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DOI
10.1016/j.avb.2017.01.005

Publication date
2017

Document Version
Final published version

Published in
Aggression and Violent Behavior

Aggression and Violent Behavior 33 (2017) 78–90

Contents lists available at ScienceDirect

Aggression and Violent Behavior

A meta-analysis of the association between mental disorders and juvenile recidivism

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ARTICLE INFO

Article history:
Received 30 June 2016
Received in revised form 9 December 2016
Accepted 11 January 2017
Available online 17 January 2017

Keywords:
Psychiatric disorder
Delinquency
Recidivism
Juvenile
Meta-analysis

ABSTRACT

To investigate the association between mental disorders and recidivism in juveniles, a three-level meta-analysis of 20 manuscripts (17 independent studies, $N = 5737$ juveniles) was conducted. The study focused on internalizing disorders, externalizing disorders, and comorbid disorders (combinations of an internalizing and externalizing disorder). Small to moderate mean effect sizes were found for externalizing disorders ($d = 0.415$, $p < 0.001$) and comorbid disorders ($d = 0.366$, $p < 0.001$), and no relation was found between internalizing disorders and recidivism ($d = 0.016$, $p = 0.877$). For comorbid disorders, no significant variation was found between studies and between effect sizes within studies. Therefore, moderator analyses were only conducted for studies on internalizing and externalizing disorders. These analyses revealed that type of recidivism (e.g., rearrest, reincarceration), type of delinquency (e.g., overt and covert delinquency), and gender influenced the direction and magnitude of the associations between recidivism and internalizing and externalizing disorders.

1. Introduction

High prevalence rates of mental disorders have been found in juvenile delinquents compared with their non-delinquent peers (e.g., Vermeiren, 2003; Wasserman, McReynolds, Schwalbe, Keating, & Jones, 2010). For example, the prevalence of attention deficit/hyperactivity disorder (ADHD; characterized by impulsive behavior, attention problems, and restlessness) in juvenile delinquents is three to four times higher than in juveniles from the general population (Eme, 2008; Nigg, 2006). A systematic review of Colins et al. (2010) revealed a mean prevalence of any psychiatric disorder among detained male adolescents of almost 70%. Conduct disorder (CD; characterized by a repetitive and persistent pattern of antisocial behavior) and substance use disorder (SUD; substance abuse or dependence) were the most frequently occurring disorders. Another systematic review found high prevalence rates of psychotic illness, depression, ADHD, and CD in juvenile delinquents (Fazel, Doll, & Långström, 2008). The high rate of mental disorders among delinquent youths suggests that mental disorders and juvenile delinquency are related. However, it remains unclear to what extent mental disorders are predictive of recidivism. In the present study, we aim to investigate whether mental disorders in juvenile delinquents increase the risk for criminal offense recidivism. Although there is no perfect definition that adequately specifies precise boundaries for the concept of mental disorder, we follow the criteria of the Diagnostic and Statistical Manual of Mental Disorders (DSM). Recent versions of the DSM consider a mental disorder a behavioral or psychological syndrome or pattern that is associated with present distress or disability (see for a discussion, Stein et al., 2010).

1.1. Mental disorder and delinquency

Various theories exist on the relation between mental disorders and delinquency. At least four theories explain the association between internalizing disorders and delinquency. Ryan and Redding (2004) suggested that depression in boys is often expressed by aggressive and/or disruptive behaviors. This may lead to increased conflicts with peers and poor relationships with parents, both of which enhance the risk of contact with the juvenile justice system. This model is also known as the acting-out model (Kofler et al., 2011; Wolff & Ollendick, 2006). The failure model (Kofler et al., 2011; Wolff & Ollendick, 2006) assumes that early delinquent behavior may lead to negative relationships with parents and peers (e.g., rejection) and an increase in depressive symptoms, which in turn could result in an increase in future delinquent behavior. Furthermore, Ulzen and Hamilton (1998) explained the high prevalence of anxiety disorders among incarcerated juveniles by suggesting that anxiety symptoms are the result of both the incarceration itself and out-of-home placements that often precede incarceration. However, some authors suggested that internalizing disorders may have a protective effect on future delinquency (e.g., Vermeiren, Schwab-Stone, Ruchkin, De Clippele, & Deboutte, 2002; Zara &

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http://dx.doi.org/10.1016/j.avb.2017.01.005
1359-1789/

Farrington, 2009). Vermeiren et al. (2002) provided an explanation for the possible buffering effect of depression on recidivism in that apathy and lower energy levels are characteristic of depression and may protect against future delinquency.

Several explanations have been given for the relation between externalizing disorders and delinquency. First, youths with ADHD show more learning problems (Polier, Vloet, & Herpertz-Dahlmann, 2012), poor academic achievement (Pardini & Fite, 2010), have more problems with peer relationships (Polier et al., 2012), and are at risk of social rejection (Bagwell, Molina, Pelham Jr., & Hoza, 2001). Research has demonstrated that these are risk factors for future delinquent behavior (Dodge et al., 2003; McCord, Widom, & Crowell, 2001; Patterson, DeBaryshe, & Ramsey, 1989; Van der Put et al., 2012).

Second, Pardini, and Fite (2010) noticed that an oppositional deviant disorder (ODD) is characterized by vindictive behavior and outbursts of anger, which interferes with the formation of positive relationships with peers. These behaviors could also result in a negative parent-child relationship, which may lead to more problem behavior (Burke, Pardini, & Loeber, 2008). Furthermore, the presence of ODD symptoms increases the risk of developing CD (Loeber, Green, Keenan, & Lahey, 1995). CD is defined as a pattern of maladaptive behavior involving a variety of antisocial behaviors, such as aggression, deception, and theft. Many delinquent acts, including robbery and violence, are also symptoms of CD. Thus, symptoms of CD overlap with delinquent behaviors.

Finally, several explanations have been given for the relation between SUD and delinquent behavior. Brook, Whiteman, Finch, and Cohen (1996) suggested that the psychopharmacological effects of drugs will make a person less concerned with the consequences of his or her behavior, such as being involved in crimes. In addition, using drugs may lead to delinquency in order to fund the drugs (Brook et al., 1996).

1.2. Mental disorder and recidivism

Although having a mental disorder is typically considered to be a risk factor for recidivism, the empirical evidence is inconsistent (see also Nilsson et al., 2009). Research on mental disorders and recidivism has yielded mixed results. In some studies among detained youths, ADHD, CD, and SUD did not increase the risk for recidivism (Grieger & Hosser, 2012; Lueger & Cadman, 1982; Wierson & Forehand, 1995), although other studies found an association between these disorders and reoffending (Al-Banna, Al-Bedwawi, Al-Saadi, Al-Maskari, & Eapen, 2008; McReynolds, Schwalbe, & Wasserman, 2010). In the study of Sherman et al. (2010), youths with depression were at greater risk for reoffending. However, the findings in Kataoka et al. (2001) contradict this.

The inconsistencies found in studies on the relation between mental disorders and recidivism may be explained by at least four factors. First, the type of recidivism differs between studies. Some studies relied on official records of recidivism in which criminal recidivism was defined in different ways, such as rearrest and reincarceration. Cottle, Lee, and Heilbrun (2001) noticed that the comparability of these different measures of official records of recidivism is unknown. Other studies were based on self-reported delinquent behavior. There are several advantages and disadvantages of using official records or self-reported measures. One of the most important disadvantages of self-reported measures is the individual's unwillingness to report negative information about themselves (Breuk, Clauser, Stams, Slot, & Doreleijers, 2007). The most important disadvantage of official records of delinquency is that they do not reveal undetected offenses. For example, in the study of Farrington, Ttofi, Crago, and Coid (2014), a large difference in frequency of offending was found between official records of delinquency and self-reports: 3.3 convictions per offender on average compared to 112 self-reported offenses. Furthermore, studies do not only use different definitions and assessments of recidivism, but may also differ on the severity, frequency, and type of crimes (i.e., covert versus overt delinquency). This could lead to different study outcomes.

