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ABSTRACT

Objective: To synthesize evidence on the prevalence of mental disorders in adolescents in juvenile detention and correctional facilities, and examine sources of heterogeneity between studies.

Method: We searched electronic databases and relevant reference lists to identify surveys published from 1966 to October 2019 that reported on the prevalence of mental disorders in unselected populations of detained adolescents. We extracted data on the prevalence of a range of mental disorders (psychotic illnesses, major depression, attention-deficit/hyperactivity disorder [ADHD], conduct disorder, and posttraumatic stress disorder [PTSD]) along with predetermined study characteristics from the eligible studies. We report analyses separately for male and female adolescents, and synthesize findings using random-effects models. Potential sources of heterogeneity are examined by metaregression and subgroup analyses.

Results: We identified 47 studies from 19 countries on 28,033 male and 4,754 female adolescents. The mean age of adolescents assessed was 16 years (range 10-19 years). In male adolescents, 2.7% (95% confidence interval [CI] 2.0%-3.4%) had a diagnosis of psychotic illness, 10.1% (8.1%-12.2%) major depression, 17.3% (13.9%-20.7%) ADHD, 61.7% (55.4%-67.9%) conduct disorder, and 8.6% (6.4%-10.7%) PTSD. In female adolescents, 2.9% (2.4%-3.5%) had a psychotic illness, 25.8% (20.3%-31.3%) major depression, 17.5% (12.1%-22.9%) ADHD, 59.0% (44.9%-73.1%) conduct disorder, and 18.2% (13.1%-23.2%) PTSD. Metaregression found higher prevalences of ADHD and conduct disorder in newer investigations. Female adolescents had higher prevalences of major depression and PTSD than male adolescents.

Conclusion: Consideration should be given to reviewing whether healthcare services in juvenile detention can meet these levels of psychiatric morbidity.

Key words: detention, criminal justice, mental disorders, PTSD, systematic review
INTRODUCTION

Adolescents account for approximately 5% of the custodial population in Western countries and on any given day in the United States, 53,000 young people are detained in various correctional facilities. Psychiatric disorders are known to be prevalent in juvenile offenders. Furthermore, a number of studies indicate that psychiatric disorders in this population are linked to a wide range of negative outcomes including elevated reoffending risk, poor prognosis of mental health problems, high rates of substance misuse, likelihood to experience or perpetrate violence in intimate relationships and psychosocial difficulties in adulthood.

A previous systematic review and meta-analysis synthesized evidence until 2006 on the prevalence of mental disorders in detained adolescents. The findings highlighted considerable mental health needs. Since then, a significant body of new primary research has been published. However, more recent systematic reviews have been limited by their scope (e.g., by only including English-language reports or not searching the grey literature), a lack of quantitative methods (including heterogeneity analyses), and the use of inconsistent time frames for psychiatric diagnoses (e.g., in past month, past year, and lifetime). This synthesis presents an updated systematic review and meta-analysis on the prevalence of mental disorders in detained adolescents, and also considers PTSD, which has become increasingly researched in this population over the last decade. The findings should inform service provision, planning and future research.

METHOD

Protocol and registration

We conducted this systematic review following the Preferred Reporting Items for Systematic Review and Meta-Analyses and the Meta-analysis of Observational Studies in Epidemiology guidelines (see Table S1, available online). The search protocol was also registered with the PROSPERO International Prospective Register of Systematic Reviews (CRD42019117111).

Search strategy
We identified studies published between January 1966 and October 2019 reporting the prevalence of mental disorders in adolescents aged between 10 and 19 years in juvenile detention and correctional facilities. For the period January 1966 to May 2006, the methods were described in a previous review conducted by two of the authors (SF and NL). For this update, we searched electronically the following databases: EMBASE, PsycINFO, Medline, U.S. National Criminal Justice Reference System Abstract Database, Global Health and Google Scholar. Our search strategy featured terms related to adolescents (juvenile*, ado*, young*, youth*, boy*, or girl*) and custody (prison*, jail*, incarcerat*, custod*, imprison*, or detain*), which was identical to the previous review. For psychotic illnesses, major depression, ADHD and conduct disorder, new search dates ranged from December 2005 to October 2019. However, for PTSD, searches began in January 1980 to coincide with the addition of this disorder to the DSM-III. Reference lists were hand-searched. No language restriction was set, and non-English surveys were translated (see Figure 1).

