



Subtypes of severely mentally ill violent offenders in a Spanish Forensic Psychiatric Hospital

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2 Psychiatric Hospital

4 Abstract

5 Conduct disorder (CD) prior to age 15 identifies a subgroup of men with severe mental
6 illness (SMI) who present a high risk for violence that persists across the life-span. The
7 present study examined male violent offenders with SMI in a forensic hospital in Spain,
8 comparing those with SMI+CD and those without SMI-CD on the HCR-20 and
9 PCL:SV. Violent offenders with SMI+CD obtained higher HCR-20 and PCL: SV total
10 scores, and much higher H and factor 2 scores as compared to those without prior CD.
11 Men with SMI+CD present a challenge to forensic psychiatric services.

18 *Keywords:* Schizophrenia, Violence, Conduct Disorder, HCR-20, PCL:SV

INTRODUCTION

There is robust evidence that among violent offenders with severe mental illness (SMI), the age of onset of antisocial and aggressive behaviour defines sub-types with distinctive features and risk of recidivism (Hodgins, 2008). Those who commit most offences present Conduct Disorder (CD) prior to age 15. Others with no childhood history of conduct problems begin engaging in aggressive behaviour as illness onsets. A small group with no prior history of aggressive behaviour engages in serious violence, usually against a care-giver, after many years of illness.

Among men with schizophrenia, those with a history of CD prior to age 15, are convicted for more non-violent and violent crimes (Crocker et al., 2005; Fulwiler & Ruthazer, 1999; Mueser, Crocker, Frisman, Drake, Covell, & Essock, 2006), commit a more diverse array of crimes (Hodgins, 2004), and have criminal histories similar to those of non-mentally ill offenders who also have a childhood history of conduct problems (Hodgins & Côté, 1993; Schug, Raine, & Wilcox, 2007). In addition, almost all display a pattern of substance misuse going back to early adolescence (Fulwiler, Grossma, Forbes, & Ruthazer, 1997).

In a prospective investigation that followed a Dunedin, New Zealand birth cohort to age 26, 40% of the cohort members who developed schizophreniform disorders had displayed CD prior to age 15 (Kim-Cohen, Caspi, Moffitt, Harrington, Milne, & Poulton, 2003). In clinical samples of adults with schizophrenia, the prevalence of CD is lower, approximately 20%, among both women and men (Hodgins, Côté, & Toupin, 1998), but for example in a UK sample of inpatients, CD prior to age 15 characterised 42.0% of the men and 22.4% of the women with SMI (Hodgins, Cree, Alderton, & Mak, 2008). While these samples of patients with SMI or schizophrenia

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6 52 were recruited in general psychiatric services, among patients in forensic services the
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8 53 prevalence of CD is higher, and among those incarcerated in correctional facilities it is
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10 54 further elevated (Hodgins et al., 1998).

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12 55 A sample of 248 men with schizophrenia who were, on average, aged 39.8 years
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14 56 old at the time of the study were assessed in the two weeks before discharge from
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16 57 hospital using multiple sources of information including complete criminal records
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18 58 (Hodgins, Tiihonen, & Ross, 2005). Fifty-two (21%) of these men met criteria for CD
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20 59 prior to age 15. Incident Rate Ratios (IRR) were calculated to estimate the association
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22 60 between CD and the number of convictions for violent crimes. A diagnosis of CD prior
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24 61 to age 15 was associated with an increase of 2.29 (95 % confidence interval (CI) 1.31-
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26 62 4.03) in the number of convictions for violent crimes after controlling for life-time
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28 63 diagnoses of alcohol and/or drug abuse and/or dependence. Each CD symptom present
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30 64 before the age of 15 was associated with a 1.15 (95% CI 1.06-1.25) increase in the
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32 65 number of convictions for violent crimes, again after controlling for diagnoses of
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34 66 substance misuse disorders. A diagnosis of CD and the number of CD symptoms were
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36 67 also associated with the number of convictions for non-violent crimes. These results
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38 68 were replicated in a sample of UK inpatients with SMI (Hodgins, Alderton, Cree,
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40 69 Aboud, & Mak, 2007). After controlling for sex, age, current alcohol and drug use, CD
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42 70 prior to age 15 was associated with a two-fold increase in the number of convictions for
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44 71 violent crimes. Again, after controlling for sex, age, and substance misuse, each CD
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46 72 symptom present before age 15 was associated with a slight increase in the number of
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48 73 violent crimes odds ratio (OR) 1.16, (95% CI 1.01-1.35). Both CD diagnosis and the
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50 74 number of CD symptoms were associated with the number of convictions for non-
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52 75 violent crimes. Importantly, no sex differences in the associations of CD and later
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54 76 offending were detected. These results concur with findings from other studies that used
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6 77 different definitions of childhood conduct problems (Fulwiler, & Ruthazer, 1999; Rice
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8 & Harris, 1995; Tengström, Hodgins, Grann, Långström, & Kullgren, 2004).

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10 79 Both in the general population (Moffitt & Caspi, 2001) and among people with
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12 80 schizophrenia, CD is a precursor of aggressive behaviour, as well as violent criminality.
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14 81 In the sample of 248 men with schizophrenia described above, the diagnosis of CD and
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16 82 the number of CD symptoms were associated with an increased the risk of aggressive
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18 83 behavior, after taking account of life-time diagnoses of alcohol abuse and/or
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20 84 dependence, alcohol and drug use during the follow-up period, depot medication or
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22 85 medication compliance, and obligatory care. The diagnosis of CD did not predict
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24 86 aggressive behavior, however, after controlling for life-time diagnoses of drug abuse
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26 87 and/or dependence diagnosis. Each CD symptom increased the risk of aggressive
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28 88 behavior by a factor of 1.2, and this remained significant after controlling for life-time
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30 89 diagnoses of alcohol and drug use disorders, self-reported alcohol and drug use, drugs
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32 90 detected in urine or hair or a refusal to provide a sample, depot medication or self-
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34 91 reported compliance, and a court order to comply with treatment (Hodgins et al., 2005).
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36 92 In the UK sample of men and women with SMI described above, after controlling for
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38 93 age, sex, and current substance misuse, CD diagnosis prior to age 15 was associated
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40 94 with an increased odds of aggressive behaviour towards others in the previous six
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42 95 months (odds ratio 2.66, 95 % CI 1.24-5.68), as was each CD symptom (odds ratio 1.29,
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44 96 95 % CI 1.11-1.50) (Hodgins et al., 2008). Similar findings emerged from analyses of
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46 97 baseline data collected for a large trial of medications in the US. While this study used
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48 98 the same instrument to assess aggressive behaviour as did the previously described
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50 99 studies, unlike the previous studies described above, symptoms were not measured
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52 100 prospectively but at the same time as the aggressive behaviour. Two or more CD
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54 101 symptoms were found to be associated with aggressive behaviour in the previous six
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6 102 months after controlling for numerous other factors, and, as in the previous studies,
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8 103 there was no association with substance misuse after taking account of childhood
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10 104 conduct problems (Swanson et al., 2006).