Second, studies differ with regard to the length of the follow-up period. Juvenile offending is more common than offending in (young) adulthood. Therefore, delinquent juveniles who persist in reoffending up to (young) adulthood may be a specific and more impaired subgroup (e.g., juveniles with a mental disorder) compared to juveniles who only recidivate during adolescence (Loeber & Farrington, 2012).

Third, the assessment of mental disorders differs between studies. Some studies relied on standardized mental health assessments, but others used unstandardized measures, such as chart reviews. Colins et al. (2011) noted that studies on mental disorders in delinquent juveniles often rely on self-report measures only. However, youths may not yet be able to provide a reliable representation of their mental health (Ko, Wasserman, McReynolds, & Katz, 2004). Research has shown that children at risk for delinquency minimize their symptoms of psychopathology on self-report questionnaires (e.g., Breuk et al., 2007; Vreugdenhil, Van den Brink, Ferdinand, Wouters, & Doreleijers, 2006).

Finally, studies differ with regard to the gender of participants. Mallett, Quinn, and Stoddard-Dare (2012) examined gender differences in mental health risk factors related to recidivism. They found some gender differences in the relation between externalizing disorders and recidivism. Only for girls, ADHD was a protective factor for recidivism. In addition, CD was a significant risk factor for recidivism in boys, but not in girls. Furthermore, McReynolds et al. (2010) concluded that the relation between mental disorders and recidivism differs for boys and girls: girls with a SUD and affective disorder were more likely to reoffend than boys with the same disorder profile.

1.3. Review aim

The present meta-analysis focuses on the relation between the most common mental disorders and recidivism in juveniles. To date, there are, to our knowledge, no meta-analyses that have examined to what extent mental disorders are related to recidivism. It is important to gain more insight into the association between mental disorders and recidivism. In order to protect public safety, justice agencies aim to identify which juveniles will reoffend. If having a mental disorder is one of the risk factors of recidivism, then effective treatment may reduce recidivism rates. This could lead to more public safety and reduced costs related to crime.

Researchers have focused on various disorders and disorder categories that may be related to recidivism. Therefore, the first aim of this study is to examine the associations between recidivism and different disorder categories, including internalizing, externalizing, and comorbid disorders (i.e., combinations of an internalizing and externalizing disorder), and more specific disorders, such as depression and ADHD. The second aim of this study is to investigate if the relation between mental disorders and recidivism is moderated by the assessment of mental disorders (i.e., predictor characteristics), the definition and assessment of recidivism (i.e., outcome characteristics), and sample characteristics (e.g., gender). The influence of methodological characteristics will also be examined.

2. Method

2.1. Selection of studies

Studies were included in the meta-analysis if they met five criteria. First, studies were selected if they provided data on recidivism. Recidivism could be defined as a subsequent delinquent behavior, also described as illegal behavior or a violation of the law. Studies with self-reported or official records of recidivism were both included. Second, only studies with a prospective study design were included, in which mental disorders were measured first and recidivism was measured after a follow-up period. Third, studies were included if mental disorders

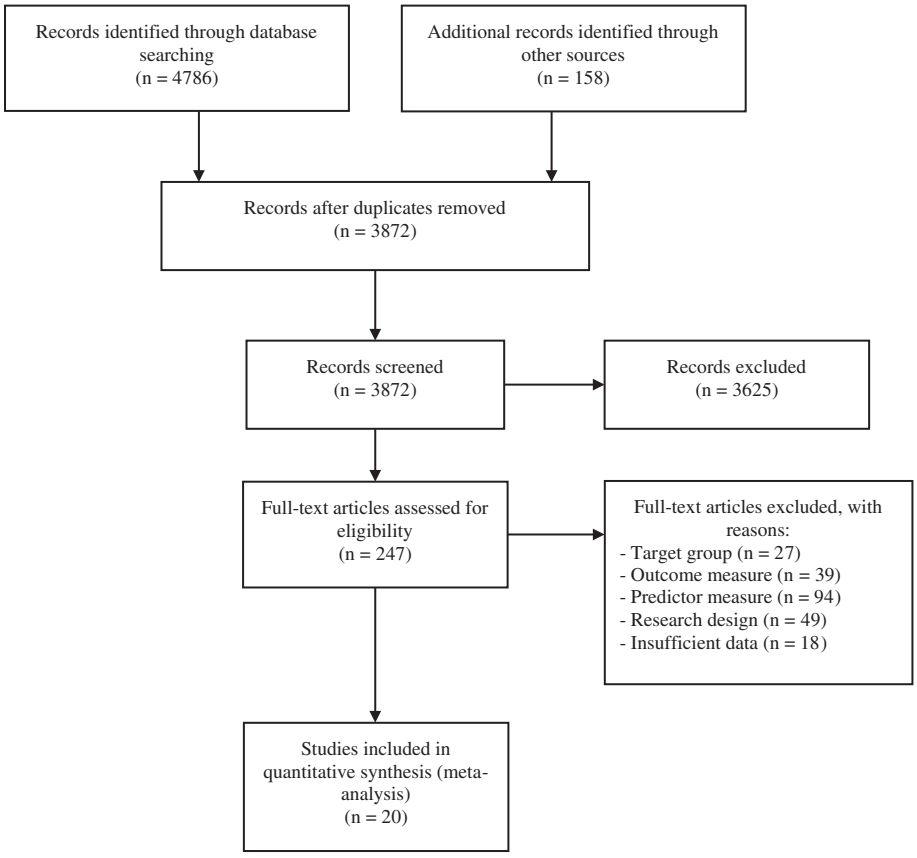

Fig. 1. Flowchart of literature search and screening.

were measured before the juveniles were 18 years old. Only measurements of the most common mental disorders were included, based on DSM criteria, and no symptoms of psychopathology, such as hyperactivity or depressive symptoms. Fourth, only studies including an appropriate comparison group of non-disordered delinquent juveniles were included. Studies focusing on specific risk groups (e.g., sexual offenders, fire-setters) were excluded. Finally, studies had to report bivariate associations between mental disorders and recidivism, since multivariate results cannot be compared across studies (Lipsey & Wilson, 2001).

Studies were collected until December 2015 by using multiple search methods. First, we searched for articles, books, chapters, dissertations, reviews, and reports in the following electronic databases: PsychINFO, ERIC, Medline, Web of Science, Sociological Abstracts, Social Service Abstracts, and Google Scholar. Various terms related to mental disorders (e.g., mental, disorder, DSM*), juveniles (e.g., adolesc*, youth*, minor*), and recidivism (e.g., recidiv*, rearrest*, reoffen*) were combined (details on the search terms and syntax for each database are available on request). Next, manual searches were conducted by inspecting reference lists of articles and reviews in order to find relevant studies that were not included yet. Third, two experts in the field of mental disorders and recidivism were contacted to collect unpublished studies or other relevant studies.[2] The search yielded 3872 reports of which 20 studies met the selection criteria, see Fig. 1 for a flowchart of the search process.

2.2. Coding the studies

A detailed coding system, based on guidelines proposed by Lipsey and Wilson (2001), was used to record all study characteristics that may potentially moderate the relation between mental disorders and recidivism. Study characteristics were grouped into predictor, outcome, sample, and methodological characteristics.