Study eligibility

We included studies reporting diagnoses of psychotic illnesses, major depression, ADHD, conduct disorder and/or PTSD among adolescents in juvenile detention and correctional facilities based on clinical examination or interviews conducted with semi-structured diagnostic instruments. We defined adolescence from the age of 10 to 19 years, comparable with the previous review and consistent with research. We excluded studies which did not report the prevalence rates of mental disorders separately for male and female adolescents (with the exception of samples including <10% of girls), surveys featuring enriched or selected samples of juveniles in custody, and those that employed exclusively self-report instruments to diagnose individuals (but did include the DISC as it was typically administered in a semi-structured way). Furthermore, included studies reported current prevalence of psychotic illnesses, major depression, ADHD and PTSD, or lifetime prevalence of conduct disorder that adhered to international classifications (ICD and DSM). Thus, one study was partially excluded because the prevalences of psychotic illnesses, major depression and ADHD were reported for the past year rather than the past six months. Another reason to include PTSD was correspondence from the original review
that recommended it to expand the clinical scope.\textsuperscript{20} For psychosis, we excluded one small study\textsuperscript{21} ($n = 173$) due to being an extreme outlier (11.0%).

**Data extraction**

One reviewer (GB) extracted data from the newly identified studies according to the fixed protocol used in the previous review. In the case of any uncertainty in data extraction, RY and SF were consulted. Gender-specific information was collected in regards to prespecified characteristics: geographic location, year of interview, sampling method (consecutive admissions, total population, random, stratified random or some combination thereof), participation rate, number of interviewed adolescents, diagnostic instrument(s) and criteria (\textit{ICD} or \textit{DSM}), type of interviewer (psychiatrist versus other), proportion of individuals diagnosed with each disorder, mean age and age range, mean duration of incarceration at the interview, and proportion with violent offenses.\textsuperscript{8} Authors of primary studies were contacted when further information was required (see Table 1).

**Quality assessment**

Study quality was assessed in the included surveys using a modified version of the Newcastle-Ottawa Scale, which appraises for sample representativeness and size, participation rate, statistical quality, and ascertainment of diagnosis.\textsuperscript{22,23} We employed the same version of the checklist used in a recent study of the prevalence of PTSD in prisoners.\textsuperscript{24} The potential total score ranged from 0 to 6 points. Studies with a score of 0 to 2 points was considered low quality, 3 to 4 points was considered medium, and 5 to 6 points high quality (see Supplement 1 and Table S2, available online).

**Data analysis**

Random-effects meta-analysis was conducted to calculate pooled prevalence of each disorder, given that heterogeneity among studies was high.\textsuperscript{25} We aggregated smaller studies, for which the sample size was fewer than 100 individuals. For these small studies, prevalences reported in the text were from the nonaggregated data, whereas the figures were generated using results from the aggregated data. The Poisson distribution was used to obtain 95\% confidence intervals when events were rare.\textsuperscript{26} Two
studies for which the prevalence of psychotic illnesses was zero were imputed according to standard methods (i.e., confidence intervals were calculated using “3” as the numerator and the real population size as the denominator). We reported the $I^2$ statistic and Cochran Q to indicate the degree of heterogeneity between studies. In line with guidelines, heterogeneity was considered to be low when $I^2$ ranges from 0 to 40%; moderate from 30% to 60%; substantial from 50% to 90%; and considerable from 75% to 100%. We conducted subgroup and metaregression analyses to explore source of heterogeneity on a range of study characteristics (year of publication [≤ 2006 versus > 2006], gender [male versus female], mean age [both as a continuous and dichotomous variable; ≤ 15 or > 15 years], sample size [both as a continuous and dichotomous variable; ≤ 250 versus > 250 adolescents], study origin [United States versus elsewhere], instrument [Diagnostic Interview Schedule for Children (DISC) versus another instrument], diagnostic criteria [International Classification of Diseases (ICD) versus DSM], interviewer [psychiatrist versus non-psychiatrist], sampling strategy [stratified/non stratified random versus consecutive/complete] and study quality score [both as a continuous and dichotomous variable; high quality studies versus low and medium quality studies]). We first conducted univariate metaregression, followed by multivariable analysis including factors that reached statistical significance (set at $p < .05$) in the univariate models. To test group differences, subgroup analyses were conducted on all dichotomous variables. All analyses were performed using STATA statistical software package, version 13.0 using metan and metareg commands.