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12 105 There is little prospective research on individuals who present conduct problems
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14 106 in childhood and who subsequently develop schizophrenia (SZ+CD). An important
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16 107 finding has emerged from the prospective longitudinal investigation of a birth cohort in
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18 108 Dunedin, New Zealand. As previously noted, and consistent with other epidemiological
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20 109 evidence, the risk of violence was elevated among cohort members who developed
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22 110 schizophreniform disorder by age 26. This association was partially explained by the
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24 111 presence of aggressive behaviour at ages 7, 9, and 11 and psychotic-like-experiences at
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26 112 age 11 (Arseneault, Cannon, Murray, Poulton, Caspi, & Moffitt, 2003). In a cohort of
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28 113 twins aged 12 years, those reporting psychotic-like-experiences also reported
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30 114 significantly more antisocial behaviour, depression, and anxiety (Polanczyk et al.,
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32 115 2010). Most other relevant findings on the childhood characteristics of individuals with
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34 116 SZ+CD derive from studies of clinical samples of adults in which data on childhood is
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36 117 collected retrospectively from multiple sources, some objective- school, social service,
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38 118 and juvenile justice records, and some subjective – reports from patients, parents, older
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40 119 siblings. For example, in the sample of 248 men with schizophrenia described above,
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42 120 more of those with, than without CD, obtained lower than average marks in elementary
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44 121 school, failed to graduate from secondary school, and prior to age 18 abused substances,
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46 122 experienced physical abuse, and were institutionalised (Hodgins et al., 2005). The
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48 123 results of other similar studies concur (Fulwiler et al., 1997; Schanda, Földes, Topitz,
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50 124 Fliedl, & Knecht, 1992; Tengström, Hodgins, & Kullgren, 2001). In contrast, while
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52 125 rates of parental criminality are elevated among men with SMI+CD, parents and
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6 126 siblings of men in this subgroup present similar rates of mental illness when compared
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8 127 to those men with SMI-CD (Hodgins et al., 2005; Tengström et al., 2004).

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10 128 Recent studies using magnetic resonance imaging (MRI) have shown that men
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12 129 with schizophrenia preceded by CD differ in both brain activity (Joyal et al., 2007) and
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14 130 brain structure (Schiffer et al., 2012) as compared to men with schizophrenia and no
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16 131 history of CD. Further, some of the structural anomalies presented by those with prior
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18 132 CD resemble anomalies of men without schizophrenia who had CD prior to age 15.

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20 133 The accumulated evidence suggests that the presence of CD prior to age 15
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22 134 identifies a subgroup of men with SMI who present high levels of violent offending and
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24 135 for violent recidivism. This body of evidence on SMI+CD has remained distinct from
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26 136 the large body of evidence demonstrating the validity of the Historical-Clinical-Risk
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28 137 Management-20 (HCR-20; Webster, Douglas, Eaves, & Hart, 1997) and **The Hare**
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30 138 **Psychopathy Checklist: Screening Version (PCL: SV; Hart, Cox, & Hare, 1995)** in
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32 139 predicting risk of violence and identifying factors associated with future violence. This
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34 140 is the first study to compare severely mentally ill violent offenders with SMI+CD and
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36 141 violent offenders with SMI-CD using these clinical tools that are commonly
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38 142 administered in forensic psychiatric services.

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40 143 We hypothesized that violent offenders with SMI+CD, as compared to those with
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42 144 SMI-CD, would obtain higher HCR-20 total scores, and higher H and R scores. The
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44 145 presence of CD prior to age 15 and high H scores would identify patients with SMI
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46 146 whose antisocial and aggressive behaviours have been present since a young age and
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48 147 that would be particularly resistant to change. Elevated R scores would suggest that the
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50 148 long-standing pattern of antisocial and aggressive behaviour continues to be associated
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52 149 to the higher scores on clinical tools use-to predict risk of violence. Consistent with
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54 150 evidence showing no difference in psychotic symptoms between those with SMI+CD
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6 151 and SMI-CD, we hypothesized that the two groups of violent offenders would obtain
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8 152 similar C scores (Hodgins, 2008). We also hypothesized that the severely mentally ill
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10 153 violent offenders with SMI+CD would obtain higher PCL:SV scores than those with
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12 154 SMI-CD, and that the elevation in scores would result primarily from higher factor 2
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14 155 scores consistent with an earlier onset of conduct problems and a more severe pattern of
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16 156 antisocial behaviour. Consistent with studies of SMI+CD, we hypothesized that violent
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18 157 offenders with SMI+CD would have been first convicted at a younger age than those
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20 158 with SMI-CD, that they would have been convicted or found not guilty by reason of
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22 159 insanity for more violent crimes, and that they would engage in more rule breaking
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24 160 within the hospital. To test these hypotheses, we examined a sample of Spanish forensic
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26 161 patients with SMI who had committed violent crimes.

162 METHOD

163 *Setting*

164 The Alicante Forensic Psychiatric Hospital is a Medium-Secure Psychiatric
165 Hospital which provides treatment for both males and females from all of Spain. The
166 hospital has 375 beds. One ward includes 43 beds for females. The other three treatment
167 wards house male patients and they differ as to level of care and supervision: one for
168 chronic, violent patients without physical deterioration (N= 117); one for chronic,
169 violent patients with physical deterioration (N= 80); and one for violent offenders with
170 primary diagnosis of personality disorder (N= 55). Additionally, there is an admissions
171 ward with 30 beds.

172 In Spain, individuals who are declared not criminally responsible on the basis of
173 mental disorders undergo a pre-trial psychiatric assessment, and if they are found to
174 have been suffering from mental illness at the time of the offense, they are sentenced to
175 psychiatric treatment at a Forensic Psychiatric Hospital where they are evaluated at least

176 twice per year in order to review their progress and modify or maintain their legal
177 status.

178 *Participants*

179 The sample included all 117 severely mentally ill violent offenders from the ward
180 housing violent men without physical deterioration. Patients were included in the study if
181 they: (a) were male; (b) had a primary clinical diagnosis of schizophrenia, schizo-
182 affective disorder, delusional disorder, other psychosis, or bipolar disorder; and (c) had
183 committed at least one violent crime. Of the 117 patients eligible to participate in the
184 study, 12 (10.3%) did not meet diagnoses criteria, 17 (14.5%) refused to take part, and
185 88 (75.2%) formally consented. Among these 88, 22 (25.0%) had presented a history of
186 conduct disorder prior to age 15 and 66 (75.0%) had not. All 88 patients were assessed
187 in the hospital between September 2012 and February 2013 and information was
188 extracted from clinical files that are up-dated every six months with progress reports
189 from a psychiatrist, psychologist, and social worker as required by the court. The
190 patients were aged, on average, 42.9 years (SD = 9.5). *Diagnostic and Statistical*
191 *Manual of Mental Disorders* (DSM-IV 4th edition; American Psychiatric Association,
192 1994) criteria for schizophrenia were met by 67.0% (n = 59), while 15.9% (n = 14)
193 presented delusional disorder, 8.0% (n = 7) schizo-affective disorder, 3.4% (n = 3)
194 bipolar disorder, and 5.7% (n = 5) other psychotic disorders. Additionally, 29.5%
195 (n=26) of the sample met criteria for a comorbid diagnosis of personality disorder.
196 Urine tests conducted within the past year when patients returned from outings detected
197 traces of drugs in 9.0% (n= 8) of the participants. The average length of stay at the
198 institution was 151 months (SD = 93.23, range 6-360 months).

