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Clinical characteristics associated with paedophilia and child sex offending – Differentiating sexual preference from offence status

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ABSTRACT

Contrary to public perception, child sex offending (CSO) and paedophilia are not the same. Only half of all cases of CSO are motivated by paedophilic preference, and a paedophilic preference does not necessarily lead to CSO. However, studies that investigated clinical factors accompanying and contributing to paedophilia so far mainly relied on paedophiles with a history of CSO. The aim of this study was to distinguish between factors associated with sexual preference (paedophile versus non-paedophile) and offender status (with versus without CSO). Accordingly, a 2 (sexual preference) × 2 (offender status) factorial design was used for a comprehensive clinical assessment of paedophiles with and without a history of CSO ($n = 83$, $n = 79$ respectively), child sex offenders without paedophilia ($n = 32$) and healthy controls ($n = 148$). Results indicated that psychiatric comorbidities, sexual dysfunctions and adverse childhood experiences were more common among paedophiles and child sex offenders than controls. Offenders and non-offenders differed in age, intelligence, educational level and experience of childhood sexual abuse, whereas paedophiles and non-paedophiles mainly differed in sexual characteristics (e.g., additional paraphilias, onset and current level of sexual activity). Regression analyses were more powerful in segregating offender status than sexual preference (mean classification accuracy: 76% versus 68%). In differentiating between

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offence- and preference-related factors this study improves clinical understanding of both phenomena and may be used to develop scientifically grounded CSO prevention and treatment programmes. It also highlights that some deviations are not traceable to just one of these two factors, thus raising the issue of the mechanism underlying both phenomena.

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1. Introduction

Child sex offending (CSO) has disastrous effects on children's mental well-being and development that persist into adulthood [1] and may lead to structural and functional changes in children's brains [2,3]. The average estimate of the prevalence of CSO is 12.7% in self-report studies, with female victims being more than twice as common as male victims [4]. Paedophilia and CSO must not be considered synonymous [5]; however paedophilic preference is a major contributing factor to CSO (present in about 50% of convicted offenders) [5,6]. The ICD-10 defines paedophilia as "A sexual preference for children, boys or girls or both, usually of prepubertal or early pubertal age" that persists for at least six months [7, p. 171]. In the DSM-5, a diagnosis can only be made if a person with this preference has acted upon these urges or if they have caused 'marked distress or interpersonal difficulty' [8, p. 697]. The prevalence of paedophilia or paedophilic disorder in the sense of these definitions is not known. However, some sexual interest in children (in the form of more or less frequent, intense and persistent sexual fantasies or thoughts involving children) is not rare in the general population. Based on extrapolation from large Finish and German surveys of convenience samples Seto estimated the upper limit for the prevalence of paedophilia in this latter sense at around 1% [9].

This already points to the prime importance of clearly defining the matter at hand and leads to the starting point of our study: Findings on the aetiology of paedophilia and CSO may largely depend on the exact composition of experimental and control group and, more specifically, on the degree to which authors manage to isolate the effect of sexual preference from the effect of offender status. For example, the currently most popular theory on the origins of paedophilia, the so-called hypothesis of 'early neurodevelopmental perturbations' states that paedophilia is a "neurologic phenomenon with prenatal origin" and "an innate neurologically-mediated characteristic" [10, p. 1546]. This hypothesis has originally been based on findings regarding elevated rates of non-right-handedness, lower intelligence quotients, worse executive functioning, and higher incidence of childhood head injuries resulting in unconsciousness in paedophiles [11–13]. In the following, it has also been supported by many of the research it prompted in the area of structural and functional brain imaging (cf. [14] for an overview). However, the samples included in this research have been composed in large parts (and often even exclusively) of the subgroup of paedophiles who had already been involved with the criminal system, thereby mixing up factors associated with sexual preference and offender status cf. [15]. In fact, virtually all studies on the characteristics of paedophilic men published before the emergence of preventive treatment efforts such as the "Don't offend" project [16] in Germany suffer from the confounding of these two factors [17].

Only recently, a growing body of studies able to control for the offender status puts these earlier findings into question and implies that it might not be paedophilia per se which is associated with cognitive and neurological deficits, but rather acting out sexually (cf. [18] for an overview). Many of these studies stem from the "NeMUP" research collaboration. "NeMUP" is the acronym of a German research consortium funded by the German Federal Ministry for Education and Research and stands for Neural Mechanisms Underlying Paedophilia and Sexual Offending Against Children.

The aim of the "NeMUP" research collaboration is to elucidate and distinguish between the clinical, neuropsychological, neurobiological, genetic and epigenetic mechanisms of paedophilia and CSO by analysing a sample of more than 340 participants using a two-factor design incorporating four groups. In this paper, we provide a detailed clinical profile of the study sample and analyse factors associating with CSO and sexual preference separately. More specifically, we collected data relevant to recent questions and theories about the aetiology of paedophilia and CSO [5,14,19] including (the above-mentioned) neurodevelopmental perturbations [11–13], adverse childhood experiences (relevant to the so-called 'sexually abused – sexual abuser' hypothesis) [20,21], personality traits, psychiatric comorbidities, familial risk factors, and sexual and behavioural problems such as higher sex drive or social deficits [6]. To our knowledge, this is the first large-scale clinical study to differentiate clearly between paedophilia and child sex offending in doing so. Earlier studies have often mixed up the factors sexual preference and offence status by either only including paedophiles with a history of CSO or by investigating child sex offenders regardless of their sexual preferences. Many of the factors reported as being related to paedophilia may therefore actually be associated with committing child sex offences and vice versa. We think that our study succeeded in disentangling both factors. In an exploratory approach in which a large set of variables was investigated, it thereby gives an overview of putative risk and protective factors linked to the aetiology of paedophilia and CSO, as well as of mechanism underlying both phenomena.

2. Methods

2.1. Recruitment strategy and group assignment

Male adult participants were recruited between January 2012 and January 2016 by research associates and practising psychotherapists working at five study sites in Germany (Berlin, Essen/Bochum, Hanover, Kiel, and Magdeburg), most of which were involved in the CSO-prevention project "Don't offend" (www.dont-offend.org) for self-identified paedophiles seeking help [16]. A few subjects were recruited in prisons or during fulfilment of a suspended sentence. We used the official "NeMUP"-website (www.nemup.de) as well as various German Internet forums to inform self-identified paedophilic men and child sex offenders without paedophilia about the study. The inclusion criterion for paedophilic men was a paedophilic and/or hebephilic preference according to the ICD-10 criteria. Paedophilia is a sexual preference for prepubescent children, whereas hebephilia is a sexual preference for children in the early pubertal stages [22]. For reasons of better readability and in conjunction with the ICD-10 definition of paedophilia as a "A sexual preference for children . . . of pre-pubertal or early pubertal age" [7, p. 171] we subsume the hebephilic group under the label paedophilia. Exclusion criteria were: intellectual disability, psychotic disorder, current severe major depressive disorder (score greater than 15 on the Hamilton Depression Scale [23]) or anxiety disorder (score greater than 25 in the Hamilton Anxiety Scale [24]), a clinically predominant substance misuse or dependence and any psychotropic medication. Control participants were recruited via advertisements on study centres' websites and Facebook[®]. All participants provided written, informed consent before participating and all local ethics

committees approved the study. Some analyses of neuropsychological and neurobiological data from varying subsets of the participants included in this study have already been published earlier by the ‘NeMUP’ research collaboration [25–31].

Participants were assigned to groups during their first appointment, after an in-depth clinical examination. The four groups were: (1) paedophiles with a history of CSO (P+CSO; $n = 83$), (2) paedophiles without a history of CSO (P-CSO; $n = 79$), (3) non-paedophilic child sex offenders (CSO-P; $n = 32$), and (4) healthy controls (HC; $n = 148$).

