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RISK FACTORS FOR CRIMINAL OFFENDING AMONG MEN WITH SCHIZOPHRENIA

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ABSTRACT

Background: There is consistent evidence for an association between schizophrenia and criminal offending. With better knowledge of the relation between schizophrenia and criminal offending, better and more cost-effective methods for prevention of criminal offending could be expected and public fear of mentally ill persons being reduced. The overall aim of the present study was to advance knowledge regarding risk factors or potential risk factors for criminal offending among males with schizophrenia. Specifically, one aim was to investigate the associations between low verbal intelligence and early-onset, persistent offending among males with schizophrenia. Another aim was to validate alcohol use typologies among males with schizophrenia.

Methods: The study was based on data provided from the Comparative Study of the Prevention of Crime by Mentally Ill Persons, an international, multi-site follow-up study on patients from forensic psychiatry (n = 186) and patients from general psychiatry (n = 122), led by Professor Sheilagh Hodgins. All participants underwent extensive assessment at discharge. The instruments used were SCID, WAIS-R, PCL-R, PANSS, and NEO-PI-R. Information on background, criminality and follow-up data was collected from all available sources, including the participant and a family member, staff, and records. In Paper I, base-line data from discharge was used along with historical data. The participants of Paper I were men with schizophrenia spectrum disorders (n = 219). Data were analysed by uni-variate methods and by standard multiple regressions. In Paper II, base-line data, historical data and prospective measures from the follow-up were used. The participants of Paper II were men with schizophrenia spectrum disorders and alcohol use disorders (n = 139). Data were analysed by uni-variate methods and by k-means cluster analyses.

Results: Low verbal IQ did not increase the risk for criminal offending among men with schizophrenia spectrum disorders, but among those who did offend it was associated with a younger age at first conviction for a non-violent crime (Paper I). Widely used uni-dimensional and multi-dimensional typologies of alcohol use disorders, developed in settings with non-mentally disordered individuals, were replicated and showed at least some degree of concurrent validity in a sample of men with schizophrenia spectrum disorders and alcohol use disorders although the predictive validity was weak (Paper II).

Conclusions: The results of the study suggest that individuals with schizophrenia constitute a heterogeneous population. Treatment planning must be kept at an individual basis and set out from qualified and thorough assessments of individual needs. When assessing risk for criminal offending, the conditional nature of risk factors must be considered. Finally, programmes for crime prevention (risk management) should be individually designed as well, to ensure that all interventions include the necessary features and are kept at a proper level.

LIST OF PUBLICATIONS

I. Eriksson, Å., Hodgins, S., & Tengström, A. (2005). Verbal intelligence and criminal offending among men with schizophrenia. *International Journal of Forensic Mental Health, 2,* 191-200.

II. Eriksson, Å., Tengström, A., & Hodgins, S. Typologies of alcohol use disorders among men with schizophrenic disorders. (Manuscript submitted for publication).

CONTENTS

LIST OF ABBREVIATIONS

ANOVA	Analysis of variance
ASPD	Antisocial personality disorder
CSPCMIP	The Comparative Study of the Prevention of Crime by Mentally Ill Persons
DSM-IV	Diagnostic and Statistical Manual of Mental Disorders (IV)
FSIQ	Full-scale intelligence quotient
ICC	Intra-class correlation
IQ	Intelligence quotient
NEO-PI-R	Neo Personality Inventory Revised
PANSS	The Positive and Negative Syndrome for Schizophrenia
PCL-R	Psychopathy Checklist Revised
PIQ	Performance intelligence quotient
SCID-I	Structured Clinical Interview for the DSM-IV, axis I
SCID-II	Structured Clinical Interview for the DSM-IV, axis II
TCO	Threat-control override symptoms
VIQ	Verbal intelligence quotient
WAIS-R	Wechsler Adult Intelligence Scale Revised

1 BACKGROUND

1.1 SCHIZOPHRENIA AND CRIMINAL OFFENDING

Schizophrenia is a mental illness that may be very disabling and lead to many negative consequences for the individuals affected by the disorder, for their families, and for the society. One of the negative consequences is the higher rate of criminal offending, especially violent criminal offending. The present study aims at investigating the associations between schizophrenia and criminal offending.

Some decades ago, a controversial question was whether people with schizophrenia were more prone than others to commit criminal offences or not. The debate clearly had political grounds and was primarily focused on the right to keep mentally ill individuals institutionalised because of their presumed "dangerousness" (Mullen, 1984; Shah, 1975). Research was still underdeveloped and there was no robust empirical evidence in support for the commonly held view that individuals with schizophrenia did not commit more crimes than did non-disordered individuals.

However, during the 1990's, evidence started to accumulate that individuals with schizophrenia were indeed at higher risk of offending. Prospective, retrospective and follow-up studies of clinical populations and birth cohorts as well as community-based epidemiological studies consistently showed an association between schizophrenia and criminal offending. The Scandinavian countries, with their personal identification numbers and excellent registers, provided good opportunities for longitudinal studies. Early studies from Sweden showed an increased risk for individuals with mental disorders (Hodgins, 1992) and schizophrenia (Lindqvist & Allebeck, 1990) to commit criminal offences as compared to the general population. Studies from Denmark (Brennan, Mednick, & Hodgins, 2000) and Finland (Tiihonen, Isohanni, Räsänen, Koiranen, & Moring, 1997) along with a birth cohort study from New Zealand (Arsenault, Moffit, Caspi, Taylor, & Silva, 2000) all revealed an association between schizophrenia and criminal offending, particularly violent criminal offending. Reports from retrospective cohort studies in Stockholm (Belfrage, 1998) and London (Wessely, Castle, Douglas, & Taylor, 1994) and epidemiological studies from the U.S. (Swanson, Holzer, Ganju, & Jono, 1990) and Israel (Stueve & Link, 1997) were all in line with the longitudinal studies. Figures vary between studies, but the risk of committing a violent offence is between two and seven times higher for individuals with schizophrenia as compared to the general population.

To conclude, there is consistent evidence for an association between schizophrenia on one hand and criminal offending on the other. The present thesis is written with the purpose of advancing knowledge of criminal offending among individuals with schizophrenia. This is not new. Numerous of researchers have contributed the knowledge from many perspectives. What are the reasons for conducting research in the field? Two main reasons may be held out.

A first reason for studies in the field, is that better knowledge may lead to better and more cost-effective methods for treatment and prevention of criminal offending (Grann et al., 2005; Hodgins & Müller-Isberner, 2004). By providing the specific individual with a specific treatment programme, based on sound scientific evidence and designed after a careful assessment of the individual's needs, the risk of providing unnecessary

treatment features and/or providing treatment at improper levels may be reduced. This would give way for treatment programmes administered on an outpatient basis. From research on non-forensic populations with mental disorders, there is evidence that community care is a cost-effective alternative to hospital care (Dickey, Fisher, Siegel, Altaffer, & Azeni, 1997; Lapsley et al., 2000; Rothbard, Kuno, Schinnar, Hadley, & Turk, 1999), although contrary findings have also been demonstrated (Rothbard, Schinnar, Hadley, Foley, & Kuno, 1998). Conclusions on cost-effectiveness may be difficult to draw (for a meta-analysis, see Burns et al., 2001).

A second reason for taking on the research field of schizophrenia and criminal offending is to reduce public fear of mentally ill persons. Criminal offending, especially violent criminal offending, often get public attention. This may lead to increased fear among the public and stigmatisation of mentally ill persons (Angermeyer & Matschinger, 1996). While there indeed is an increased risk of offending among individuals with schizophrenia, it must be noted that only a small fraction of all crimes in society are committed by individuals with the disorder (Stuart & Arboleda-Florez, 2001; Wallace et al., 1998). It is thus important that research challenges myths and misconceptions by providing scientific knowledge on risk factors of offending.

1.2 WHAT IS A RISK FACTOR?

The present study deals with risks and risk factors. Since risk is a widely used concept, various definitions are used throughout the literature, more or less stringent. The terminology of risk will therefore be briefly discussed. In an important article, Kraemer and coworkers (1997) stated that the issues in risk research are much too important to tolerate less than precise terminology. In a series of papers, the authors defined and clarified some of the misleading terms used in previous research (Kazdin, Kraemer, Kessler, Kupfer, & Offord, 1997; Kraemer et al., 1997; Kraemer, Wilson, Fairburn, & Agras, 2002).

To start, it is important that a distinction is made between correlates of risk and risk factors. A *correlate* is a variable that is associated with the outcome variable, but where it cannot be decided which of the variables precedes the other. In the absence of an established timeline, the variables involved should be labelled correlates rather than risk factors. Identifying correlates may be very important in a first stage of research where hypotheses are generated rather than tested.

If it can be determined that a correlate precedes the outcome, the term risk factor may be used. Three different types of risk factors have been proposed: fixed markers, variable markers, and causal risk factors. *Fixed markers* are those risk factors that cannot be changed (i.e. gender). *Variable markers* are risk factors that can be changed either spontaneously or by intervention. *Causal risk factors* are those risk factors that have been shown to be possible to manipulate, and, when manipulated, also change the outcome. To summarise, only some risk factors are causal risk factors.

In risk research, complexity is the rule. One specific outcome may be predicted by multiple risk factors, or one specific risk factor may increase the risk for various outcomes. Risk factors may interact in different ways. An increased risk for a certain outcome may require a number of risk factors accumulated. Risk factors may also interact in a synergistic way, that is that if a second risk factor is added to a first, the risk for a certain outcome is not merely added, but multiplied. Global measures of risk

factors are composed by many risk factors. An example is low socio-economic status (SES), a global measure of risk factors (i.e., low income, low level of education, low occupational status). In research it is valuable to break down global risk factors into smaller, more manageable units.

Risk factors may also differ between different populations and different time periods in an individual's life. In developmental psychology, it is generally considered that different risk factors may be influential at different periods of time within an individual's life. This may lead to subtypes of individuals with the same outcome, i.e. criminal behaviour, but for whom different risk factors may have operated at different periods of time.

This short discussion on risk factors may be concisely summarised in the words of Kazdin et al., (1997):

> "… whether a characteristic, event, or experience is a risk factor 'depends'."

1.3 RISK FACTORS FOR CRIMINAL OFFENDING IN SCHIZOPHRENIA

From what has been argued above, it may not be easily established what is and what is not a risk factor. Nevertheless, a brief review on some of the most commonly investigated risk factors for criminal offending in schizophrenia will follow down below. The risk factors of special interest for the present study, substance abuse and low intelligence, will be reviewed in greater detail. However, intelligence has previously not been studied as a risk factor for offending among individuals with schizophrenia. Therefore the review will mainly focus on the associations between intelligence and offending in non-disordered populations.

1.3.1 Psychiatric symptoms

A general view held by the public, is that criminal offending among individuals with schizophrenia is caused by the symptoms of the disorder. Much research has been devoted to the issue. However, findings are inconsistent.