199 *Measures*

200 *Socio-demographic characteristics* were extracted from hospital files and collected
201 from participants and other informants, primarily family members.

202 *Diagnoses of Severe Mental Illness.* The DSM-IV (4th ed) classification criteria for
203 Axis I (American Psychiatric Association, 2000) were used to revise all file diagnoses.
204 Clinical information was corroborated through weekly reports from psychiatrists and
205 psychologists who periodically reviewed each diagnosis and carried out an exhaustive
206 evaluation of the patient's mental state. Given the diverse sources of information and
207 the high degree of consensus among the evaluations, fewer than 5% of the diagnoses
208 were modified by the researchers.

209 *Convictions and judgements of not guilty by reason of insanity.* Information was
210 extracted from official criminal records. Violence was defined as in the HCR-20 manual
211 as actual, attempted or threatened physical harm deliberately to others (Webster et al.,
212 1997). Acts of violence included; homicide, murder, assault, injury, robbery offences
213 involving injury to the victim. According to the Spanish Penal Code (arts. 138-140) it is
214 considered murder when the act coincides with at least one of the following
215 circumstances: treachery, cruelty, or the perpetrator has been hired. The categories of
216 homicide or murder were established based on the information collected from the court
217 judgement.

218 *Physical abuse* prior to age 15 was documented from patient interviews recorded in
219 clinical files. It was defined as the child having been hit, pushed, kicked, slapped, and
220 any other act resulting in deliberate physical harm. Responses were coded as present
221 (frequently occurred) or absent (occasionally or never).

222 *Hyperactivity.* Childhood hyperactivity was defined according to DSM-IV-TR
223 criteria as a persistent pattern of inattention and excessive motor activity present in

224 more than one setting before age 7. This information was extracted from hospital files.

225 When information was unclear or not available, it was coded as absent.

226 *Family history of mental disorders.* Information on mental disorders among family
227 members was extracted from files and coded as present, absent or not available.

228 *Family history of criminality* Information on criminal convictions or judgments of
229 insanity among fathers, mothers, brothers and sisters was coded as present, absent or not
230 available and collected from hospital files and from participants during interviews.

231 *Violation on rules in the Institution.* Information on violation of rules within the
232 hospital was extracted from hospital files and coded as: (a) non-compliance with
233 timetables; (b) not taking medication during outings; (c) possession of prohibited
234 objects in the institution; and (d) minor acts of aggression (including verbal aggression
235 and property damage not resulting in physical harm).

236 *HCR-20.* The HCR-20 (Webster et al., 1997) is a tool that uses structured
237 professional judgment (SPJ) to assess risk of violence and factors associated with risk.
238 It is composed of 20 risk factors grouped into 3 domains: Historical (H), Clinical (C)
239 and Risk Management (R) scored on a 3-point scale (0, 1 or 2) indicating the presence,
240 possible presence or absence of each item. The psychometric properties have been
241 examined in numerous studies reporting rates of moderate to excellent predictive
242 validity (Belfrage, 1998; Douglas & Reeves, 2010). In a recent Spanish prospective
243 longitudinal study exploring the predictive validity of the HCR-20 and PCL:SV (Hart
244 et al., 1995) in a sample of 78 mentally disordered inpatients followed up for 12
245 months, the ROC analysis yielded moderate to strong association between HCR-20 and
246 violence (AUCs=.69-.77), PCL:SV (AUCs=.61-.70) (for a review see Arbach-Lucioni,
247 Andrés-Pueyo, Pomarol-Clotet, & Gomar-Soñez, 2011) . In the present study a random

248 sample of 16 patients was rated independently by a second experienced psychologist
249 and the intra-class correlation for the total score was high 0.71.

250 *PCL:SV*. The PCL:SV (Hart et al., 1995) consists of 12 items rated on a 3-point
251 scale ranged from 0 to 24. A cut-off of 18 and above has been recommended to indicate
252 the presence of psychopathy. The psychometric properties of this instrument have been
253 confirmed in numerous studies reporting high correlations with the original scale *The*
254 *Hare Psychopathy Checklist-Revised* (PCL-R; Hare, 1991) and adequate cross-cultural
255 reliability (Cooke, Michie, Hart, & Clark, 2005). *The PCL:SV has been shown to be the*
256 *most appropriate instrument to measure prototypical psychopathic facets in forensic*
257 *populations (Cooke, & Michie, 1999) and includes two robust factors that capture the*
258 *interpersonal/affective and antisocial/unstable behaviour traits of psychopathy.* A
259 random sample of 16 patients was rated independently by an experienced psychologist
260 and the intra-class correlation for the total scores was high 0.84.

261 The HCR-20 and the PCL-SV were completed by psychologists trained in the use
262 of both instruments for each patient based on information from a clinical interview and
263 files.

264 *Conduct Disorder*. Information on childhood characteristics was collected from
265 files and interviews with each participant, using the Conduct Disorder module of the
266 Structured Clinical Interview for DSM-IV (SCID-II) (First, Gibbon, Spitzer, Williams,
267 & Benjamin, 1997). In addition we used multiple sources of information (medical
268 records, files, and interviews with family members and social workers) to assess
269 symptoms of CD prior to age 15. A diagnosis of CD was coded as present or absent.

270 *Ethical approval*. The study was approved by the ethics committee of the forensic
271 psychiatric hospital.

272 *Statistical Analysis*

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6 273 Data were analysed using SPSS for the Social Sciences version 20. Socio-
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8 274 demographic, clinical, criminal histories, and HCR-20 and PCL:SV scores of violent
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10 275 offenders with SMI+CD and with SMI-CD were compared using chi-square tests for the
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12 276 categorical variables, Student's *t*-tests for normally distributed continuous variables and
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14 277 the Mann-Whitney *U* for skewed continuous variables. Six forward stepwise logistic
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16 278 regression analyses were then performed to examine the multivariate relationships of
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18 279 scores on HCR-20, PCL:SV and socio-demographic variables with SMI+CD. The
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20 280 dependent variable was coded 0 for participants with SMI-CD and 1 for those with
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22 281 SMI+CD. Model 1 estimates the independent contribution of the total HCR score to
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24 282 group SMI+CD. Model 2 estimates the independent contribution of the H, C, and R
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26 283 scores to SMI+CD, while Model 3 estimates the association of the total PCL:SV score
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28 284 with SMI+CD. Model 4 estimates the independent contribution of the total PCL:SV
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30 285 factor 1 and 2 scores with SMI+CD. Because some of the symptoms of the CD could
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32 286 be captured by the risk assessment instruments, the analyses of these models were
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34 287 conducted leaving out possible confounders (young age at first violent incident and
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36 288 early maladjustment), both part of the H scale of the HCR-20 and juvenile delinquency,
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38 289 part of the PCL: SV. To test the collinearity between confounders, we used the Collin
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40 290 Command in Stata. We found no evidence of collinearity (the mean of variance was
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42 291 3.05) while a mean variance inflation factor above 10 is considered indicative of
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44 292 significant collinearity (Chen, Ender, Mitchell, & Wells, 2009).

