Mental disorders in juveniles who sexually offended: A meta-analysis

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ABSTRACT

The purpose of this study was to establish the prevalence of mental disorders in juveniles who sexually offended (JSOs). A meta-analysis was performed based on studies reporting on the prevalence rates of mental disorders in JSOs. Furthermore, differences in mental disorders between JSOs and juveniles who offended non-sexually (non-JSOs) were assessed. In total, 21 studies reporting on mental disorders in 2951 JSOs and 18,688 non-JSOs were included. In the total group of JSOs, 69% met the criteria for at least one mental disorder; comorbidity was present in 44%. The most common externalizing and internalizing disorders were respectively conduct disorder (CD; 51%) and anxiety disorder (18%). Compared to non-JSOs, JSOs were less often diagnosed with a Disruptive Behavior Disorder (DBD, i.e., CD and/or Oppositional Deviant Disorder [ODD]), an Attention-Deficit/Hyperactivity Disorder (ADHD) and a Substance Use Disorder (SUD). No significant differences were found for internalizing disorders. In conclusion, although the prevalence of externalizing disorders is higher in non-JSOs, mental disorders are highly prevalent in JSOs. Even though results of the current meta-analysis may overestimate prevalence rates (e.g., due to publication bias), screening of JSOs should focus on mental disorders.

1. Introduction

In recent years, several studies have shown that the prevalence of mental disorders among juvenile offenders is high and that comorbidity is the rule rather than the exception (Colins, Vermeiren, Schuyten, & Broekaert, 2009; Fazel, Doll, & Långström, 2008; Vermeiren, Jespers, & Moffitt, 2006). The most prevalent mental disorders found among juvenile offenders are Disruptive Behavior Disorders (DBD; i.e., Conduct Disorder [CD] and/or Oppositional Deviant Disorder [ODD]), Attention-Deficit/Hyperactivity Disorder (ADHD), and Substance Use Disorder (SUD), and to a lesser extent internalizing disorders, such as anxiety disorders (e.g., Colins et al., 2010; Fazel et al., 2008).

Juvenile delinquents, however, constitute a heterogeneous group, with differences in mental health problems between various types of offenders, such as property and violent offenders (e.g., Colins et al., 2009). It has been demonstrated that juveniles who sexually offended (JSOs) have more internalizing problems and show less antisocial behavior problems, including substance abuse problems, than juvenile who offended non-sexually (non-JSOs) (Seto & Lalumière, 2010; Van Wijk et al., 2006). Studies reporting on actual diagnoses of mental disorders in JSOs, which are defined differently than mental health problems, however, are scarce and showed considerable variety among studies (e.g., Galli et al., 1999; Kavoussi, Kaplan, & Becker, 1988). It is, therefore, important to systematically examine the prevalence of mental disorders in this specific group of offenders.

Gaining insight in mental disorders of JSOs is important for at least four reasons. First, mental disorders are highly prevalent in juvenile offenders (e.g., Colins et al., 2010; Fazel et al., 2008), and a mental health assessment at the time of entry into a juvenile justice facility has gradually become common practice. However, it is as yet unknown whether the assessment of mental disorders in JSOs should be similar to the assessment of juvenile offenders in general or whether they should be tailored to the specific needs of JSOs. Second, knowledge about the type and seriousness of the mental disorder(s) could guide future treatment decisions. Taking the 'what works' principles of justice interventions as an example, treatment should target specific problems, including mental health (Andrews & Bonta, 2010). Correctional facilities now have the obligation to provide treatment for mental health problems (Grisso, 2004), which might improve the mental health of JSOs in adolescence as well as in emerging adulthood. Third, specific knowledge of mental health in JSOs can be used for further development of sex offender treatment programs. This may not only safeguard the positive development of the offender (in accordance with the Good Lives Model (Ward, 2002)), but may also prevent future offending (Cuellar, McReynolds, & Wasserman, 2006). Fourth, as mental disorders are assumed to increase

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the risk for reoffending in juvenile offenders (Colins et al., 2011), it is of societal relevance to focus on mental disorders in JSOs.

The main purpose of the current study was to estimate the prevalence of mental disorders in JSOs by means of meta-analytical techniques. Results might inform us about the specific characteristics of JSOs, allowing the scientific and clinical field to improve assessment, including treatment decisions, and sex offender prevention and treatment programs. To examine the prevalence and variability of mental disorders, we collected empirical research on mental disorders in JSOs based on the Diagnostic and Statistical Manual of mental disorders (DSM) and the Internal Classification of Diseases (ICD). In addition, in order to specify mental disorders in relation to sexual offending behavior versus offending behavior in general, JSOs were compared to non-JSOs. Based on previous studies on mental health problems (Seto & Lalumière, 2010; Van Wijk et al., 2006) it was hypothesized that JSOs show more internalizing disorders and fewer externalizing disorders, including SUD, than non-JSOs.