Symptoms of schizophrenia can be divided into positive and negative symptoms (Kay, Fiszbein, & Opler, 1987). Positive symptoms are symptoms such as hallucinations, delusions, and threat/control override symptoms. Data from studies on *hallucinations* and offending do not show any clear evidence of an association (Cheung, Schweitzer, Crowley, & Tuckwell, 1997; Kasper, Rogers, & Adams, 1996, for a review, see Bjorkly, 2000a).

Delusions are misperceptions of reality, i.e. paranoid delusions or delusions of grandeur. There is support for an association between delusions and offending (Arsenault et al., 2000; Taylor et al., 1998). By contrast, from an interview study of psychiatric inpatients, Junginger, Parks-Levy, and McGuire (1998) concluded that delusional motivation of violence was rare.

The term *threat/control override (TCO) symptoms* refers to a specific cluster of psychotic symptoms. Individuals with TCO symptoms experience that people want to harm them (threat) and/or that they cannot control their own thinking due to either the mind dominated by forces outside of their control or that other people's thoughts were put into their heads (override). TCO symptoms have been hypothesized to be an important link between symptoms and offending. Evidence for an association between TCO symptoms and offending have been demonstrated (Link, Stueve, & Phelan, 1998;

Swanson, Borum, Swartz, & Monahan, 1996) and between TCO symptoms and severe violence (Stompe, Ortwein-Swoboda, & Schanda, 2004).

Negative symptoms of schizophrenia involve decreased normal functions, i.e. initiative and emotional expression. It may be counterintuitive to view negative symptoms as a possible risk factor for offending, and in accordance, research is scarce. Krakowski, Czobor, Pal, and James (1999) observed that persistently violent patients in a hospital ward had significantly more negative symptoms as compared to non-violent patients and patients with decreasing violence.

While all individuals with schizophrenia have symptoms of the disorder, symptoms that may increase or decrease over time, only a fraction of them show criminal behaviours. It has been argued that to explain violence, mediating factors must be present along with the symptoms. It has been reported that fright, sadness, or anxiety may act as mediating factors (Buchanan, 1997), as well as negative emotions (Cheung et al., 1997) and distress in the form of anxiety and depression (Hodgins, Hiscoke, & Freese, 2003). Haggård-Grann, Hallqvist, Långström, and Möller (2006) suggested that suicidal ideation and interpersonal stressors might serve as triggers of violence. On the basis of a review, Bjorkly (2002b) summarised that the link between delusions and violence would be *"delusional distress"*, i.e. emotional distress such as anxiety, fear, anger or irritability.

To summarise, it is reasonable to assume that psychiatric symptoms, at least in some cases, may increase the risk for offending. There are however methodological problems in the assessment of symptoms in relation to offending (Haggård-Grann et al., 2006; Hodgins et al., 2003), i.e. problems due to the time delay between the assessment of symptoms and the offence.

1.3.2 Antisocial behavioural style

In the following section, evidence for an association between an antisocial behavioural style and criminality among individuals with schizophrenia will be reviewed.

Conduct disorder refers to a childhood pattern of behaviours where the basic rights of others or age-appropriate societal norms are violated. Conduct disorder has consistently been shown to be a risk factor for early-onset, persistent offending among persons with schizophrenia. Findings from the longitudinal Dunedin study indicated that conduct disorder during childhood was one of the most important predictors of violence among persons with schizophrenia-spectrum disorder (Arsenault et al., 2000). Retrospective studies have demonstrated firm associations between conduct disorder and early-onset offending among male offenders with schizophrenia (Hodgins, Lapalme, & Toupin, 1999; Hodgins, Tiihonen, & Ross, 2005; Tengström, Hodgins, & Kullgren, 2001).

Antisocial personality disorder is characterized by a pervasive pattern of disregard for and violation of the rights of others, starting in childhood. Individuals with an antisocial personality disorder are impulsive, aggressive and easily get into law-breaking behaviours. Among individuals with schizophrenia, associations have been found between antisocial personality disorder and aggressive assault (Moran et al., 2003), time incarcerated (Mueser et al., 1997), number of previous convictions (Joyal, Putkonen, Paavola, & Tiihonen, 2005), and early-onset offending (Joyal et al., 2005; Tengström et al., 2001).

An antisocial behavioural style may be viewed as a global measure of risk. It comprises a number of factors that may correlate to offending, i.e. impulsivity, irritability, and substance abuse. To understand the relation between personality and offending, it would be valuable to break down the concept into smaller units.

1.3.3 Intelligence

So far, little research has been devoted to intelligence as a potential risk factor for offending among individuals with schizophrenia. The section starts out with a review of research on the associations between low intelligence and offending among non-mentally ill individuals. It is followed by a brief discussion of the current knowledge of the associations between low intelligence and schizophrenia. Finally, findings on the associations between intelligence and criminality among individuals with schizophrenia will be presented.

First a few words on the measurement of intelligence and an introduction to some of the terms associated with intelligence. The most widely used intelligence test, the Wechsler Adult Scale of Intelligence (Wechsler, 1981, Wechsler, 1997) consists of verbal and non-verbal subtests. Results from all subtests are usually summarised into an IQ score, labelled full-scale IQ score (FSIQ). It is, however, common to report verbal IQ scores (VIQ) and non-verbal IQ scores (performance IQ scores; PIQ) separately. This makes it possible to draw inferences on the impact of verbal and non-verbal intelligence, respectively, on i.e. offending.

1.3.3.1 Intelligence and criminal offending

Throughout the literature on non-mentally ill offenders, there is consistent evidence for an association between low intelligence and criminality, especially between low verbal intelligence and criminality (Lynam, Moffit, & Stouthamer-Loeber, 1993; Moffit, Gabrieli, Mednick, & Schulsinger, 1981), early-start offending (Moffit & Caspi, 2001), and recidivism (Vermeiren, Schwab-Stone, Ruchkin, De Clippele, & Deboutte, 2002).

There are three main hypotheses to explain the link between low verbal intelligence and delinquency. First, it has been argued that low verbal intelligence leads to delinquency either directly, through difficulties in anticipating consequences and solving conflicts verbally (Farrington, 2000; Gibson, Piquero, & Tibbetts, 2001), or indirectly, through school failure and affiliation with delinquent peers and alternative means to reach goals (Farrington, 2000; Vermeiren et al., 2002). A second hypothesis is that delinquency leads to lower intelligence through i.e. head injuries, drugs, and low motivation (Lynam et al., 1993). Third, the link may be explained by some third factor, such as neurological dysfunction (Lynam et al., 1993).

1.3.3.2 Intelligence and schizophrenia

The associations between low intelligence and schizophrenia are complex and the scientific terminology may be confusing. In this section an effort will be made to briefly review current knowledge.

First, it is well established that individuals with schizophrenia have lower IQ as compared to individuals from the general population. Investigations from populations of individuals with first-episode schizophrenia have revealed average IQ scores around 90 (86.3, Bilder et al., 2000; 91.2, Fitzgerald et al., 2004; 88.1, Gold, Arndt, Nopoulos, O'Leary, & Andreasen, 1999; however, 98.9, Rund et al., 2004).

Second, low intelligence is a precursor of schizophrenia. Associations have been found between estimated pre-morbid IQ scores and current IQ scores (Fitzgerald et al, 2004; Sheitman et al., 2000) and between pre-morbid school function and current IQ scores (Rund et al., 2004). Longitudinal studies have consistently shown that individuals with schizophrenia had lower IQ during childhood as compared to adults with no diagnosis (Cannon et al., 2000; Cannon et al., 2002). Similar findings have been reported from high-risk studies (Cosway et al., 2000; Ott et al., 1998) and in studies of adolescent military conscripts (David, Malmberg, Brandt, Allebeck & Lewis, 1997; Davidson et al., 1999; Gunnel, Harrison, Rasmussen, Fouskakis, & Tynelius, 2002; Reichenberg et al., 2002). It has been suggested from longitudinal studies that intellectual deterioration may have occurred during childhood (Fuller et al., 2002; Kremen et al., 1998) although this has not consistently been shown (Cannon et al., 2000; Russel, Munro, Jones, Hemsley, & Murray, 1997).

Third, there is no evidence for intellectual deterioration after the onset of the disorder (Gold et al.; 1999; Heaton et al., 2001; for a review, see Rund, 1998), at least not for younger persons. Recent findings reveal that there may be an intellectual decline among elderly individuals with schizophrenia (for a meta-analysis, see Kurtz, 2005).

Fourth, there is consistent evidence that intellectual functions are predictors of outcome, i.e. social and vocational functioning (Addington & Addington, 2000; Robinson, Woerner, McMeniman, Mendelowitz, & Bilder, 2004; for reviews, see Elvevag & Goldberg, 2000; Green, 1996).

The association between low intelligence and schizophrenia may, if examined in detail, at least partly stem from an association between poor verbal abilities/low verbal intelligence and the disorder (Bearden et al., 2000; Cannon et al., 2002; Davalos, Compagnon, Heinlein, & Ross, 2004; for a review, see DeLisi, 2001). It has been suggested that pre-morbid language dysfunction may be one of the most potent predictors of future schizophrenia illness (Bearden et al., 2000).

1.3.3.3 Intelligence and offending in schizophrenia

Research aiming at investigating intelligence as a risk factor for offending among individuals with schizophrenia is scarce.

As demonstrated in Table 1, in three of the studies individuals with and without previous criminal behaviour were compared. No differences were found in any of the measures of intelligence. Neither was low IQ found to predict violence in a prospective, follow-up study. By contrast, from assessments of inpatients with previous violent offending it was suggested that there might be a deterioration of intelligence after the onset of the disorder.

To current knowledge, there is still no study on the association between intelligence and criminality in schizophrenia that has used a longitudinal design. However, data from a recent Finnish cohort study (Cannon et al, 2002) revealed an association between lower educational achievement and adult convictions among individuals with schizophrenia.

To summarise, there is so far no convincing evidence of an association between intelligence and offending in schizophrenia. At this stage of research, the task is to identify whether or not intelligence may be a correlate of offending.

