prevalence of PDs was 14.8% (Grant *et al.* 2004). Furthermore, in an Australian population survey the prevalence of PDs was found to be 6.62% (Jackson & Burgess 2000).

In this study the proportion of Cluster C PDs was higher among the general population sample than among the hospital-treated sample. This finding is in line with earlier findings in community surveys (Maier *et al.* 1992, Regier *et al.* 1993). However, in a study with adults Samuels with his colleagues found that Cluster B PDs were more common than Cluster C PDs in the community (Samuels *et al.* 1994). Furthermore, epidemiological studies conducted after the late 1990s have established a higher prevalence of Cluster C PDs compared to earlier studies (Torgersen *et al.* 2001, Crawford *et al.* 2005, Coid *et al.* 2006). Most epidemiological studies nowadays are based on structured diagnostic methods, which may explain the differences in results. In population samples, dropout may also contribute to the differing results.

Two thirds of the hospital-treated PDs were found in men. This is in line with the findings of Jackson *et al.* (1991), according to whom men had significantly more PDs than women in a hospital sample. Fossati *et al.* (2000) have also found a male preponderance among PDs in a sample consisting of psychiatric inpatients and outpatients. On the other hand, Dahl (1986) found no gender differences among a hospital sample with PDs. In this dissertation study, antisocial PD was significantly more common in hospital-treated males than females, constituting 40.4% of all hospital-treated PDs in men. Also Jackson *et al.* (1991) found that males had significantly more antisocial PD diagnoses than women. In the present study, borderline PD made up nearly two thirds of all hospital-treated PD diagnoses in women, and it occurred significantly more often among women than men. This finding is in line with the findings of Jackson *et al.* (1991) and Grilo *et al.* (1996).

In the interviewed subsample males had PD diagnoses somewhat more commonly than women. Males have been shown to have higher PD rates than females in the community in previous studies (Samuels *et al.* 1994, Jackson & Burges 2000). In this study the distribution of PDs in the population subsample was rather similar among men and women. The only difference was found in the case of antisocial PD diagnosis, which was significantly more common among men than women. This finding is in line with previous studies based on SCD-II interviews in population samples (Maier *et al.* 1992, Coid *et al.* 2006). In the population subsample in this study, women tended to have paranoid and borderline PD diagnoses more commonly than men, but the differences were not significant. This finding is in line with those of Torgersen *et al.* (2001).

To estimate the representativeness of the population subsample the occurrence of hospital treatments among the whole cohort were compared with

the subsample of the cohort members living in Oulu and the interviewed sample. The rate of hospital-treated subjects among the whole cohort population (4%) and among the "Oulu subsample" (4%) was the same. Nineteen (6%) of the SCID-interviewed subjects were treated at hospital due to psychiatric reasons (six of them had schizophrenia, three had other psychosis and ten had non-psychotic disorders). According to this rough estimation the population subsample was not biased by the sampling.

6.2.2 Childhood family structure and personality disorders (II)

Specific PDs associated with family background on general population level. A single-parent family type at birth and being an only child associated significantly with PDs in adulthood. A single-parent family type at all times in childhood associated especially with Cluster B PDs. Furthermore, only child position was a risk for any PDs and Cluster A. These associations remained significant after adjusting for parental social class and parent's psychiatric disorder in 1972–1982. No special childhood family risk factor for Cluster C PDs was found in this study.

In this study an association was found between being an only child in the family and PDs, especially Cluster A PDs. In earlier literature it has been suggested that children growing up as only children in the family without siblings may absorb more autocratic and less interactive interpersonal behavioural styles (Miller & Maryana 1976). Additionally, a very large family has been found to be a protective factor against behavioural problems (Taanila *et al.* 2002, Hurtig *et al.* 2005). It is also possible to speculate that only children are considered to have a special position in the family, which may bring its own stress that may associate independently with PD.

