



## Life History of Aggression scores are predicted by childhood hyperactivity, conduct disorder, adult substance abuse, and low cooperativeness in adult psychiatric patients

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### ABSTRACT

The prevention of aggressive behaviours is a core priority for psychiatric clinical work, but the association between the diagnostic concepts used in psychiatry and aggression remains largely unknown. Outpatients referred for psychiatric evaluations of childhood-onset neuropsychiatric disorders ( $n = 178$ ) and perpetrators of violent crimes referred to pre-trial forensic psychiatric investigations ( $n = 92$ ) had comprehensive, instrument-based, psychiatric assessments, including the Life History of Aggression (LHA) scales. Total and subscale LHA scores were compared to the categorical and dimensional diagnoses of childhood and adult DSM-IV axis I and II mental disorders, general intelligence (IQ), Global Assessment of Functioning (GAF), and personality traits according to the Temperament and Character Inventory (TCI). Overall, the two groups had similar LHA scores, but the offender group scored higher on the Antisocial subscale. Higher total LHA scores were independently associated with the hyperactivity facet of attention-deficit/hyperactivity disorder (AD/HD), childhood conduct disorder, substance-related disorders, and low scores on the Cooperativeness character dimension according to the TCI. IQ and GAF-scores were negatively correlated with the LHA subscale Self-directed aggression. Autistic traits were inversely correlated with aggression among outpatients, while the opposite pattern was noted in the forensic group. The findings call for assessments of aggression-related behaviours in all psychiatric settings.

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### 1. Introduction

The prevention of aggressive behaviours is often referred to as an important target for psychiatric treatment, but there is little systematic knowledge about which psychiatric problems may herald violence. The major mental disorders, such as schizophrenia and bipolar disorder, have been shown to carry an increased risk for violent offending (Hodgins et al., 1996; Fazel et al., 2009), but this association is mainly caused by a subgroup of disordered persons who have had an early onset of norm-breaking, aggressive behaviours (conduct disorder) (Tengström et al., 2001). Similarly, substance abuse is associated with aggression but mainly through the early-onset type-II alcoholism, which has a strong patrilinear inheritance and often includes poly-substance

abuse and criminality (Cloninger et al., 1981). There is also a large body of longitudinal research on the progression of childhood-onset disruptive disorders, such as hyperactivity and conduct disorder (CD), towards antisocial personality disorder (ASPD) in adulthood (for a review, see Hofvander et al., 2009). The psychiatrist charged with assessing the risk of aggressive behaviours in his/her patients, thus has every reason to consider not only the current mental status but also the childhood-onset behaviour patterns and disorders in each case. The knowledge about which aspects of childhood-onset problems that predict aggression is, however, preliminary as yet.

Hyperactivity has been inculpated based on several prospective, longitudinal studies, clinical as well as population-based (Satterfield et al., 1982; Hechtman and Weiss, 1986; Biederman et al., 1996; Babinski et al., 1999; Mannuzza et al., 2008). The link between hyperactivity and violent criminality is, however, not straightforward, as it seems to require the combined presence of hyperactivity and childhood CD (referred to as hyperkinetic conduct disorder in the ICD), which in its

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turn, constitutes a major risk factor for sustained aggressiveness over the life course (Moffitt et al., 2002; Lahey et al., 2005).

A broader range of childhood-onset cognitive and social disorders, such as the autism spectrum disorders (ASDs) and learning disorders (LDs), has also been implicated in the background to aggressive behaviours across all ages in case reports (Mawson et al., 1985; Wolff and Cull, 1986; Baron-Cohen, 1988; Kohn et al., 1998; Kristiansson and Sörman, 2008), in clinical surveys of correctional/forensic groups (Dalteg and Levander, 1989; Scragg and Shah, 1994; Rasmussen et al., 2001; Siponmaa et al., 2001; Kroll et al., 2002; Soderstrom et al., 2004), and in epidemiological research (Farrington, 1987; Hodgins, 1992; Rasmussen and Gillberg, 2000; Moffitt and Caspi, 2001).