Table 1. Studies on intelligence and offending in schizophrenia

Authors	Participants	*n*	Design	Results
			Retrospective comparison between groups	
Krakowski et al., 1996	In-patients with schizophrenia	102	History of violent arrest No history of violent arrest	No differences in VIQ, PIQ, or FSIQ between groups
Lafayette, Franckle, Pollock, Dyer, & Goff, 2003	Out-patients with schizophrenia	96	History of violent arrest History of non-violent arrest No history of arrest	No differences in VIQ, PIQ, or FSIQ between groups
Barkataki et al., 2005	Incarcerated and hospitalised patients with schizophrenia	58	History of violence and antisocial personality disorder (ASPD) History of violence, no ASPD No history of violence	No differences in VIQ, PIQ, or FSIQ between groups
			Prospective follow-up study	
Walsh et al., 2004	Patients with schizophrenia at discharge from hospital	272	Sociodemographic and clinical predictors of violence	Low IQ did not predict violence at 2-year follow-up
			Assessment of in-patients, no controls	
Puri, Richardson, Higgins, & Tresaden, 2002	In-patients with schizophrenia who had offended	17	Comparison between pre-morbid IQ and current IQ	Deterioration of IQ after onset of disorder

1.3.4 Substance use disorders

1.3.4.1 Prevalence

Many individuals with schizophrenia use alcohol and/or drugs and some of them develop an abuse or dependence. In a recent Swedish study almost half of the participants (48.3%), patients at an outpatient clinic in Malmö, met criteria for a lifetime prevalence of substance abuse (Cantor-Graae, Nordström, & McNeil, 2001). This is in concordance with often-cited findings from the Epidemiological Catchment Area Study, based on data from more than 20 000 community citizens and individuals in institutions in the United States (Regier et al., 1990). The study revealed a lifetime prevalence of forty-seven percent for substance use disorder among individuals with schizophrenia. The odds of having a life-time diagnosis of a substance use disorder was estimated to be almost five times as high for individuals with schizophrenia as for the general population. Despite different research designs, a number of recently conducted studies from around the world have reported similar figures (shown in Table 2).

However, it should be noted that figures of current substance use disorders are lower (see Table 2). This indicates that while individuals with schizophrenia may be at high risk for substance use disorders, they are not automatically persistent substance users. Some of them may have stopped using substances on their own; others may have taken benefit from treatment.

Table 2. Lifetime and current prevalence of substance use disorders among individuals with schizophrenia.

		Life-time	Current
Sweden	Cantor-Grae, Nordström, & McNeil (2001)	48.3%	15%
Finland	Räsänen et al. (1998)		22%
Irland	Condren, O'Connor, & Browne (2001)	45%	
Irland	Kamali et al. (2000)		20%
Canada	Van Mastrigt, Addington, & Addington (2004)	44.5%	
Canada	Margolese, Malchy, Negrete,Tempier, & Gill (2004)	44.9%	14%
USA	Mueser et al. (2000)	58%	
Australia	Wallace, Mullen, & Burke (2004)		11%

1.3.4.2 Negative consequences

There is a consensus among clinicians and researchers that the widespread use of substances among individuals with schizophrenia leads to a vast array of negative consequences.

From a review, Drake and Mueser (2000) reported that more than one hundred studies indicate associations between substance abuse in schizophrenia and negative outcome. Among the negative consequences are *treatment non-compliance* (Negrete, 2003; Olfson et al., 2000), *re-hospitalisations* (Hunt, Bergen, & Bashir, 2002; Sorbara, Liraud, Assens, Abalan, & Verdoux, 2003; Swofford, Scheller-Gilkey, Miller, Woolwine, & Mance, 2000), *relapse into psychosis* (Gerding, Meason, Santos, & Arana, 1999; Gupta, Hendricks, Kenkel, Bhatia, & Haffke, 1996; Sorbara et al., 2003), *suicidality* (Kamali et al., 2000; Verdoux et al., 1999), *homelessness* (Gonzalez & Rosenheck, 2002), *decreased familial support* (Bentsen et al., 1998), and *elevated risk of HIV infections* (Cournos & McKinnon, 1997).

Of special interest for the present study, is the *increased risk of offending* which has been found to be associated with substance use disorders. Results from a longitudinal study in the United States revealed that individuals with schizophrenia and poly-substance abuse had odds of violence over twelve times higher than individuals with schizophrenia and no abuse (Cuffel, Shumway, Chouljian, & MacDonald, 1994). Interestingly, no higher risk was found for individuals with schizophrenia who used alcohol only or marijuana only. The latter finding is in contrast with findings from a Finnish study. Results from a birth cohort prospective study demonstrated that at age twenty-six more than one third of individuals with schizophrenia and an alcohol use disorder had committed a violent crime as compared to less than one tenth of individuals with schizophrenia and no alcohol use disorder (Räsänen et al., 1998). Findings from a Swedish forensic sample revealed that males with schizophrenia and a co-morbid substance use disorder were four times more likely to recidivate into a violent offence as compared to males with schizophrenia and no substance abuse (Tengström et al., 2004). Despite differences in methodology, similar results have been

reported from studies in many countries, i.e. England (Scott et al., 1998), New Zealand (Arseneault et al., 2000), and Australia (Wallace, Mullen, & Burke, 2004).

All the findings reviewed above refer to violent offending. Data on non-violent offending have not been shown specifically. However, from interpolating data on general offending, it may be concluded that the impact of co-morbid substance use disorders on non-violent offending may be even larger. Data from the British and Australian studies referred to above demonstrated that for individuals with schizophrenia, a co-morbid substance abuse increased risk for any offence with five and thirteen times, respectively (Scott et al., 1998,Wallace et al., 2004).

The relationship between substance abuse and offence has been described as very complex, interactional, and multi-factorial (Boles & Miotto, 2003; Hoaken & Stewart, 2003). While the studies discussed above may be described as primarily correlational, the associations found between substance abuse and offence may best be labelled correlates or markers of offence. As discussed by Haggård-Grann, Hallqvist, Långström, & Möller (2006), asking an offender why he or she committed an offence, may give rise to a tendency to blame substances. Retrospective studies are thus not very helpful in determining causal relationships. Evidence from laboratory and empirical studies support the possibility of alcohol as a causal risk factor for violent behaviour (for a review, see Boles & Miotto, 2003). To present knowledge, there are no such studies of individuals with schizophrenia.

1.3.4.3 Typologies of substance use disorders in non-disordered populations

There is no single theory on substance abuse among individuals with schizophrenia that is commonly agreed upon although a number of theories have been proposed (for a review, see Mueser, Drake, & Wallace, 1998). This merely reflects the research field of substance abuse among non-disordered individuals. Alcohol and substance use disorders have been described as heterogeneous to their clinical expression and multi-factorial in aetiology (Babor et al., 1992; Basu, Ball, Feinn, Gelernter, & Kranzler, 2004; Johnson, van den Bree, Gupman, & Pickens, 1998). This constitutes a challenge for clinicians and scientists. However, one way to reduce the heterogeneity of substance use disorders is the use of typologies, that is, classification of individuals with substance use disorders into distinct subtypes. It has been proposed that distinct subtypes of substance use disorders are likely to reflect different underlying causal factors, different trajectories into abuse and dependence, and different mechanisms of maintenance of the disorder (Basu et al., 2004; Penick et al., 1999). If subtypes of substance abuse among individuals with schizophrenia could be identified and more advanced knowledge of the disorder thus be achieved, an expectation would be that better and more differentiated treatment programmes for individuals with schizophrenia and substance use disorders would ultimately be developed.

In an early study of Swedish male adoptees it was suggested that there be two distinct forms of alcoholism, each with its own aetiology, course, and association with criminality (Cloninger, Bohman, & Sigvardsson, 1981). Findings from this and subsequent studies by Cloninger and coworkers resulted in the *Type I/II typology*, which has influenced academic research substantially and also found ways to clinical settings. A typology based on empirical clustering technique; the *Type A/B typology,* was presented a decade later (Babor et al., 1992). The two typologies, presented in Table 3, share many similarities. It has been suggested that individuals with Type I/A

alcohol use disorders may be more prevalent (Ball, Jaffe, Crouse-Artus, Rounsaville, & O'Malley, 2000; Cloninger et al., 1981; Schuckit et al., 1995) although the original study by Babor and coworkers (1992) yielded two equally large subgroups (for an overview, see Carpenter & Hasin, 2001). The Type I/II typology and Type A/B typology are often labelled multi-dimensional, that is, they are based on a number of variables.

Table 3. The Type I/II typology and the Type A/B typology of alcohol use disorders

	Type I/II typology		Type A/B typology	
	Type I	Type II	Type A	Type B
Contributing factors	Genetic and environmental	Primarily genetic	Fewer childhood factors	More childhood and familial risk factors
Age of onset	> 25	< 25	Later onset	Earlier onset
Alcohol-related problems	*Loss of control, binge drinking*, guilt	Cannot abstain, fighting, arrests	Fewer physical and social consequences, *less binge drinking*	More serious consequences, *loss of control*
Personality characteristics	High harm avoidance	High novelty-seeking	Conservative	Experimenting, less controlled

Differences between the two typologies are italicised

There is also a number of uni-dimensional typologies. They are based on one variable only, and, in accordance, easy to apply in research and clinical settings. Widely used are typologies based on *abuse or dependence* (DSM-IV, APA, 1994), *presence or absence of antisocial personality traits* (Bahlmann, Preuss, & Soyka, 2002; Holdcraft, Iacono, & McGue, 1998; Zucker, Ellis, & Fitzgerald, 1994), *age of onset of the substance use disorder* (Farren & Dinan, 1996; Irwin, Schuckit, & Smith, 1990; Johnson, Cloninger, Roache, Bordnick, & Ruiz, 2000; Lykouras, Moussas, & Botsis, 2004; Watson et al., 1997), and *presence or absence of a family history of substance use disorders* (Hasin, Paykin, & Endikott, 2001; Hill & Yuan, 1999; Lieb et al., 2002; Penick et al., 1987).

A number of studies have been designed to compare and evaluate typologies. Findings generally reveal that most typologies have at least some validity (Babor, Webb, Burleson, & Kaminer, 2002; Basu et al., 2004; Penick et al., 1999). However, in three studies the Type A/B typology has been suggested to be the "most promising" (Epstein, Labouvie, McCrady, Jensen, & Hayaki, 2002), to have "superior validity" (Basu et al., 2004) and to have "the strongest reliability and consistency over time" (Carpenter & Hasin, 2001) as compared to other typologies evaluated. The typology based on abuse or dependence has not been evaluated in the studies previously discussed.

2 AIMS

The overall aim of the present study was to advance knowledge regarding risk factors or potential risk factors for criminal offending among males with schizophrenia spectrum disorders.

Specifically,

- *Paper I* aimed at investigating the associations between low verbal intelligence and criminal offending and between low verbal intelligence and early-onset persistent offending among men with schizophrenia spectrum disorders
- *Paper II* aimed at validating four uni-dimensional and one multi-dimensional alcohol use typology among males with schizophrenia spectrum disorders and also at exploring whether a typology with a number of subtypes exceeding two would be valid and clinically useful

3 METHOD

The present study is based on data provided from The Comparative Study of the Prevention of Crime by Mentally Ill Persons (CSPCMIP). To give the reader a background of the present study, this section starts with a description of the main features of CSPCMIP. Thereafter, the methods of the present study will be described in detail.