The present finding that Cluster B PDs were associated with single-parent family type in childhood is in line with previous studies. According to Paris and his colleagues, male patients with borderline PD had increased rates of early separation or loss of parent (Paris *et al.* 1994). Pfiffner *et al.* noticed that heightened antisocial behaviour in children associated with absent biological fathers (Pfiffner *et al.* 2001). Living in single-parent families may include many practical problems that may influence the child's psychic development. For example, when the family moves to a new place of residence, children may have to change their school and lose friends, and there may be a change in the pattern of contact with other relatives and friends (Tennart 1988).

Bor *et al.* found that a change in parents' marital status emerged as a strong predictor for a child's antisocial behaviour (Bor *et al.* 2004). In this study, parental divorce was not a risk for child's PDs. On the other hand, Perth *et al.* (2004) found that 81% of patients with PDs had been separated from one or both parents before the age of 16, compared to 62% in the group of schizophrenia patients. Amato has established that children's adjustment to divorce depends on several factors, including the amount and quality of contact with noncustodial parent, the custodial parent's psychological adjustment and parenting skills, the level of interparental conflict that precedes and follows divorce, the degree of economic hardship to which children are exposed, and the number of stressful life events that accompany and follow divorce (Amato 1994). Furthermore, it has been thought that children's mental health is protected by good interaction between the parents and clarified family boundaries after their parents' divorce or separation (Taanila *et al.* 2002).

In this study no associations were found between mother's or father's psychiatric disorders and child's PDs. This finding was surprising, because previous studies have indicated that mother's depression predicts child's PD in adulthood (Veijola *et al.* 1998). Kim-Cohen *et al.* (2005) have found that maternal depression after delivery was associated with antisocial personality in the child at 7 years of age. Coid (1999) has also established an association with family history of depression and borderline PD. When comparing the results of this study with findings from other studies it should be kept in mind that in this study the data on parents' psychiatric disorders were incomplete, involving only hospital records, and this may explain the differences from previous findings.

Contrary to earlier findings, no associations were found between young motherhood or low social class and PDs in the present study (Coid 1999, Jaffee *et al.* 2001). One explanation for this finding may be the fact that the Finnish social security system has provided support to families with low socioeconomic class to cope well with their parenthood. It is also possible that young motherhood and low socioeconomic status are not independent factors of child PDs (Christ 1990). In the Christchurch Health and Development Study, a 25-year longitudinal study of a birth cohort, Ferguson *et al.* established that the associations between single parenthood and later adverse outcomes largely reflected the social context within which single parenthood occurred, rather than the direct effect of single parenthood on individual functioning (Ferguson *et al.* 2007).

6.2.3 Co-occurrence of personality disorders with mood, anxiety and substance use disorders in young adult population (III)

This study showed the high prevalence of PDs with mood, anxiety and substance use disorders among young Finnish adult population. The comorbidity rate of any PD varied from one fourth (mood disorders) to nearly one half (substance use disorders) among the three Axis I disorders examined. The findings are in line with previous epidemiological studies in general population samples (Regier *et al.* 1993, Kessler *et al.* 1994).

Cluster C PDs were found to be prevalent among young population and were strongly related to Axis I disorders in this study. Furthermore, Cluster B PDs have been found to be predominant in inpatient and outpatient samples (Carter *et al.* 1999). In particular, subjects with Axis I comorbidity have especially high rates of Axis II disorders. Since this was a cross-sectional study there is no way of knowing whether these rates of PD are maintained across time or whether they fluctuate with the rates of Axis I disorders, or whether one Axis is a simple variation in manifestation of the same problems represented in the other Axis. In addition, it was not possible to present any aetiological inferences based on this study.

Cluster C PDs were predominant in all three Axis I disorders, as was the case in a previous population based study by Tyrer *et al.* (1992). The rates of avoidant and obsessive-compulsive PDs were high in this study. The prevalence of obsessive-compulsive PD was 6.5%, which is in line with previous studies. In their study in the U.S., Grant *et al.* (2004) also found that obsessive-compulsive PD was the most prevalent PD (7.9%). In an Australian survey (Jackson & Burgess 2000) anancastic PD, which is a PD equivalent to the DSM-III-R criteria for obsessive-compulsive PD, was the most prevalent PD (3.1%). The DSM-IV-TR (American Psychiatric Association 2000) states the prevalence of this PD to be between 1% (population) and 10% (mental health clinics).