The predictor characteristics included features of mental disorders and mental health assessments. First, in order to examine the associations between different disorder categories and recidivism, specific mental disorders (e.g., ADHD, depression) were classified into categories. Based on Krueger (1999) and Krueger, Caspi, Moffitt, and Silva (1998), specific mental disorders were divided into three disorder categories, internalizing disorders (e.g., depression, PTSD), externalizing disorders (e.g., ADHD, CD), and comorbid disorders (i.e., combinations of an internalizing and externalizing disorder). Second, a distinction was made between different types of mental disorders. For internalizing disorders, a distinction was made between mood disorders (e.g., depression) and anxiety disorders (e.g., PTSD). For externalizing disorders, a distinction was made between ADHD, SUD, and disruptive behavior disorder (DBD; i.e., CD and ODD). Finally, two types of comorbid disorders were distinguished: a SUD or DBD in combination with an internalizing disorder. Furthermore, the source (diagnostic interview, diagnostic questionnaire, or other) and the informant (subject, parent, subject and parent, or other) of the mental disorder were coded.

The outcome characteristics pertain to the measurement of recidivism. Recidivism was coded on a dichotomous scale (yes/no subsequent offense). The type of recidivism (rearrest, reconviction, reincarceration, or reoffense) was coded, where rearrest could be defined as being charged with a new offense, reconviction as being found guilty of a new offense, reincarceration as a subsequent incarceration, and reoffense as a violation of the law without a known arrest, conviction, or incarceration. The type of offense was coded (overt delinquency, e.g., violence, vandalism, covert delinquency, e.g., fraud, theft, or general delinquency), as well as the number of committed offenses (0.3 to 4.5),

[2] We contacted Olivier Colins and Larkin S. McReynolds.

the source of the information (official record, self-report, or self-report and parent report), and the length in months between the measurement of a mental disorder and recidivism (4 to 84).

We also coded sample characteristics, including: age at first measurement (5 to 19), gender (male, female, or mixed), ethnicity (proportion of Caucasian participants), socioeconomic status (SES; proportion of participants with a low SES), level of delinquency at baseline (delinquents, institutionalized delinquents, or mixed), and number of prior offenses (0 to 9). In addition, non-disordered youths in the control group were divided into three groups: (i) participants without the most common internalizing and externalizing disorders (non-disorder group), (ii) participants without at least an externalizing disorder (non-externalizing disorder group), and (iii) participants without at least the corresponding disorder (no or other disorder group).

Finally, methodological characteristics included year of publication (1995 to 2014), publication status (published or unpublished), continent of study (Australia, Europe, or North America), impact factor of the journal (0 to 6.35), and sample size (21 to 1137).

Authors were contacted by email to obtain relevant information that was not provided in the selected articles. For example, when authors had measured various mental disorders, but only reported recidivism rates of a disorder category (e.g., externalizing disorder), recidivism rates of the specific mental disorders were requested.

Inter-rater agreement was based on nine studies that were randomly selected and scored by two coders. The inter-rater agreement reflects the percentage of agreement for the study characteristics. The intraclass correlation was used for continuous variables and Kappa for categorical variables. The inter-rater reliability for continuous variables proved to be good, with interclass correlations ranging from 0.80 (79% agreement) for length of follow-up period to 1.00 (100% agreement) for the effect size value, year of publication, impact factor of the journal, and sample size. Kappa's for the categorical variables were high, ranging from 0.95 (97% agreement) for level of delinquency at baseline to 1.00 (100% agreement) for continent of publication, publication status, informant of the mental disorder, recidivism type, type of offense, and source of the recidivism information.

2.3. Analyses

Studies reported on one or multiple disorders in relation with recidivism (see Table 1). Therefore, for each study, one or multiple effect sizes were calculated. Cohen's *d* was computed in order to examine the differences in recidivism rates between youths with a mental disorder and a comparison group of youths without a mental disorder. For most studies, Cohen's *d* was calculated based on frequencies or proportions (recidivism rates). For other studies, Cohen's *d* could not be computed directly, because of frequencies of zero. In these cases, raw statistics were converted to correlation coefficients (Pearson's *r*) and then each correlation was transformed to Cohen's *d*. All test statistics were transformed into Cohen's *d* using formulas from Lipsey and Wilson (2001). For the moderator analyses, each continuous variable was centered around its mean and each categorical variable with *k* categories was converted to *k*-1 dummy variables through binary coding. We checked for outliers on the basis of standardized *z*-values larger than 3.29 or smaller than −3.29 (Tabachnick & Fidell, 2013).

Most studies reported on multiple predictors (i.e., mental disorders) generating multiple effect sizes per study. It is likely that effect sizes from the same study are more similar than effect sizes from different studies. Consequently, the assumption of independency of effect sizes, an assumption that underlies traditional meta-analysis, is violated. To account for this dependency, we applied a three-level random effects model (Cheung, 2014; Van den Noortgate, López-López, Marín-Martínez, & Sánchez-Meca, 2013). A three-level random effects model accounts for three sources of variance: variance between studies, variance between effect sizes from the same study, and sampling variance (Hox, 2002; Van den Noortgate et al., 2013). The advantage of the three-level approach is that effect sizes derived from the same study can be included and, since all available effect sizes can be modeled, this results in maximum information and statistical power. In addition, by using the three-level approach, differences in outcomes among studies can be examined (i.e., between-study heterogeneity) and differences in outcomes within studies (i.e., within-study heterogeneity). We used a likelihood ratio test to test for between-study and within-study heterogeneity (Raudenbush & Bryk, 2002). If there was evidence for heterogeneity in effect sizes, moderator analyses were conducted by extending the model with study and effect size characteristics. For models including moderators, an omnibus test of the fixed-model parameters was conducted, which tests the null hypothesis that the group mean effect sizes are equal. To control for Type I error rates, the Knapp and Hartung (2003) adjustment was applied. Consequently, test statistics of the fixed-model parameters were based on a *t*-distribution and the omnibus test statistic was based on a *F*-distribution.

Furthermore, in addition to the overall analysis, we conducted separate meta-analyses for the three different disorder categories (i.e., internalizing, externalizing, and comorbid disorders). The analyses were carried out with the metafor package (Viechtbauer, 2010) for the R environment (Version 3.1.0; R Development Core Team, 2013), using guidelines formulated by Assink and Wibbelink (2016) for modeling a three-level random effects model as described by Van den Noortgate et al. (2013). Parameters were estimated using the restricted maximum likelihood procedure.

2.4. File drawer problem

Studies with significant results are more likely to be published than studies with non-significant results (Dickersin, 2005). In a meta-analysis, this could lead to an overestimation of the true effect size (Borenstein, Hedges, Higgins, & Rothstein, 2009). This type of bias is also known as the file drawer problem (Rosenthal, 1995). A method to test the file drawer problem is by funnel plot investigation. The funnel plot was created by plotting the distribution of each individual study's effect size on the horizontal axis against its precision (i.e., the reciprocal of the standard error on the vertical axis). If publication bias is present, the funnel plot is asymmetrical (Torgerson, 2006). In the present study, Egger's test (Egger, Smith, Schneider, & Minder, 1997) was applied to test for asymmetric funnel plots. When this test was statistically significant, sensitivity analyses were conducted by performing the trim and fill method, which corrects for asymmetric plots by imputing missing effect sizes (Duval & Tweedie, 2000a, 2000b). This method is implemented in the metafor package (Viechtbauer, 2010). It is important to note that we should realize that imputing non-existing effect sizes into a meta-analysis is controversial (Sutton, Duval, Tweedie, Abrams, & Jones, 2000) and that the adjusted effect sizes produced by the trim and fill analyses should not be regarded as true effect sizes.