3.1 THE COMPARATIVE STUDY OF THE PREVENTION OF CRIME BY MENTALLY ILL PERSONS

The Comparative Study of the Prevention of Crime by Mentally Ill Persons (CSPCMIP) is an international, multi-site follow-up study on forensic and general psychiatric patients in community care. The study, which started in 1998, is led by Professor Sheilagh Hodgins. The main objectives of the study were to study treatment and its relations to the needs of the patients, and to identify legal powers that contribute to treatment. Additional objectives were to assess the predictive validity of the HCR-20 and to assess the validity of hair analysis for measuring medication use and alcohol and drug consumption (Hodgins et al., in press).

The sites of the study were Province of British Columbia (Canada), the entire country of Finland, Hessen (Germany), and Southern Sweden, geographical areas with a total number of inhabitants of almost 18 million. The sites were selected on the ground that they were responsible for all forensic patients of the catchment area. They were also considered to have adequate resources for optimal care to forensic patients and to be able to guarantee that the study follow-up would be carried out.

CSPCMIP is a naturalistic case-control study. The treatment programmes at the four sites are non-standardised and the patients are assigned to different treatment programmes according to the routines of the sites and the needs of the patients and not, as would be the case in an experimental study, randomly assigned to different treatment conditions. No control conditions have been involved in the study. Instead, the sites included were judged to differ on several features of treatment, social service, and legislation. Thus, comparisons between sites would generate valuable knowledge of treatment. To make this possible, treatment components are being described with extreme accuracy.

The participants of CSPCMIP comprise two subgroups. One subgroup consists of patients from forensic psychiatry (n = 186). The other subgroup consists of patients from general psychiatry (n = 122).

All persons with a major mental disorder about to be discharged from the forensic hospitals within the catchment area were invited to participate in the study. The patients gave their written informed consent to participate and gave access to medical and criminal records. They also named a family member to provide information on them. When consent was given, a structured diagnostic interview was completed. If a diagnosis of a major mental disorder was confirmed, the patient was included into the study. For each included participant from a forensic hospital, a participant from a general psychiatric hospital was invited to participate. The participants from general psychiatric hospitals were matched with the participants from forensic psychiatric

hospitals on diagnosis, sex and age. With the exception of the matching procedure, the procedure of inclusion into the study was the same for both subgroups.

All participants underwent assessment prior to discharge. An extensive battery of diagnostic interviews and tests were used. Aside from those described in section 3.2.3 (p. 13), scales for depression, akathisia, and TCO symptoms were used. Historical data was extracted from official files and from the participant and his family. After discharge, the participants were interviewed and reassessed at four occasions with six months interval. At each stage of data collection, all available sources of information were used to provide data; interviews with participants and relatives, official records, and information from staff.

The refusal rate was 167 persons out of the 475 persons originally invited to participate. To understand possible biases of the sample, approval had been obtained to record a small amount of information on the patients who refused to participate.

3.2 THE PRESENT STUDY

3.2.1 Design and setting

The present study includes two smaller samples of participants from the CSPSMIP. In Paper I, base-line data from discharge were used along with historical data. In Paper II, prospective measures from the follow-up were added.

3.2.2 Participants

The participants of the present study were males with a diagnosis of schizophrenia, schizoaffective disorder, or schizophreniform disorder (DSM-IV, Spitzer, Williams, Gibbon, & First, 1990a&b). The choice to leave out females was undertaken due to their low number in the CSPSMIP (n = 8). In Paper I, the Swedish participants were excluded due to the use of a Swedish, non-comparable intelligence test. In Paper II, only those males with schizophrenia spectrum disorders and a life-time diagnosis of alcohol use disorder were included.

The distribution of participants on site and psychiatric subgroup is shown in Table 4.

Table 4. Subjects, psychiatric subgroup and site country

Study	Population characteristics	N	Psychiatric subgroup	Site country			
				Canada	Finland	Germany	Sweden
Paper I	Male, schizophrenia spectrum disorder	219	Forensic	49	42	41	-
			General	49	15	23	-
Paper II	Male, schizophrenia spectrum disorder, alcohol use disorder	139	Forensic	24	32	24	8
			General	25	9	13	4

3.2.3 Instruments

In the following, the instruments used in the present study will be presented. It is to be noted that all figures on inter-rater reliability were calculated by a second assessment on 15% of the participants of the entire sample of CSPCMIP.

3.2.3.1 *Structured Clinical Interview for DSM-IV (SCID; Spitzer, Williams, Gibbons, & First, 1990a&b)*

Psychiatric diagnoses were made using Structured Clinical Interview for DSM-IV (SCID). SCID is a semi-structured interview guide. It comprises fixed questions, but also leaves an opportunity to formulate questions freely. Studies have shown that axis I and axis II disorders can be reliably and validly diagnosed with SCID (Maffei et al., 1997; Schneider et al., 2004; Zanarini et al., 2000).

A complete SCID-I interview was conducted along with an additional SCID-II interview on conduct disorder and antisocial personality disorder. The psychiatrists who interviewed the participants of the study were trained and examined by the authors of the instrument. Additional information was provided from collaterals and records. Inter-rater reliability was measured by a second assessment on 15% of the participants. The agreement between raters on diagnoses was excellent; schizophrenia spectrum diagnosis, $\kappa = 1.0$ ($n = 35$), conduct disorder, $\kappa = 1.0$ ($n = 34$), and antisocial personality disorder $\kappa = 1.0$ ($n = 34$). The agreement between raters on alcohol abuse or dependence was lower, $\kappa = .79$ ($n = 35$).

3.2.3.2 *Wechsler Adult Intelligence Scale Revised (WAIS-R; Wechsler, 1981, Wechsler, 1997)*

Intelligence was assessed by Wechsler Adult Intelligence Scale Revised (WAIS-R). The instrument is a revision of previous versions of the Wechsler Intelligence Scale, first published in 1939 and now worldwide used. WAIS-R consists of eleven subtests, six of them measuring verbal abilities, five of them measuring non-verbal (performance) abilities. The person to be assessed is asked questions on i.e. the meaning of words and general knowledge. He is also asked to perform tasks such as puzzles and paper-and-pencil assignments. Some of the subtests are time-limited. A WAIS-R test usually takes between 60 and 90 minutes to complete. Traditionally, the scale is considered to consist of two subscales, a verbal subscale and a performance subscale. The results from all subtests are summarised into a full-scale IQ score (FSIQ).

The instrument was administered according to standard protocol. If a participant had completed a WAIS-R test within a year before discharge, the results of that test were used for the study. The results from the subtests were summarised into a verbal IQ score (VIQ) and a performance IQ score (PIQ), respectively. Low VIQ was defined as VIQ ≤ 85, one standard deviation below the mean. All participants with VIQ > 85 were considered to be in "normal range" VIQ despite the fact that IQ scores > 110 in clinical practice generally are considered to be "high average", "superior", or "very superior"

3.2.3.3 *Psychopathy Checklist Revised (PCL-R; Hare, 1991; Hare, 2003)*

Psychopathy is a psychological and behavioural disorder characterized by deficient affective and interpersonal traits, and antisocial behaviour (Cooke & Michie, 1999). Psychopathic traits are assessed with the PCL-R, a widely used instrument with reliable and valid psychometric measures (Hare, 2003). The instrument comprises twenty items reflecting psychological and behavioural traits commonly observed in individuals with psychopathy. Each item is rated 0-2. 0 means not present, 2 means clearly present. The assessment is based on information from multiple sources. A semi-structured interview is conducted and all available files and records are scrutinised. Factor analyses of PCL-

R have distinguished a two-factor model, Factor 1 consisting of psychological traits and Factor 2 consisting of behavioural traits (see i.e. Hare, 1991) as well as three-factor and four-factor models (Cooke & Michie, 1999).

In the present study, the assessments were made by psychiatrists in collaboration with the research assistants who had done the interviews with the patients and the collaterals and who had read all the files. The psychiatrists had been trained and examined by the author of the instrument. Inter-rater reliability was measured by a second assessment on 15% of the participants. For the PCL-R total score, *ICC* = .94 (*n* = 35).

3.2.3.4 Positive and Negative Syndrome Scale for Schizophrenia (PANSS; Kay, Fiszbein & Opler, 1987)

Positive and negative symptoms of schizophrenia were assessed with the Positive and Negative Syndrome Scale for Schizophrenia (PANSS). Positive symptoms include delusions and hallucinations, while negative symptoms refer to characteristics such as affective flattening and lack of motivation. The instrument consists of 30 items. The positive and negative scales each consist of seven items rated 1 (absent) to 7 (extreme). There is also a scale of general psychopathology, comprising sixteen items, also rated 1 to 7. Due to good reliability and validity of the instrument, it has been widely used in clinical and research settings.

For the present study, the same psychiatrists who conducted the SCID also conducted the PANSS assessment after training to use the instrument. The inter-rater reliability was assessed with the same procedure as for the other instruments. For the positive scale, *ICC* = .71 (*n* = 34). For the negative scale, *ICC* = .52 (*n* = 34).

3.2.3.5 Neo Personality Inventory Revised (NEO-PI-R; Costa & McGrae, 1992)

All participants completed the Neo Personality Inventory Revised (NEO-PI-R) self-report form to assess personality traits. The instrument is based on the Five Factor model of personality and was designed to provide a general description of normal personality. It has been used in research to assess personality traits among individuals with schizophrenia (Bagby et al., 1997; Camisa et al., 2005; Gurrera, Nestor, & O'Donnel, 2000; Kentros et al.; 1997; Reno, 2004). The five factors include neuroticism, extraversion, openness to experience, agreeableness, and conscientiousness. The instrument comprises 243 items; each rated on a 5-point scale. The results are summarised into the five factors, each consisting of six facet scales for more detailed analysis. As an example, the neuroticism factor includes an anxiety facet, a hostility facet, a depression facet, a self-conscientiousness facet, an impulsiveness facet, and a vulnerability facet. Research has consistently demonstrated good reliability and validity as well as longitudinal stability for the instrument (Miller, Reynolds, & Pilkonis, 2004; Quirk, Christiansen, Wagner, & McNulty, 2003; Young & Schinka, 2001).

3.2.3.6 Background information

It was considered important to measure childhood and family variables to understand their influence as risk factors for un-desired outcomes in adult age. Thus, information on childhood attention/hyperactivity problems, childhood depression/anxiety, and institutionalisations during childhood was collected. Information was also collected on mental disorder, substance abuse, and criminality among parents and siblings. All

information on pre-morbid risk factors was provided from the participant, family members, and from records.

3.2.3.7 Criminality

Information on criminal variables was collected from official records. Separate analyses were conducted for non-violent and violent offending. Non-violent offending included offences such as stealing, car theft, and break and enters. Violent offences were murder, manslaughter, arson, threat of violence, harassment, sexual offence, robbery, forcible confinement, and illegal possession of firearms or explosives. Information on age of first conviction, number of crimes, and convictions was collected from official files on criminality. The term conviction refers to convictions within the legal system as well as judgments of non-responsibility due to a mental disorder. A measure was created to make it possible to control for the effects of hospitalisations and incarcerations on criminality. Years at risk for offending was defined as the number of years after age 15 (or, if that was the case, after immigration) that a participant had not been hospitalised or incarcerated.