Childhood-onset neurodevelopmental disorders such as AD/HD, ASDs, and LDs are more frequent than previously assumed (Landgren et al., 1996; Kadesjo and Gillberg, 1998; Kadesjo et al., 1999; Baird et al., 2006), with severe variants affecting at least 5% of all children. They are also linked to milder phenotypical expressions in relatives (Epstein et al., 2000; Briskman et al., 2001; Happe et al., 2001; Dawson et al., 2002; Baron-Cohen, 2003), and in many cases they persist into adulthood in similar or modified forms (Rasmussen and Gillberg, 2000; Moffitt and Caspi, 2001; Beadle-Brown et al., 2002; Willoughby, 2003). These disorders coincide both with each other at a very considerable rate (Rutter et al., 2006) and with major mental disorders across the life course (Weiss et al., 1985; Biederman et al., 1993; Rasmussen and Gillberg, 2000; Fischer et al., 2002). In addition, they have been shown to play a key-note role in the development of personality and its disorders (Anckarsater et al., 2006; Nigg, 2006).

Several important questions concerning the relation between childhood neuropsychiatric disorders and aggression remain to be disentangled by systematic studies. It is an open question whether childhood attention deficits and hyperactivity in the absence of CD also carry an increased risk for violent acts in adulthood (Lilienfeld and Waldman, 1990), and if the ASDs in the absence of hyperactivity could lead to an increased risk of aggressive behaviours. Using the Temperament and Character Inventory (TCI, Cloninger et al., 1993), Anckarsäter et al. (2006) showed a specific temperament configuration in ASDs, with low Novelty Seeking, low Reward Dependence, and high Harm Avoidance, while subjects with AD/HD reported high Novelty Seeking and high Harm Avoidance. Character scores, defined as conceptual tools for handling oneself and others (Self-Directedness and Cooperativeness), were extremely low in both groups, and personality disorders (PDs) according to the DSM-IV were found in the majority of adults diagnosed with ASDs and/or AD/HD. These results have recently been replicated for subjects with AD/HD (Faraone et al., 2009). Low scores in Self-Directedness and Cooperativeness have also been related to feelings of distrust or anger and to direct aggressive expressions, both in clinical groups (Fassino et al., 2001) and in community-based samples (Yoo et al., 2006), and specific associations have been noted between low character scores and self-injurious behaviours (Evren and Evren, 2006; Favaro et al., 2008). Antisocial aggressive behaviours may even be thought of as a prototypical expression of hampered self-regulation and cooperativeness.

We have now used subscales from the Life History of Aggression (LHA) measuring different forms of aggressive behaviours in relation to lifetime psychiatric diagnoses in two groups of adult psychiatric patients (outpatients seeking evaluations of childhood-onset neuropsychiatric disorders and violent offenders referred to forensic psychiatric investigations) to test the following hypotheses:

1. That outpatients with AD/HD and/or ASDs would have high LHA scores, on par with those found among violent offenders.
2. That high LHA scores would be specifically associated with symptoms of hyperactivity, CD, and substance abuse in both groups.
3. That high LHA scores would be associated with disordered personality profiles with explosive temperaments and low character scores in both groups.

## 2. Methods

### 2.1. Procedures

The analyses presented in this paper were made possible by access to two independent study groups, both of which were assessed for childhood-onset neuropsychiatric disorders and aggression by basically the same research protocol. The Gothenburg Child Neuropsychiatric Clinic (CNC) had, at the time, the nation-wide responsibility for assessments of autism and related disorders in Sweden and was the only diagnostic centre specifically focused on neuropsychiatric assessments of childhood-onset disorders in the city of Gothenburg. An adult project carried out at the CNC included specialized evaluations of possible childhood-onset neuropsychiatric disorders (AD/HD, ASDs, tic disorders, and various kinds of LDs) in outpatients referred by general practitioners, by other specialists in adult psychiatry, or by self-referral, forming a consecutive, large, well-characterized, clinical case cohort for the Gothenburg Neuropsychiatric Genetic Study (NPG). The Gothenburg Forensic Neuropsychiatry Project (the FNP project) includes all consenting subjects referred for inpatient forensic psychiatric investigations in Gothenburg during a defined period who were charged with a severe violent crime (homicide, attempted homicide, aggravated assault, arson, rape, or sexual violation of minors) and had received their basic education in Sweden. In this group, childhood-onset neuropsychiatric disorders were previously analyzed in relation to adult psychopathic personality traits, overall aggression scores, and recidivistic crimes (Soderstrom et al., 2005). The results were used to formulate the hypotheses for the present paper, which include subscale analyses of aggression and the comparisons to the much larger group of outpatients with childhood-onset neuropsychiatric disorders.