Classification of sexual preference was based on a detailed sexual history combined with subjective self-report data from an adapted version of the Kinsey scale for sexual fantasy and behaviour in which respondents were asked to indicate range and peak for the age and sex of their preferred sexual partner using the Tanner stages I–V [32]. For 102 of the 162 subjects (~63%) who met the ICD-10 criteria for paedophilia and 22 of the 32 subjects (~69%) who did not meet these criteria but had had a history of CSO, additional data from previous and current treatments or forensic records were available to confirm self-assessments. Among the 162 diagnosed paedophiles, about 60 (~40%) were recruited from the “Don’t offend” project [16]. Classification of offender status was based on subjective self-reports given in a semi-structured interview specifically designed for this purpose: the participant was asked to indicate if he had ever committed a sex offence, and if so, to indicate the age, sex and Tanner stage of his victim(s), as well as the type of sexual activity (e.g., picture-taking or consumption of material depicting the sexual exploitation of children, touching, kissing, penetrating etc.). We assume that these self-reports are of especially high validity, because medical doctors and psychologists in Germany are subject to medical confidentiality. This means that, in contrast to their counterparts in e.g., the USA or Canada, they are not bound to mandatory reporting of cases of child sexual abuse which are not known to the authorities. As we have made this very clear to our participants, we assume that they were less inclined to conceal such incidents than participants of many earlier studies might have been.

A paedophilic participant was deemed eligible for the P + CSO group if he admitted at least one sex offence against children under the age of 14 years involving touching or manipulating (manually or orally) the child’s naked body or genitals with the aim of sexually stimulating himself, penetrating the child anally or vaginally or making the child touch or manipulate the offender’s genitals or penetrate him. Paedophiles who had not committed “hands-on” offences and/or were solely current or historical consumers of material depicting the sexual exploitation of children or so-called indicative pictures (i.e., pictures of fully closed children or their faces in erotic posing) were assigned to the P-CSO group. This procedure in no way implies that consumption of such pictures or films is not a criminal offence in Germany; it was used simply to differentiate between paedophiles on the basis of whether or not they had been able to refrain from actual sexual behaviour towards children. A participant was deemed eligible for the CSO-P group if he had a history of “hands-on” child sex offences and careful clinical examination provided no evidence of a paedophilic preference. The control group consisted of men who provided no evidence of paedophilic preference or history of CSO.

2.2. Measures

Four main types of clinical variable were assessed: (1) intelligence, sociodemographic and neurodevelopmental factors, (2) sexual history and current sexual functioning variables, (3) familial risk factors and (4) psychiatric comorbidities and personality.

2.2.1. Intelligence, sociodemographic and neurodevelopmental factors

The semi-structured interview used to assess sexual preference and offender status was also used to collect sociodemographic data including age, highest certificate of education, and (highest) professional status. We also collected variables which have been examined in relation to the hypothesis of ‘early neurodevelopmental perturbations’ by earlier studies [e.g.,11–13]: parents’ age at birth, birth complications, childhood bedwetting and history of accidents and head injuries during childhood that had resulted in unconsciousness. Handedness was assessed using an adapted 10-item version of the German Edinburgh Handedness Inventory [33]. Intelligence was assessed using a short version of the German version of the third edition of the Wechsler Adult Intelligence Scale (WAIS) [34]. All participants completed two subtests from the verbal subscale (*Vocabulary* and *Similarities*) and two subtests from the performance subscale (*Block Design* and *Matrix Reasoning*).

2.2.2. Sexual history and current sexual functioning

The semi-structured interview also included questions on participants’ sexual history (i.e., age at first ejaculation, masturbation and intercourse) and current sexual functioning. Amongst other variables the interview assessed whether ICD-10 criteria for additional paraphilias or sexual dysfunctions were met and participants were asked to indicate their average number of sexual outlets per week (i.e., their weekly total of orgasms derived from all types of sexual activity). Participants were also asked if they had ever consumed material depicting the sexual exploitation of children or indicative pictures, and if so, their lifetime peak and current consumption frequencies. Tendency to sexual excitation and sexual inhibition were assessed using the German version of the Sexual Inhibition and Sexual Excitation Scales (SIS/SES scales) [35].

2.2.3. History of childhood sexual abuse and other familial risk factors

Most of the familial risk factors were assessed via the German version of the Childhood Trauma Questionnaire (CTQ) [36] which is used to screen for histories of five types of maltreatment (sexual, physical and emotional abuse as well as physical and emotional neglect). A brief assessment of the psychiatric and criminal history of both parents was also included in the semi-structured interview used to assess the other clinical variables.

2.2.4. Psychiatric comorbidities

Psychiatric disorders were examined using the German version of the Structured Clinical Interview for DSM-IV Axis I Disorders [37]. Additionally, childhood or adult problems related to attention deficits and/or hyperactivity were assessed via two self-report measures from the Homburger scales of attention deficit hyperactivity disorder (ADHD) for adults [38]: (1) the German version of the short form of the Wender Utah Rating Scale (WURS-K), and (2) an 18-item ADHD self-assessment scale (ADHS-SB), in which the respondent indicates current ADHD symptoms according to DSM-IV and ICD-10 criteria using a four-point Likert scale ranging from 0 = “not at all” to 3 = “severe”.

Comorbid personality disorders were assessed via the German version of the Structured Clinical Interview for DSM-IV Axis II Disorders [39]. Additionally, two non-clinical variables thought to be associated with CSO – impulsiveness and empathy – were assessed using the German translation of the Barratt Impulsiveness Scale (BIS) [40] and the German adaption of the Interpersonal Reactivity Index (IRI) [41].

2.3. Data analysis

All analyses were carried out using SPSS Statistics Version 21 (IBM® Corporation, Amonk, NY, USA) for Windows. As this was the

first study to differentiate between paedophilia and CSO in the search for group differences regarding the theoretically derived set of clinical variables tested here, we opted for an exploratory approach and report two-tailed significance levels without correction for multiple comparisons (all analyses $p < .05$).

2.3.1. Group comparisons

We tested for normal distribution of the continuous variables using the Shapiro-Wilk test ($p > .1$, excluding cases pairwise); Levene's test ($p > .1$) was used to verify the assumption of variance homogeneity. As none of the variables fulfilled both criteria two-way analysis of variance was not appropriate. We therefore opted to use Kruskal-Wallis H tests (using Monte-Carlo simulation) for group comparisons and Mann-Whitney *U* tests for post hoc pairwise comparisons for all continuous variables as well as the ordinal variables.

In the case of dichotomous variables, we assessed group differences using the extension of Fisher's exact test for more than two groups if at least one of the expected cell frequencies in our 2×2 -design was less than 5, otherwise we used χ^2 -tests. Fisher's exact test was used for all post hoc comparisons involving dichotomous variables.

2.3.2. Regression analyses

To identify risk factors for paedophilic preference and CSO we carried out multiple regression analyses using binary logistic models with paedophilia and history of CSO as dichotomous dependent variables. Our aim was not to identify predictors of paedophilia and CSO, but to identify the variables that most clearly differentiated between paedophiles and non-paedophiles and offending and non-offending participants through exploratory analysis. In line with this the independent variables were selected mainly on the basis of the existence of group differences rather than theoretical assumptions about the origins of paedophilia or CSO. The number of independent variables included in the analyses was based on the recommendation by Agresti [42] in order to ensure sufficient power. Variables which did not account for sufficient between-group variance were excluded from the regression models stepwise, in an iteration-driven analysis. This procedure led to multiple models, which were compared against each other in a next evaluative step, until the model with the best values for fit, classification rate and explained variance was found.

3. Results

3.1. Baseline characteristics

Approximately 550 subjects were screened for eligibility for the study and 342 met the inclusion criteria. Distributions of sexual preference with respect to age (paedophilia/hebephilia), gender and exclusivity were similar in paedophiles with and without a history of CSO (Table S1 in Appendix A). Sixty-six out of 162 (41%) paedophiles showed the exclusive type of paedophilia (53 paedophilic, 13 hebephilic) (Fig. S1 in Appendix A). Homosexual preference was more common in the P + CSO group (37/83, 45%) than the P-CO group (25/79, 32%), CSO-P group (5/32, 16%) or HC group (40/148, 27%) (Table S1 in Appendix A). The average number of victims was slightly higher (about one more victim) in homosexual child sex offenders than in heterosexual child sex offenders (P + CSO and CSO-P) (Table S2 in Appendix A).

3.2. Intelligence, sociodemographic and neurodevelopmental factors

Child sex offenders (P + CSO and CSO-P) were older and had a lower education level than paedophiles without a history of CSO

and controls (Table 1). Child sex offenders also had lower total intelligence scores than non-offending subjects. This difference was mainly driven by lower scores on the verbal subscales of the German WAIS [34] in both offending groups. Offenders without paedophilia had the lowest total intelligence scores and lowest scores on all four WAIS subscales (especially the *Matrix Reasoning* subscale).