3.2.3.8 Follow-up measures

Information on alcohol and drug use and medication non-compliance was collected from participants and informants at four interviews conducted at six month intervals during the two-year follow-up period. At each interview session, it was asked if the patient had used alcohol and/or drugs during the last week and if the patient had been non-compliant with medication or had committed an aggressive behaviour during the six month period since the last interview session. Alcohol and/or drug use, non-compliance, and aggressive behaviour were judged to have occurred if reported from either the patient or the informant (or both). The participants were informed that all information collected for the research project remained confidential and was not communicated to the clinical team.

3.2.4 Procedure

The procedure of the present study has been described above (see 3.1, p. 12). Many clinicians and researchers were involved in the data acquisition on the different sites. My own contribution to the present study was to systematize and analyse data.

3.2.5 Statistics

The statistical methods used in this study were Pearson's product moment correlations, χ^2-tests, *t*-tests, analysis of variance (ANOVA), multiple regressions, *k*-means cluster analysis, κ-correlations and intra-class correlations. If not otherwise indicated, the text below refers to Howell (2002) and Pallant (2003).

Pearson's product moment correlation coefficient (r) is a measure of the degree of relationship between two variables. The coefficient is on the scale between –1 and 1. The closer to the extremes, the stronger relationship. The squared coefficient (r^2) gives the shared variance between variables. In Paper I, r was used to show the strength of association between i.e. VIQ and various measures of criminality.

χ^2-tests are used to investigate whether two or more groups are different from each other on categorical data. This is accomplished by comparing the frequencies observed in data with the expected frequencies, would the groups not differ from each other. As an example, in Paper II, χ^2-tests were used to investigate whether the proportion of

participants with a Type I/A alcohol use disorder was different from the proportion of participants with a Type II/B alcohol use disorder as to lifetime drug abuse/dependency.

T-tests are used to test whether the difference between the means of a certain variable in two independent groups is large enough to justify a conclusion that the two groups really differ from each other as to the variable of interest. To illustrate, in Paper II, *t*-tests were applied to test whether the mean age of first conviction for a non-violent crime among participants with a Type I/A alcohol use disorder was significantly different from that of the participants with a Type II/B alcohol use disorder.

Analysis of variance (ANOVA test) is a method used for the same purpose as a *t*-test when there are more than two groups involved. In Paper II, the defining variables of the three-cluster solution were analysed with ANOVA tests. An ANOVA test only indicates whether there are significant differences between groups or not. To further understand the direction of the differences, post-hoc analyses are performed. For the present study, the method of choice was the Tukey test, chosen for the control it exercises over α, but still not so cautious that possible significant differences between groups would be less likely to detect.

Standard multiple regression is a method that may be used to explore how well a set of variables predicts a certain outcome. Information is obtained about the model but also about the contribution of each of the variables. In Paper I, standard multiple regression was used to explore how well VIQ would predict age at first conviction for a non-violent crime. Multiple regressions are very sensitive to outliers, that is, cases with extreme values. Therefore, outliers that were found to deviate more than three standard deviations from the mean were removed from the analyses. The method is also sensitive to the combinations of variables that are included. Theoretical considerations should guide the researcher as to what variables should be entered into the regression analysis.

Cluster analysis is a method used to find natural groups within a data set. There are two widely used methods of clustering: hierarchical cluster analysis and *k*-means cluster analysis. In a hierarchical cluster analysis, one of two approaches is followed. Either is each single case initially constituting a cluster of its own, and, step by step, grouped together into larger clusters until an optimal number of groups is achieved. The other approach starts with all cases in one large cluster, gradually split into smaller clusters (Sclove, 2001). Before a *k*-means cluster analysis is performed, a desired number of clusters is specified. Each cluster has a centroid around which cases will group. During the process, cases are assigned to the most likely cluster one by one. At any step, the centroid may be recalculated and the previously assigned cases will be re-assigned if necessary (Basu et al., 2004). There are no "statistical rules" as to what method should be used. It has been suggested that both be used (Sclove, 2001). In the present study, *k*-means cluster analyses were used to replicate the Type I/A – Type II/B typology and the three-cluster solution of Paper II. The choice to use *k*-means cluster analysis was justified by the exclusive use of this method in the studies reviewed. Thus, this study would be comparable to previous studies. As is the case for multiple regressions, cluster analyses are sensitive to the combinations of variables included.

To quantify the level of inter-rater agreement, two statistical methods were used. Intra-class correlation (*ICC*, Shrout & Fliess, 1979) is a method used for continuous data. In

the present study, *ICC* was used to measure the degree of agreement between raters on PCL-R scores and PANSS scores. When data are dichotomous, a widely used method of choice is the Kappa coefficient, κ. In the present study, κ was used as an estimate of agreement of raters on SCID diagnoses. Values of *ICC* and κ take on measures between 0 and 1; the closer to 1, the better agreement. For the present study, *ICC* and κ were calculated as weighted means for each of the sites. (Sweden was excluded due to few inter-reliability ratings, $n = 3$). All analyses on inter-rater agreement were conducted on the entire sample of the CSPCMIP.

All statistical analyses were performed using SPSS 12.0. Before conducting statistical analyses, SPSS REGRESSION and SPSS FREQUENCIES were used for the evaluation of assumptions. In case of skewed distributions, log transformations and non-parametric methods were used. Results were considered to be significant if $p < .05$. Two-tailed tests were applied. Missing data are reported.

3.3 ETHICAL CONSIDERATIONS

Conducting research always involves ethical considerations. Research in the field of forensic mental health may be particularly challenging. First, collecting and storing data on sensitive information is a potential threat to the integrity of the studied individuals. Second, the results achieved may in some cases be harmful for mentally ill offenders in general. While the researcher's aim may be to improve forensic mental health, information on the associations between mental disorder and criminality may lead to public fear and rejection of individuals with psychiatric problems, and also to public demands for more repressive sanctions for criminal offence.

However, the potential harm caused by research should be weighed against the usefulness of new knowledge. The aim of the present study was to advance knowledge regarding risk factors for criminal offending among males with schizophrenia. More knowledge may lead to better treatment programmes for identified patients with schizophrenia, but also, on a societal level, to programmes for targeted prevention and early intervention. The long-term benefits include a more humane care for individuals with schizophrenia, lower costs for society, and a decreased crime rate.

Before included into the present study, all patients gave their written informed consent to participate, authorized access to medical and criminal records, and also named a family member to provide information on them. In case of no consent, approval had been obtained to acquire a small amount of information. This was done to understand possible biases of the sample due to refusals.

To protect the integrity of the individual, all data were stored in a data file with names and personal identification numbers of the participants removed. A special study identification number was used throughout all stages of data analysis. All written material (i.e. forms, test material) was kept securely at the sites. The analyses did not focus on specific participants and the results were not presented in a way that would make it possible to identify a certain participant.

The project was approved by the ethics committees on the different sites (Lund University, Sweden, LU 171-98; Kuopio University, Finland; Giessen, Germany; and Simon Fraser University, British Columbia, Canada).

It is necessary to emphasize that the researcher has a responsibility to discuss the achieved results in public and to present findings to policy-makers. This is to ensure that research findings will be used in a way that will be beneficial for persons with major mental disorders but also for the society as a whole.

4 RESULTS

4.1 PAPER I

The study aimed at investigating associations between low verbal intelligence and early-onset persistent offending among males with schizophrenia spectrum disorders.

4.1.1 Descriptive information of the participants

The participants of Paper I were males with schizophrenia spectrum disorders (n = 219; schizophrenia, n = 176, schizoaffective disorders, n = 42, and schizophreniform disorder, n = 1).

The age of the participants ranged from eighteen to seventy-five (M = 37.7, SD = 11.4). The highest educated participant had completed twenty years of education (M = 10.5, SD = 2.6). One fifth of the study participants had an additional antisocial personality disorder (19.2%). The proportion of lifetime substance use disorders was high; more than half of the participants had a diagnosis of alcohol abuse or dependence (57.5%), and four of ten were diagnosed with drug abuse or dependence (41.4%). The mean GAF score at discharge from hospital was 50.6 (SD = 12.3). The number of offences committed varied from none to almost 90 (M = 7.9, SD = 14.2). The mean age for first judgement for an offence was twenty-five years (M = 25.3, SD = 9.2).

The mean VIQ score for the sample was 92.18 (SD = 15.25). This is significantly lower than the mean for the general population, $t(169) = -6.687$, $p = .000$, $CI = -10.13 - -5.51$. One third of the participants (33.5%) had a VIQ score of 85 or below. This is to compare with the estimated proportion of individuals from the general population with a VIQ score of 85 or below, which is sixteen percent.

4.1.2 Findings of the study

The hypothesis that associations would be observed between low VIQ and criminal offending was only partially confirmed. As shown in Table 5, participants with low VIQ were not more likely than participants with VIQ in the normal range to have been convicted of a non-violent or a violent crime.

Table 5. Comparison between participants with VIQ ≤ 85 and participants with VIQ > 85 on variables related to criminal offending

	VIQ ≤ 85	VIQ > 85	
Ever convicted of a non-violent crime	52.6%	51.3%	$\chi^2(170) = .026$, p = .872
Ever convicted of a violent crime	68.4%	67.3%	$\chi^2(170) = .023$, p = .878
Number of non-violent crimes	7.46	4.22	t(168) = -1.764, p = .08
	SD = 13.92	SD = 9.71	
Number of violent crimes	3.21	2.16	t(167) = -1.316, p = .190
	SD = 7.31	SD = 3.04	

Neither was convincing evidence reached for an association between VIQ and persistent offending. As demonstrated in Table 5, among those participants ever convicted, participants with low VIQ had not committed more non-violent or violent crimes as compared to participants with VIQ in the normal range. There was, however, a weak negative association between VIQ and the number of non-violent crimes (r = -

.152, p = .048), but not between VIQ and the number of violent crimes (r = -.016, p = .832).

The hypothesis that associations would be observed between low VIQ and early-onset offending was confirmed. This was, however, only the case for non-violent offending. Among the participants who had been convicted for a crime, Pearson correlations revealed an association between VIQ and age at first non-violent conviction (r = .410, p < .000) but not between VIQ and age at first violent conviction (r = .125, p = .197).

To further investigate the association between VIQ and early-onset, non-violent offending, and to control for confounding variables, a multiple regression was conducted. As shown in Table 6, VIQ and substance abuse before age eighteen were two large, independent predictors of age of first non-violent conviction.

Table 6. Standard regression analysis predicting age at first conviction for a non-violent crime.