2. Method

2.1. Sample of studies

To be included in this meta-analysis, each study had to report on mental disorders based on DSM or ICD classifications, assessed by use of a structured or semi-structured clinical instrument, or retrieved from file reports. In line with previous studies in juvenile (general) offenders (e.g., Colins et al., 2011; Fazel et al., 2008) Axis-I disorders were included. Juveniles who sexually offended (JSOs) included in the current meta-analysis had been suspected of, or convicted for, a sex offense (e.g., child molestation, rape). Due to differences resulting from the various countries and types of institution, the age of the juveniles ranged between 10 and 22. As not all studies reported on type of sex offense, the current meta-analysis was not able to correct for type of offense.

In order to avoid biased retrieval of studies, multiple search methods were used (Rosenthal, 1995). First, we conducted a computerized search of several relevant databases: Web of Science, PsycInfo, PubMed, ERIC, Dissertation Abstracts and Scholar Google. The following key words were used in varying combinations: you*, juvenile, adolescen*, sex*, off*, psychopathology and psychiatr*. Subsequently, we examined the combination offen*, and several instruments reported in the papers of Fazel et al. (2008) (i.e., Adolescent Psychopathology Scale [APS], Diagnostic Interview for Children and Adolescents [DICA], Diagnostic Interview Schedule for Children [DISC], Juvenile Detention Interview [JDI], Practical Adolescent Dual Diagnostic Interview [PADDI], Kiddie-Schedule for Affective Disorders and Schizophrenia [K-SADS], Schedules for Clinical Assessment in Neuropsychiatry [SCAN], Structured Clinical Interview for DSM Diagnoses [SCID] and Salford Needs Assessment Schedule for Adolescents [SNASA]), Esmeijer, Veerman, and van Leeuwen (1999) (i.e., Anxiety Disorder Interview Schedule for Children [ADIS], Child and Adolescent Psychiatric Assessment [CAPA], Child Assessment Schedule [CAS], DICA, DISC, Interview Schedule for Children [ISC], K-SADS and Structured Interview for Diagnostic Assessment of Children [SIDAC]), and one additional instrument (i.e., Composite International Diagnostic Interview [CIDI]). Second, reference lists from relevant studies on mental disorders in JSOs (e.g., Seto & Lalumière, 2010; Van Wijk et al., 2006) or juveniles who offended non-sexually (non-JSOs) (e.g., Fazel et al., 2008) were examined for studies that might be included in the current meta-analysis. Third, we contacted researchers who published on the prevalence of mental disorders in juvenile offenders in general, including JSOs, but who did not (yet) report separately on the prevalence of mental disorders in JSOs. These researchers were asked to provide the prevalence rates of mental disorders both in the JSO sample and non-JSO sample. Fourth, we contacted researchers who collected data on mental disorders in JSOs (if available compared to general offenders), but did not (yet) publish about these outcomes in national or international journals, or reports. Last, all authors who were contacted were asked about possible recent studies, unpublished studies, doctoral dissertations and theses.

2.2. Coding of the studies

First, the prevalence rates for each mental disorder in JSOs were extracted from the studies and converted into proportions. Subsequently, we coded moderators (i.e., type of assessment, gender, age, and ethnicity/race) that were assumed to affect the prevalence of disorders in JSOs. With regard to the type of assessment used to establish the prevalence rates of mental disorders in JSOs, we distinguished between clinical instruments and file information (categorical moderator). Gender was based on the proportion of males, and ethnicity/race on the proportion of Caucasians or non-immigrants in each study (both continuous moderators). Age reflects the mean age in years (continuous moderator).

Second, we compared the prevalence of mental disorders among JSOs and non-JSOs, and calculated the standardized mean differences (d) for each mental disorder (e.g., ADHD), or mental disorder category (e.g., DBD). Using Lipsey and Wilson's (2001) formula, both the proportions and the standardized mean difference were weighted in the analyses by the inverse variance. For the interpretation of the magnitude of the effect sizes, the classification provided by Cohen (1988) was used, distinguishing between a small effect ($d = .20$), a medium effect ($d = .50$) and a large effect ($d = .80$).

2.3. Analytic strategy

SPSS macros (Lipsey & Wilson, 2000; see for SPPS macros: http://mason.gmu.edu/~dwilsonb/ma.html) were used to compute effect sizes based on random effect models for all mental disorders separately. Significance testing in random effect models is based on the total number of studies included in a meta-analysis, resulting in lower statistical power, but greater generalizability (Rosenthal, 1995). In random effect models, the mean of the distribution of the effects is calculated, which is thought to be a more conservative method producing larger variances, standard errors, and confidence intervals. The weights assigned under random effects are more balanced in that large studies will not dominate the analysis, whereas small studies will not be trivialized (Borenstein, Hedges, & Rothstein, 2007). For all calculations the level of statistical significance was set at .05.

The categorical variable (type of assessment) was analyzed using an analysis of variance like procedure, using a SPSS macro from Lipsey and Wilson (2001). The total variability is divided in a portion that can be explained by the moderator and a residual portion (as expressed as $Q_{BETWEEN}$ and Q_{WITHIN} values). A significant $Q_{BETWEEN}$ value indicates that the differences between the categories are larger than what can be expected by sampling error (Lipsey & Wilson, 2001). For the continuous variables (gender, age, and ethnicity/race), a regression-like procedure was used, again using SPSS macros devised by Lipsey and Wilson (2001), providing homogeneity statistics for the regression model ($Q_{REGRESSION}$) and for the sum of squares residual (Q_{ERROR}). Moderator analysis was only performed if the selected moderator had at least three studies in each category.