3. Results

The present meta-analysis included 20 manuscripts, reporting on 17 independent studies. In total, the studies produced 263 effect sizes, each reflecting the association between a mental disorder and recidivism. The studies reported in total on $N = 5737$ juveniles of whom $n = 1186$ had a mental disorder and $n = 4551$ had no mental disorder. Sample sizes ranged from 21 (Vermeiren, De Clippele, & Deboutte, 2000) to 1137 participants (Veysey & Hamilton, 2007). The mean age of the youths was $M = 15.8$ years and ranged from 5 to 19 years. The data included samples of only females (5%), only males (27%), or both (68%). Table 1 presents an overview of all studies included in the meta-analysis.

Table 1
Studies included in the meta-analysis.

Study	Year	Disorder	*N*	*n* Disorder group	*n* Non-disorder group	Mean age (in years)	White %	Control group[a]	Recidivism type
Cohn et al.	2012	ADHD, ODD/CD,ADHD + ODD/CD	111	13	98	10.3	57	Non-externalizing disorder	Reoffense[b]
Colins et al.	2011	AD, ADHD, CD, depression, ODD, SUD	117	77	40	16.0	77	Non-disorder	Rearrest
Colins et al.	2012	ADHD, early-onset CD, late-onset CD	59	22	37	16.1	–	Non-externalizing disorder	Rearrest
Gordon & Moore	2005	ADHD	453	92	361	16.3	44	No or other disorder	Rearrest, reconviction
Hoeve et al.[c]	2013	Internalizing disorder, DBD, SUD, DBD + SUD, DBD + internalizing disorder, SUD + internalizing disorder, DBD + SUD + internalizing disorder	211	22	189	18.0	37	Non-disorder	Rearrest
Hoeve et al.[d]	2013	Internalizing disorder, DBD, SUD, DBD + SUD, DBD + internalizing disorder, SUD + internalizing disorder, DBD + SUD + internalizing disorder	424	32	392	15.2	31	Non-disorder	Rearrest
Indig et al.	2014	SUD, ADHD + ODD/CD	143	101	42	17.0	51	Non-disorder	Reincarceration
Mallett et al.	2013	AD, ADHD, CD, depression, ODD, PTSD, SUD	433	40	393	15.2	36	No or other disorder	Reincarceration
McReynolds et al.	2010	AD, AfD, DBD, SUD, AD + AfD, AfD + SUD, AD + SUD, DBD + AD, DBD + AfD, DBD + SUD	588	97	491	14.6	20	Non-disorder	Rearrest
Mulvey	2013	Depression, PTSD, SUD, Depression + SUD, PTSD + SUD	809	87	722	16.0	20	No or other disorder	Reoffense
Ramaswamy & Freudenberg	2010	SUD	323	63	260	18.0	–	No or other disorder	Rearrest
Reich	2014	AD, ADHD, CD, depression, ODD, PTSD, SUD	459	81	378	14.5	–	Non-disorder	Rearrest
Rowe	2002	Early-onset CD, late-onset CD, ADHD + CD	109	78	31	15.4	–	Non-externalizing disorder	Rearrest, reconviction
Satterfield & Schell	1997	ADHD	52	41	11	14.3	100	No or other disorder	Rearrest
Tolou-Shams et al.	2014	AD, ADHD, CD, DBD, MD, PTSD, ODD, SUD	89	38	51	15.0	64	Non-disorder	Reincarceration
Vermeiren et al.	2000	ADHD, CD, depression, early-onset CD, PTSD, SUD, ADHD + CD, PTSD + CD, SUD + CD	20	11	9	16.0	54	Non-disorder	Reoffense
Vermeiren et al.	2002	AD, ADHD, CD, depression, ODD, SUD	29	13	16	16.0	56	Non-disorder	Reoffense
Veysey & Hamilton	2007	ADHD, DBD, depression, SUD	1137	219	918	15.5	28	No or other disorder	Rearrest
Wierson & Forehand	1995	ADHD, CD, depression, SUD	37	13	24	15.0	50	No or other disorder	Reconviction
Wilson et al.	2001	SUD	134	46	88	15.9	43	No or other disorder	Rearrest

Note. *N* = mean number of participants; *n* Disorder group = mean number of participants with a disorder; n Non-disorder group = mean number of participants without a disorder; White % = percentage of Caucasian participants; AD = anxiety disorder; ADHD = attention-deficit/hyperactivity disorder; AfD = affective disorder; CD = conduct disorder; DBD = disruptive behavior disorder; MD = mood disorder; ODD = oppositional defiant disorder; PTSD = posttraumatic stress disorder; SUD = substance use disorder.

[a] The non-disorder group contained participants without the most common internalizing and externalizing disorders, the non-externalizing disorder group contained participants without at least an externalizing disorder, and the no or other disorder group contained participants without at least the corresponding disorder.

[b] Recidivism rates were based on self-report or self-report and parent-report.

[c] Hoeve, McReynolds, & Wasserman.

[d] Hoeve, McReynolds, Wasserman, & McMillan.

3.1. Central tendency

The overall mean effect size of the association between mental disorder and recidivism was $d = 0.358$, $p = 0.002$ ($k = 263$ effect sizes), indicating that youths with a mental disorder were more likely to recidivate than non-disordered youths. The effect size was small to moderate, according to rules of thumb formulated by Cohen (1992), with $d = 0.2$, 0.5, and 0.8 indicating small, medium, and large effect sizes. In addition, the effect size corresponds to a difference in recidivism rates of 18% between youths with a mental disorder compared to non-disordered youths, based on the formula of Rosenthal and Rubin (1982). Next, for each disorder (category) we estimated the mean effect size based on empty (intercept-only) three-level models. Table 2 presents an overview of the mean effect sizes of the associations between recidivism and disorders and recidivism and disorder categories. The overall mean effect size of internalizing disorder was non-significant, $d = 0.016$, $p = 0.877$, suggesting that youths with an internalizing disorder did not have a higher risk for recidivism compared to non-disordered youths. The mean effect sizes of the various internalizing disorders were also non-significant. The overall mean effect size of externalizing disorder was significant and small to moderate, $d = 0.415$, $p < 0.001$. This indicates that youths with an externalizing disorder had higher recidivism rates compared to non-disordered youths. More specific, this effect size corresponds to a difference in recidivism rates of 20%. The mean effect sizes of the various externalizing disorders were significant or marginally significant (early-onset CD), except for ODD. The mean effect sizes ranged in strength from small ($d = 0.185$; SUD) to large ($d = 0.948$; early-onset CD), ODD disregarded. Finally, the overall mean effect size of comorbid disorder was significant and small to moderate, $d = 0.366$, $p < 0.001$, corresponding to a difference in recidivism rates of 18%. This suggests that youths with a comorbid disorder were at higher risk for recidivism than youths without a disorder. The mean effect sizes of both types of comorbid disorders, SUD or DBD in combination with an internalizing disorder, were significant and small to moderate, $d = 0.353$, $p < 0.001$ and $d = 0.414$, $p < 0.001$, respectively.

We examined possible publication bias by testing funnel plot asymmetry for studies on each disorder category. The standard normal deviate was regressed against the estimate's precision (Egger et al., 1997). The intercepts significantly deviated from zero for studies on internalizing disorders, $t(70) = 2.85$, $p = 0.006$, and studies on externalizing disorders, $t(138) = 3.05$, $p = 0.003$. The intercept did not significantly deviate from zero for studies on comorbid disorders, $t(49) = 1.76$, $p = 0.085$. This suggests that there was indication for publication bias for studies on internalizing and externalizing disorders. Publication bias has been taken into account by means of a trim and fill procedure (Duval & Tweedie, 2000a,b). Trim and fill analysis showed an overall mean effect size for internalizing disorders of $d = -0.118$, $p = 0.248$, based on 14 independent studies and 93 effect sizes. The overall mean effect size of externalizing disorders, after trim and fill correction, was $d = 0.158$, $p = 0.313$, based on 21 independent studies and 158 effect sizes.