	Age at first conviction for a non-violent crime n = 60			
Independent variable	B	SE B	β	p
VIQ	.247	.073	.377	.001
Behaviour problem index	-.938	.890	-.128	.296
Substance abuse before age 18	-5.464	2.036	-.324	.010
Parental problem index	-.446	1.023	-.050	.665
Institutionalisation before age 18	-3.234	2.088	-.177	.127
Test of model	$F(5,54) = 6.995$, p = .000, R^2 = .427			

(2 outliers were removed)

Post-hoc analyses were conducted in an effort to understand why VIQ was associated with early but not with persistent offending. The results showed negative correlations between VIQ and total length of all hospitalisations (r = .200, p = .009). Participants with VIQ ≤ 85 had been hospitalised longer (M = 101.02 months, SD = 111.02) as compared to participants with VIQ > 85 (55.60 months, SD = 54.81).

To conclude, among men with schizophrenia spectrum disorders, low VIQ did not increase the risk for criminal offending, but among those who did offend it was associated with a younger age at first conviction for a non-violent crime. The main finding of the study was that lower VIQ was associated with early-onset, non-violent offending.

4.2 PAPER II

The aim of the study was to validate uni-dimensional typologies and the Type I/II - A/B typology of alcohol use disorders in a sample of individuals with schizophrenia spectrum disorders. Another aim was to explore other possible modes to subtype individuals into a valid and clinically useful typology.

4.2.1 Descriptive information of the participants

The participants of Paper II were males with schizophrenia spectrum disorders and a lifetime diagnosis of alcohol use disorder (n = 139; schizophrenia, n = 110, schizoaffective disorder, n = 29).

The age of the participants ranged from twenty to seventy (M = 39.7, SD = 11.3). More than half of the participants (54%) had over and above their schizophrenia spectrum disorder and alcohol use disorder, an additional drug use disorder. Interestingly, there were differences between sites. While drug use disorders were very common among the participants from Canada and Sweden (76%; 83%, respectively), the proportion of participants with a drug use disorder was considerably lower in Germany (49%) and, specifically, Finland (24.4%) $\chi^2(3, N = 139) = 28.178$, $p = .000$. Forty-one of the participants (29.5%) had an additional antisocial personality disorder. The mean GAF score was 49.7 (SD = 12.6).

4.2.2 Findings of the study

Four uni-dimensional typologies were validated. The participants were classified to either subtype of each of the typologies, alcohol abuse/alcohol dependence (n = 65; n = 65), presence/absence of antisocial personality disorder (n = 41; n = 98), early onset (< 18 years)/late onset (≥ 18 years) of alcohol use disorder, (n = 45, n = 65), and presence/absence of a parent with a substance use disorder (n = 56, n = 67).

All uni-dimensional typologies showed at least some degree of concurrent validity across the domains of pre-morbid risk factors, drug use disorders, criminality, symptoms, and personality, although different typologies showed better or poorer validity in different domains. However, the predictive validity was less impressive.

To replicate the Type I/II- A/B typology, *k*-means cluster analysis was used. Two clusters were requested. The clusters derived were similar to the subtypes of the Type I/II- A/B typology (Table 7). The Type I/A drinkers were characterized by fewer childhood risk factors, fewer first-degree relatives with substance use, and less severe alcohol use disorder.

Table 7. Construct validity of the Type I/II – Type A/B typology

	Type 1/A n = 65	Type II/B n = 39	
Number of conduct disorder symptoms	1.34	3.92	$t(94) = 4.550$
	SD = 1.843	SD = 3.662	$p = .000$
Proportion of first-degree relatives with substance	.10	.47	$t(94) = 7.998$
abuse	SD = .1484	SD = .2971	$p = .000$
Sum of SCID symptoms of abuse/dependency	12.31	22.32	$t(94) = 7.045$
	SD = 5.961	SD = 6.524	$p = .000$
Age of onset of alcohol use disorder	19.63	17.80	$t(94) = -1.295$
	SD = 3.979	SD = 6.657	$p = .198$

Additional analyses on concurrent validity revealed that a larger proportion of Type II/B drinkers had at least one criminal family member (Type I/A, 21.1%; Type II/B, 44.0%, respectively), $\chi^2(1, N = 96) = 4.898$, p = .027, or a family member with a mental disorder (Type I/A, 39.4%; Type II/B, 68.0%, respectively), $\chi^2(1, N = 96) = 6.058$,

p = .014. Type II/B drinkers were also more likely to have a life-time diagnosis of drug abuse/dependency (Type I/A, 53.5%; Type II/B, 80.0%, respectively), $\chi^2(1, N = 96) = 5.421$, p = .020, and they reported having used a larger number of drugs as compared to the Type I/A drinkers (Type I/A, $M = 2.48$, $SD = 2.500$, Type II/B, $M = 4.44$, $SD = 3.477$, respectively), $t(94) = 3.030$, $p = .003$. No differences were found between the two subtypes in the domains of illness (PANSS scores), or personality (the facets of anxiety, depression, impulsiveness, and excitement-seeking from the NEO-PI-R, and PCL-R score). Neither were there any differences between subtypes as to follow-up variables alcohol/drug use, and non-compliance to medication during the follow-up.

Of special interest for the present study, are variables of criminal behaviour. No differences were found between subtypes as to age at first conviction (Type I/A, $M = 24.69$, $SD = 8.696$, Type II/B, $M = 23.20$, $SD = 8.514$, respectively), $t(79) = -.668$, $p = .506$, or number of crimes (Type I/A, $M = 13.58$, $SD = 22.234$, Type II/B, $M = 15.52$, $SD = 33.834$, respectively), $t(92) = -.757$, $p = .451$. Neither were there any significant differences found between the subtypes as to aggressive behaviour during the follow-up (Type I/A, 19.0%; Type II/B, 25.0%, respectively), $\chi^2(1, N = 82) = .376$, p = .540.

To explore other modes to subtype the participants, additional *k*-means cluster analyses were conducted. A three-cluster solution was judged to be the best solution. The subtypes were 1) "Less severe alcohol use disorder" ($n = 61$), 2) "Antisocial ($n = 13$), and 3) "Family history of substance abuse and severe alcohol use disorder" ($n = 22$). The validity of the three-cluster solution was not superior to that of the two-cluster solution.

To summarise, the main finding of the study was that widely used uni-dimensional and multi-dimensional typologies of alcohol use disorders, developed in settings with non-mentally disordered individuals, showed at least some degree of concurrent validity in a sample of men with schizophrenia spectrum disorders and alcohol use disorders. The predictive validity was, however, weak.

5 DISCUSSION

The purpose of the present study was to advance knowledge of risk factors and potential risk factors for criminal offending among men with schizophrenia.

The study comprises two papers on potential risk factors for offending among men with schizophrenia. Both papers were based on theories from research among non-mentally ill individuals and explored relationships at least partly not previously investigated among individuals with schizophrenia.

Low intelligence has only recently been studied as a risk factor for offending among individuals with schizophrenia. Thus, in Paper I, a direct approach was used. The relationship between intelligence - a potential risk factor for offending - and offending was investigated. Substance abuse, on the other hand, is a well-established risk factor for offending among individuals with schizophrenia. Therefore, in Paper II, a more indirect approach was chosen. It was considered to be of interest to advance the knowledge of substance abuse among individuals with schizophrenia; in this study through validation of typologies of alcohol use disorders.

The results showed that low verbal intelligence might be a correlate of early-onset, non-violent offending among men with schizophrenia (Paper I) and that distinct subtypes of alcohol use disorders may be present among men with schizophrenia (Paper II).

In Paper I, VIQ was not found to be associated with the risk for offending *per se*. Participants with low VIQ were not more likely than participants with normal VIQ to have been convicted of a non-violent or violent crime. However, among those who had been convicted for a non-violent crime, VIQ was associated with age of onset.

The results from the study suggest that the interactions between verbal intelligence and criminality are complex. First, lower verbal intelligence may be a risk factor for offending only in young age, when school failures and social embarrassment may lead children to associate with delinquent peers and take on an antisocial life style. Second, lower verbal intelligence may be a risk factor for offending only in interaction with other risk factors. In research among non-mentally ill individuals, verbal intelligence has not been suggested to be the only factor to be associated with criminality, but to be included in a set of multiple risk factors such as social class, inadequate parenting, temperament, and problem behaviours (Lynam et al., 1993; Moffitt & Caspi, 2001;Vermeiren et al., 2002). In the present study, it was demonstrated that VIQ and childhood substance abuse both predicted age at first conviction for a non-violent crime.

Thus, low VIQ may be a risk factor for offending among individuals with schizophrenia only in young age and in interaction with other risk factors. This is in line with a hypothesis proposed by Hodgins and co-workers suggesting that offenders with schizophrenia can be divided into two subtypes, labelled “early-starters” and “late-starters” (Hodgins, Coté, & Toupin, 1998; Hodgins, & Janson, 2001; Hodgins, Toupin, & Coté, 1996; Tengström, Hodgins, & Kullgren, 2001). Early-starters are characterized by early-onset antisocial behaviour and early substance abuse. They start to offend before the onset of the mental disorder and their early criminal careers are similar to those of offenders with no mental disorder. Late starters, on the other hand, start to offend after the onset of schizophrenia.

VIQ was associated with early-onset offending, but not with the number of offences. Individuals who start to commit crimes early would be expected to commit more crimes than others (see i.e. Moffitt, Caspi, Harrington, & Milne, 2002). Why was this not the case among the participants with schizophrenia?

There may be several explanations. First, in the present study, individuals with lower VIQ were found to have been hospitalised in forensic and/or general psychiatric hospitals almost twice as long as individuals with VIQ in the normal range. We have no information as to why this was the case. There may have been difficulties in finding appropriate after care-services, which may have led to longer hospitalizations. After discharge, individuals with lower VIQ may have been supervised more closely than other patients with apparently better social skills. Whatever reason, these treatment strategies may have prevented a number of participants with an early-onset criminality from going back to a previous antisocial life-style.

Second, another reason may be the disorder itself. It is reasonable to assume that for some individuals, negative symptoms of schizophrenia will be handicapping to the extent that they will not proceed into adult antisocial behaviour after the onset of the disorder.

In Paper II, widely used typologies of alcohol use disorders, developed in research among non-disordered individuals, were replicated in a sample of men with schizophrenia. The results revealed many similarities between alcohol use among men with schizophrenia and men from the general population. However, there were also differences. In the following, some theoretical implications of the findings of the present study will be discussed.

There are a number of theories on substance use disorders in schizophrenia. They can be grouped into a) theories based on an assumption of *difference*; substance use in schizophrenia is associated with the disorder and thus different from substance use among people in the general population, b) theories based on an assumption of *similarity*; substance use among individuals with schizophrenia is similar to substance use among people in the general population.