The comorbidity with Cluster C PDs and mood and anxiety disorders was consistent with earlier studies (Maier *et al.* 1992, Flick *et al.* 1993, Skodol *et al.* 1999, Marteinsdottir *et al.* 2001). In this study, Cluster C PDs were also predominant among substance use disorders. The co-occurrence between substance use disorders and Cluster B PDs has earlier been shown in a population sample (Maier *et al.* 1992) and in patient samples (Grilo *et al.* 1997, Modestin *et al.* 1997). It may be that the subjects with substance use disorders were less likely to participate in the psychiatric field study.

A high comorbidity between avoidant and obsessive-compulsive PDs with all three Axis I disorders was found in this study. This was an expected finding among mood and anxiety disorders, since previous studies have pointed out significant associations between avoidant PD and mood disorders (Maier *et al.* 1992, Flick *et al.* 1993) and anxiety disorders (Marteinsdottir *et al.* 2001). In the literature (Vize & Tyrer 1994), compulsive, avoidant and dependent PDs have often been found to be associated with neurotic disorders and could be considered part of the core of neurosis.

In this study, antisocial and obsessive-compulsive PD were the most common comorbid PD types among substance use disorders. Previous studies have shown a significant association with alcohol abuse and antisocial PD both in a clinical sample (Valgum 2000) and in general population (Nestad *et al.* 1992, Samuels *et al.* 1994, Kessler *et al.* 1994). It has even been suggested that type 2 alcoholics always have antisocial PD, and that alcohol abuse is only one symptom of the syndrome (Tiihonen & Eronen 1993). One possible reason for our result may be the fact that the HSCL-25 screen may have selected those subjects with substance use disorder who had a lot of mood and anxiety symptoms, which have led to over-representation of Cluster C subjects. It should to be noted that in our study, substance use disorder diagnosis consisted mainly of alcohol abuse and alcohol dependence, while the use of opiates and other drugs was quite rare in Finland in the 1990s compared to most European countries (1995 Annual Report on the State of the Drugs Problem in the European Union, 1996). In this study the only gender differences were found in the case of antisocial PD, in which all subjects were men.

Due to methodological differences it is difficult to compare the results of this study with those of previous studies. This study consisted of an age cohort sample, while in previous studies the samples have usually consisted of different age groups. One third of the subjects suffering from one of the three Axis I disorders also had one or both of the other two Axis I disorders. This limits the interpretation of the results, as a relatively high proportion of subjects with Axis I disorders were the same.

6.2.4 TCI Temperament profiles in personality disorders (IV)

The temperament profiles among Cluster A and C were similar. The hypothesis that PD clusters and separate PDs can be distinguished from one another by their specific temperament profiles did not get much support in this study. Low NS,

high HA and low RD characterized both Cluster A and C. Cluster B differentiated from Cluster A and C by displaying high NS and low HA. Subjects with a Cluster B PD did not differ from controls, except for NS, which was high. On the other hand, Cluster B PDs were not well characterized by HA or RD. These findings are in line with previous studies (Svrakic *et al.* 1993, Goldman *et al.* 1994, Mulder *et al.* 1996, Bejerot *et al.* 1998, Mulder *et al.* 1999, Bränström *et al.* 2001, Karwautz *et al.* 2003, Steinmayer *et al.* 2002, Bagby *et al.* 2005, Ha *et al.* 2007) lending some, albeit limited support to Cloninger's (2000) theory.

Cloninger has pointed out that some of the PDs can be distinguished from one another by the temperament profiles. In this study temperament profiles associated modestly with categorical PD types. The findings in this study are consistent with those of Cloninger in the case of obsessive-compulsive PD and partly inconsistent in the case of antisocial, avoidant and borderline PDs.