2.4. File-drawer-analysis

Studies that report significant results are more often accepted for publication than studies that do not report significant results. Although we took the effort to also include unpublished data, this so-called publication bias could result in a file-drawer problem, which suggests the sample of studies found for the researched area to be incomplete and not representative of the total sample of studies. In order to examine whether such publication bias or file-drawer problem exists,

we calculated the fail-safe number to estimate the number of unpublished studies that were not included in the meta-analysis, but in case of inclusion could render the overall significant effect size non-significant (Durlak & Lipsey, 1991). Meta-analytic findings are considered to be robust if the fail-safe number exceeds the critical value obtained with Rosenthal's (1995) formula of $5 * k + 10$, in which k is the number of studies used in the meta-analysis. If the fail-safe number falls below this critical value, a publication bias or file drawer problem may exist.

3. Results

3.1. Description of the studies included

A total of 21 studies were included (Table 1). In nine studies, the information was directly extracted from a published paper or dissertation (Aebi & Bessler, 2010; Dolan et al., 1996; Etherington, 1993; Fanniff & Kolko, 2012; Galli et al., 1999; Habermann, 2008; Kavoussi et al., 1988; Långström & Lindblad, 2000; Tardif et al., 2005). Additional information

Table 1
Summary of 21 studies included in the meta-analysis.

Study	Country	Period	Sample	Sample size (JSOs)	Sample size (non-JSOs)	Information	Age range	Characteristics JSOs		
								Mean age	Gender (% males)	Ethnicity (% non-immigrants)
Aebi and Bessler (2012)[a]	Switzerland	2000–2008	Convicted JSOs	99		File information	10–18		100.0	
Chu and Thomas (2010)	Singapore	1996–2007	Court ordered psychological assessed JSOs	156		File information	12–18	15.0	100.0	44.2
Colins et al. (2009)	Belgium	2005–2007	Detained adolescents	43	202	DISC-IV	12–17	15.8	100.0	76.7
Dolan, Holloway, Bailey, and Kroll (1996)	United Kingdom	1985–1992	JSOs referred to a forensic unit	121		File-information	12–18	15.2	100.0	93.3
Etherington (1993)	United States		Juvenile offenders in a residential treatment center	20	20	K-SADS-P	13–18	17.0	100.0	10.0
Fanniff and Kolko (2012)[b]	United States		JSOs court ordered to a community based intervention program	168		K-SADS-PL	10–20	15.3	100.0	48.0
Galli et al. (1999)	United States		Child molesters in residential treatment programs, juvenile court systems and outpatient psychiatric clinics	22		SCID-P, DICA-A, DICA-P, structured interview	13–17	15.9	100.0	64.0
GGzE (Unpublished)	The Netherlands	2009–2012	Juveniles assessed in a forensic psychiatric clinic	9	49	File information	14–22	18.9	100.0	77.8
Gretton and Clift (2011)	Canada	2006–2009	Incarcerated juvenile offenders	8	160	DISC-IV	12–20	16.4	87.5	12.5
Habermann (2008)[c]	Germany	1945–1991	Court ordered assessed juvenile sexual murderers	19		File information		16.8	100.0	100.0
't Hart-Kerkhoffs et al. (2015)	The Netherlands	2003–2006	Suspected JSOs	106		K-SADS-PL	12–18	15.0	100.0	24.0
Kavoussi et al. (1988)	United States		JSOs referred to an outpatient evaluation and treatment program	58		SCID & K-SADS-E	13–18	15.3	100.0	11.0
Långström and Lindblad (2000)[d]	Sweden	1988–1995	JSOs referred to forensic psychiatric assessment	56		File information	15–20		96.4	68.0
Leenarts, McReynolds, Vermeiren, Doreleijers, and Wasserman (2013)[e]	United States	1999–2011	Juveniles in juvenile justice institutions	387	9432	DISC		16.0	97.2	59.2
NIFP (Unpublished)	The Netherlands	2004–2011	Court ordered psychological assessed juvenile offenders	1011	7977	File information	12–18	15.2	98.9	59.7
Ruchkin, Schwab-Stone, Koposov, Vermeiren, and Steiner (2002)	Russia	1999	Juvenile offenders in a juvenile detention center	20		K-SADS-PL	14–19		100.0	100.0
Schubert, Mulvey, and Glasheen (2011)	United States		Juvenile arrestees	101	696	CIDI	14–18	16.1	100.0	16.7
Tardif, Auclair, Jacob, and Carpentier (2005)	Canada	1992–2002	Female JSOs in an outpatient clinic	15		File information	12–17	14.7	0.0	
Van den Berg, Bijleveld, and Hendriks (2011)	The Netherlands	1988–2004	Court ordered psychological assessed JSOs and JSOs in residential treatment	426		File information	10–17	14.4	100.0	71.5
Van Vugt (2011)	The Netherlands	2008–2009	Detained JSOs	85		File information	12–21	17.5	100.0	77.6
Van Wijk, Vreugdenhil, van Horn, Vermeiren, and Doreleijers (2007)[f]	The Netherlands	1998–1999	Juvenile detainees	21	152	DISC	12–18	16.4	100.0	23.8