Prolonged bedwetting in childhood was considerably more frequent in paedophiles than controls. The rate in non-paedophilic child sex offenders lay between those for paedophilic offenders and paedophilic non-offenders. There were no group differences in handedness, birth complications, childhood accidents that resulted in unconsciousness or maternal or paternal age at birth (Table 1). The rates of self-reported birth complications and childhood accidents that resulted in unconsciousness were between 1.7 and 7.8 percentage points higher in the two paedophilic groups than in the two non-paedophilic groups.

3.3. Sexual characteristics

There were group differences in self-reported age at first masturbation, ejaculation and intercourse. Age at first masturbation was lower in the P + CSO group than in any other group, and also lower in the paedophilic groups than in the control group. A similar, albeit non-significant, pattern of post hoc group differences was found for age at first ejaculation and age at first intercourse was higher in the P-CSO group than in any other group (Table 2).

All three clinical/offender groups (P + CSO, P-CSO, CSO-P) had higher rates of nearly all categories of sexual dysfunction and paraphilias (Table 2). Rates of sexual dysfunction were especially high in the CSO-P group, whereas paraphilias were most frequent in paedophiles, regardless of offender status. Both paedophilic groups also had higher rates of increased sexual desire as well as higher average total sexual outlets per week than the two non-paedophilic groups. The P-CSO group reported a particularly high average number of total sexual outlets per week and also had high sexual excitability scores (SIS/SES scales; Table 3) [35]. The two paedophilic groups reported similar historical and current consumption of material depicting the sexual exploitation of children or indicative pictures (Table S3 in Appendix A) and only a minority (17/157, 11%; data from 5 P + CSO missing) had never used indicative or explicit material.

3.4. Own sexual abuse during childhood and other familial risk factors

The reported rates of all forms of childhood trauma, with the exception of physical neglect, were higher in the three clinical/offender groups than in the control group (Table 3 and Fig. 1). More specifically, the three clinical/offender groups reported significantly higher rates of emotional, physical, and sexual abuse as well as emotional neglect in childhood and adolescence than controls. Moreover, the CSO-P group reported higher scores than the paedophilic groups on all CTQ subscales except the sexual abuse subscale and both offender groups reported higher frequencies of sexual abuse than the non-offender groups. The severity of reported abuse ranged from low to moderate according to the classification criteria proposed by Bernstein and Fink [36].

Subjects in the two paedophilic groups were about twice as likely as controls to have a mother with a psychiatric history, whereas in the CSO-P group the probability of having a mother with a psychiatric history was similar to that for the control group and the probability of having a father with a psychiatric history was lower than that for the control group. The percentage of subjects reporting a paternal criminal history was, however, higher in the CSO-P group than in any other group and maternal criminal history was most often reported in the P + CSO group (Table 1).

Table 1
General characteristics of study groups.

Variable	Group								Statistic	
	P+CSO (n = 83)		P-CSO (n = 79)		CSO-P (n = 32)		HC (n = 148)			
<i>Demographic</i>										
Age in years ^{111, 333, 444, 666}	Mean	SD	Mean	SD	Mean	SD	Mean	SD		
Educational level ^{a 111, 2, 333, 444, 666}	2.87	1.17	3.68	0.94	2.41	1.10	3.82	0.90		H(3) = 34.007; p = .000
(Highest) professional status ^{b 111, 2, 333, 444, 666}	3.05	1.33	3.52	1.04	3.20	1.42	3.56	1.12		H(3) = 70.140; p = .000
										H(3) = 6.552; p = .089
<i>Cognitive and physical</i>										
Short Version of the German WAIS ^c	Mean	SD	Mean	SD	Mean	SD	Mean	SD		
Vocabulary ^{111, 333, 444, 666}	8.90	3.13	10.99	2.98	8.32	2.50	10.84	3.27		H(3) = 35.887; p = .000
Similarities ^{11, 33, 444, 666}	8.84	3.04	10.28	2.94	7.68	2.99	9.94	3.04		H(3) = 22.312; p = .000
Block Design	10.07	3.20	10.88	3.36	9.61	3.29	10.36	3.37		H(3) = 4.002; p = .261
Matrix Reasoning ^{22, 444, 666}	11.27	2.73	11.55	2.17	9.90	2.83	11.39	2.50		H(3) = 10.705; p = .015
Total intelligence score ^{d 11, 2, 33, 444, 666}	99.00	18.75	106.8	17.53	90.94	15.00	105.15	18.75		H(3) = 25.011; p = .000
Handedness ^e	n	%	n	%	n	%	n	%		
(right/left/mix)	72/9/2	86/11/2	67/7/5	85/9/6	29/2/1	91/6/3	129/16/3	87/11/2		F = 3.616; p = .720
(right/left/mix) ^f	54/4/25	65/5/30	48/6/23	62/8/30	26/1/5	81/3/16	102/11/35	69/7/24		F = 4.921; p = .543
(right/non-right)	72/11	87/13	67/12	85/15	29/3	91/9	129/19	87/13		F = 0.627; p = .899
(right/non-right) ^f	54/29	65/35	48/29	62/38	26/6	81/19	102/46	69/31		X ² (3) = 4.060; p = .255
Laterality index ^g	65.74	5.53	61.44	6.35	76.25	8.60	65.84	4.64		H(3) = 7.225; p = .064
<i>Neurodevelopmental</i>										
Unconsciousness in childhood	17	20.48	20	25.32	6	18.75	26	17.57		X ² (3) = 2.112; p = .550
Birth complications	17	20.48	16	20.25	5	15.63	25	16.89		X ² (3) = 0.817; p = .849
Bed-wetting in childhood ^{3,555}	14	16.87	20	25.32	6	18.75	11	7.43		F = 14.533; p = .002
<i>Familial^h</i>										
In relationship ^k	n	%	n	%	n	%	n	%		
Paternal age at birth in years ^l	29.74	6.68	30.82	6.76	30.67	6.52	31.02	7.13		X ² (3) = .920; p = .629
Paternal psychiatric treatment ([N(yes)/total N])	20/69	28.99	16/74	21.33	3/29	10.34	26/142	18.31		H(3) = 1.345; p = .723
Paternal criminal history ([N(yes)/total N]) ^{2, 44, 666}	9/70	12.86	5/74	6.67	9/29	31.03	9/142	6.34		X ² (3) = 5.312; p = .150
Maternal age at birth in years ^m	26.46	6.25	27.18	6.95	27.41	5.55	27.35	5.95		F = 14.025; p = .002
Maternal psychiatric treatment ([N(yes)/total N]) ^{3, 55}	22/81	27.16	25/78	31.65	4/28	14.29	21/144	14.58		H(3) = 2.350; p = .513
Maternal criminal history ([N(yes)/total N]) ³	5/82	6.10	0/78	0.0	0/28	0.0	1/144	0.69		X ² (3) = 11.518; p = .009
										F = 7.550; p = .025