In this study paranoid PD associated with low NS and high HA. On the other hand, paranoid PD was not included in Cloninger's theory. According to Maggini *et al.* (2000), paranoid traits showed a positive relationship with HA and PS and a negative relationship with NS and RD in a large sample of Italian high school students. Ball *et al.* (1997) also found a high correlation between HA and paranoid PD in a study with 370 substance abusers. In earlier studies, low PS has been associated with paranoid PD (Svrakic *et al.* 1993, Ball *et al.* 1997).

Of subjects with antisocial PD (all men) one third were characterized by high NS and low HA and low RD. These findings are in line with those of Goldman *et al.* (1994), Cloninger (2000) and Maggini *et al.* (2000). On the contrary, in previous studies no significant correlation has been found between antisocial PD and low HA (Svrakic *et al.* 1993) or between antisocial PD and RD (Ball *et al.* 1997). In Cloninger's model borderline PD was characterized by high NS, high HA, and low RD. In this study borderline PD associated with high NS and high RD. A positive correlation between borderline PD and high HA has been found in previous studies (Svrakic *et al.* 1993, Goldman *et al.* 1994, Ball *et al.* 1997). Cloninger (2000) and Maggini *et al.* (2000) found that histrionic PD associated with high NS and RD and low HA. In our study histrionic PD corresponded to low NS, low HA and low RD.

Among Cluster C, obsessive-compulsive PD was characterized by low NS, high HA and low RD, corresponding to Cloninger's model. Earlier studies have found similar temperament profiles among subjects with obsessive-compulsive personality traits (Goldman *et al.* 1994, Maggini *et al.* 2000). The temperament dimensions are well able to distinguish subjects with avoidant PD, who all had

high HA scores. Altogether one fourth of the subjects with avoidant PD were characterized by low NS, high HA, high RD. The findings of this study are in line with earlier findings (Maggini *et al.* 2000) and correspond to Cloninger's model. Ball *et al.* (1997) have also found that the severity of avoidant personality correlates with higher HA. However, a negative correlation between avoidant PD and RD has been found in previous studies (Svrakic *et al.* 1993, Ball *et al.* 1997, Ha *et al.* 2007).

Temperament and PD may have the same genetic background factors, and in some environmental circumstances temperament may predispose to the development of PD (Livesley *et al.* 1993, Ando *et al.* 2002). Even though in this study no clear evidence was found between temperament and PDs, temperament in general may be seen as a vulnerability factor for developing PDs. More research is needed to determine whether there is common genetic aetiology contributing to both temperament and PDs.

Cloninger (2000) classified PDs according to the DSM-IV -criteria. In this study, DSM-III-R criteria were applied because they were in use in Finland at the time of the field study. Due to the low number of some PDs, all DSM-III-R PDs could not be subtyped according to temperament dimensions. In this study subjects with PD were divided into two categories (high or low) according to the mean values of NS, HA, RD and P, while previous studies have dealt with the relationships (Bayon *et al.* 1996, Mulder *et al.* 1996) and correlations (de la Rie *et al.* 1998, Casey & Joyce 1999, Mulder *et al.* 1999, Maggini *et al.* 2000).

6.3 Methodological considerations

6.3.1 Study samples

The original NFBC 1966 included 12,058 live births, covering 96.3% of all deliveries in Northern Finland in the year 1966. The participation rate in the study was high. In the 31-year follow-up study in 1997, 81.5% of cohort members living in the city of Oulu participated in the field study. In the psychiatric field study all HSCL-25 screen positives (N=241, 18% of the sample) were invited to the SCID interview. Altogether 86.7% of the screen positives and 10.5% of the screen negative subjects were interviewed. The interviews totalled 24.5% of the Oulu study subsample.