[a] This study also includes Aebi and Bessler (2010).
[b] This study also includes Kolko, Noel, Thomas, and Torres (2005).
[c] This study also includes Spehr, Driemeyer, and Briken (2010) and Hill, Habermann, Berner, and Briken (2007).
[d] This study also includes Långström and Grann (2000).
[e] This study also includes Wasserman and McReynolds (2011, 2006) and Wasserman, McReynolds, Lucas, Fisher, and Santos (2002).
[f] This study also includes Vreugdenhil, Doreleijers, Vermeiren, Wouters, and van der Brink (2004), Vreugdenhil, Vermeiren, Wouters, Doreleijers, and van den Brink (2004) and Vreugdenhil, van den Brink, Wouters, and Doreleijers (2003).

on juveniles who sexually offended (JSOs) was obtained in 10 studies based on a published paper reporting on mental disorders in general offending youths ('t Hart-Kerkhoffs et al., 2015; Chu & Thomas, 2010; Colins et al., 2009; Gretton & Clift, 2011; Leenarts et al., 2013; Ruchkin et al., 2002; Schubert et al., 2011; Van den Berg et al., 2011; Van Vugt, 2011; Van Wijk et al., 2007). Finally, in two studies, information was based on unpublished datasets from Mental Health Service Eindhoven (GGzE) and the Netherlands Institute for Forensic Psychiatry and Psychology (NIFP).

A total of 2951 JSOs were included in this meta-analysis (range: 8–1011). Eight studies also reported on juveniles who offended non-sexually (non-JSOs), with a total of 18,688 respondents (range: 20–9432). For each mental disorder or mental disorder category, a separate meta-analysis was conducted, resulting in 28 meta-analyses.

For mental disorders in JSOs, the fail-safe number for the random effect models for the meta-analyses of mental disorder, affective disorder, ADHD, DBD, and SUD was larger than Rosenthal's critical number. This indicates that a file-drawer effect is unlikely. The fail-safe number for the random effect models for the meta-analyses of comorbidity, major depression, anxiety disorder, post-traumatic stress disorder (PTSD), CD, ODD, alcohol abuse/dependence, drug abuse/dependence, paraphilia, and pedophilia, however, was smaller than Rosenthal's critical number, suggesting that there may be a file-drawer effect.

Table 2
Mental disorders in JSOs (including categorical moderators).

Domain	Number of studies (K)	Number of respondent (N)	Mean proportion (random effects)	95% CI (random effects)	Z	Heterogeneity (Q) (between studies)	Heterogeneity (Q) (within studies)	FS 5%	Fail-safe number
Mental disorder	**16**	**2821**	**.69**	**.60 to .79**	**14.1*****		**5726.4*****	**1161.6**	**90**
Type of assessment						0.4			
- File information	*7*		*.65*	*.47 to .83*			*11.3*		
- Instruments	*9*		*.73*	*.57 to .89*			*4.3*		
Comorbidity	**5**	**343**	**.44**	**.25 to .63**	**4.5*****		**53.2*****	**32.7**	**35**
Type of assessment						0.1			
- File information	1		.39	.07 to .71			0.0		
- Instruments	4		.44	.27 to .61			4.6		
Internalizing disorders									
Affective disorder	**10**	**1843**	**.09**	**.06 to .13**	**5.0*****		**167.3*****	**83.6**	**60**
Type of assessment						0.4			
- File information	2		.06	−.22 to .35			0.1		
- Instruments	8		.16	.02 to .30			10.8		
- **Major depression**	**6**	**214**	**.10**	**.03 to .17**	**2.8****		**45.3*****	**11.4**	**40**
Anxiety disorder	**8**	**740**	**.18**	**.08 to .28**	**3.5****		**209.0*****	**27.2**	**50**
Type of assessment						1.2			
- File information	2		.08	−.14 to 2.9			0.1		
- Instruments	6		.21	.09 to .33			8.2		
- **PTSD**	**7**	**230**	**.08**	**.02 to .14**	**2.8****		**28.6*****	**12.9**	**45**
Externalizing disorders									
ADHD	**11**	**1925**	**.14**	**.11 to .18**	**7.6*****		**369.6*****	**227.0**	**65**
Type of assessment						0.1			
- File information	4		.19	.00 to .39			1.6		
- Instruments	7		.22	.08 to .37			9.8		
DBD	10	2195	.38	.30 to .47	8.8***		122.4***	283.4	60
Type of assessment						6.6*			
- File information	5		.28	.17 to .39			1.8		
- Instruments	5		.50	.38 to .62			7.6		
- CD	11	537	.51	.18 to .83	3.1**		2351.9***	27.1	65
Type of assessment						3.4			
- File information	2		.20	−.16 to .56			0.1		
- Instruments	9		.57	.40 to .74			10.1		
- ODD	5	346	.21	.06 to .36	2.7**		133.9***	8.0	35
SUD	12	1870	.30	.22 to .38	7.0***		245.2***	206.5	70
Type of assessment						1.3			
- File information	4		.21	−.01 to .44			1.4		
- Instruments	8		.38	.21 to .54			10.7		
- Alcohol abuse/dependence	6	1204	.29	.14 to .43	3.8***		67.0***	25.5	40
Type of assessment						1.8			
- File information	2		.16	−.05–.37			2.3		
- Instruments	4		.34	.18–.50			3.8		
- Drug abuse/dependence	5	1185	.34	.14 to .53	3.4**		66.6***	16.4	35
Type of assessment						60.8***			
- File information	1		.07	.06 to .09			0.0		
- Instruments	4		.36	.29 to .43			5.8		
Paraphilia	4	1151	.42	−.26 to 1.09	1.2		40,264.4***	−1.8	30
Type of assessment						10.1**			
- File information	3		.19	−.06 to .45			4.4		
- Instruments	1		.99	.57 to 1.43			0.0		
- Pedophilia	4	106	.32	−.33 to .97	1.0		1281.0***	−2.6	30
Type of assessment						1280.2***			
- File information	3		.06	.01 to .11			0.8		
- Instruments	1		1.00	1.00 to 1.00			0.0		