45 293 Finally, models 5 and 6 were computed to determine whether variables that were
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47 294 significantly associated with SMI+CD and SMI-CD at univariate level $p < .05$ (current
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49 295 personality disorder, age at first offence, low education level, rule breaking within the
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51 296 institution, and family psychiatric history) were independently associated with SZ+CD,
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297 as opposed to SZ-CD, after controlling in model 5 for the total HCR score and in model
298 6 for the PCL:SV score.

299 RESULTS

300 *Comparisons of severely mentally ill offenders with and without Conduct Disorder prior*
301 *to age 15*

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303 Insert Table 1 about here
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305 Comparisons of the severely mentally ill violent offenders with and without CD are
306 presented in Table 1. No significant differences were observed regarding age, marital
307 status, primary diagnosis, or family history of mental disorders. Fewer of the
308 participants with CD than those without CD, had completed secondary school, more had
309 a co-morbid personality disorder, and a history of substance misuse. Those with CD
310 prior to age 15 had been first convicted of a criminal offence at a younger age, had
311 acquired more had convictions prior to the judgement of insanity, had experienced
312 physical abuse as a child, presented hyperactivity in childhood, had relatives with
313 mental disorders, acquired a greater number of convictions, and proportionately more of
314 their relatives had a history of criminality. Additionally, proportionately more of those
315 with CD than those without had breached institutional rules.

316 *Comparison of HCR-20 and PCL: SV scores of violent offenders with SMI+CD and*
317 *violent offenders with SMI-CD*

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319 Insert Table 2 about here
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6 321 As presented in Table 2, violent offenders with SMI+CD obtained significantly
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8 322 higher HCR-20, H, R, PCL: SV, and PCL factor 1 and 2 scores than the violent
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10 323 offenders with SMI-CD.

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12 324 -----
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14 325 Insert Table 3 about here

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18 327 The results of the logistic regression analyses are shown in Table 3. In Model 1,
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20 328 the total HCR-20 score was positively associated with SMI+CD. In Model 2, the H
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22 329 score was independently, and positively, associated with SMI+CD, while C scores were
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24 330 independently and negatively associated with SMI+CD, and the R score was not
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26 331 significantly associated. In Model 3, the total PCL:SV score was significantly
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28 332 associated with SMI+CD. In Model 4, factor 2 scores were positively associated with
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30 333 SMI+CD, while factor 1 scores showed no association. Six predictor variables were
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32 334 entered into Model 5: total HCR-20 score, personality disorder, age at first offence, low
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34 335 educational level, rule breaking within institution and family psychiatric history. The
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36 336 model indicated that the HCR-20 total scores, a comorbid personality disorder, and low
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38 337 educational level were independently associated with SMI+CD, while age at first
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40 338 offence, rule breaking within institution, and family psychiatric history were not. A final
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42 339 Model included the total PCL:SV score and the significant variables that distinguished
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44 340 the violent offenders with and without CD at univariate level. The model showed that
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46 341 scores on the PCL:SV and low educational level were significantly associated with
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48 342 SMI+CD. However, personality disorder, age at first offense, and rule breaking within
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50 343 institution, did not significantly contribute to the regression model. The wide confidence
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52 344 intervals for the odds ratios in these models indicate that these findings should be
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54 345 carefully interpreted.

346

347 DISCUSSION

348 This study compared HCR-20 and PCL: SV scores of violent offenders with SMI
349 with and without a history of CD prior to age 15. In univariate comparisons, patients
350 with SMI+CD as compared to those without CD were more likely to have been
351 convicted of violent crimes prior to the index offence that lead to the judgement of
352 insanity and to have engaged in breaches of hospital rules. However, in regression
353 models, after taking account of either the HCR-20 score or the PCL:SV score, neither of
354 these factors were associated with SMI+CD.

355 As hypothesized, violent offenders with SMI+CD obtained higher total HCR-20
356 scores. Further, in the regression model that included the three HCR sub-scales, the total
357 H scores were independently and positively associated with SMI+CD confirming past
358 studies showing that among men with schizophrenia or SMI the presence of CD prior to
359 age 15 was associated with persistent pattern of criminality through middle age
360 (Hodgins, et al, 2005; Hodgins et al., 2008; Swanson et al., 2006). However, C scores
361 on HCR-20 were negatively associated with SMI+CD, suggesting that these patients
362 were less symptomatic than those with SMI-CD. We hypothesized that these offenders
363 with SMI+CD commit their first offence prior to treatment for psychosis, and they go
364 on to commit more offences than those offenders without CD. However, despite the fact
365 that they are more persistent offenders, they are more clinically stable and they spend
366 less time in the institution due to that they are convicted for less severe violent crimes.
367 However, this hypothesis was not tested due to the small size of the sample. The lack of
368 association of the R score with SMI+CD is also surprising, given the evidence that those
369 with prior CD are more likely than others to commit future violent crimes and to engage

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6 370 in aggressive behaviour. The finding may be due to the fact that patients were not being
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8 371 considered for discharge at the time of the study.

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10 372 In the present study, violent offenders with SMI+CD obtained higher PCL:SV total
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12 373 scores than did violent offenders with SMI-CD. This is similar to a previous finding
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14 374 showing that among forensic patients PCL-R scores correlated with a diagnosis of
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16 375 Antisocial Personality Disorder (Hart & Hare, 1989). In regression model examining the
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18 376 independent contributions of PCL:SV factors 1 and 2 to SMI+CD or SMI-CD, only
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20 377 factor 2 was found to be associated with SMI+CD. This finding indicates that the
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22 378 elevated PCL:SV scores result from the severity of antisocial/unstable behaviour traits,
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24 379 rather than from the interpersonal/affective traits of psychopathy. These results are also
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26 380 consistent with results from previous studies that demonstrated that factor 2 of PCL:SV
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28 381 is more strongly related to violent offending than factor 1 (Guy, Edens, Anthony, &
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30 382 Douglas, 2005; Leistico, Salekin, DeCoster, & Rogers, 2008; Belfrage, Fransson, &
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32 383 Strand, 2000; Salekin, Rogers, & Sewell, 1996).

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34 384 In the present study, primary diagnoses of patients with and without prior CD were
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36 385 similar, consistent with previous studies (Moran & Hodgins, 2004), but the proportion
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38 386 of patients with delusional disorder was higher among the violent offenders with no
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40 387 history of CD than among those with CD. However, this difference was not statistically
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42 388 significant, due to the small number of patients with this diagnosis. In a study conducted
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44 389 in Canada, delusional disorder was found to be much more common among prison
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46 390 inmates than in a sample of patients recruited in a psychiatric hospital (Côté, Lesage,
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48 391 Chawky & Loyer, 1997). Delusional disorder may be associated with violent behaviour
49
50 392 but not surprisingly given the symptoms of the disorder, few studies have examined this
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52 393 possibility. Importantly, almost two-thirds of the violent offenders who had presented
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54 394 CD prior to age 15 received a clinical diagnosis of a personality disorder. Consistent

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6 395 with previous studies, proportionately fewer of the violent offenders with SMI+CD than
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8 396 those with SMI-CD completed high school, while proportionately more presented
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10 397 hyperactivity and reported having experienced physical abuse in childhood. Physical
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12 398 abuse is a precursor of both schizophrenia (Bendall, Jackson, Hulert, & McGorry, 2008;
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14 399 Morgan & Fisher, 2006; Read, vanOs, Morrison, & Ross, 2005) and CD (Murray &
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16 400 Farrington, 2010; Stouthamer-Loeber, Loeber, Homish, & Wei, 2001; Widom, 1989).
17
18 401 Further, the families of the violent offenders with SMI+CD included proportionately
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20 402 more individuals with criminal convictions and mental disorders, consistent with
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22 403 previous reports (Fazel, Langstrom, Hjern, Grann, & Lichtenstein, 2009; Hodgins,
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24 404 2008). In regression models, after taking account of either the HCR-20 or PCL:SV total
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26 405 score, only a comorbid personality disorder and low education were associated with
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28 406 SMI+CD.