Notes: ^aEducational level was classified as follows: 0 = no school-leaving qualification; 1 = leaving certificate of a school for mentally handicapped; 2 = leaving certificate of secondary education (4 years secondary); 3 = leaving certificate of secondary education (5 years secondary); 4 = leaving certificate of secondary education (8 years secondary); 5 = university degree. ^b(Highest) professional status was classified as follows: 0 = out of work; 1 = labourer/unskilled worker; 2 = vocational training; 3 = university training; 4 = work requiring vocational training; 5 = work requiring university training. Missing data: P+CSO n = 5; P-CSO n = 6; CSO-P n = 2; HC n = 13. Still in education: P+CSO n = 19; P-CSO n = 12; CSO-P n = 1; HC n = 15. ^cData are given as point scale points per subtests of the short version of the German Wechsler Adult Intelligence Scale WAIS [34]. Missing data: Vocabulary subtest, P+CSO n = 1, P-CSO n = 1, CSO-P n = 1, HC n = 3; Similarities subtest P+CSO n = 1, P-CSO n = 1, HC = 3; Block Design subtest, P+CSO n = 1, P-CSO n = 1, CSO-P n = 1, HC n = 4; Matrix Reasoning subtest, P+CSO n = 2, P-CSO n = 1, CSO-P n = 1, HC n = 3. ^dTotal intelligence score extrapolated from the point scale points of four subtests of the short version of the German WAIS [34] using the following formula: [point scale points (Vocabulary) + point scale points (Similarities)]*3.0 + [point scale points (Block Design) + point scale points (Matrix Reasoning)]*2.5. Missing data: P+CSO n = 1; P-CSO n = 2; CSO-P n = 1; HC n = 4. ^eHandedness was assessed using an adapted 10-item version of the German Edinburgh Handedness Inventory [33]. ^fClassification according to Fazio et al. [43]. Missing data: P-CSO n = 2. ^gCalculated according to Oldfield [33]. Values range from -100 (left-handed) to +100 (right-handed). Data are given as means and standard deviations. Missing data: P-CSO n = 2. ^hPaternal psychiatric treatment and criminal history, missing data: P+CSO n = 14; P-CSO n = 4; CSO-P n = 3; HC n = 6. Maternal psychiatric treatment, missing data: P+CSO n = 2; CSO-P n = 3; HC n = 2. Maternal criminal history, missing data: P+CSO n = 1; CSO-P n = 4; HC n = 4. ⁱSubjects in prison at the time of the study were excluded from these analyses: P+CSO n = 36; CSO-P n = 26. ^jData are given as means and standard deviations. Missing data: P+CSO n = 13; P-CSO n = 2; CSO-P n = 2; HC n = 7. ^kData are given as means and standard deviations. Missing data: P+CSO n = 4; P-CSO n = 2; CSO-P n = 3; HC n = 3. ^lAbbreviations and Symbols: P + CSO = paedophiles with a history of child sex offending. P-CSO = paedophiles without a history of child sex offending. CSO-P = non-paedophiles with a history of child sex offending. HC = healthy controls. ^mTest statistics: F = extension of Fisher's exact test for more than two groups. H = Kruskal-Wallis H test. X² = χ²-test. Post hoc test P+CSO vs. P-CSO = ¹¹¹p < .05, ³³³p < .01, ⁴⁴⁴p < .001; post hoc test P+CSO vs. CSO-P = ²²p < .01, ²²²p < .001; post hoc test P+CSO vs. HC = ³³p < .05, ³³³p < .01, ³³³p < .001; post hoc test P-CSO vs. CSO-P = ⁴p < .05, ⁴⁴p < .01, ⁴⁴⁴p < .001; post hoc test P-CSO vs. HC = ⁵p < .05, ⁵⁵p < .01, ⁵⁵⁵p < .001; post hoc test CSO-P vs. HC = ⁶p < .05, ⁶⁶p < .01, ⁶⁶⁶p < .001. Effect sizes are given in Appendix B.

3.5. Psychiatric comorbidities

The rates of psychiatric comorbidities (current and historical diagnoses; axis I and axis II psychiatric disorders) were higher in all three clinical/offender groups than in the control group (all ps < .000; Table 4 and Table S4 in Appendix A).

Sixty-one percent of paedophiles and 66% of the CSO-P group fulfilled the lifetime criteria for at least one axis I disorder, compared with 27% of the control group. Rates of all mood disorders were higher in the three clinical/offender groups (CSO + P: 37%; P-CSO: 47%; CSO-P: 38%) than in controls (12%). Prevalence rates were highest for major depression in all four groups (P + CSO: 35%; P-CSO: 39%; CSO-P: 31%; HC: 12%). Lifetime prevalence rates for anxiety disorders were also higher in the clinical/offender groups (CSO + P: 25%; P-CSO: 25%; CSO-P: 31%) than in controls (10%). Social phobia was most prevalent in the two paedophilic groups (P + CSO: 10%; P-CSO: 14%), panic disorder

in the CSO-P group (13%) and simple phobia in controls (5%). The overall lifetime prevalence rates for all psychoactive substance use disorders was highest in the CSO-P group (44%), and the rates in the P + CSO group (25%) and P-CSO group (14%) were still higher than in the control group (6%). Almost all subjects reporting any lifetime psychoactive substance use disorder reported a history of alcohol abuse or dependence (CSO-P: 41%; P + CSO: 22%; P-CSO: 10%; HC: 3%).

Rates of current axis I (mood and anxiety) disorders were also significantly higher in the clinical/offender groups than in controls. More specifically, at the time of the study 19% of the P + CSO group, 34% of the P-CSO group and 19% of the CSO-P group (versus 3% of controls) were suffering from some form of mood disorder (remember that severe mood disorder was an exclusion criterion) whilst 20% of the P + CSO group, 25% of the P-CSO group and 28% of the CSO-P group (versus 8% of controls) were suffering from some form of anxiety disorder (remember that severe anxiety disorder

Table 2
Sexual characteristics of study groups.

Variable	Group								Statistic
	P+CSO (n = 83)		P-CSO (n = 79)		CSO-P (n = 32)		HC (n = 148)		
	Mean	SD	Mean	SD	Mean	SD	Mean	SD	
<i>Sexual history</i>									
align="center"									
Age at first ejaculation in years ^a 333	12.11	1.16	12.55	1.70	12.79	1.89	12.73	1.61	$H(3) = 12.929; p = .004$
Age at first masturbation in years ^b 1, 2, 333, 55	11.38	2.02	12.01	2.35	13.81	8.14	12.91	2.47	$H(3) = 28.639; p = .000$
Age at first sexual intercourse in years ^c 1, 44, 55	17.63	5.08	19.86	5.36	16.81	3.24	17.60	3.00	$H(3) = 10.668; p = .012$
<i>Current sexual functioning^d</i>									
Average total sexual outlets per week ^e 1, 22, 444, 55, 666	5.46	7.68	6.41	5.53	2.51	2.41	4.51	3.14	$H(3) = 25.732; p = .000$
Any sexual dysfunction ^{333, 555, 666}	31	37.8	37	46.8	17	53.1	21	14.3	$\chi^2(3) = 37.437; p = .000$
Sexual desire disorders ^{33, 666}	10	12.0	6	7.6	6	18.8	3	2	$F = 15.247; p = .001$
Sexual arousal disorders ^{33, 5, 6}	12	14.5	15	19.0	7	21.9	10	6.8	$F = 10.653; p = .011$
Orgasmic disorders ^{33, 5, 6}	13	15.9	11	13.9	6	18.8	7	4.7	$F = 11.747; p = .007$
Sexual pain disorders ^{2, 4, 666}	2	2.4	1	1.3	4	13.3	0	0.0	$F = 17.359; p = .000$
Increased sexual desire ^{333, 4, 555}	17	20.5	20	25.3	2	6.3	5	3.4	$F = 29.452; p = .000$
<i>Additional paraphilias^f</i>									
Any additional paraphilia ^{333, 555}	21	26.58	20	25.64	6	18.75	11	7.43	$\chi^2(3) = 18.745; p = .001$
Exhibitionism ³³	6	7.59	1	1.28	0	0.0	1	0.68	$F = 16.385; p = .006$
Fetishism ^{1, 44, 555}	0	0.0	3	3.85	0	0.0	1	0.68	$F = 21.179; p = .000$
Transvestic fetishism ^{1, 2, 555, 66}	0	0.0	1	1.28	2	6.25	0	0.0	$F = 24.575; p = .000$
Frotteurism ^{333, 555}	8	10.13	5	6.41	1	3.12	0	0.0	$F = 21.679; p = .001$
Sexual masochism	0	0.0	3	3.85	0	0.0	1	0.68	$F = 10.241; p = .052$
Sexual sadism ^{11, 4, 555}	1	3.8	8	10.26	1	3.12	0	0.0	$F = 24.046; p = .000$
Voyeurism ^{333, 555, 6}	8	10.13	6	7.69	1	3.12	0	0.0	$F = 28.400; p = .000$
Paraphilic coercive disorder ^{33, 55, 6}	5	6.33	4	5.13	1	3.12	1	0.68	$F = 25.952; p = .000$