In Study I, all cohort members (515 subjects, 4.3%) with a (FHDR) psychiatric diagnosis were selected for diagnostic re-checking. In this re-checking process 86.2% (N=444) cases met the criteria of a DSM-III-R disorder. Of the cohort members living in the Oulu town 0.6% (N=10) were treated in hospital due the PDs. In Study II, all medical records in public health care of the Oulu-study members during 1982–1996 were reviewed. In all, 97.3% of the 1,609 study members had used these services by the end of 1996.

In Study II, the lifetime PD diagnoses were assessed according to the best-estimate procedure by an expert panel using information from all data sources available (Leckman *et al.* 1982, Taiminen *et al.* 2001).

6.3.2 Strengths of the study

The major strength of this study was the large, population-based birth-cohort sample, consisting of subjects of the same age and ethnicity. The prospective follow-up study gave the opportunity to examine longitudinally the associations between childhood family factors and PDs in adulthood.

PD diagnoses and Axis I psychiatric diagnoses in the population sample at the age of 31 years were based on structured clinical interviews. SCID interviews were conducted by trained clinicians. The SCID has been found to yield highly reliable diagnoses for most Axis I and II disorders (Segal *et al.* 1994) and it has been established to have good interrater (Dreessen & Arnz 1998) and test-retest reliability (First *et al.* 1995b, Weertman *et al.* 2003) and internal consistency (Maffei *et al.* 1997). The SCID-II interview has also been validated against "longitudinal expert's evaluation using all data" (LEAD) (Skodol *et al.* 1988).

The retrospective use of medical records from hospitals and outpatient care can be seen as an advantage. The nation-wide FHDR covers all mental and general hospitals in Finland, meaning that all hospital records concerning the cohort members were available. The FHDR register data have been shown to be of sufficiently high accuracy to be used for research purposes (Poikolainen 1983, Keskimäki & Aro 1991, Näyhä 1992, Mähönen *et al.* 2000). The diagnoses should be accurate, as the hospital diagnoses of cohort members were re-checked twice by professionals (Isohanni *et al.* 1997, Moilanen *et al.* 2003).

The Finnish version of the TCI has been shown to be applicable, and the results are probably not biased due to cultural differences in measuring temperament profiles (Miettunen *et al.* 2004).

6.3.3 Limitations of the study

The present study includes several limitations. Despite the longitudinal setting the population sample used in the present study was limited to inhabitants of one town, forming only part of the entire cohort. This should be kept in mind when assessing the generalizability of the results of this study.

One limitation deals with the dropout. It is commonly presumed that psychiatric disorders are more common among the losses than among the subjects participating in a study. In the NFCB 1966 it has been observed that subjects with psychiatric disorders participated less actively in the 31-year follow-up study than those without psychiatric disorders (Haapea *et al.,* submitted for publication). It is possible that Cluster A and B PDs are more common among the drop-outs than among subjects participating in the field study. These findings point out the very important fact that a considerable inpatient psychiatric provision is needed for subjects who present behaviour related to Cluster B PDs.

Due to practical reasons, a two-stage design was used in the diagnosing process, as is commonly done in epidemiological studies (Lenzenweger *et al.* 1997, Dunn *et al.* 1999, Perälä *et al.* 2007). The subjects interviewed for PDs were selected by a screening questionnaire (HSCL-25) covering anxiety and mood symptoms (Sandager *et al.* 1998). The HSCL-25 is not a specific method for screening PDs, and therefore we interviewed every tenth HSCL screen-negative subject as well. In this study there were some differences in the distribution of PD subtypes among the HSCL screen-negative and positive subjects. This should be kept in mind when comparing the results of this study with a more representative study. The two-stage method might have affected the distribution of different PDs. Viinamaki *et al.* (2006) have reported that current depressive disorder may especially affect the diagnosing of Cluster C PDs. On the other hand, in this study the proportion of screen negatives in each PD cluster varied between 15% and 29%; in addition, there was no overrepresentation of Cluster C PDs among screen-negative subjects. The mean scores of the temperament factors did not differ between HSCL screen-positive and negative subjects. There were no differences in correlations in temperament dimensions in the case of HSCL screen-negative or positive subjects in substudy IV. The SCID interviewers were not blind to the HSCL-screen, but it is presumable that this had no effect on the SCID interviews.