3.2. Heterogeneity in effect sizes

The three-level approach allowed assessing the heterogeneity between studies (i.e., between-study heterogeneity), as well as heterogeneity between effect sizes from the same study (i.e., within-study heterogeneity). We will focus on the heterogeneity in effect sizes for each disorder category (i.e., internalizing, externalizing, and comorbid disorders). For internalizing disorders, we found significant variation between studies, ($\sigma^2 = 0.084$, $\chi^2(1) = 17.51$, $p < 0.001$), as well as between effect sizes within studies ($\sigma^2 = 0.026$, $\chi^2(1) = 29.85$, $p < 0.001$). For externalizing disorders, we also found significant variation between studies, ($\sigma^2 = 0.173$, $\chi^2(1) = 91.77$, $p < 0.001$), as well as between effect sizes within studies, ($\sigma^2 = 0.093$, $\chi^2(1) = 187.24$, $p < 0.001$). Finally, for comorbid disorders, we found no significant variation between studies, ($\sigma^2 = 0.000$, $\chi^2(1) = 0.00$, $p = 1.000$), and no significant variation between effect sizes from the same study, ($\sigma^2 = 0.001$, $\chi^2(1) = 0.00$, $p = 0.970$). To conclude, for internalizing and externalizing disorders, significant variation was found between studies and between effect sizes within studies. However, for comorbid disorders we did not find significant variation. Therefore, moderator analyses were only conducted for internalizing and externalizing disorders.

Table 2
Mean effect sizes for each disorder category and specific disorder.

Disorder (category)	# studies	# ES	Mean *d* (SE)	95% CI	*t*-Statistic	*p*-Value	Variance level 2[a]	Variance level 3[b]
Mental disorder	17	263	0.358 (0.113)	0.135; 0.581	3.160	0.002**	0.064***	0.187***
Internalizing disorder	10	72	0.016 (0.106)	−0.195; 0.228	0.155	0.877	0.026***	0.084***
Mood disorder	9	34	−0.050 (0.113)	−0.279; 0.180	−0.440	0.663	0.041***	0.063**
Depression	7	31	−0.030 (0.139)	−0.314; 0.253	−0.219	0.828	0.043***	0.079**
Anxiety disorder	7	35	0.062 (0.127)	−0.195; 0.320	0.493	0.625	0.000	0.082*
PTSD	5	24	0.130 (0.145)	−0.169; 0.430	0.899	0.378	0.000	0.051
Externalizing disorder	17	140	0.415 (0.113)	0.192; 0.638	3.676	<0.001***	0.093***	0.173***
SUD	13	49	0.185 (0.085)	0.015; 0.356	2.189	0.033*	0.042***	0.050***
ADHD	10	21	0.376 (0.170)	0.021; 0.732	2.208	0.039*	0.066	0.198
DBD	11	53	0.406 (0.137)	0.131; 0.680	2.961	0.005**	0.107***	0.137***
CD	7	37	0.549 (0.210)	0.122; 0.975	2.610	0.013*	0.109***	0.212***
Early-onset CD	3	14	0.948 (0.461)	−0.049; 1.944	2.055	0.061+	0.057	0.539**
Late-onset CD	2	13	0.467 (0.181)	0.074; 0.861	2.586	0.024*	0.000	0.053
ODD	5	8	−0.084 (0.142)	−0.420; 0.251	−0.595	0.571	0.116**	0.000
Comorbid disorder[c]	4	51	0.366 (0.036)	0.294; 0.438	10.210	<0.001***	0.001	0.000
SUD + internalizing disorder	3	44	0.353 (0.046)	0.260; 0.446	7.677	<0.001***	0.008	0.000
DBD + internalizing disorder	3	5	0.414 (0.087)	0.173; 0.655	4.765	0.009**	0.000	0.000

Note. # studies = number of independent studies; # ES = number of effect sizes; Mean *d* = mean effect size; CI = confidence interval; ADHD = attention-deficit/hyperactivity disorder; CD = conduct disorder; DBD = disruptive behavior disorder; ODD = oppositional defiant disorder; PTSD = posttraumatic stress disorder; SUD = substance use disorder.

[a] Variance between the effect sizes from the same study.

[b] Variance between studies.

[c] A comorbid disorder is defined as a combination of an internalizing and externalizing disorder.

+ <0.01;

* $p < 0.05$;

** $p < 0.01$;

*** $p < 0.001$.

3.3. Moderator analyses

Moderator analyses were conducted to identify possible predictor, outcome, sample, and methodological characteristics that could moderate the associations between recidivism and internalizing and externalizing disorders. Table 3 presents the results of the moderators of which the omnibus test statistic was significant ($p < 0.05$), the results are presented for internalizing and externalizing disorders separately. Tables including the results of all moderators for internalizing and externalizing disorders can be obtained from the authors.

3.3.1. Internalizing disorder

From Table 3, it can be derived that none of the predictor characteristics moderated the association between internalizing disorders and recidivism. We found that several outcome characteristics affected the relation between internalizing disorders and recidivism. First, type of recidivism significantly moderated the effect size. A significant positive effect size was found if reoffense was assessed, whereas a significant negative effect size was found if reincarceration was assessed. No significant relation between internalizing disorders and recidivism was found when reconviction or rearrest was measured. In addition, the effect size for reoffense was significantly larger compared to the effect size for rearrest. Second, we found a significant negative association between internalizing disorders and recidivism when covert delinquency was measured, whereas no significant relation was found for general or overt delinquency. The effect size for covert delinquency was significantly smaller than the effect size for general delinquency. Furthermore, number of offenses was a significant moderator; larger effect sizes were found if the number of committed offenses increased.

The effect size for the relation between internalizing disorders and recidivism was affected by one sample characteristic. Only for females, we found a significant negative association between internalizing disorders and recidivism. In addition, we found that the effect sizes for male samples and mixed gender samples were significantly larger than the effect sizes for female samples. Finally, one methodological characteristic, sample size, significantly moderated the association between internalizing disorders and recidivism. Larger effect sizes were found when the sample size increased.

3.3.2. Externalizing disorder

Table 3 shows that one predictor characteristic moderated the association between externalizing disorders and recidivism. Significant effect sizes were found when parents, the subject-and-parents, or other informants were used as the informant for mental health assessments, although no significant effect size was found when subjects-only were used as the informant. Significantly larger effect sizes were found for parents compared to subjects.

The effect size for the relation between externalizing disorders and recidivism was moderated by three outcome characteristics: recidivism type, delinquency type, and number of offenses. First, significant effect sizes were found if reincarceration or reoffense was measured, but not if rearrest or reconviction were measured. In addition, larger effect sizes were found for reoffense compared to rearrest. Second, we only found a significant association between externalizing disorders and recidivism when general delinquency was assessed, whereas no significant association was found when overt or covert delinquency was assessed. The effect sizes for overt and covert delinquency were significantly smaller than the effect size for general delinquency. Finally, the number of offenses was a significant moderator; larger effect sizes were found if the number of committed offenses increased.

Furthermore, we found that the association between externalizing disorders and recidivism was moderated by one sample characteristic, control group, and one methodological characteristic, publication year. We found only a non-significant relation between externalizing disorders and recidivism for studies in which the control group comprised youths without at least the corresponding disorder. In addition, effect sizes retrieved from studies in which the control group comprised youths without at least an externalizing disorder were significantly larger than effect sizes retrieved from studies in which the control group comprised non-disordered youths (i.e., youths without the most common internalizing and externalizing disorders). Finally, significantly smaller effect sizes were found for more recently published studies.