Notes: ^aMissing data: P+CSO n = 1; P-CSO n = 5; CSO-P n = 1; HC n = 1. ^bMissing data: P+CSO n = 1; P-CSO n = 6; HC n = 1. ^cMeans and standard deviations are based on data from the subjects who had already had sexual intercourse with an adult partner (P+CSO n = 75; P-CSO n = 54; CSO-P n = 31; HC n = 146). Missing data: P-CSO n = 1; HC n = 1. ^dAll data given in this section are based on the ICD-10 criteria for sexual dysfunctions and paraphilias. Increased sexual desire, frotteurism and paraphilic coercive disorder were assessed according to the same scheme, although those are no ICD-10 diagnostic categories. For the variables orgasmic and sexual pain disorders and any form of sexual dysfunction ns and% s are based on data from 82 P+CSO. Desire disorders, missing data: HC n = 1; pain disorders, missing data: CSO-P n = 2. ^eAverage total sexual outlets per week corresponds to the average weekly number of orgasms derived from all types of sexual activity (e.g., masturbation, petting, intercourse). Data are given as means and standard deviations. ^fAll additional paraphilias, missing data: P+CSO n = 4; P-CSO n = 1. *Abbreviations and Symbols:* P+CSO = paedophiles with a history of child sex offending. P-CSO = paedophiles without a history of child sex offending. CSO-P = non-paedophiles with a history of child sex offending. HC = healthy controls. *Test statistics:* F = extension of Fisher's exact test for more than two groups. H = Kruskal-Wallis H test. $\chi^2 = \chi^2$ -test. Post hoc test P+CSO vs. P-CSO = ¹ $p \leq .05$, ¹¹ $p \leq .01$, ¹¹¹ $p \leq .001$; post hoc test P+CSO vs. CSO-P = ² $p \leq .05$, ²² $p \leq .01$, ²²² $p \leq .001$; post hoc test P+CSO vs. HC = ³ $p \leq .05$, ³³ $p \leq .01$, ³³³ $p \leq .001$; post hoc test P-CSO vs. CSO-P = ⁴ $p \leq .05$, ⁴⁴ $p \leq .01$, ⁴⁴⁴ $p \leq .001$; post hoc test P-CSO vs. HC = ⁵ $p \leq .05$, ⁵⁵ $p \leq .01$, ⁵⁵⁵ $p \leq .001$; post hoc test CSO-P vs. HC = ⁶ $p \leq .05$, ⁶⁶ $p \leq .01$, ⁶⁶⁶ $p \leq .001$. Effect sizes are given in Appendix B.

was an exclusion criterion). Rates of current substance abuse or dependence were also significantly higher in both paedophilic groups (P + CSO: 9%; P-CSO: 10%) (but not the CSO-P group) than in controls (2%).

Regarding axis II symptoms, 41% of paedophiles and 38% of the CSO-P group fulfilled the DSM-IV criteria for one or more personality disorders, compared with 6% of controls. Specifically, rates of cluster B and C personality disorders were significantly higher in the clinical/offender groups than in the control group; the most prevalent forms of disorder were avoidant personality disorder in the paedophilic groups (P + CSO: 13%; P-CSO: 21%) and avoidant and antisocial personality disorder (both 16%) in the CSO-P group. Only the offender groups (P + CSO and CSO-P) showed significantly elevated rates of cluster A personality disorders (5% and 9% respectively) as compared to controls (0%). Conduct disorders in childhood/adolescence were also reported more often by the two offender groups (both 9%) than the P-CSO group (4%) or control group (2%).

The clinical/offender groups reported higher rates of ADHD symptoms during childhood (based on the WURS-K [38]) than controls. Current ADHD symptoms (ADHS-SB [38]) were also more common in the paedophilic groups (P + CSO and P-CSO) than in controls whereas the rate in the CSO-P group was not significantly higher than in the control group (Table 3).

All the clinical/offender groups had higher *attentional impulsiveness* scores (BIS [40]) than the control group, but there were no significant group differences in total score or in scores on the other two subscales. In contrast, we found significant group differences in scores on all ADHS-SB subscales. All the clinical/offender groups had significantly higher total scores and *hyperactivity* subscale scores

than controls, but only the P + CSO and P-CSO groups scored significantly higher than controls on the *inattention* and *impulsive-ness* subscales (Table 3).

There were group differences in only two of the four facets of empathy as assessed via the German adaption of the IRI [41]. On the one hand, clinical/offender groups scored significantly higher than the control group on the *personal distress* subscale. On the other hand, the CSO-P group reported significantly higher rates of *empathic concern* than all the other groups and the reported rate of *empathic concern* was also higher in both offender groups when compared to controls (Table 3).

3.7. Classification of paedophilia and child sexual offending

The variables that differentiated best between offenders and non-offenders were age, childhood history of emotional and sexual abuse and impulsivity based on total score on the BIS [40] (Table S5 in Appendix A). The specified regression model had a good fit (with Nagelkerke $R^2 = .33$ and Hosmer-Lemeshow Test: $\chi^2 = 5.59, df = 8, p = .69$) and explained about 33% of the variance between the two groups of men without a history of CSO (P-CSO and HC) and the two groups of men with a history of CSO (P + CSO and CSO-P). The mean classification accuracy was 76% (77% specificity, 71% sensitivity).

The variables that differentiated best between offending and non-offending paedophiles (i.e., P + CSO and P-CSO) were age, educational level, sexual sadism and childhood history of sexual abuse (Table S6 in Appendix A). The specified regression model had a good fit (with Nagelkerke $R^2 = .37$ and Hosmer-Lemeshow Test: $\chi^2 = 5.80, df = 8, p = .67$) and explained about 37% of the variance

Table 3
Assessment of childhood traumatisations^a, empathy^b, impulsiveness^c, ADHD^d and sexual excitation and inhibition proneness^e.

Questionnaire subscales	Group				Statistic				
	P+CSO (n = 79)		P-CSO (n = 76)		CSO-P (n = 30)		HC (n = 144)		
	Mean	SD	Mean	SD	Mean	SD	Mean	SD	
Childhood Trauma Questionnaire align="center"									
Emotional abuse ^{2, 333, 44, 555, 666}	10.64	5.20	10.14	4.75	13.00	5.23	7.58	3.47	H(3) = 48.975; p = .000
Physical abuse ^{22, 333, 444, 555, 666}	8.23	4.21	7.57	3.58	10.99	5.00	6.06	2.41	H(3) = 49.634; p = .000
Sexual abuse ^{111, 333, 444, 555, 666}	8.29	5.15	6.70	3.55	10.07	5.77	5.37	1.29	H(3) = 76.578; p = .000
Emotional neglect ^{2, 333, 4, 555, 666}	12.58	4.68	12.37	4.76	14.47	4.78	9.77	3.91	H(3) = 40.908; p = .000
Physical neglect ^{2, 66}	7.63	3.10	7.74	2.99	8.83	3.07	7.01	2.50	H(3) = 10.597; p = .015
Adapted Interpersonal Reactivity Index									
Fantasy	12.28	3.22	13.19	3.37	11.79	3.12	12.36	3.07	H(3) = 4.308; p = .220
Personal distress ^{33, 555, 666}	10.86	2.96	11.93	3.44	11.65	3.21	9.58	2.92	H(3) = 27.635; p = .000
Perspective taking	14.05	2.49	14.33	2.94	14.59	3.01	14.66	2.47	H(3) = 2.405; p = .513
Empathic concern ^{2, 3, 444, 666}	14.49	2.91	14.07	3.24	16.00	3.05	13.82	2.37	H(3) = 20.333; p = .000
Total score	40.89	6.65	41.59	7.80	42.38	7.40	40.84	5.98	H(3) = 3.007; p = .377
Barratt Impulsiveness Scale									
Attentional impulsiveness ^{3, 5, 6}	16.38	3.18	16.16	2.87	16.66	3.00	15.22	3.09	H(3) = 12.086; p = .006
Motor impulsiveness	22.15	4.01	21.42	3.67	22.67	4.60	21.95	2.99	H(3) = 3.948; p = .270
Non-planning impulsiveness	25.53	4.77	24.39	4.36	25.17	5.32	24.42	3.85	H(3) = 6.121; p = .105
Total score	64.39	9.36	62.31	7.35	64.49	11.32	61.59	7.90	H(3) = 5.960; p = .111
Sexual Inhibition and Sexual Excitation Scales									
Sexual excitation ^{1, 444, 555}	49.51	7.93	52.55	7.57	45.14	9.29	47.60	8.19	H(3) = 23.467; p = .000
SI due to threat of performance failure ⁵⁵⁵	24.68	5.04	25.71	5.22	25.20	5.38	22.97	5.27	H(3) = 12.875; p = .005
SI due to threat of performance consequences	20.50	4.17	20.52	4.02	21.40	4.11	21.27	4.06	H(3) = 3.767; p = .292
ADHD self-assessment scale									
Inattention ^{3, 555}	5.92	4.95	6.48	4.20	5.44	3.63	4.26	3.69	H(3) = 23.467; p = .000
Hyperactivity ^{3, 5, 6}	3.26	3.25	2.73	2.27	3.56	2.85	2.09	2.18	H(3) = 11.162; p = .008
Impulsiveness ^{33, 555}	2.56	2.36	2.51	1.89	2.44	2.29	1.59	1.59	H(3) = 16.504; p = .001
Total score ^{33, 555, 6}	11.78	9.16	11.73	6.04	11.44	7.43	7.94	6.36	H(3) = 25.506; p = .000
Above cut-off ^{3, 55}	22	24.7	23	29.1	6	18.8	20	13.5	X ² (3) = 10.835; p = .013
Wender-Utah-Rating-Scale									
Total score ^{2, 333, 555, 666}	24.51	17.68	24.68	13.88	31.91	17.76	14.17	12.21	H(3) = 51.753; p = .000
Above cut-off ^{333, 555, 666}	28	36.36	28	37.84	13	46.43	16	11.11	F = 36.135; p = .000