Among theories based on an assumption of difference, is the theory of *self-medication*, (Khantzian, 1985) according to which individuals with schizophrenia use substances to relieve symptoms. Another popular view is that *substance abuse causes schizophrenia*. This is in part based on the observation that substance abuse generally precedes the onset of schizophrenia. There is recent support for this model, but only for an association between cannabis and schizophrenia. (Zammit, Allebeck, Andreasson, Lundberg, & Lewis, 2002; Henquet et al., 2005; van Os et al., 2002; Phillips, Curry, Yung, Adlard, & McGorry, 2002). There is also evidence for *biological vulnerability models*. It has been suggested that both schizophrenia and substance use disorders may have the same underlying neuropathology, causing dysfunction in the reward system (Chambers, Krystal, & Self, 2001; Krystal; D'Souza, Madonick, & Petrakis, 1999; Noordsy & Green, 1999). Research has consistently shown that individuals with schizophrenia are highly sensitive to small doses of substances (for a review, see Mueser et al., 1998).

A theory based on an assumption of similarity, is the *psychosocial model*. The higher prevalence of substance abuse among individuals with schizophrenia as compared to

non-disordered individuals may be explained by the poorer living conditions and limited social skills of the former group. (Lamb & Bachrach, 2001; Dixon, 1999; Addington & Duchak, 1997; Alverson, Alverson, & Drake, 2001; Spencer, Castle, & Michie, 2002; Salyers & Mueser, 2000). Other theories take their interest in *personality*. Just as among non-disordered individuals, links between antisocial personality disorder and substance abuse have been observed among individuals with schizophrenia (Mueser et al., 1997; Mueser et al., 1999) and among specific personality traits, i.e. impulsivity, negativity, disinhibition, sensation-seeking, high neuroticism, low agreeableness, and substance abuse (Van Ammers, Sellman, & Mulder, 1997; Blanchard, Mueser, & Bellack, 1998; Blanchard et al., 1999; Dervaux et al., 2001; Reno, 2004).

An intermediate position is taken by Mueser et al. (1998). According to the *super-sensitivity model*, there may be two subgroups of substance users among individuals with schizophrenia. One of the subgroups would consist of individuals with antisocial personality traits while the other subgroup would consist of individuals with a heightened sensitivity to substances.

Contrary to the findings of Cloninger and Babor and their respective co-workers, the present study revealed no significant difference between the subtypes as to mean age of onset of the alcohol use disorder. It would have been expected that the Type I/A drinkers would have a later age of onset as compared to the Type II/B drinkers. This was, however, not the case. The age of onset was only slightly lower for the Type II/B drinkers (17.80, $SD = 6.657$) as compared to the Type I/A drinkers (19.63, $SD = 3.979$), $t(94) = -1.295$, $p = .198$. While the Type II/B drinkers may have started to use and abuse alcohol early as one of many early delinquent behaviours, the low age of onset for the Type I/A drinkers may rather be an indication of a biological vulnerability to alcohol due to the disorder. The Type I/A – Type II/B typology of the present study may thus lend some support for the super-sensitivity model of substance abuse among individuals with schizophrenia.

The results of the present study have clinical implications for the assessment, treatment planning, and risk management of individuals with schizophrenia. The results from the study contribute to the evidence that individuals with schizophrenia constitute a heterogeneous population. This must be considered at every stage of intervention.

First, individuals with schizophrenia must be carefully assessed in all possible aspects: intellectual functioning, patterns of substance abuse, personality, and symptoms of the disorder. Family history and history of social functioning and criminality must be known. Second, treatment programmes should be individually designed and based upon the needs and the resources of the person. Third, risk assessments should also be individualized with the conditional nature of risk factors kept in mind (Kazdin et al., 1997) – i.e. what is a risk factor for one person may not contribute to an increased risk for another. Finally, programmes for crime prevention (risk management) should be specific for each individual to ensure that all interventions are targeted at the particular risk factors of interest. They should also be adjusted for possible intellectual problems and personality traits, and kept at a proper level.

5.1 A MODEL FOR CRIME PREVENTION

This section sets out with a proposed model (Table 8) for the detection and treatment of risk factors for criminal offending in different populations before and after the onset of schizophrenia. The model is an effort to integrate findings from the present study and knowledge based upon previous research. The aim of the model is not to give detailed recommendations for assessment and treatment, but to serve as an overview on the complex field of crime prevention (risk management) among individuals with schizophrenia.

In the proposed model examples are given of settings were individuals at risk might be found (second column). It is also suggested what kind of information that should be acquired routinely and what type of assessments or evaluations that should be undertaken to detect potential risk factors of criminal offence (third column). If treatment of a detected risk factor lies outside the competence of the particular setting, consultation or referral elsewhere might be necessary (fourth column). Examples are also provided on treatment strategies, targeted at specific risk factors (right column).

Discussions about how to prevent criminality among individuals with schizophrenia often focus on forensic psychiatric services (lower row). How can forensic psychiatric services be developed and improved to better fulfil legitimate expectations from the general public of a safe society? In my opinion, the challenge is to detect and target possible risk factors for criminal offending at all levels, preferably at the earliest level possible. The discussion about prevention therefore starts at a general level at the top of the model.

Children with intellectual and behavioural problems. Paper I findings demonstrated an association between low VIQ and early-onset non-violent criminality among individuals with schizophrenia. Despite the retrospective nature of our study, we suggest that there may be a link between childhood verbal intellectual deficits and delinquency among individuals later to develop schizophrenia, similar to what has been found in longitudinal studies of early delinquents in non-disordered populations. Childhood behavioural problems have been shown to constitute a risk for early-onset offending among both individuals later to develop schizophrenia and non-disordered individuals.

To prevent criminality at a general level, it thus is important that parents, teachers at all levels of education, and child clinicians recognize children with intellectual problems and refer those at need to special education programmes. This is likely to reduce the risk of affiliation with delinquent peers as a consequence of school failure (Farrington, 2000; Vermeiren et al., 2002). Children with behavioural disturbances should as early as possible be referred to appropriate programmes with focus on parent management training (Fonagy & Kurtz, 2002) and social and cognitive skills training (Gibson, Piquero, & Tibbets, 2001). It is also of utmost importance that early substance use is prevented. As has been pointed out by Clark, Kirisci, and Tarter (1998), adolescent-onset alcohol use disorders have a more rapid development than onset in adulthood. The time span for prevention and early intervention of substance use disorders among adolescents may thus be very short.

Adolescents with prodromal symptoms of schizophrenia. In clinical practice it is recognized that some adolescents with substance abuse and/or behavioural problems

have additional prodromal symptoms of schizophrenia. Studies show that psychotic symptoms among children are common in clinically referred samples (8.0 %, Biederman, Petty, Faraone, & Seidman, 2004; 4.5 %, Ulloa et al., 2000), but also among children from the general population (8.0 %, McGee, Williams, & Poulton, 2000).

Routinely asking questions about psychotic experiences in adolescents' clinical settings may facilitate an early identification of prodromal symptoms of schizophrenia in adolescents with substance abuse and/or behavioural problems. As an example, from a study on juvenile detainees, Abram, Teplin, McClelland, and Dulcan (2003) recommended mental health professionals to anticipate that one out of ten young detainees will have a major mental disorder and a substance abuse, that three of four male detainees with a psychiatric disorder will have a substance abuse, and that one fifth of detainees with substance abuse will have a major mental disorder. Child

Table 8. Crime prevention strategies among individuals with schizophrenia before and after the onset of the disorder

Population	Setting(s)	Information, assessment(s)	Consultation, referral	Treatment(s)
Children with intellectual and behavioural problems	Home, child welfare, day care centres, schools	Assessment of intellectual capacity assessment of behavioural problems	Special education, child psychiatry	Special education, parent management training, social and cognitive skills training, substance abuse prevention
Adolescents with prodromal symptoms of schizophrenia	Youth detainment centres, youth addiction centres	Psychiatric evaluation, assessment of risk for criminal offending	Child psychiatry	Treatment of prodromal symptoms of schizophrenia, substance abuse treatment, risk management
Young adults with first-time episode of schizophrenia	Inpatient and outpatient psychiatric care	Assessment of intellectual capacity, assessment of substance abuse, information on criminality	-	Substance abuse treatment, risk management
Individuals with undetected schizophrenia	Prisons, probation services, addiction centres	Psychiatric evaluation	Psychiatric services	Treatment of schizophrenia
Individuals with schizophrenia in general psychiatric care	Inpatient and outpatient general psychiatric services	Assessment of intellectual capacity , assessment of substance abuse, information on criminality, risk assessment, observations of daily life and psychiatric symptoms	Psychiatric expertise, case manager (or similar)	Social skills training, relapse prevention, substance abuse treatment, risk management
Individuals with schizophrenia in forensic mental care	Forensic in- and outpatient care	Assessment of intellectual capacity, assessment of substance abuse, risk assessment, observations of daily life and psychiatric symptoms	Psychiatric expertise, case manager (or similar)	Individually targeted treatment programmes including risk management

psychiatry should be consulted and integrated treatment for all disorders be provided (Akerele & Levin, 2002; Hodgins & Müller-Isberner, 2004) along with assessments of the risk for criminal offending and risk management.

Young adults with first-time episode of schizophrenia. A contrary case to what has been described above is to detect substance abuse and/or criminality among young adults with a first-time episode of schizophrenia. It has consistently been found that many individuals who receive psychiatric treatment for a first-time episode of schizophrenia have a co-morbid substance abuse (37%, Cantwell et al., 1999; 37%, Green et al., 2004; 44%, Van Mastrigt et al., 2004). It is important that these individuals be identified and that substance abuse treatment can be offered as an integrated part of the treatment.

It has also been recognized that some individuals with a first-time episode of schizophrenia already have committed an offence before their first admission to a general psychiatric hospital (Hodgins & Müller-Isberner, 2004). As recommended by the authors, first-episode patients may either be asked about their criminal history or official criminal records may be consulted. As soon as possible, risk assessments should be conducted and targeted risk management programmes be provided, aimed at reducing antisocial behaviours and attitudes, increasing social skills, and controlling substance abuse.

It is now recommended in Sweden and in other countries that a thorough cognitive-neuropsychological assessment should be undertaken among all individuals with a first-time episode of schizophrenia (SPRI, 1997). This is necessary since intellectually handicapped individuals need specific treatment programmes, suited to fit their needs (Bellack, Gold, & Buchanan, 1999). It has also been shown that specific neuropsychological deficits have been linked to a more severe outcome (Milev, Ho, Arndt, & Andreasen, 2005; for a review, see Green, 1996).

Adults with undetected schizophrenia. Worldwide, it is recognised that a large number of incarcerated individuals either have undetected mental health problems or do not receive treatment for their mental health problems. Findings from two reviews of international studies conducted between 1966 and 2001 (Fazel & Danesh, 2002) and between 1990 and 2001 (Andersen, 2004) revealed a prevalence of psychotic illness or schizophrenia among individuals in prison of between two and seven percent. For reasons of humanity and prevention of criminal offence, it is necessary that prisoners with possible symptoms of schizophrenia undergo psychiatric evaluation and, if considered necessary, are offered treatment for the disorder.