In both groups, DSM-IV diagnoses were assigned by two senior psychiatrists in consensus (in the NPG project by MR and HA, and in the FNP project by AF and HA), based on longitudinal, all-data considerations of available information, including clinical status, the Structured Clinical Interview for Diagnosis according to the DSM (SCID-I, First, 1997a, and SCID-II, First, 1997b), the Asperger Syndrome and high-functioning autism Screening Questionnaire (ASSQ, Ehlers et al., 1999), the Asperger Syndrome Diagnostic Interview (ASDI, Gillberg et al., 2001), and the DSM-IV criteria check-lists for other disorders not included in any of the cited instruments, currently and retrospectively. Reliability and validity for all these scales are good to excellent. When possible, a semi-structured collateral interview was performed ( $n = 123$ , 69% in the NPG project and  $n = 29$ , 32% in the FNP project) with a relative who had known the index subject as a child. Clinical records were collected from paediatric and child psychiatric services and from school health services.

For all disorders, criteria limiting the possibility of assigning other comorbid psychiatric diagnoses were disregarded to allow comprehensive recording of the pattern of comorbidity. The numbers of fulfilled DSM-IV AD/HD and Gillberg & Gillberg criteria for Asperger syndrome/high-functioning autism in childhood were used as dimensional assessments of AD/HD and autism spectrum traits. Full-scale IQ and the subscores for verbal and performance IQ were calculated on the Wechsler Adult Intelligence Scale-Revised (WAIS-R, Wechsler, 1981).

Different aspects of aggression, and the frequency of its occurrence, were measured dimensionally using the LHA. The LHA has been shown to have excellent test-retest stability, inter-rater reliability, and internal consistency reliability (Coccaro et al., 1997). It has been used in many studies of violent behaviour (e.g. Coccaro et al., 1998; Hoptman et al., 2002). The 11-item scale was developed to assess trait aggressive behaviour, with each item reflecting a different form of aggressive behaviour. Coccaro et al. (1997) used the items to create three a priori subscales. The Aggression subscale includes temper tantrums, physical fights, verbal aggression, physical assaults on people (or animals), and assaults on property (items 1–5). The Self-directed aggression subscale quantifies self-injurious and suicide attempts (items 6a and 6b). The Consequences/Antisocial behaviour subscale denotes school disciplinary problems, problems with supervisors at work, antisocial behaviour not involving the police, and antisocial behaviour involving the police (items 7–10). Each item is rated on a five-point scale based on the number of occurrences of the behaviour since adolescence, from 0 (“no event”) to 5 (“so many events that they cannot be counted”), with possible total scores ranging from 0 to 55. In these studies, the LHA was used as an initial self-rating instrument, where subjects who had problems filling-out self-rate questionnaires received help from contact persons or clinicians. Subsequently, patients' self-reports were supplemented by extensive clinical interviews and review of all available records and file reports.

### 2.2. Subjects

Totally 273 consecutive subjects in the NPG group (149 men, 124 women, median age 31.0, range 18–61) gave informed consent, and the 178 subjects (98 men, 80 women, median age 31.5, range 19–59) who completed the LHA constitute the outpatient study group. There were no statistically significant differences between those who were rated with the LHA and those who were not in terms of age, sex, intelligence, tics, depression, bipolar disorder, psychotic disorder, and ASDs. A diagnosis of AD/HD was, however, significantly less common (48% vs. 65%,  $P < 0.01$ ) among those not assessed by the LHA. Among the included subjects, 161 (90%) had a childhood-onset neurodevelopmental disorder (AD/HD and/or ASD), 81 subjects (46 men, 35 women, median age 28, range 19–57) had ASD (5 autism, 32 Asperger syndrome, and 44 atypical autism), and 116 (61 men, 55 women, median age 33, range 19–55) had AD/HD (35 predominantly AD, 12 predominantly HD, 58 combined form,

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