Notes: ^aFive types of childhood traumatisations were assessed via retrospective self-reports using the German version of the Childhood Trauma Questionnaire [36]. ^bFour facets of empathy were assessed using the Saabruer Personality Questionnaire Version 5.8 [44], which is the German adaptation of the Interpersonal Reactivity Index (IRI) [41]. In contrast to the original, it consists of only 16 (instead of 28) items and allows for the calculation of a total empathy score from the *perspective taking*, *fantasy* and *empathic concern* subscales [45]. Missing data, *empathic concern* subscale: P+CSO n = 1. ^cThree facets of impulsiveness were assessed using the German translation of the Barratt Impulsiveness Scale [40]. Missing data, *non-planning impulsiveness* subscale: P+CSO n = 1; P-CSO n = 1. ^dChildhood or adult problems related to attention deficits and/or hyperactivity were assessed using two self-report measures from the Homburger scales of attention deficit hyperactivity disorder (ADHD) for adults [38]: (1) the German version of the short form of the Wender Utah Rating Scale, and (2) an 18-item ADHD self-assessment scale. ^eSexual excitation and inhibition proneness were assessed using a German version of the Sexual Inhibition and Sexual Excitation Scales [35]. Missing data: *sexual inhibition due to threat of performance failure* subscale, P-CSO n = 1, HC n = 2; *sexual inhibition due to threat of performance consequences* subscale, P-CSO n = 1; HC n = 1. ^fFigures relate to cut-off score (total score \geq 15) reported by Rösler et al. [38] to allow for the tentative diagnosis of adult ADHD with sufficient sensitivity and specificity. Data are given as numbers and percentages. ^gFigures relate to cut-off score (total score \geq 30 and control score \leq 10) reported by Rösler et al. [38] to allow for the assumption of a history of childhood ADHD. Data are given as numbers and percentages. **Abbreviations and Symbols:** P+CSO = paedophiles with a history of child sex offending. P-CSO = paedophiles without a history of child sex offending. CSO-P = non-paedophiles with a history of child sex offending. HC = healthy controls. SI = Sexual inhibition. **Test statistics:** F = extension of Fisher's exact test for more than two groups. H = Kruskal-Wallis H test. X² = χ^2 -test. Post hoc test P+CSO vs. P-CSO = ¹p \leq .05, ¹¹p \leq .01, ¹¹¹p \leq .001; post hoc test P+CSO vs. CSO-P = ²p \leq .05, ²²p \leq .01, ²²²p \leq .001; post hoc test P+CSO vs. HC = ³p \leq .05, ³³p \leq .01, ³³³p \leq .001; post hoc test P-CSO vs. CSO-P = ⁴p \leq .05, ⁴⁴p \leq .01, ⁴⁴⁴p \leq .001; post hoc test P-CSO vs. HC = ⁵p \leq .05, ⁵⁵p \leq .01, ⁵⁵⁵p \leq .001; post hoc test CSO-P vs. HC = ⁶p \leq .05, ⁶⁶p \leq .01, ⁶⁶⁶p \leq .001. Effect sizes are given in Appendix B.

between the two groups. The mean classification accuracy was 74% (74% specificity, 74% sensitivity).

The variables that differentiated best between paedophilic and non-paedophilic men were increased sexual desire, voyeurism, childhood history of sexual abuse and the sexual excitation subscale of the SIS/SES scales (Table S7 in Appendix A) [35]. The specified regression model had a good fit (with Nagelkerke R² = .23 and Hosmer-Lemeshow Test: $\chi^2 = 9.11$, df = 8, p = .33) and explained about 23% of the variance between the two paedophilic (P + CSO and P-CSO) and the two non-paedophilic (CSO-P and HC) groups. The mean classification accuracy was 68% (66% specificity, 74% sensitivity).

4. Discussion

This is the first large scale clinical investigation to differentiate between paedophiles and non-paedophiles with and without a history of child sexual offending. This allowed us to identify factors associated specifically with sexual preference or offender status. However, our results have to be considered as being of preliminary nature only, as they are based on exploratory analyses (i.e. not corrected for multiple comparisons).

Comparisons of offenders and non-offenders revealed clear-cut group differences in age, intelligence, educational level and childhood history of sexual abuse, and most of these variables

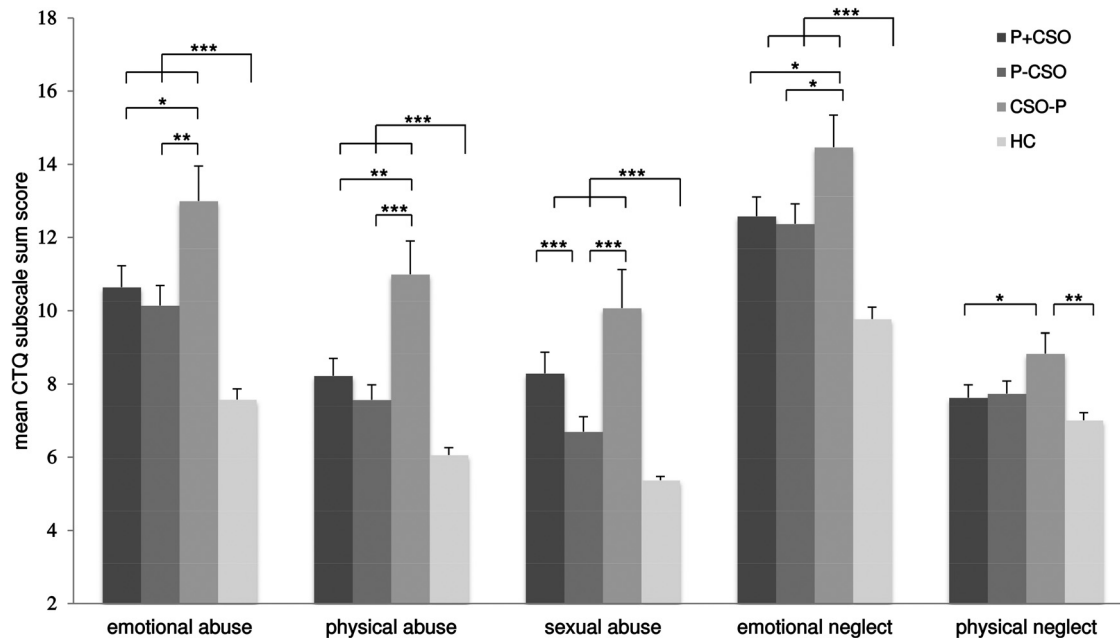


Fig. 1. Means and standard errors of the five subscale sum scores of the Childhood Trauma Questionnaire (CTQ) [36]. *Abbreviations and symbols:* P+CSO = paedophiles with a history of child sex offending, P-CSO = paedophiles without a history of child sex offending, CSO-P = non-paedophiles with a history of child sex offending, HC = Healthy controls. * $p \leq .05$, ** $p \leq .01$, *** $p \leq .001$.

Table 4
Main categories and findings regarding axis I and II (comorbid) disorders.