3.3.3. Multiple moderator analyses

Analyses with multiple moderators were conducted to examine the unique influence of each significant moderator. Given that the number of offenses was not often reported in studies (four studies and 12 effect sizes for internalizing disorders and eight studies and 80 effect sizes for externalizing disorders), this moderator was excluded. The results for the multiple moderator model for internalizing disorders are presented in Table 4. We found significant effects for gender; male samples and mixed gender samples were associated with larger effect sizes than samples consisting of females only. Furthermore, we found significant negative effects for reincarceration and covert delinquency. Table 5 presents the results for the multiple moderator model for externalizing disorders. We found a significant positive effect for reoffense and significant negative effects for overt and covert delinquency.

4. Discussion

We examined the association between mental disorders and recidivism among delinquent juveniles, focusing on disorder categories (i.e., internalizing disorder, externalizing disorder, and comorbid disorder) and specific mental disorders. The first aim of this study was to estimate the magnitude of the associations between recidivism and the most common mental disorders in adolescence, and which of these disorders would have the strongest relation with criminal offense recidivism. The second aim was to examine potential moderator effects of predictor, outcome, sample, and methodological characteristics. We found a significant association between mental disorders in general and recidivism. The associations between recidivism and externalizing and comorbid disorders were generally significant (except for ODD), whereas no significant association was found between recidivism and internalizing disorders. The magnitude of the effect sizes was small to moderate, according to rules of thumb formulated by Cohen (1992). It should be noted that even small effect sizes can have substantively important consequences. For example, the overall effect size of $d = 0.358$ for the association between mental disorder and recidivism, corresponds to a difference in recidivism rates of 18% between youths with a mental disorder compared to non-disordered youths, based on the formula of Rosenthal and Rubin (1982), which is a substantive difference.

4.1. Externalizing disorders

Externalizing disorders were found to be related to recidivism. This is not surprising, since externalizing disorders can be defined as mental disorders with primary symptoms that include outward directed behaviors (Thackery & Harris, 2003). Externalizing behaviors are characterized by acting out behaviors, such as aggression and destructive behavior, and are associated with a wide spectrum of negative outcomes, including conflictual parent-child interactions, academic underachievement, and difficulties in peer relationships (e.g., Hinshaw, 1992; Mash & Barkley, 2003; Milich & Landau, 1988; Polier et al., 2012). Research has demonstrated that these are risk factors for future delinquent behavior (Dodge et al., 2003; Mash & Barkley, 2003).

Examining specific externalizing disorders, we found that youths with ADHD or SUD were at higher risk for recidivism than non-disordered youths. Furthermore, we found that having an early-onset CD was strongly related to recidivism, whereas a late-onset CD was

Table 3
Results for the significant moderators for internalizing and externalizing disorders.

Moderator variables	# studies	# ES	β_0, mean d[a] (95% CI)	β_1 (95% CI)	Omnibus test	p-Value	Variance level 2[b]	Variance level 3[c]
Internalizing disorder								
Outcome characteristics								
Recidivism type					$F(3,28) = 3.721$	0.023*	0.089***	0.005
Rearrest (RC)	5	21	−0.052 (−0.227; 0.123)					
Reconviction	1	3	0.172 (−0.240; 0.585)	0.224 (−0.224; 0.673)				
Reincarceration	2	4	−0.468 (−0.929; −0.006)*	−0.415 (−0.909; 0.078)				
Reoffense[d]	1	4	0.806 (0.125; 1.487)*	0.858 (0.155; 1.561)*				
Delinquency type					$F(2,69) = 5.056$	0.009**	0.022***	0.087***
General (RC)	10	46	0.055 (−0.160; 0.271)					
Overt	2	22	0.041 (−0.223; 0.305)	−0.014 (−0.188; 0.159)				
Covert	1	4	−0.605 (−1.051; −0.160)**	−0.661 (−1.079; −0.243)**				
Number of offenses	4	12	−0.172 (−0.478; 0.134)	0.587 (0.178; 0.996)***	$F(1,10) = 10.215$	0.010***	0.009	0.043
Sample characteristics								
Sex of subject					$F(2,69) = 29.080$	<0.001***	0.000	0.067***
Female (RC)	1	1	−1.012 (−1.415;−0.610)***					
Male	4	12	−0.072 (−0.415; 0.272)	0.941 (0.689; 1.193)***				
Both	7	59	0.108 (−0.108; 0.323)	1.120 (0.668; 1.572)***				
Methodological characteristics								
Sample size	10	72	0.074 (−0.223; 0.371)	661 (467; 856)[e],***	$F(1,70) = 45.964$	<0.001***	0.000	0.192***
Externalizing disorder								
Predictor characteristics								
Informant					$F(3,136) = 3.121$	0.028*	0.091***	0.136***
Subject (RC)	10	72	0.215 (−0.037; 0.467)					
Parent	2	18	0.499 (0.161; 0.838)**	0.284 (0.022; 0.547)*				
Subject and parent	2	15	0.753 (0.180; 1.325)*	0.538 (−0.088; 1.163)				
Other	4	35	0.700 (0.272; 1.127)**	0.485 (−0.012; 0.981)				
Outcome characteristics								
Recidivism type					$F(3,110) = 3.100$	0.030*	0.126***	0.109***
Rearrest (RC)	9	63	0.203 (−0.069; 0.474)					
Reconviction	1	3	0.446 (−0.332; 1.224)	0.243 (−0.581; 1.067)				
Reincarceration	5	38	0.450 (0.090; 0.811)*	0.247 (−0.192; 0.687)				
Reoffense[d]	1	10	1.412 (0.660; 2.164)***	1.209 (0.409; 2.009)**				
Delinquency type					$F(2,137) = 21.516$	<0.001***	0.051***	0.177***
General (RC)	17	91	0.460 (0.240; 0.680)***					
Overt	3	31	0.109 (−0.146; 0.363)	−0.352 (−0.495; −0.208)***				
Covert	1	18	−0.218 (−0.524; 0.088)	−0.678 (−0.903; −0.453)***				
Number of offenses	8	80	0.421 (0.071; 0.772)*	0.217 (0.114; 0.320)***	$F(1,78) = 17.634$	<0.001***	0.114***	0.197***
Sample characteristics								
Control group[f]					$F(2,137) = 3.379$	0.037*	0.091***	0.141***
Non-disorder (RC)	6	54	0.438 (0.146; 0.730)**					
Non-externalizing disorder	3	45	0.739 (0.404; 1.073)***	0.301 (0.045; 0.556)*				
No or other disorder	9	41	0.287 (−0.011; 0.585)	−0.151 (−0.568; 0.266)				
Methodological characteristics								
Publication year	17	140	0.414 (0.214; 0.613)***	−0.038 (−0.073; −0.004)*	$F(1,138) = 4.799$	0.030*	0.094***	0.132***

Note. # studies = number of independent studies; # ES = number of effect sizes; mean d = mean effect size; CI = confidence interval.

[a] For continuous predictors, the mean effect size indicates the mean effect size of a participant with an average value on the corresponding predictor.

[b] Variance between the effect sizes from the same study.

[c] Variance between studies.

[d] Studies with recidivism rates based on self-report or self-report and parent-report were not included to increase the comparability of the recidivism types.

[e] 0.000 removed in table.

[f] The non-disorder group contained participants without the most common internalizing and externalizing disorders, the non-externalizing disorder group contained participants without at least an externalizing disorder, and the no or other disorder group contained participants without at least the corresponding disorder.

* $p < 0.05$;

** $p < 0.01$;

*** $p < 0.001$.

Table 4
Results for the multiple moderator model for internalizing disorders.