* $p < .05$.
** $p < .01$.
*** $p < .001$.

For mental disorders in JSOs compared to general offending youths, only the fail-safe number for the random effect model for the meta-analyses of alcohol abuse/dependence was larger than Rosenthal's number. All other fail-safe numbers (i.e., mental disorders, comorbidity, affective disorder, major depression, anxiety disorder, PTSD, ADHD, DBD, CD, ODD, SUD, and drug abuse/dependence) were smaller than Rosenthal's critical number, indicating a possible file drawer effect (Table 2).

3.2. Prevalence rates of mental disorders in JSOs

In total, 69% of JSOs met the criteria for at least one mental disorder, and 44% for at least two disorders (Table 2). CD was the most prevalent externalizing disorder in JSOs (51%), whereas anxiety disorder was the most common internalizing disorder (18%). With regard to substance abuse, 30% of the JSOs had at least one SUD. Furthermore, the prevalence of paraphilia was high (42%) (Table 2).

All meta-analyses showed heterogeneity, which means that the prevalence rate of mental disorders in JSOs was influenced by additional factors. Therefore, the moderating effect of type of assessment, gender, age and ethnicity/race was examined. When the source of information was a clinical instrument (50%; 95% CI: 0.38–0.62) diagnoses of a DBD were significantly more prevalent in JSOs than when the source of information was file information (28%; 95% CI: 0.17–0.39) (Table 2). ODD decreased and SUD increased when the percentage of girls who had been included in the studies increased (Table 3). The prevalence of CD and alcohol and drug abuse/dependence disorders increased with age, whereas PTSD and ODD decreased with age. Finally, DBD was less prevalent when the percentage of non-immigrants in the studies included increased (Table 3).

Table 3
Significant continuous moderators for mental disorders in JSOs.

Domain/moderator	Number of studies (K)	Number of respondent (N)	Z	Beta
PTSD				
- Gender	7	230	−0.66	−0.23
- Age	6	210	−3.72	−0.75***
- Ethnicity	6	215	1.84	0.52
DBD				
- Gender	10	2195	−1.33	−0.40
- Age	9	2096	0.38	0.13
- Ethnicity	9	2096	−2.65	−0.67**
CD				
- Gender	11	537	0.80	0.24
- Age	9	461	3.31	0.75***
- Ethnicity	10	522	−0.78	−0.24
ODD				
- Gender	5	346	2.14	0.70*
- Age	5	346	−1.99	−.067*
- Ethnicity	5	346	0.62	0.27
SUD				
- Gender	12	1870	−2.06	−0.51*
- Age	11	1814	0.46	0.14
- Ethnicity	12	1870	−0.46	−0.13
Alcohol abuse/dependence				
- Gender	6	1204	−1.39	−0.52
- Age	6	1204	2.01	0.63*
- Ethnicity	6	1204	0.25	0.10
Drug abuse/dependence				
- Gender	5	1185	−1.21	−0.51
- Age	5	1185	3.68	0.85***
- Ethnicity	5	1185	−0.46	−0.20
Developmental disorder				
- Gender	4	1531	0.24	0.10
- Age	4	1531	4.16	0.92***
- Ethnicity	4	1531	0.90	0.39

* $p < .05$.
** $p < .01$.
*** $p < .001$.