Disorder	Group								Statistic
	P+CSO (n = 81)		P-CSO (n = 77)		CSO-P (n = 32)		HC (n = 146)		
	n	%	n	%	n	%	n	%	
Axis I disorders^a									
<i>Current axis I disorders</i>									
Any mood disorder ^{1, 333, 555, 66}	15	18.5	26	33.8	6	18.8	4	2.7	$F = 41.868; p = .000$
Any anxiety disorder ^{33, 555, 66}	17	20.1	19	24.7	9	28.1	11	7.5	$\chi^2(3) = 16.437; p = .001$
Any psychoactive substance use disorder ^{3, 5}	7	8.6	7	9.9	1	3.1	3	2.1	$F = 7.411; p = .050$
Any current axis I disorder ^{333, 555, 6}	34	42.0	35	45.0	10	31.3	18	12.3	$\chi^2(3) = 36.630; p = .000$
<i>Lifetime axis I disorders</i>									
Any mood disorder ^{333, 555, 666}	30	37.0	36	46.8	12	37.5	18	12.3	$\chi^2(3) = 35.441; p = .000$
Any anxiety disorder ^{33, 55, 66}	20	24.7	19	24.7	10	31.3	14	9.6	$\chi^2(3) = 14.976; p = .002$
Any psychoactive substance use disorder ^{2, 333, 44, 5, 666}	20	24.7	11	14.3	14	43.8	8	5.5	$F = 35.474; p = .000$
Lifetime history of any axis I disorder ^{333, 555, 666}	51	62.9	45	58.4	21	65.6	39	26.7	$\chi^2(3) = 40.930; p = .000$
Axis II disorders^b									
<i>Any cluster A disorder^{3, 66}</i>									
Paranoid	4	5.1	2	2.6	3	9.4	0	0.0	$F = 11.411; p = .003$
Schizoid	3	3.8	1	1.3	3	9.4	0	0.0	
Schizotypal	1	1.3	1	1.3	0	0.0	0	0.0	
<i>Any cluster B disorder^{333, 55, 666}</i>									
Antisocial	14	17.9	10	13.2	6	18.8	3	2.1	$F = 21.947; p = .000$
Narcissistic	5	6.3	3	3.9	5	15.6	3	2.1	
Borderline	6	7.6	7	9.2	2	6.3	0	0.0	
<i>Any cluster C disorder^{333, 555, 66}</i>									
Avoidant	15	19.0	22	28.9	5	15.6	4	2.7	$\chi^2(3) = 34.290; p = .000$
Dependent	10	12.7	16	21.1	5	15.6	1	0.7	
Obsessive-compulsive	1	1.3	2	2.6	1	3.1	0	0.0	
Any axis II disorder ^{333, 555, 666}	5	6.3	12	15.8	0	0.0	5	3.4	$\chi^2(3) = 53.291; p = .000$
Any childhood/adolescence conduct disorder	30	38.0	34	44.7	12	37.5	8	5.5	
	7	8.9	3	3.9	3	9.4	3	2.1	$F = 6.993; p = .057$

Notes: ^aPsychiatric disorders were assessed using the German version of the Structured Clinical Interview for DSM-IV Axis I Disorders [37]. ^bPersonality disorders were assessed using the German version of the Structured Clinical Interview for DSM-IV Axis II Disorders [39]. *Abbreviations and Symbols:* P+CSO = paedophiles with a history of child sex offending, P-CSO = paedophiles without a history of child sex offending, CSO-P = non-paedophiles with a history of child sex offending, HC = healthy controls. *Test statistics:* F = extension of Fisher's exact test for more than two groups. $\chi^2 = \chi^2$ -test. Post hoc test P+CSO vs. P-CSO = ¹ $p \leq .05$, ¹¹ $p \leq .01$, ¹¹¹ $p \leq .001$; post hoc test P+CSO vs. CSO-P = ² $p \leq .05$, ²² $p \leq .01$, ²²² $p \leq .001$; post hoc test P+CSO vs. HC = ³ $p \leq .05$, ³³ $p \leq .01$, ³³³ $p \leq .001$; post hoc test P-CSO vs. CSO-P = ⁴ $p \leq .05$, ⁴⁴ $p \leq .01$, ⁴⁴⁴ $p \leq .001$; post hoc test P-CSO vs. HC = ⁵ $p \leq .05$, ⁵⁵ $p \leq .01$, ⁵⁵⁵ $p \leq .001$; post hoc test CSO-P vs. HC = ⁶ $p \leq .05$, ⁶⁶ $p \leq .01$, ⁶⁶⁶ $p \leq .001$. Effect sizes are given in Appendix B.

also helped differentiate between offenders and non-offenders in the regression analysis. Comparisons of paedophilic and non-paedophilic men (regardless of offender status) revealed small differences in a range of sexual characteristics (e.g., additional paraphilias, onset and current level of sexual activity) which also differentiated between paedophiles and non-paedophiles in the regression analysis. In many other theory-driven group comparisons (e.g., regarding intelligence or educational level), however, the differences between controls and non-paedophilic offenders were larger than those between either of these two (non-paedophilic) groups and either of the two paedophilic groups.

At least with respect to those characteristics assumingly associated with neurodevelopmental perturbations we examined in our study, the sexual preference factor (i.e., paedophilic or not) appears as less decisive than the currently most popular hypothesis on the origins of paedophilia might suggest. We were, for example, not able to replicate findings of significantly increased rates of non-right-handedness or childhood accidents resulting in unconsciousness in paedophiles [cf. 11–13]. And significantly higher rates of childhood bed-wetting and maternal psychiatric burden were only found comparing paedophilic groups with the control group, not with the group of non-paedophilic child sex offenders.

Group comparisons of our study do, however, indicate an accumulation of sexual anomalies (cf. [46]) in both paedophilic groups: regardless of offender status, paedophiles reported higher rates of additional paraphilias and higher sexual desire than controls and non-paedophilic child sex offenders. Total number of sexual outlets per week, sexual excitation score and the rate of sexual sadism were significantly higher in the P-CSO group than in any other group and we also found trends towards differences between the P+CSO group and the two non-paedophilic groups with respect to the first two variables, while age at first masturbation and ejaculation was especially low in the P+CSO group. These results may be interpreted in the light of studies which report strong associations between paraphilic interests in general and sex drive or one of its proxy variables (e.g., number of sexual partners, rates of sexual behaviour, or sexual preoccupation [cf. 47]). However, none of the above-mentioned sexual characteristics examined in this study discriminated consistently between the paedophilic and non-paedophilic groups in post-hoc group comparisons, so these results are suggestive, rather than providing clear evidence that the sexual perturbations reported by paedophiles in this study are implicated in the aetiology of paedophilia.

If one nevertheless assumes a higher sex drive in the two paedophilic groups of this study, the question remains why one subgroup (P-CSO) is able to refrain from acting out sexually while the other (P+CSO) is not. There were some variables that clearly distinguished between offenders and non-offenders (regardless if paedophilic or not), including educational level, mean total intelligence score and verbal intelligence subscores. Other studies have reported lower intelligence and educational attainment in paedophiles in general and these findings have been linked to the hypothesis of neurodevelopmental perturbations [11–13,48], but we were unable to replicate them. In fact, because we differentiated between offender status and sexual age preference, we were able to show that lower intelligence and lower educational level were associated with CSO rather than with paedophilia per se. Although the earlier studies had larger samples, these consisted mainly of offenders, making it difficult to disentangle sexual preference factors from those associating with offending [6].

It is important to notice that these earlier studies on the hypothesis of neurodevelopmental perturbations are also different from the present study in that they used penile plethysmography for establishing study groups while we used subjective self-reports given in semi-structured interviews. One might therefore consider

the group assignment of earlier studies as more objective and valid. However, we believe that self-reports also offer high validity if they are assessed outside the correctional setting and the climate of “panic and hysteria” [49, p. 507] fuelled by mandatory reporting laws. It would still be best if future studies used a combination of different data sources in establishing study groups in order to rule out possible confounding factors inherent to the current study design.