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30 407 In the present study, proportionately more of the violent offenders with SMI+CD
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32 408 than those with SMI-CD had a history of substance misuse. This is to be expected since
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34 409 prospective longitudinal studies have shown that children and adolescents with CD are
35
36 410 exposed earlier to alcohol and drugs and begin misusing these substances at a young age
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38 411 (Robins & McEvoy, 1990). Importantly, much evidence now indicates that among
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40 412 individuals who are genetically vulnerable for schizophrenia, heavy cannabis use in
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42 413 early adolescence promotes the onset of psychosis (Di Forti et al., 2012). A recent study
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44 414 of a sample of patients experiencing their first episode of schizophrenia indicated that
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46 415 the presence of CD increased the likelihood of heavy cannabis use in early adolescence
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48 416 (Malcolm et al., 2011).

49 417 *Clinical implications*

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51 418 The results of the present study have relevant clinical implications for mental
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53 419 health services. Among men with severe mental illness antipsychotic medication is
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6 420 essential for treating the symptoms of schizophrenia. However, once positive symptoms
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8 421 have been reduced, other factors such as prior CD and aggressive behaviour continue to
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10 422 be associated with elevated scores on risk assessment tools. In order to reduce violence,
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12 423 strategies are required to change what are life-long patterns of aggressive behaviour.
13
14 424 Individuals with schizophrenia and high levels of violence require treatments that
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16 425 promote compliance and reduce their long-standing antisocial and aggressive
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18 426 behaviours. New behaviours and ways of thinking are needed, as are prosocial skills
19
20 427 especially problem solving skills. Psychoeducation promotes knowledge of
21
22 428 schizophrenia and the necessity of neuroleptic medications. Cognitive-behavioural
23
24 429 treatments within institutions show promise in reducing antisocial and aggressive
25
26 430 behaviours (for a review see Kolla & Hodgins, 2013). A recent study showed that prior
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28 431 CD was associated with a failure to complete such an intervention (Cullen, Soria,
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30 432 Clarke, Dean, & Fahy, 2011) again highlighting the need for interventions aimed at
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32 433 promoting engagement in treatment in this sub-group of patients. As such interventions
33
34 434 are labour intensive and costly, it is essential to identify the patients with SMI+CD who
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36 435 are most in need and likely to benefit from them.

37 436 *Strengths and limitations*

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39 437 The study examined a sample of violent offenders with SMI who had been judged
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41 438 not guilty by reason of insanity and sent to treatment in a forensic hospital in Spain.
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43 439 Information was collected from multiple sources including the patients themselves,
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45 440 family members, criminal and medical files. The HCR-20 and PCL:SV were
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47 441 administered and scored by psychologists trained to use these instruments and inter-
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49 442 rater reliability was high for both. Limitations include the focus on men only, a small
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51 443 sample size not allowing for statistical comparisons, and a lack of clear information
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53 444 about whether childhood hyperactivity was not present or was not assessed.
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445 *Conclusions*

446 Results suggest that the elevated scores on the risk assessment scales among
447 patients with SMI vary by the presence of a history of antisocial behaviour in childhood.
448 The presence of CD prior to age 15 was associated with higher total HCR-20 and
449 PCL:SV scores. These elevations on scores resulted from elevations in scores on the H
450 scale and factor 2, both of which assess a history of antisocial and aggressive
451 behaviours.

452 *References*

- 453
454 American Psychiatric Association (2000). *Diagnostic and Statistical Manual of Mental*
455 *Disorders (4th ed) (DSM-IV)*. Washington, DC: American Psychiatric Association.
- 456 Arbach-Lucioni., Andrés-Pueyo., Pomarol-Clotet, E., & Gomar-Soñes, J. (2011).
457 Predicting violence in psychiatric inpatients: a prospective study with the HCR-20
458 violence risk assessment scheme. *The Journal of Forensic Psychiatry & Psychology*,
459 22(2), 203-222. doi.org/10.1080/14789949.2010.530290
- 460 Arseneault, L., Cannon, M., Murray, R., Poulton, R, Caspi, A., & Moffitt, T. E. (2003).
461 Childhood origins of violent behaviour in adults with schizophreniform disorder. *The*
462 *British Journal of Psychiatry*, 183, 520–525. doi: 10.1192/02-485
- 463 Belfrage, H., Fransson, G., Strand, S. (2000). Prediction of violence using the HCR-20:
464 A prospective study in two maximum security correctional institutions. *Journal of*
465 *Forensic Psychiatry*, 11, 167– 175. doi: 10.1080/095851800362445
- 466
- 467 Belfrage, H.A. (1998). Ten-Year Follow-Up of Criminality in Stockholm Mental
468 Patients: New evidence for a Relation between Mental Disorders and Crime. *The*
469 *British Journal of Psychiatry*, 38, 145-155.

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- 1
2
3
4
5
6 470 Bendall, S., Jackson, H. J., Hulbert, C. A., & McGorry, P. D. (2008). Childhood trauma
7
8 471 and psychotic disorders: A systematic, critical review of the evidence. *Schizophrenia*
9
10 472 *Bulletin*, 34, 568–579. doi: 10.1093/schbul/sbm121
11
12 473 Chen, X., Ender, P., Mitchell, M., & Wells, C. (2009). *Regression With Stata*.
13
14 474 <http://www.ats.ucla.edu/stat/stata/webbooks/reg/default.htm>. Accessed October 21,
15
16 475 2013.
17
18 476 Cooke, D. J., Michie, C., Hart, S. D., & Clark, D. (2005). Assessing psychopathy in the
19
20 477 UK: concerns about cross-cultural generalisability. *The British Journal of Psychiatry*,
21
22 478 186, 335–341. doi: 10.1192/bjp.186.4.335
23
24 479 Cooke, D. J., & Michie, C. (1999). Psychopathy across cultures: North America and
25
26 480 Scotland compared. *Journal of Abnormal Psychology*, 108, 58-68. doi: 10.1037/0021-
27
28 481 843X.108.1.58
29
30 482 Côté, G., Lesage, A., Chawky, N., & Loyer, M. (1997). Clinical specificity of prison
31
32 483 inmates with severe mental disorders: A case-control study. *The British Journal of*
33
34 484 *Psychiatry*, 170, 571-577. doi: 10.1192/bjp.170.6.571
35
36 485 Cullen, A.E., Soria, C., Clarke, A., Dean, K., & Fahy, T. (2011). Factors Predicting
37
38 486 Dropout From the Reasoning and Rehabilitation Program With Mentally Disordered
39
40 487 Offenders. *Criminal Justice and Behavior*, 38(3), 217-230.
41
42 488 doi:10.1177/0093854810393659
43
44 489 Crocker, A. G., Mueser, K. T., Drake, R. E., Clark, R. E., Mchugo, G. J., Ackerson, T.
45
46 490 H., & Alterman, A. I. (2005). Antisocial personality, psychopathy, and violence in
47
48 491 persons with dual disorders: A longitudinal analysis. *Criminal Justice and Behaviour*,
49
50 492 32, 452–476. doi:10.1177/0093854805276407
51
52 493 Di Forti ,M., Iyegbe, C., Sallis, H., Kolliakou, A., Falcone, M.A., Paparelli, A.,
53
54 494 ...Murray, R.M. (2012). Confirmation that the AKT1 (rs2494732). Genotype