3.3. Mental disorders in JSOs compared to non-JSOs

A significant effect size was found for the prevalence of mental disorders and comorbidity (Table 4), indicating that JSOs were less often diagnosed with a mental disorder ($d = -0.19$) and comorbidity ($d = -0.37$) than non-JSOs. These effect sizes were small. No significant effect sizes were found for any of the internalizing disorders (i.e., affective disorder, major depression, anxiety disorder and PTSD). JSOs were less often diagnosed with an externalizing disorder than non-JSOs; a large effect size was found for ADHD ($d = -1.37$) and a small effect size for DBD ($d = -0.32$). Effect sizes for CD and ODD were non-significant. With regard to SUD, JSOs scored lower on overall SUD ($d = -0.46$), alcohol abuse/dependence ($d = -0.32$) and drug abuse/dependence ($d = -0.47$) than non-JSOs. All effect sizes were small.

4. Discussion

The general aim of the current meta-analytic study was to gain better insight in the prevalence of mental disorders in juveniles who sexually offended (JSOs). It was found that mental disorders were highly prevalent in JSOs: 69% of the JSOs met the criteria for at least one mental disorder, and 44% for at least two disorders. Although externalizing disorders were the most prevalent type of disorder (e.g., CD: 51%), a substantial number of JSOs also faced internalizing disorders, especially anxiety disorders (18%). SUD and paraphilia were also present to a high degree. All examined moderators (i.e., type of assessment, age, gender, and ethnicity/race) significantly influenced the results of mental disorders in JSOs. Furthermore, JSOs less often met the criteria for one or more mental disorders or comorbidity than juveniles who offended non-sexually (non-JSOs). JSOs were also less often diagnosed with ADHD, and – to a lesser extent – DBD and SUD, than non-JSOs. No significant differences were found for internalizing disorders.

Three findings concerning the examined moderators deserve to be discussed in more detail. First, although the group of female JSOs is relatively small, the current study found that SUD was associated with female JSOs. Previous research in the general population found a positive relationship between traumatic experiences and SUD as well as PTSD and SUD (Kilpatrick et al., 2000). In addition, it has been shown that female adolescents who sexually offended were more often and more severely abused (sexually and non-sexually) than their male counterparts (Kubik, Hecker, & Righthand, 2002; Van der Put, van Vugt, Stams, & Hendriks, 2013). Hence, SUD, but also the underlying causes (e.g., traumatic experiences), may be important factors in the sexual offending behavior of females. As it has been demonstrated that detained female adolescents also experience multiple mental health problems later in life (Van der Molen et al., 2013), SUD as well as the underlying causes of SUD should be given extra attention in the assessment and treatment of female JSOs. Second, PTSD in JSOs was negatively related to age (i.e., the number of PTSD diagnoses decreased with age). This is in line with previous research that found that abused JSOs were younger than non-abused JSOs (Cooper, Murphy, & Haynes, 1996), and the results found by Kilpatrick et al. (2000) that traumatic experiences are positively related to PTSD. It is, therefore, of clinical importance to pay special attention to (symptoms of) PTSD, and underlying causes of PTSD, especially in younger JSOs. Finally, DBD was less prevalent in non-immigrants. These results contradict previous findings in general offending populations: non-immigrant offenders were found to have more mental health problems, including externalizing problems, than immigrant offenders (Colins et al., 2013; Teplin, Abram, McClelland, Dulcan, & Mericle, 2002; Veen, Stevens, Doreleijers, van der Ende, & Vollebergh, 2010). As most instruments for mental health problems, however, are poorly validated for immigrant groups (including indigenous populations), results of the current study should be interpreted carefully (e.g., Paalman, Terwee, Jansma, & Jansen, 2013; Stevens & Vollebergh, 2008). Still, assessment and treatment of

Table 4
Mental disorders in JSOs compared to general offending juveniles.