One limitation deals with the evaluating of the PDs. In this study PDs were diagnosed with the SCID-II-interview. Although SCID-II has proved to be valid

and its test-retest and interrater-reliability satisfactory, there may be a possibility of a "halo-effect", yielding a greater number of diagnoses overall than for example other interviews (IPDE-interview) for assessing PDs (Oldham *et al.* 1992).

The comparison of PDs in hospital-treated, out-patient and SCID-interviewed study samples is limited due to the different diagnosing methods. The PD rates in medical records were much lower than in previous studies. It is evident that Cluster B PD symptoms are more often described in hospital notes than other PDs, which may lead to overrepresentation of these PDs. Furthermore, only a small proportion of people with PD are treated in psychiatric hospitals.

Some PDs, especially Cluster A PDs, were rare in this sample as well as in most previous studies (Svrakic *et al.* 1993, Ball *et al.* 1997), limiting the statistical power. For this reason "definite" and "probable" PD diagnoses were pooled together. If only the "definite" PD diagnoses had been examined the lifetime prevalence of specific PDs would have been even lower.

One limitation deals with the comorbidity between Axis I disorders and PDs, which proved to be relatively high among the SCID-interviewed subjects in the sample. It has been found that PDs may predispose to psychiatric disorders (Johnson *et al.* 2006a, Cohen *et al.* 2007), but the impact of Axis I psychiatric disorders on PD diagnoses is largely unknown (Grilo *et al.* 2000).

During the last twenty years, the diagnostic classification system (DSM) has changed three times, which partly limits comparison of the diagnostic findings between different studies. The DSM-III-R criteria that were in research use in Finland at the time of the field study were applied. Both the concept of PDs and their classification is problematic. Quantitative problems have been found with the DSM PD classification, notably the validity of PD assessment (Westen & Arkowitz-Westen 1998, Farmer & Chapman 2002). While the traditional view of PDs has focused on various entities, it is not clear whether the categories are distinct. Previous studies have established that PD diagnoses demonstrate only moderate stability (Grilo *et al.* 2000, Coid 2003, Viinamäki *et al.* 2006).

The FHDR register has only been in use since 1967, which limits the knowledge concerning parents' hospital register data collected by personal identification codes (Keskimäki & Aro 1991).

Unfortunately, it was not possible to collect data on parents' behaviour during the subjects' childhood. In a previous study Johnson *et al.* pointed out that parental behaviour during child-rearing years may be associated with risk for offspring PD that endures into adulthood (Johnson *et al.* 2006b). Furthermore, the

confounding factors associated with familial background of PDs in this study were few. In their large birth cohort study, Ferguson *et al.* have established that most of the linkages between single parenthood and later adjustment reflect the effects of confounding factors associated with exposure to single parenthood (Ferguson *et al.* 2007).

The TCI questionnaire was given to the subjects after they had participated in the field study. Probably due to the long completion time (30-60 minutes) of the TCI questionnaire, the response rate was rather low (56%). However, there were only small differences in sociodemographic characteristics between responders and non-responders among subjects with PD. In the whole NFBC 1966 cohort, males and those with lower education levels made up a higher proportion of non-respondents and those who answered incompletely, compared with those who filled in all the temperament items (Miettunen *et al.* 2004).

7 Conclusions

7.1 Main conclusions

This study showed that childhood family background may have some effects on the development of PD in early adulthood. It seems that mother's single marital status at delivery may predict PD, especially Cluster B PDs. Furthermore, being an only child may associate with Cluster A PDs in adulthood. In this study specific childhood risk factors were not found for Cluster C PDs. (I).

The results of this study established the different distribution of PDs in population and hospital-treated samples. Cluster B PDs, mainly antisocial and borderline PDs, associated mostly with hospital-treatment. On the contrary, Cluster C PDs, such as avoidant and obsessive-compulsive PDs, were common in population sample, but did not associate with hospital-treatment. Cluster A PDs were rare in both population and hospital-treated samples (II).