Moderator variables	β (SE)	95% CI	*t*-Statistic	*p*-Value
Intercept	−0.957 (0.139)	−1.244; −0.670	−6.903	<0.001***
Methodological characteristics				
Sample size	−210 (134)[a]	−488; 067[a]	−1.570	0.130
Sample characteristics				
Sex of subject				
Both (vs. female)	1.055 (0.152)	0.741; 1.370	6.934	<0.001***
Male (vs. female)	1.199 (0.188)	0.810; 1.588	6.375	<0.001***
Outcome characteristics				
Recidivism type				
Reconviction (vs. rearrest)	0.072 (0.137)	−0.212; 0.355	0.523	0.606
Reincarceration (vs. rearrest)	−0.704 (0.180)	−1.077; −0.331	−3.901	<0.001***
Reoffense (vs. rearrest)	0.473 (0.321)	−0.191; 1.137	1.474	0.154
Delinquency type				
Overt (vs. general)	−0.399 (0.256)	−0.929; 0.132	−1.555	0.134
Covert (vs. general)	−0.852 (0.222)	−1.310; −0.393	−3.840	<0.001***
Omnibus test	$F(8, 23) = 12.722$***			
Variance level 2[b]	0.000			
Variance level 3[c,***]	0.009			
# ES	32			

Note. CI = confidence interval; # ES = umber of effect sizes.
[a] 0.000 removed in table.
[b] Variance between the effect sizes from the same study.
[c] Variance between studies.
*** $p < 0.001$.

moderately related to recidivism. These results are in line with the developmental theory of Moffitt (1993). Early-onset CD is considered to be the most serious form of CD, with conduct problems emerging before the age of 10 years and a rather stable pattern of antisocial behavior. Early-onset CD is related to more negative individual (e.g., higher rates of psychopathology, neurocognitive problems) and environmental (e.g., inadequate parenting, poverty) characteristics (Moffitt, Caspi, Harrington, & Milne, 2002; Ruchkin, Koposov, Vermeiren, & Schwab-Stone, 2003).

Surprisingly, ODD was not related to recidivism. Multiple studies examined the symptoms of ODD in a two- or three-factor model (e.g., Althoff, Kuny-Slock, Verhulst, Hudziak, & Ende, 2014; Burke, Hipwell, & Loeber, 2010; Stringaris & Goodman, 2009). There are some small disagreements, but overall, studies agreed on the separation of symptoms indexing an irritable dimension from symptoms indicating a headstrong and/or hurtful dimension (Althoff et al., 2014). Research has found that the different dimensions of ODD are predictive of different types of psychopathology, whereby the headstrong or hurtful dimensions were

Table 5
Results for the multiple moderator model for externalizing disorders.

Moderator variables	β (SE)	95% CI	*t*-Statistic	*p*-Value
Intercept	0.364 (0.117)	0.132; 0.597	3.112	0.002**
Methodological characteristics				
Publication year	−0.022 (0.016)	−0.053; 0.009	−1.404	0.163
Sample characteristics				
Control group[a]				
Non-externalizing disorder (vs. non-disorder)	0.485 (0.376)	−0.260; 1.231	1.291	0.200
No or other disorder (vs. non-disorder)	−0.311 (0.185)	−0.677; 0.055	−1.683	0.095
Predictor characteristics				
Informant				
Parent (vs. subject)	−0.073 (0.392)	−0.852; 0.705	−0.187	0.852
Subject and parent (vs. subject)	−0.166 (0.304)	−0.770; 0.438	−0.546	0.586
Other (vs. subject)	0.289 (0.185)	−0.078; 0.657	1.563	0.121
Outcome characteristics				
Recidivism type				
Reconviction (vs. rearrest)	0.114 (0.228)	−0.339; 0.567	0.498	0.620
Reincarceration (vs. rearrest)	0.015 (0.199)	−0.380; 0.410	0.075	0.940
Reoffense (vs. rearrest)	1.042 (0.418)	0.212; 1.872	2.490	0.014*
Delinquency type				
Overt (vs. general)	−0.493 (0.110)	−0.712; −0.274	−4.466	<0.001***
Covert (vs. general)	−0.730 (0.127)	−0.982; −0.478	−5.744	<0.001***
Omnibus test	$F(11, 102) = 10.487$***			
Variance level 2[b]	0.075***			
Variance level 3[c]	0.013			
# ES	114			

Note. CI = confidence interval; # ES = number of effect sizes.
[a] The non-disorder group contained participants without the most common internalizing and externalizing disorders, the non-externalizing disorder group contained participants without at least an externalizing disorder, and the no or other disorder group contained participants without at least the corresponding disorder.
[b] Variance between the effect sizes from the same study.
[c] Variance between studies.
* $p < 0.05$;
** $p < 0.01$;
*** $p < 0.001$.

associated with delinquency and disruptive behaviors and irritability with internalizing symptoms (e.g., Althoff et al., 2014; Stringaris & Goodman, 2009). Given that several symptoms of ODD are not predictive of delinquency, this might explain why we did not find a relation between ODD and recidivism.

4.2. Internalizing disorders with or without an externalizing disorder

We found that youths with an internalizing disorder were in general not more or less at risk for recidivism than non-disordered youths. This is in contrast with the findings of the meta-analytic study of Cottle et al. (2001). They found that nonsevere pathology, such as distress and anxiety symptoms, was positively associated with recidivism. However, Cottle et al. (2001) used different inclusion criteria and included only seven effect sizes (from seven studies). This might explain the discrepancy.

Although internalizing disorders were in general not related to recidivism, there were some indications that internalizing disorders may have a possible buffering effect on recidivism in specific cases. We found that youths with an internalizing disorder were at lower risk for a subsequent incarceration or covert crime than non-disordered youths, which indicates a protective effect of internalizing disorders on reincarceration and future covert delinquency. Furthermore, females with an internalizing disorder were at lower risk for recidivism than females without a mental disorder, indicating a protective effect of internalizing disorders on recidivism in females. These findings are in line with several studies suggesting possible buffering effects of internalizing disorders on future delinquency (e.g., Vermeiren et al., 2002; Zara & Farrington, 2009).

Further, we found that youths with a combination of an internalizing and externalizing disorder (i.e., comorbid disorder) were at higher risk for recidivism than non-disordered youths. Apparently, the combination with an externalizing disorder increases the risk for recidivism. Research has suggested that co-occurring disorders may interact and produce more negative developmental outcomes compared to a single mental disorder (Hoeve, McReynolds, & Wasserman, 2013; McReynolds et al., 2010; Riggs, Baker, Mikulich, Young, & Crowley, 1995). However, we did not find more negative developmental outcomes for youths with a combination of an internalizing and externalizing disorder compared to youths with only an externalizing disorder. In addition, these results also indicate that internalizing disorders have no protective effect on recidivism, otherwise we would have found smaller effect sizes for comorbid disorders compared to externalizing disorders.

4.3. Moderator effects

We were interested in the moderating effects of definition and assessment of recidivism, length of the follow-up period, assessment of mental disorders, and gender on the relation between mental disorders and recidivism. No significant variation was found between studies and among effect sizes within studies of studies on comorbid disorders. Therefore, moderator analyses were only conducted for studies on internalizing and externalizing disorders. We found that the associations between recidivism and internalizing and externalizing disorders were moderated by type of recidivism and type of delinquency. Youths with an internalizing disorder were at lower risk for a subsequent incarceration than non-disordered youths, whereas we did not find associations between internalizing disorders and rearrest, reconviction, and reoffense. Cottle et al. (2001) noticed that the comparability of the different types of recidivism is unknown. Based on the present findings, we conclude that recidivism type may have a moderating effect on the associations between recidivism and internalizing and externalizing disorders.