Study	Domain/variable	%		N		d	95% CI	Z	Heterogeneity (Q)	FS 5%	Fail-safe number
		JSOs	Non-JSOs	JSOs	Non-JSOs						
	Mental disorder					−0.19	−0.28 to −0.11	−4.5***	8.4	44.4	45
Colins et al. (2009)		79.1	84.5	43	202	−0.21					
GGzE (Unpublished)		100.0	100.0	9	49	0.00					
Gretton and Clift (2011)		87.5	87.5	8	160	0.00					
Leenarts et al. (2013)		47.7	52.0	387	9432	−0.11					
NIFP (Unpublished)		77.9	83.4	1011	7977	−0.20					
Schubert et al. (2011)		45.0	56.0	101	696	−0.28					
Van Wijk et al. (2007)		78.9	93.3	21	152	−0.70					
	Comorbidity					−0.37	−0.66 to −0.08	−2.5*	4.0	3.8	25
Colins et al. (2009)		55.8	76.6	43	202	−0.58					
Gretton and Clift (2011)		62.5	78.1	8	160	−0.46					
Schubert et al. (2011)		16.0	21.0	101	696	−0.19					
	Affective disorder					−0.23	−0.53 to 0.06	−1.6	54.3***	−0.4	35
Colins et al. (2009)		11.9	14.9	43	202	−0.14					
Gretton and Clift (2011)		0.0	6.9	8	160	−2.24					
Leenarts et al. (2013)		9.0	7.8	387	9432	0.08					
NIFP (Unpublished)		2.2	3.5	1011	7977	−0.20					
Van Wijk et al. (2007)		10.5	6.3	21	152	0.28					
	Major depression					−0.28	−1.05 to 0.49	−0.7	42.7***	−3.2	30
Colins et al. (2009)		9.5	13.9	43	202	−0.23					
Etherington (1993)		60.0	15.0	20	20	1.29					
Gretton and Clift (2011)		0.0	5.0	8	160	−2.07					
Schubert et al. (2011)		3.9	6.0	101	696	−0.21					
	Anxiety disorder					0.22	−0.12 to 0.56	1.3	4.4	−1.2	25
GGzE (Unpublished)		11.1	12.2	9	49	−0.06					
Leenarts et al. (2013)		23.7	20.3	387	9432	0.11					
Van Wijk et al. (2007)		21.1	8.1	21	152	0.60					
	PTSD					0.27	−0.89 to 1.42	0.5	108.9***	−3.7	30
Colins et al. (2009)		4.8	1.5	43	202	0.51					
Gretton and Clift (2011)		0.0	5.0	8	160	−2.07					
Schubert et al. (2011)		5.9	5.0	101	696	0.08					
Van Wijk et al. (2007)		10.0	0.0	21	152	2.44					
	ADHD					−1.37	−2.57 to −0.17	−2.2*	154.6***	3.4	30
Colins et al. (2009)		4.7	12.4	43	202	−0.52					
Gretton and Clift (2011)		0.0	16.7	8	160	−2.75					
NIFP (Unpublished)		9.8	8.0	1011	7977	0.11					
Van Wijk et al. (2007)		0.0	10.9	21	152	−2.49					
	DBD					−0.32	−0.60 to −0.05	2.3*	56.0***	5.6	40
Colins et al. (2009)		58.1	67.3	43	202	−0.24					
GGzE (Unpublished)		44.4	44.9	9	49	−0.01					
Gretton and Clift (2011)		75.0	77.6	8	160	−0.08					
Leenarts et al. (2013)		23.7	27.2	387	9432	−0.11					
NIFP (Unpublished)		33.4	55.0	1011	7977	−0.55					
Van Wijk et al. (2007)		57.9	83.1	21	152	−0.76					
	CD					−0.38	−0.80 to 0.04	1.8	8.3*	0.6	30
Colins et al. (2009)		48.8	61.9	43	202	−0.33					
Etherington (1993)		100.0	100.0	20	20	0.00					
Gretton and Clift (2011)		75.0	76.9	8	160	−0.06					
Van Wijk et al. (2007)		47.4	81.6	21	152	−0.97					
	ODD					−0.89	−2.41 to .0.63	−1.2	58.7***	−1.5	25
Colins et al. (2009)		30.2	27.7	43	202	0.07					
Gretton and Clift (2011)		0.0	27.2	8	160	−3.11					
Van Wijk et al. (2007)		19.0	13.6	21	152	0.22					
	SUD					−0.46	−0.69 to −0.23	3.9***	42.0***	32.0	45
Colins et al. (2009)		65.1	75.2	43	202	−0.29					
Etherington (1993)		50.0	50.0	20	20	0.00					
GGzE (Unpublished)		11.1	24.5	9	49	−0.53					
Gretton and Clift (2011)		87.5	90.3	8	160	−0.15					
Leenarts et al. (2013)		23.6	34.8	387	9432	−0.33					
NIFP (Unpublished)		13.0	32.6	1011	7977	−0.68					
Van Wijk et al. (2007)		26.3	62.9	21	152	−0.96					
	Alcohol abuse/dependence					−0.32	−0.38 to −0.26	−10.3***	1.4	151.4	40
Colins et al. (2009)		41.9	56.9	43	202	−0.38					
Gretton and Clift (2011)		62.5	70.3	8	160	−0.21					
NIFP (Unpublished)		3.2	6.4	1011	7977	−0.33					
Schubert et al. (2011)		14.7	20.0	101	696	−0.21					
	Drug abuse/dependence					−0.47	−0.68 to −0.25	−4.3***	9.3*	23.4	30
Colins et al. (2009)		46.5	66.8	43	202	−0.52					
Gretton and Clift (2011)		62.5	70.3	8	160	−0.21					
NIFP (Unpublished)		7.4	20.0	1011	7977	−0.61					
Schubert et al. (2011)		30.4	41.0	101	696	−0.29					
	Paraphilia										

Table 4 (*continued*)

Study	Domain/variable	%		N		d	95% CI	Z	Heterogeneity (Q)	FS 5%	Fail-safe number
		JSOs	Non-JSOs	JSOs	Non-JSOs						
NIFP (Unpublished)	Pedophilia	2.2	0.1	1011	7977	1.08					
GGzE (Unpublished)		11.1	0.0	9	49	2.50					

* $p < .05$.
** $p < .01$.
*** $p < .001$.

immigrant JSOs should target DBD, in order to protect these offenders in their development and society against their future antisocial behavior.