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- 1
2
3
4
5
6 495 influences the risk of psychosis in cannabis users. *Biological Psychiatry*. 72, 811–816.
7
8 496 doi: 10.1016/j.biopsych.2012.06.020
9
10 497 Dolan, M., Doyle, M. (2000). Violence risk prediction. Clinical and actuarial measures
11 and the role of the Psychopathy Checklist. *The British Journal of Psychiatry*, 177,
12 498 303-311. doi: 10.1192/bjp.177.4.303
13
14 499
15
16 500 Douglas, K. S., y Reeves, K. A. (2010). *Historical-Clinical-Risk management – 20*
17 501 *(HCR-20) violence risk assessment scheme. Rationale, application, and empirical*
18 502 *overview*. In R. K. Otto y K. S. Douglas (Eds.), *Handbook of violence risk*
19 503 *assessment* (pp.147-185). New York, NY:Taylor & Francis.
20
21 504 Fazel, S., Langstrom, N., Hjern, A., Grann, M., & Lichtenstein, P. (2009).
22 505 Schizophrenia, substance abuse, and violent crime. *JAMA*. 301, 2016– 2023.
23 506 doi:10.1001/jama.2009.675
24
25 507 First, M.B., Gibbon, M., Spitzer, R.L., Williams, J.B.W., & Benjamin, L.S. (1997).
26 508 Structured Clinical Interview for DSM-IV Axis II Personality Disorders, (SCID-II).
27 509 Washington, D.C: American Psychiatric Association.
28
29 510 Fulwiler, C., & Ruthazer, R. (1999). Premorbid risk factors for violence in adult mental
30 511 illness. *Comprehensive Psychiatry*, 40, 96–100. doi:10.1016/S0010-440X(99)90112-8
31
32 512 Fulwiler, C., Grossman, H., Forbes, C., & Ruthazer, R. (1997). Early-onset substance
33 513 abuse and community violence by outpatients with chronic mental illness. *Psychiatric*
34 514 *Services*, 48, 1181–1185.
35
36 515 Guy, L., Edens, J. F., Anthony, C., & Douglas, K. S. (2005). Does psychopathy predict
37 516 institutional misconduct among adults? A meta-analytic investigation. *Journal of*
38 517 *Consulting and Clinical Psychology*, 73, 1056-1064. doi: 10.1037/0022-
39 518 006X.73.6.1056
40
41
42
43
44
45
46
47
48
49
50
51
52
53
54
55
56
57
58
59
60

- 1
2
3
4
5
6 519 Hare, R. D. (1991). *The Hare Psychopathy Checklist-Revised*. Toronto, Canada: Multi-
7
8 520 Health Systems.
- 9
10 521 Hart, S. D., Cox, N., & Hare, D. (1995). *The Hare Psychopathy Checklist: Screening*
11
12 522 *Version (PCL:SV)*. Toronto: Multi Health System Inc.
- 13
14 523 Hart, S. D., & Hare, R. D. (1989). The discriminant validity of the Psychopathy
15
16 524 Checklist in a forensic psychiatric population. *Psychological Assessment: A Journal*
17
18 525 *of Consulting and Clinical Psychology, 1*, 211-218. doi:10.1037/1040-3590.1.3.211
- 19
20 526 Hodgins, S., & Côté, G. (1993). Major mental disorder and antisocial personality
21
22 527 disorder: A criminal combination. *The Bulletin of the American Academy of*
23
24 528 *Psychiatry and Law, 21*, 155-160.
- 25
26 529 Hodgins, S., Côté, G., & Toupin, J. (1998). *Major mental disorders and crime: An*
27
28 530 *etiological hypothesis*. In. Cooke D, Forth A, Hare RD (eds) *Psychopathy: Theory,*
29
30 531 *research and implications for society*. Kluwer Academic Publishers, Dordrecht, p.
31
32 532 231-256.
- 33
34 533 Hodgins, S. (2004). *Criminal and antisocial behaviours and schizophrenia: A neglected*
35
36 534 *topic*. In Gattaz WF & Häfner H (eds) *Search for the causes of schizophrenia*, vol V.
37
38 535 Steinkopff Verlag, Darmstadt, p 315-341.
- 39
40 536 Hodgins, S., Tiihonen, J., & Ross, D. (2005). The consequences of conduct disorder for
41
42 537 males who develop schizophrenia: Associations with criminality, aggressive
43
44 538 behaviour, substance use, and psychiatric services. *Schizophrenia Research, 78*, 323-
45
46 539 335. doi:10.1016/j.schres.2005.05.021
- 47
48 540 Hodgins, S., Alderton, J., Cree, A., Aboud, A., & Mak, T. (2007). Aggressive
49
50 541 behaviour, victimisation and crime among severely mentally ill patients requiring
51
52 542 hospitalisation. *The British Journal of Psychiatry, 191*, 343-350. doi:
53
54 543 10.1192/bjp.bp.106.06.029587
- 55
56
57
58
59
60

- 1
2
3
4
5
6 544 Hodgins, S., Cree, A., Alderton, J., & Mak, T. (2008). From conduct disorder to severe
7
8 545 mental illness: Associations with aggressive behaviour, crime and victimization.
9
10 546 *Psychological Medicine*, 38, 975–987.
11
12 547 doi: <http://dx.doi.org/10.1017/S0033291707002164>
13
14 548 Hodgins, S. (2008). Violent behaviour among people with schizophrenia: A framework
15
16 549 for investigations of causes, and effective treatment, and prevention. *Philosophical*
17
18 550 *Transaction of the Royal Society of London. Series B Biological Sciences*, 363, 2505–
19
20 551 2518. doi: [10.1098/rstb.2008.0034](https://doi.org/10.1098/rstb.2008.0034)
21
22 552 Joyal, C., Putkonen, A., Mancini-Marie, A., Hodgins, S., Kononen, M., Boulay, L. ... &
23
24 553 Aronen, H. (2007). Violent persons with schizophrenia and comorbid disorders: A
25
26 554 functional magnetic resonance imaging study. *Schizophrenia Research*, 91, 97–102.
27
28 555 doi: [10.1016/j.schres.2006.12.014](https://doi.org/10.1016/j.schres.2006.12.014)
29
30 556 Kim-Cohen, J., Caspi, A., Moffitt, T. E., Harrington, H., Milne, B. J., & Poulton, R.
31
32 557 (2003). Prior juvenile diagnoses in adults with mental disorder developmental follow-
33
34 558 back of a prospective-longitudinal cohort. *Archives of General of Psychiatry*, 60, 709–
35
36 559 717. doi:[10.1001/archpsyc.60.7.709](https://doi.org/10.1001/archpsyc.60.7.709).
37
38 560 Kolla, N. & Hodgins, S. (2013). *Treatment of people with schizophrenia who behave*
39
40 561 *violently towards others: A review of the empirical literature on treatment*
41
42 562 *effectiveness* (pp. 321-339). In L. A. Craig, L. Dixon, & T. A. Gannon (Eds). *What*
43
44 563 *Work's in Offender Rehabilitation: An evidence based approach to assessment and*
45
46 564 *treatment*. United Kingdom: Wiley Blackwell.
47
48 565 Leistico, A., Salekin, R., DeCoster, J., & Rogers, R. (2008). A large-scale meta-analysis
49
50 566 relating the Hare measures of psychopathy to antisocial conduct. *Law and Human*
51
52 567 *Behaviour*, 32, 28-45.
53
54
55
56
57
58
59
60