Individuals with severe substance abuse disorders may, in some cases, have undetected schizophrenia. Weaver et al. (2003) found that eight percent of individuals at a drug service and nineteen percent of individuals at an alcohol service had a psychotic disorder. An extensive substance abuse may serve as a disguise of schizophrenia and thus delay or be a hindrance to detection of the disorder. It is nevertheless important that psychiatric expertise is easily accessible at every suspicion of a mental disorder and that adequate treatment be provided.

Individuals with schizophrenia in general psychiatric care. Individuals with schizophrenia in general psychiatric care should be well assessed as to their intellectual functioning. Possible substance abuse and previous criminal activities should be known. For patients with a previous history of criminality, assessments of future risk

for criminal offending should be conducted and individually targeted risk management programmes set up.

For patients with no previous history of criminality, the challenge is to prevent unexpected violent offending. Many patients who commit violent offences commit only one such offence. In the present study, 32% of the participants ever convicted for a violent offence had committed only one violent offence. It cannot be ruled out that symptoms of the disorder may have been present at the time of the offence. However, it may be that mediating factors, such as distress and negative emotions were present along with the symptoms. It has been suggested that individuals with severe mental disorders are less capable than others of handling stressful situations, which may lead to violent behaviour (Haggård-Grann et al., 2006). Social skills training may be useful along with individual programmes as how to prevent relapse into psychosis. The ideal situation would be that basic needs, such as housing, economy and daily life are as well arranged as possible. Each patient should be in close contact with a case manager (or similar), who knows the client well and can help out when there is an increase in stress or psychiatric symptoms.

Individuals with schizophrenia in forensic mental care. Individuals with schizophrenia in forensic hospitals or former forensic patients are already identified as to their mental disorder and previous criminal activities. However, in order to set up individually targeted programmes to prevent recidivism into crime, it is necessary that the functions and needs of the patients will be thoroughly assessed.

As the results from Paper I indicated, a substantial number of patients in forensic mental care might have intellectual problems. This is likely to constitute a challenge for clinicians. Intellectually handicapped patients are less likely to take their prescribed medications (Jeste, et al., 2003; Robinson et al., 2002; Vauth, Löschmann, Rüsch, & Corrigan, 2004). They may also have problems to keep up with treatment programmes (Green, 1996). As suggested by Bellack, Gold and Buchanan (1999), it is necessary to take very small steps in training. Training sessions should be highly structured, and groups should be small. All material should be broken down into smaller units and rehearsed extensively. Glaser and Florio (2004) proposed 'humanistic and holistic' services for intellectually handicapped offenders with psychiatric disorders, among other things characterised by continuity, flexibility, shared responsibility between agencies and a case management organization. Crime prevention programmes for intellectually handicapped individuals with schizophrenia should be developed and evaluated.

The prevalence of alcohol and drug use disorders is high among individuals with schizophrenia. The results of Paper II suggest the existence of different patterns of substance abuse among individuals with schizophrenia, a phenomenon that may require differentiated treatment options.

Substance abuse treatment for individuals with schizophrenia has in many countries, by tradition, been organized as either sequential ("first we take care of your mental disorder, then we do something about your drinking") or parallel ("we treat your mental disorder, they help you with your substance abuse"). Integrated treatment may best be described as treatment, targeted at both schizophrenia and substance abuse simultaneously and provided within the same organizational setting. Recent findings suggest that integrated treatment may be a promising treatment approach for dually

diagnosed patients (Judd, Thomas, Schwartz, Outcalt, & Hough, 2003; Moggi, Brodbeck, Koltzsch, Hirsbrunner, & Bachmann, 2002; Rosenheck, Resnick, & Morrisey, 2003; for reviews, see Akerele & Levin, 2002; Tsuang & Fong, 2004; Ziedonis, 2004). However, as has been pointed out, more controlled research is needed (Drake, Mercer-McFadden, Mueser, McHugo, & Bond, 1998; Ley, Jeffrey, McLaren, & Siegfried, 2000).

In Paper II it was proposed that integrated treatment for individuals with Type I/A substance use disorders might be based on broad interventions to improve social skills and cope with high-risk situations (Bellack & DiClemente, 1999). Individuals with Type II/B substance use disorders, on the other hand, may be provided with cognitive-behavioural interventions aimed at reducing antisocial behaviours and attitudes (Hodgins & Müller-Isberner, 2004) along with alcohol and drug tests and frequent contacts with i.e. a case manager to prevent substance use and recidivism into criminal and violent behaviours.

Alike patients with schizophrenia in general psychiatric care, patients in forensic care should also be well informed about their disorder and how to prevent relapse into psychosis, and stay in close contact with a case manager.

Comments on the model. As implied by the model, crime prevention among individuals at risk for schizophrenia or with an already developed disorder is a matter for a number of agencies, in Sweden, as well as in many countries, run by different authorities. It is necessary that policies and systems be organized in such a way that different providers of treatment can cooperate and that prestige and conflicts over financing can be avoided. It is also important that professionals in all settings are well educated and have a thorough training to be able to detect also what may be outside of their own profession.

The specific challenge for forensic mental health is to organize integrated treatment in such a way that individually designed treatment programmes, based on the specific needs of each participant, can be developed and implemented.

5.2 LIMITATIONS AND STRENGTHS

The major drawback of Paper I is the use of retrospectively acquired data. The participants and their families have provided information on i.e. childhood behaviour problems and parental problems, for some participants dating decades back. For reasons of social desirability, or pure recall problems, there may have been a risk of underreporting. Over-exaggerating adverse circumstances in the past due to a present, perhaps unhappy, situation, is another possibility. To minimize recall bias, multiple sources of information were used as well as national registers of criminality and records from medical agencies.

However, the main variable of interest of Paper I was verbal IQ, a variable that was not retrospectively acquired but assessed at the time of inclusion into the study. Based on assumptions of the stability of intelligence in schizophrenia, we inferred that current verbal IQ would be similar to childhood verbal IQ. Thus, Paper I cannot be described as a "true" retrospective study, but comprising an unholy mix of variables.

To justify our choice of design, at least to some degree, some points should be made. To our knowledge, very few studies have investigated the association between

intelligence and offending among individuals with schizophrenia. Identifying correlates, which is what a retrospective design permits the researcher to do, can be viewed as a preliminary step when conducting research in previously not investigated fields (Kazdin et al., 1997). A preferred next step would be to establish a time line between antecedent events and outcomes by using a prospective, longitudinal design. However, longitudinal studies in the field of schizophrenia and criminality are difficult to carry out. Schizophrenia affects less than one percent of the population and may onset twenty or thirty years after birth. The proportion of individuals with schizophrenia who commit criminal offences is even smaller. As an example, results from the Dunedin study (Arseneault et al., 2000) revealed that from a total birth cohort of 1,037 children, 39 participants were considered to have a schizophrenia spectrum disorder at age 21. It was estimated that one quarter of them were expected to be diagnosed with schizophrenia in the future. One third of the participants with a schizophrenia spectrum disorder (n = 13) reported having committed a violence offence while only six individuals, less than 6‰ of the original birth cohort, were actually convicted.

For Paper II, retrospective data were used only to some extent. They major drawback in this study was that data that would have been valuable were not obtainable. Data for Paper II were acquired from the CSPCMIP, aimed at the study of treatment and its relations to the needs of the patients, but not specifically designed to suit researchers with an interest in alcohol use typologies. Useful information on i.e. drinking habits, and adverse consequences of alcohol use, used by Cloninger et al. (1981) and Babor et al. (1992) was thus missing. Despite this, it was considered that the information available was sufficient for the study, essentially explorative in nature.

There are limitations of the extent to which the results from this study can be generalized. First, due to their low number in the CSPCMIP (n = 8), females were not included in the present study. It was considered that gender differences might confuse results if data from males and females were merged. The number of females was too low to allow separate presentations of data. From empirical research, it has been suggested that men and women in forensic psychiatry have different needs and that women may need other types of forensic services than those organized for men (Coid, Kahtan, Gault, & Jarman, 2000). Future research will shed further light on criminality and substance abuse among women with schizophrenia.

Second, cautiousness is recommended before generalizing the results to males with schizophrenia in general. All participants of the study were discharged from hospitals, some of them after quite lengthy hospitalisations. They may have had more severe forms of the disorder as compared to individuals with schizophrenia attending open facilities only or being hospitalised for shorter time periods. Further, the majority of the participants of the study had been patients at forensic hospitals. Previous reports from the CSPCMIP have revealed that participants from forensic hospitals had been convicted for more crimes than the participants from the general psychiatric hospitals (Tengström & Hodgins, 2002).

The seemingly high refusal rate (167 persons out of the 475 persons originally invited to participate in the CSPCMIP) is another limitation of the study. It may be that those individuals, not consenting to participate, systematically differ from the participants. Analyses revealed that the refusal rate was higher among the individuals who were

discharged from general psychiatric hospitals as compared to the individuals who were discharged from forensic hospitals (42.2%; 29.5%, respectively), $\chi^2(1, N = 475) = 8.212, p < .01$. Another limitation to the extent to which the findings of the study may be generalised is that only patients who were discharged were included into this study. Severely mentally ill individuals or individuals considered to be in high risk to recidivate have not been discharged and consequently have not been included into the study.

It should also be held out that the study is characterised by a number of strengths. The participants were recruited in four different countries, which limited the risk of cultural bias. The sample sizes of the two papers are relatively large ($n = 219$, $n = 139$). Diagnoses, symptom measures, and PCL-R ratings were all made by experienced clinicians trained to use standardized and validated procedures. Data were acquired from multiple sources including the participant, family members and staff, and from medical, social service, and criminal records.

5.3 CONCLUSIONS AND FUTURE DIRECTIONS

To my knowledge, the present study is the first to show an association between lower verbal IQ and criminal offending among men with schizophrenia. To further the understanding of the relationship between intelligence and criminal offence, intelligence should be considered to be a variable of interest in future follow-up studies. Qualitative and process-orientated studies would be suitable to explore criminal careers and treatment provisions for intellectually handicapped individuals with schizophrenia.

The results of the present study also suggest that the Type I/A – Type II/B typology of alcohol use disorders is valid among men with schizophrenia. It would be valuable if this finding could be replicated in other samples. The heterogeneity of substance abuse among individuals with schizophrenia must be considered when designing and evaluating treatment programmes.

Crime prevention among individuals with mental illness is a demanding task that requires intense co-operation between agencies in different sectors such as forensic and general psychiatry, prison and probation services, and social services. To make implementation and evaluation of new treatment options possible, in my opinion it is valuable if research is conducted in close collaboration with those services concerned.

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