Mood, anxiety and substance use disorders associate with PDs in population. The weighted prevalence of PDs of any comorbid PD varied from 47% (anxiety disorders) to 27% (mood disorders). Cluster C PDs predominated in all Axis I disorder classes.

The findings of this study suggest that temperament dimensions alone are not suitable for diagnosing PDs. Temperament dimensions are useful as a diagnostic or screening instrument for PD traits, at least at cluster level. The findings of this study did not support Cloninger's theory as hypothesized, which claimed that PD clusters and separate PDs can be distinguished from one another by their specific temperament profiles. A dimensional approach to personality improves the insight into the structure and organization of PD (IV).

7.2 Clinical implications

Assessing family structure is an important part of psychiatric history taking. Childhood family circumstances may have effects on a person's life later in adulthood. The single family type at delivery associated with any PD, especially Cluster B PDs. Only child position showed a risk for any PD, especially Cluster A PDs in adulthood. As an explanation to these findings, single mothers may be stressed and have social or financial problems, which are reflected in their parenting behaviour. They may be tired and unable to give support to their

children. An only child may be isolated, which may reinforce odd and eccentric features of personality. Additionally, parents may be over-protective of their only child, which may inhibit mental development or cause problems in social interactions later. It is probable that social and economic support, a good parent-child relationship, the presence of additional carers besides the mother as well as structure and rules in the household might prevent some problems associated with PDs.

PDs are quite common in young adult population, associating with mood, anxiety and substance use disorders. Due to this high comorbidity, PDs may cause functional or occupational impairment and need for health care services. The assessment of PDs and Axis I comorbidity can be difficult. Therefore, in clinical practice, when treating patients with Axis I disorders, the potential comorbid PD should be routinely screened by health care professionals both in general practice and special health care. Besides careful clinical examination semi-structured clinical interviews have been found to be useful and valid in diagnosing PDs.

Some PDs are associated with a need for hospital-treatment. The need for hospitalization may associate with comorbid Axis I disorders or the core symptoms of these PDs, e.g. affective instability or suicidal ideations. However, there are currently few intervention strategies available for PDs; most are referral services for individuals with severe personality disorders. This suggests that more intervention strategies should be targeted at public health at earlier life phases during which subjects with severe PDs are more susceptible to change.

It is difficult to separate different PDs according to the current categories with the temperament dimensions. One problem is that personality may show stability over time but PDs do not, thereby challenging their own definition. Clinicians must recognize that PDs are highly complex and multidimensional phenomena. Further information is still needed about integration of these two approaches for achieving better methods for PD evaluation and interventions.

7.3 Research implications

This study revealed some associations between childhood family and PDs in adulthood. Although the data from childhood were unique and prospectively collected, the variables describing family background were limited. In future studies, more information should be gathered about parenting styles and their association with PDs. Aetiological studies of PDs have established interactions between genetic vulnerabilities and prenatal or postnatal environmental insults.

The development of PDs is thought to involve processes whose effects cumulate across individual development. Therefore, more information is needed about the protective childhood factors for PDs.

At present, it was possible to compare the distribution of PDs in hospital-treated and population samples consisting of young adults. In addition, in longitudinal studies the need for hospital-treatment in the long term should be evaluated. An important topic would be to investigate whether there is recovery from PDs requiring hospital treatment in young adulthood.

There are many studies on comorbidity between Axis I disorders and PDs, most of them cross-sectional. The changes in the rates of comorbidity between PDs and Axis I disorders could be evaluated better in longitudinal studies. Further research concerning the diagnostic stability of PDs and the advantages of birth cohort data are of major importance. Further research is needed on the natural course and prognosis of PDs.

The interest in associations between temperament dimensions and PDs is increasing. There are a lot of questions to answer. In the future, the NFCB 1966 database will provide a possibility to explore and understand temperament and its underlying potential endophenotypes in a large, heterogeneous population sample.

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