We found that externalizing disorders were not related to recidivism when overt or covert delinquency were measured. In addition, we found that internalizing disorders were negatively related to recidivism when covert delinquency was measured, whereas no association was found between internalizing disorders and recidivism when general or overt delinquency was measured. In the study of Mulder, Vermunt, Brand, Bullens, and Van Marle (2012), juvenile offenders were classified into distinct subgroups on the basis of their past offending behavior (serious violent offenders, property offenders, violent property offenders, and sex offenders). They found that these groups were characterized by different risk factors, suggesting that risk factors related to recidivism may differ for the type of delinquency measured.

The length of the follow-period had no moderating effect on the associations between recidivism and internalizing and externalizing disorders. This was not as expected, since we expected that the associations between mental disorders and recidivism would differ with longer time periods between measurements (Loeber & Farrington, 2012; Loeber, Hoeve, Farrington, Slot, & Van der Laan, 2012).

Furthermore, no moderating effects were found for mental health assessment source and informant. Research has assumed that parent-reports of mental health (with or without the subject) are more reliable compared to adolescent self-reports of mental health (e.g., Breuk et al., 2007; Jensen et al., 1999). However, we found no evidence for this assumption.

Finally, we found a moderating effect of gender on the relation between internalizing disorder and recidivism, whereas no moderating effect was found on the relation between externalizing disorder and recidivism. Females with an internalizing disorder were at lower risk for recidivism than females without a mental disorder, suggesting that having an internalizing disorder has a protective effect on future delinquency in females. Previous research has produced mixed results regarding gender differences in risk factors for delinquency. Some studies found gender differences (e.g., Mallett et al., 2012; McReynolds et al., 2010; Wiesner, 2003), whereas other studies did not find gender differences (e.g., Hodgins & Janson, 2002; Johansson & Kempf-Leonard, 2009; Sullivan, Veysey, & Dorangrichia, 2003). Given that only few studies examined the association between mental disorders and recidivism separately for males and females, future research should examine this issue in order to draw empirically well-supported conclusions.

4.4. Limitations and gaps in research

Several limitations of the present meta-analysis should be mentioned. First, the analyses revealed that some publication bias was present for internalizing and externalizing disorders. Publication bias has been taken into account by means of a trim and fill procedure (Duval & Tweedie, 2000a,b) and revealed different effect sizes, suggesting that the true effect sizes for the relations between internalizing and externalizing disorders and recidivism may be different from the effect sizes that were estimated in the present study. It is important to note that the trim and fill approach should only be seen as a method for sensitivity analysis rather than actually finding the values of missing effect sizes (Duval & Tweedie, 2000b). Sutton et al. (2000) suggested that we should not rely on results of imputed studies for the final conclusions. However, potential publication bias should be taken into account and, therefore, the effect sizes for internalizing and externalizing disorders should be interpreted with some caution.

Second, we have only focused on studies analyzing bivariate associations. Studies reporting multivariate results could not be included in this meta-analysis, because the effect sizes derived from multivariate analyses depend on other assessed factors, limiting their comparability between studies (Lipsey & Wilson, 2001). Also, we included prospective studies only, measuring mental disorder before recidivism, and included studies on delinquents, and thus adjusting for previous delinquency. Nevertheless, the present meta-analysis does not provide a complete answer to the question about to what extent

mental disorder precedes or is a consequence of delinquency. We had no information on the lifetime course of disorder and delinquency patterns. If future studies examine mental disorder and delinquency longitudinally, measuring both mental disorder and delinquency at least at two different time points, the directionality of the effect could be examined in a meta-analysis.

Furthermore, several limitations in the present study are a consequence of shortcomings in current scientific knowledge. First, in most studies, recidivism rates of only the most common mental disorders were reported. Information on other disorders, such as eating disorders, a common disorder among females (Wilson, Becker, & Heffernan, 2003), is unknown. In addition, although the presence of multiple disorders is more often the rule than the exception (Shufelt & Cocozza, 2006; Ulzen & Hamilton, 1998), studies often reported recidivism rates of participants who met criteria for one mental disorder. For future research, it would be interesting to investigate the influence of less common mental disorders and various combinations of disorders on the risk for recidivism.

Second, the control groups (i.e., non-disordered youths) of the included studies were heterogeneous. We aimed to compare disordered youths with youths without any mental disorder. However, few studies reported recidivism rates of youths without the most common internalizing and externalizing disorders. Among the other studies, recidivism rates were only known for youths without an externalizing disorder or without a specific internalizing or externalizing disorder. Consequently, these control groups may have also included some youths with a disorder. We have examined the possible impact of the different compositions of the control group and we found that the composition of the control group had no moderating effect on the relations between recidivism and internalizing and externalizing disorders.

Finally, data of several moderators were based on a limited number of studies and effect sizes. For example, moderator analyses revealed that youths with an externalizing disorder had no higher recidivism rates compared to non-disordered youths when focusing on covert or overt delinquency. However, only one study measured covert delinquency and three studies measured overt delinquency. Consequently, these findings should be interpreted with caution.

4.5. Implications for theory and practice

The present study provided more insight into the relation between mental disorders and delinquency, more specific, recidivism. Several theories have suggested that externalizing disorders are related to future delinquent behavior, for example through their interference with the formation of positive relationships with peers and parents (e.g., Brook et al., 1996; Burke et al., 2008). The present study provides evidence for the association between externalizing disorders, with or without an internalizing disorder, and recidivism. However, we found no convincing evidence for the hypothesized relation between internalizing disorders and (future) delinquency. Several models, such as the acting-out and failure model (Kofler et al., 2011; Wolff & Ollendick, 2006), assume that internalizing symptoms could lead to an increased risk for delinquency. This was not confirmed in the present meta-analysis. Other authors (e.g., Vermeiren et al., 2002; Zara & Farrington, 2009) suggested that internalizing disorders may have a protective effect on (future) delinquency. We did find some indications of a possible buffering effect of internalizing disorders on recidivism in females, when recidivism was defined as reincarceration, or when covert delinquency was measured. We therefore argue that models on the relation between internalizing disorders and (future) delinquency should be tailored to different subgroups (e.g., females) and different delinquency and recidivism types.

Besides implications for theory, the present meta-analysis has important implications for practice. The findings suggest that screening for mental disorders among delinquent juveniles not only contributes to the identification of treatment needs, but also to the identification of juveniles who are the most or least likely to engage in further delinquent behaviors. Risk assessment tools that examine the risk for recidivism should therefore include risk indicators that focus on mental disorders, in particular externalizing disorders, such as ADHD, CD, and SUD. The identification of juvenile's mental health status provides information that might be helpful to distinguish high-risk versus low-risk youths.

Furthermore, the results emphasize the importance of interventions focusing on mental disorders, especially since intervening might lead to a reduction in recidivism rates for youths with an externalizing disorder. Hoeve, McReynolds, and Wasserman (2014) investigated the influence of service referral on recidivism among delinquent juveniles. They concluded that youths with a SUD had lower recidivism risks when they received a service referral compared with substance disordered youths without a service referral. Cuellar, McReynolds, and Wasserman (2006) found that mental health diversion programs were effective in delaying or preventing recidivism among disordered youths. Based on the previous results, mental health service among delinquent juveniles seems to have a promising effect. However, service access among delinquent juveniles is generally low. In a study on incarcerated youths, Rogers, Zima, Powell, and Pumariega (2001) concluded that only 6% received a mental health service referral. In another study among youths referred to juvenile courts, only 3% was referred to a mental health service (Breda, 2003). This is striking, since a mean prevalence of any psychiatric disorder of almost 70% was found among detained male adolescents (Colins et al., 2010). To conclude, we argue that more attention should be paid to the screening for mental health problems, the referral to mental health services, and effective treatment of mental disorders. This could not only lead to an improvement for the individual youth, but it could also have a significant impact on society through the reduction of recidivism rates and, concomitant, the reduction of social and economic costs associated with delinquency.

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