- 1
2
3
4
5
6 568 Malcolm, C. P., Picchioni, M. M., DiForti, M., Sugranyes, G., Cooke, E., Joseph, C.,
7
8 569 ...Hodgins, S. (2011). Pre-morbid conduct disorder symptoms are associated with
9
10 570 cannabis use among individuals with a first episode of psychosis. *Schizophrenia*
11
12 571 *Research*, 126, 81-86. doi.org/10.1016/j.schres.2010.11.025
13
14 572 Moffitt, T. E., & Caspi, A. (2001). Childhood predictors differentiate life-course
15
16 573 persistent and adolescence-limited antisocial pathways among males and females.
17
18 574 *Development and Psychopathology*, 13, 355–375.
19
20 575 doi.org/10.1017/S0954579401002097
21
22 576 Moran, P., & Hodgins, S. (2004). The correlates of comorbid antisocial personality
23
24 577 disorder in schizophrenia. *Schizophrenia Bulletin*, 30, 791–802.
25
26 578 Morgan, C., & Fisher, H. (2006). Environment and schizophrenia: Environmental
27
28 579 factors in schizophrenia: Childhood trauma- a critical review. *Schizophrenia Bulletin*,
29
30 580 33, 3–10. [doi: 10.1093/schbul/sbl053](https://doi.org/10.1093/schbul/sbl053)
31
32 581 Mueser, K.T., Crocker, A.G., Frisman, L.B., Drake, R.E., Covell, N.H., & Essock, S.M.
33
34 582 (2006). Conduct disorder and antisocial personality disorder in persons with severe
35
36 583 psychiatric and substance use disorders. *Schizophrenia Bulletin*, 32, 626–636.
37
38 584 [doi: 10.1093/schbul/sbj068](https://doi.org/10.1093/schbul/sbj068)
39
40 585 Murray, J., & Farrington, D. (2010). Risk factors for conduct disorder and delinquency:
41
42 586 Key findings from longitudinal studies. *Canadian Journal of Psychiatry* 55, 633–642.
43
44 587 Polanczyk, G., Moffitt, T. E., Arseneault, L., Cannon, M., Ambler, A., Keefe, R. S. E.,
45
46 588 ... & Caspi, A. (2010). Etiological and clinical features of childhood psychotic
47
48 589 symptoms: Results from a birth cohort childhood psychotic symptoms. *Archives*
49
50 590 *General of Psychiatry*, 67, 328–338. [doi: 10.1001/archgenpsychiatry.2010.14](https://doi.org/10.1001/archgenpsychiatry.2010.14)
51
52 591 Read, J., van Os, J., Morrison, A. P., & Ross, C. A. (2005). Childhood trauma,
53
54 592 psychosis and schizophrenia: A literature review with theoretical and clinical
55
56
57
58
59
60

- 1
2
3
4
5
6 593 implications. *Acta Psychiatrica Scandinava*, 112, 330–350. doi: 10.1111/j.1600-
7 0447.2005.00634.x
8 594
9
10 595 Rice, M. E., & Harris, G. T. (1995). Psychopathy, schizophrenia, alcohol abuse, and
11 violent recidivism. *International Journal of Law and Psychiatry*, 18, 333–342.
12 596
13 597 doi.org/10.1016/0160-2527(95)00015-A
14
15
16 598 Robins, L. N., & McEvoy, J. P. (1990). *Conduct problems as predictors of substance*
17 599 *abuse*. In Robins LN, Rutter M (eds). *Straight and Devious Pathways from Childhood*
18 600 *to Adulthood*. Cambridge University Press, New York, p 182-204.
19
20
21 601 Salekin, R., Rogers, R., & Sewell, K. (1996). A review and meta-analysis of the
22 602 Psychopathy Checklist and Psychopathy Checklist-Revised: Predictive validity of
23 603 dangerousness. *Clinical Psychology: Science and Practice*, 3, 203–215.
24 604 doi: 10.1111/j.1468-2850.1996.tb00071
25
26
27 605 Schug, R. A., Raine, A., & Wilcox, R. R. (2007). Psychophysiological and behavioural
28 606 characteristics of individuals comorbid for antisocial personality disorder and
29 607 schizophrenia-spectrum personality disorder. *The British Journal of Psychiatry*, 191,
30 608 408–414. doi: 10.1192/bjp.bp.106.034801
31
32
33 609 Schanda, H., Földes, P., Topitz, A., Fliedl, R., & Knecht, G. (1992). Premorbid
34 610 adjustment of schizophrenic criminal offenders. *Acta Psychiatrica Scandinava*, 86,
35 611 121–126. doi: 10.1111/j.1600-0447.1992.tb03239.x
36
37
38 612 Schiffer, B., Leygraf, N., Muller, B.W., Scherbaum, N., Forsting, M., Wiltfang, J., ... &
39 613 Hodgins, S. (2012). Structural brain alterations associated with schizophrenia
40 614 preceded by conduct disorder: A common and distinct subtype of schizophrenia?
41 615 *Schizophrenia Bulletin*. doi: 10.1093/schbul/sbs115
42
43
44
45
46
47
48
49
50
51
52
53
54
55
56
57
58
59
60

- 1
2
3
4
5
6 616 Stouthamer-Loeber, M., Loeber, R., Homish, D.L., Wei, E. (2001). Maltreatment of
7
8 617 boys and the development of disruptive and delinquent behavior. *Development and*
9
10 618 *Psychopathology*, 13, 941–955.
- 11
12 619 Swanson, J. W., Swartz, M. S., Van Dorn, R. A., Elbogen, E. B., Wagner, R.,
13
14 620 Rosenheck, R.,... & Lieberman, J. A. (2006). A national study of violent behavior in
15
16 621 persons with schizophrenia. *Archives General of Psychiatry*, 63, 490–499.
- 17
18 622 Tengström, A., Hodgins, S., Grann, M., Långström, N., & Kullgren, G. (2004).
19
20 623 Schizophrenia and criminal offending: The role of psychopathy and substance use
21
22 624 disorders. *Criminal Justice and Behavior*, 31, 367–391. doi:
23
24 625 [10.1177/0093854804265173](https://doi.org/10.1177/0093854804265173)
- 25
26 626 Tengström, A., Hodgins, S., & Kullgren, G. (2001). Men with schizophrenia who
27
28 627 behave violently: The usefulness of an early- versus late-start offender typology.
29
30 628 *Schizophrenia Bulletin*, 27, 205–218.
- 31
32 629 Webster, C. D., Douglas, K. S., Eaves, D., & Hart, S. D. (1997). *HCR-20: Assessing*
33
34 630 *Risk for Violence (Version 2)*. Burnaby, Canada: Mental Health, Law, and Policy
35
36 631 Institute, Simon Fraser University.
- 37
38 632 Widom, C. S. (1989). The cycle of violence. *Science*, 244, 160–166.
- 39
40
41
42
43
44
45
46
47
48
49
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Table 1. Comparisons of severely mentally ill violent offenders with and without Conduct Disorder prior to age 15