In line with our second hypothesis, JSOs had significantly less externalizing disorders (i.e., ADHD, DBD, and SUD) than general offending youths. This may suggest that sexual offenses are less often exhibited as part of impulsive and/or antisocial behavior than general offenses. Surprisingly, no differences in internalizing disorders were found between JSOs and non-JSOs, a finding that contrasts previous studies (Seto & Lalumière, 2010; Van Wijk et al., 2006). In the current study, however, participants were diagnosed with an internalizing disorder based on DSM or ICD categories, whereas most other studies assessed internalizing mental health problems with a dimensional (symptoms) scale. Furthermore, it has been suggested that internalizing problems could actually be a reaction to the (sexual or non-sexual) offenses and its consequences and should not necessarily have preceded the offense (Vermeiren, 2003). As this may account for JSOs as well as non-JSOs, the prevalence of internalizing problems may be increased in both groups, possibly resulting in equally high levels of internalizing disorders.

4.1. Limitations

The results of this meta-analytic review should be considered in light of some limitations. First, as there may be a file-drawer effect for several disorders, the results of this meta-analysis need to be interpreted with caution. It must be noted, however, that the fail-safe number, as a test of possible publication bias, is related to the magnitude of the effect sizes (Rosenberg, 2005). As effect sizes become larger, the fail-safe number rapidly increases to exceed Rosenthal's (1995) critical value. However, to prevent possible publication bias, we contacted several relevant researchers and asked them about the presence of recent studies, unpublished studies, doctoral dissertations and theses that were unknown to us. In addition, some unpublished datasets were included in the current meta-analysis.

Second, the current study used several classification systems (e.g., DSM-III, DSM-IV, ICD-10). Therefore, prevalence rates between studies may have varied due to methodological differences between these instruments. Additionally, as the current meta-analytic study reported information in line with the original papers or databases, representation of mental disorders could also have differed between studies; some studies, for example, reported the prevalence rates for DBD as well as CD and ODD, whereas others only reported DBD or CD and ODD. Likewise, we also used the definition of JSOs and non-JSOs as used by the authors of the original papers or databases. Consequently, there was a wide age range, JSOs committed various sex offenses (e.g., child abuse, rape) and offenders were defined as JSOs or general offending juveniles based on different criteria (e.g., self-report, criminal history, index offense). However, the current study could be considered a first systematic review on psychopathology in JSOs (also compared to non-JSOs).

Third, because only few studies reported on subgroups of JSOs, it was not possible to examine differences in mental disorders between various types of sex offenses (e.g., juveniles with child victims or peer/adult victims, solo or group sex offenders). As it is known that JSOs constitute a heterogeneous group of offenders ('t Hart-Kerkhoffs et al., 2009; Hunter, Figueredo, Malamuth, & Becker, 2003; Hunter, Hazelwood, & Slesinger, 2000), it is important to focus on differences in mental disorders between subgroups of JSOs. Recently, differences in mental disorders between subgroups of JSOs were found; juveniles who offended against a much younger child showed more mental disorders than those who offended against peers and/or adults ('t Hart-Kerkhoffs et al., 2015).

4.2. Implications

The current study demonstrated that mental disorders are highly prevalent in JSOs. In addition, several factors (e.g., gender, age, ethnicity/race) moderate the effect of mental disorders in JSOs. Although JSOs showed lower prevalence rates of externalizing disorders and SUD than non-JSOs, both groups did not differ in internalizing disorders.

To safeguard the development of juvenile offenders, it is important to match the program to the specific needs of the offender (Andrews & Bonta, 2010). Assessment of JSOs, as well as offenders in general, should, therefore, include standard screening of mental disorders, preferably by means of standardized clinical instruments (Langton, 2012; Young, Dembo, & Henderson, 2007). This will ensure that mental disorders will not go unnoticed. Special attention should be devoted to SUD in female JSOs, PTSD in young JSOs, and DBD in non-immigrant JSOs, also addressing the underlying causes of these disorders. In addition, the recognition and treatment of mental disorders may also prevent future reoffending. As the impact of dynamic risk factors (i.e., criminogenic needs) on recidivism is greater among JSOs than among general offending youths (Van der Put, Vugt, Stams, Deković, & Van der Laan, 2013); assessment and treatment programs of JSOs should target these dynamic factors.

Although the current meta-analytic study increased our insight in the prevalence of mental disorders in JSOs, further research is warranted. Research should focus on differences in mental disorders between subgroups of JSOs (e.g., based on offense characteristics; physical contact between the perpetrator and the victim [hands-on and hands-off offenses; e.g., Saunders, Awad, & White, 1986], victim age [child abusers, rapists, mixed offenders; e.g., Hendriks & Bijleveld, 2004; Hunter et al., 2003; Kemper & Kistner, 2007; Parks & Bard, 2006; Seto & Lalumière, 2010], number of offenders [solo offenders, group offenders; e.g., Bijleveld & Hendriks, 2003], offense history [sex only offenders, sex and non-sex offenders; e.g., Butler & Seto, 2002], age, gender, and ethnicity/race). Furthermore, future research should also focus on the relationship between mental disorders and sexual reoffending and general reoffending in JSOs.

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