Another variable that distinguished between offenders and non-offenders was the *sexual abuse* subscale of the CTQ [36]. We endorse the argument that self-reported rates of childhood abuse may be artificially inflated in offenders [21,50] due to e.g., an increased propensity to report a personal history of childhood sexual abuse after having committed CSO as a ‘quasi-excuse’ [51, p. 567]. However, our result corroborates a recent internet study by Bailey, Bernhard and Hsu [52] which also found that men with a history of childhood sexual abuse reported significantly higher rates of child sexual offending than men without such experience. Bailey and colleagues only tested men who were sexually attracted to children, whereas we also included groups of non-paedophilic child sex offenders and non-offenders and so were able to differentiate between participants on the basis of both offender status and sexual preference in testing the ‘sexually abused – sexual abuser’ hypothesis. This differentiation indicates that a history of childhood sexual abuse may increase the propensity to engage in CSO, but not the likelihood of developing paedophilia. It thereby adds to former studies testing the ‘sexually abused – sexual abuser’ hypothesis in paedophilic men (e.g., [20,51,53]), which, to our knowledge, have so far only included offenders, but at least partly propagate a link between own child sexual abuse and paedophilia, thereby mixing up the factors sexual preference and offence status [6,21].

When it comes to other potential risk factors for CSO the picture is complex. Contrary to predictions derived from earlier studies [54], we found no evidence of a lack of empathy in offenders. Offenders actually had higher scores on the *empathetic concern* subscale of the German adaption of the IRI [41] than the control group. Also, rather unexpectedly, the total number of sexual outlets per week was significantly lower in the CSO-P group than in any other group and was also lower in the P+CSO than in the P-CSO group. Taken together with the elevated rates of sexual desire disorders in both offending groups we may conclude from this that sex drive was lowest in the two offending groups in our sample. This contradicts existing theories about routes to CSO, especially CSO in non-paedophilic men [6], but we cannot rule out the possibility that this result is due to a systematic bias in imprisonment status between the offending (P+CSO and CSO-P) and non-offending (P-CSO and HC) groups in our sample. Men who were in prison at the time of the study may have been more inclined to give socially desirable responses.

The significant differences in age between offenders and non-offenders may also have influenced the results. There was a difference of almost six years between the mean age of offending and non-offending paedophiles in our sample, which might encourage one to speculate that in paedophilic men offending behaviour is simply a matter of time and access to children. This interpretation is consistent with a study reporting significant correlations between child sexual offending and age, frequency of working with children, and frequency of falling in love with children [55]. In our sample the differences between offending and non-offending paedophiles however also included trait rather than state variables (e.g., intelligence, educational level, sexual excitability, several additional paraphilias and childhood history of sexual abuse) and the regression analyses indicated that some trait variables (namely educational level, sexual sadism and history of childhood sexual abuse) differentiated between offending and non-offending paedophiles (mean classification accuracy of 74%), as did impulsivity and history of childhood

emotional and sexual abuse between offenders and non-offenders in general (76% mean classification accuracy). Overall these regression analyses therefore indicate that, at least in our sample, opportunity is not the only factor which differentiates non-offending (paedophilic) men from those who offend.

Our finding that offending paedophiles reported more familial risk factors than non-offending paedophiles (e.g., higher rates of a maternal and paternal criminal history, emotional abuse and neglect, and physical abuse) accords well with theories of sexual offending against children [56]. Offending paedophiles also reported lower rates of internalising behaviours (e.g., lower lifetime rates of mood disorders and Cluster C personality disorders) and higher rates of externalising behaviours (e.g., higher lifetime rates of psychoactive substance use disorders, Cluster B personality disorders and childhood conduct disorders; higher current BIS [40] impulsiveness and ADHS-SB [38] hyperactivity) than non-offending paedophiles. However, we were not able to differentiate statistically between paedophiles with and without a history of CSO on the basis of any of these variables. Interestingly, however, values for most of the risk factors for CSO were higher in non-paedophilic than paedophilic offenders and post-hoc comparisons also revealed significant differences between these groups. More specifically, the CSO-P group reported significantly higher rates of childhood emotional abuse, neglect and physical abuse than any other group, as well as by far the greatest prevalence of paternal criminal history, and the lowest intelligence scores on the German WAIS [34]. Although overall rates of Cluster B personality disorders were similar in the CSO-P group and the other groups, at a descriptive level antisocial tendencies, Cluster A personality disorders (and more specifically paranoid personality disorder), lifetime history of axis I psychoactive substance use disorders and self-reported childhood sexual abuse and physical neglect were all more frequent in the CSO-P group than in any other group. These results suggest that a wide range of risk factors for CSO are more frequently found in non-paedophilic child sex offenders than in paedophilic child sex offenders or non-offenders [6].

Most relevant from a clinical point of view are the high rates of psychiatric comorbidities, cluster B and cluster C personality disorders and sexual dysfunctions among the clinical/offender groups. All three groups differed significantly from the control group with respect to these broad psychiatric disorder categories and many of the subcategories. Furthermore, self-reported childhood ADHD symptoms (based on the WURS-K [38]) were significantly more pronounced in these groups than in the control group. These characteristics are not specifically linked to just one of the two factors we examined, offender status or paedophilic sexual preference; however, they stand out from the norm as defined by the group of healthy controls, and suggest that comorbid disorders may be involved in a unitary mechanism underlying both paedophilic sexual age preference and CSO. On the other hand, the finding that all the clinical/offender groups also reported significantly higher anxiety and discomfort in tense interpersonal settings than controls (on the *personal distress* subscale of the German adaption of the IRI [41]) suggests that many of the reported deficits in these three groups may be a consequence of the stigma associated with “coming out” as a paedophilic and/or being incarcerated for CSO, too. Due to the cross-sectional design of our study we have no evidence on the direction of the relationship. We do however want to emphasise that researchers should pay more attention to this latter possibility when studying groups of paedophiles and/or child sex offenders than they seem to have done up to now [57]. A small group of researchers has already started developing and test hypotheses about the ways in which stigmatisation of paedophiles and child sex offenders may actually increase the risk of offending or re-offending [58,59]. And health professionals (e.g., from the “Don’t offend” project in Germany, or

the Specialist Treatment Organisation for the Prevention of Sexual Offending in the United Kingdom) and non-professionals (e.g., self-help groups such as the online platform *Virtuous Paedophiles*, or the community-based reintegration initiative *Circles of Support and Accountability* in Canada) already try to interrupt the emerging vicious cycle by offering help and support to individuals who perceive themselves to be at risk of committing child sex offences and are struggling to refrain from doing so.

In summary, a combination of internal and external, psychological and developmental risk factors can be found in both paedophilic men and men with a history of CSO. Our results are essentially similar to those of earlier studies in that they suggest that paedophilia and CSO are multi-causal phenomena. However, in disentangling sexual preference factors from those associated with offending, our study additionally indicates that increasing age is linked to CSO, whether by paedophilic or by non-paedophilic men, that childhood trauma may underlie the phenomenon of CSO and that an accumulation of sexual anomalies may be a major influence on the pathogenesis of paedophilia.

Our sample size may still have been too small and the number of tested variables too high in order to pinpoint specific associations. Future studies should focus on smaller subsets of the variables included within the exploratory approach of our study in order to provide statistically sound analyses including correction for multiple comparisons. Such studies could for example test for the relationship between the type of childhood traumatization experienced and the exact nature of risk factors found to be fulfilled in later (paedophilic or non-paedophilic) child sex offenders. Or, they could search for a possible link between age at first masturbation and exclusivity of the sexual age preference. In this sense, we hope that the results of our study may serve as a source of inspiration for the selection and combination of variables in forthcoming studies on the origins of paedophilia and child sex offending.

5. Conclusions

The main strengths of this study are the comprehensive clinical examination and the fact that we divided our sample according to both sexual preference and offence status. Because of this design the study clearly extends and, in some cases, contradicts existing findings relevant to theories about pathways leading to paedophilia and/or child sex offending. We hope that it will inspire further research in a field where suffering can be tremendous and clinical help is limited.

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Parts of the results reported in this paper have previously been presented in a talk entitled “Clinical characteristics associated with pedophilia and child sexual offending” at the 14th Conference of the International Association for the Treatment of Sexual Offenders (IATSO), held at the University Hospital of Copenhagen, Denmark from the 7th to the 10th of September 2016, as well as in a talk

entitled “Clinical, neuropsychological and (epi-)genetic alterations in pedophiles with and without child sexual offending” at the XVII World Congress of Psychiatry of the World Psychiatric Association (WPA), held at Messe Berlin, Germany from the 8th to the 12th of October 2017.

Appendices A and B. Supplementary data

Supplementary data associated with this article can be found, in the online version, at <https://doi.org/10.1016/j.eurpsy.2018.02.002>.

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