	Violent offender		Test
	SMI+CD (N=22)	SMI-CD (N=66)	
Age	M=41.8 SD=8.7	M=43.3 SD=9.8	Mann-Whitney U , $z = -5.50$, $p = 0.582$
Marital status %			
Single	15 (68.2)	52 (78.8)	
Married	2 (9.1)	5 (7.6)	
Separated/Divorced	5 (22.7)	9 (13.6)	
Accommodation %			
Living alone	7 (31.8)	13 (19.7)	
Couple	1 (4.5)	12 (18.2)	
Family	9 (40.9)	36 (54.5)	
Others	5 (22.5)	5 (7.6)	
Education level %			
Primary school	19 (86.4)	33 (50.0)	
Secondary education	3 (13.6)	28 (42.4)	
College or above		5 (7.6)	
Primary Diagnosis %			
Schizophrenia	15 (68.2)	44 (66.7)	
Delusional disorders	1 (4.5)	13 (19.7)	
Schizo-affective-disorder	2 (9.1)	5 (7.6)	
Other psychotic disorders	3 (13.6)	2 (3.0)	
Bipolar disorder	1 (4.5)	2 (3.0)	
Comorbidity %			
Current personality disorder	15 (68.2)	11 (16.7)	$\chi^2 (n 88) = 18.63, p < .001$
Current substance misuse	3 (13.6)	5 (7.6)	
History of substance misuse	22 (100)	35 (53.0)	$\chi^2 (n 84) = 14.11, p < .001$
Criminal history			
Mean age at first offense	M=27.7 SD=9.2	M=36.7 SD=12.6	Mann-Whitney U , $z = -2.11, p = 0.035$
Rule breaking within the hospital	14 (63.6)	19 (28.8)	$\chi^2 (n 88) = 7.12, p = 0.004$

Prior conviction %	18 (81.80)	14 (21.2)	$\chi^2 (n 88)=26.19, p < .001$
For at least one violent-crime	17 (77.3)	13 (19.7)	$\chi^2 (n 88)=24.72, p < .001$
For at least one non-violent crime	1 (4.5)	1 (1.5)	
Index offences %			
Murder	4 (18.2)	20 (30.3)	
Attempted murder	1 (4.5)	9 (13.6)	
Homicide	2 (9.1)	11 (16.7)	
Attempted homicide	2 (9.1)	11 (16.7)	
Threats	5 (22.7)	2 (3.0)	
Injuries	1 (4.5)	3 (4.5)	
Sexual assault	1 (4.5)	2 (3.0)	
Robbery	1 (4.5)		
Other violent offenses	5 (22.6)	8 (12)	
Victim %			$\chi^2 (n 88)= 2.07, p=0.120$
Family member or known	12 (54.5)	47 (71.2)	
Unknown	10 (45.5)	19 (28.2)	
Physical abuse in childhood %	10 (45.5)	3 (4.5)	
Hyperactivity in childhood %	11 (50.0)		
Family psychiatric history %			$\chi^2 (n 80)= 5.244, p=0.022$
Yes	14 (63.6)	27 (40.9)	
No	4 (18.2)	35 (53.0)	
Family criminal history %			
Yes	4 (18.2)	3 (4.5)	
No	8 (36.4)	55 (83.3)	
Unknown	10 (45.5)	8 (12.1)	

N.B. For some variables, numbers of participants in each cell were too small to allow for statistical comparisons.

Table 2. Comparisons of HCR-20 and PCL:SV scores of severely mentally ill violent offenders who presented conduct disorder before age 15 and those who did not

Violent Offenders						
	SMI+CD (N=22)		SMI-CD (N=66)			
	M	SD	M	SD	t (88)	<i>p</i>
HCR Total	25.09	4.7	15.2	6.5	-6.536	<.001
HCR- H	14.7	2.3	6.6	2.9	-12.048	<.001
HCR- C	4.5	2.2	4.2	2.8	-0.601	0.548
HCR- R	6.4	2.6	4.4	2.2	-3.406	<.01
PCL:SV Total	14.4	3.3	6.7	4.1	-3.749	<.001
Factor 1	5.3	2.4	2.9	2.2	-6.443	<.001
Factor 2	9.1	1.3	3.9	2.3	-5.887	<.001

SMI+CD: severe mental illness and conduct disorder prior to age 15

SMI-CD: severe mental illness with no conduct disorder

Table 3. Relationship of HCR-20, PCL: SV scores and multiple variables with the presence of conduct disorder before age 15 among violent offenders with severe mental illness.

	B	SE	Wald	<i>p</i>	OR (IC 95%)
Model 1					
HCR-20 Total	0.242	0.059	16.714	<.001	1.27 (1.13-1.43)
Model 2					
HCR-H	1.800	0.550	10.705	.0001	6.05 (2.06-17.77)
HCR-C	-0.983	0.451	4.738	0.029	0.37 (0.16-0.91)
HCR-R	0.473	0.360	1.727	0.189	1.61 (0.79-3.25)
Model 3					
PCL:SV Total	0.413	0.095	18.764	<.001	1.51 (1.25-1.82)
Model 4					
PCL Factor 1	-0.034	0.180	0.036	0.849	0.97 (0.68-1.38)
PCL Factor 2	0.912	0.222	16.389	<.001	2.49 (1.61-3.85)
Model 5					
HCR-20 Total	0.278	0.078	12.749	<.001	1.32 (1.13-1.54)
Personality disorder	3.384	1.322	6.553	0.010	29.50 (2.21-393.65)
Age at first offence	-0.186	0.106	3.091	0.079	0.83 (0.68-1.02)
Low education level	1.805	0.843	4.587	0.032	6.08 (1.17-31.70)
Rule breaking institution	0.264	0.752	0.123	0.725	1.30 (0.30-5.69)
Family Psychiatric history	-1,287	1.209	1.134	0.287	0.28 (0.03-2.95)
Model 6					
PCL:SV	0.532	0.145	13.383	<.001	1.70 (1.28-2.26)
Personality disorder	3.791	3.528	3.528	0.060	44.29 (0.85-2313.46)
Age at first offense	-0.247	2.609	2.609	0.106	0.78 (0.58-1.05)
Low education level	2.469	1.003	6.064	0.014	11.81 (1.66-84.32)
Rule breaking institution	0.774	0.808	0.918	0.338	2.17 (0.45-10.56)
Family psychiatric history	-1,826	0.543	0.543	0.461	0.16 (0.00-20.71)