RESULTS

We identified 47 studies (46 different samples) from 19 different countries. Through our updated search, we found 22 new surveys. We combined them with the 25 surveys identified in the previous review. Two studies were based on the same sample, which provided data for different outcomes. The 47 studies included a total of 32,787 adolescents (28,033 male and 4,754 female adolescents [15%]) of whom the mean age was 16 years (range 10-19 years). Eighteen studies were from the United States ($n = 28,018$, [86%]), six from the United Kingdom ($n = 1,145$), three from Canada ($n = 408$), two each from Australia ($n = 384$), Brazil ($n = 143$), Russia ($n = 740$), and the Netherlands ($n = 416$), and one each from Austria
Belgium ($n = 259$), $^{19}$ China ($n = 232$), $^{47}$ Denmark ($n = 100$), $^{58}$ Germany ($n = 38$), $^{43}$ Iran ($n = 100$), $^{36}$ Japan ($n = 48$), $^{48}$ Malaysia ($n = 105$), $^{34}$ Norway ($n = 40$), $^{46}$ South Korea ($n = 173$), $^{21}$ Spain ($n = 35$), $^{65}$ and Switzerland ($n = 158$). $^{32}$ These surveys were conducted using a range of sampling strategies: consecutive recruitment of participants ($n = 14,768$), $^{21,32,33,42,44,45,48-50,53,55-61,63,65,66,71,72}$ stratified-random sampling ($n = 3,272$), $^{12,52,54,62,64,69}$ simple random sampling ($n = 1,432$), $^{19,27,34,35,41,51,73}$ and complete sampling ($n = 12,980$). $^{37,39,40,43,46,47,67,68}$ Three studies ($n = 335$) did not report on their sampling method. $^{36,38,70}$ Response rates were reported in 38 studies $^{12,19,27,32-34,36,39,41-49,51,53-59,61-63,65-73}$ and only seven of them ($n = 1,317$) were less than or equal to 75%. $^{19,51,57,58,61,63,71}$ Interviews were conducted using the following instruments: 12 used the Diagnostic Interview Schedule for Children and Adolescents, $^{12,19,27,32-34,36,39,41-49,51,53-59,61-63,65,66,68,69,71,73}$ and 14 used the Schedule for Affective Disorders for School-Age Children, Present, Lifetime or Epidemiologic Version, $^{21,27,35,36,39,41-47,55,56,64,66,67}$ while the other surveys employed the Diagnostic Interview for Children and Adolescents, $^{42,70}$ the Research Diagnostic Criteria for Depression, $^{53}$ the Adolescent Psychopathology Scale and Juvenile Detention Interview, $^{28}$ the Practical Adolescent Dual Diagnostic Interview, $^{50}$ the Salford Needs Assessment Schedule for Adolescents, $^{54}$ the Mini-International Neuropsychiatric Interview for Children and Adolescents, $^{32-34}$ the Structured Clinical Interview for DSM-IV Axis I, II and Personality, $^{42,43}$ the Clinician-Administered PTSD Scale from DSM-IV, $^{48}$ or a semi-structured interview. $^{52}$ Most reported diagnoses were assigned using DSM criteria. However, one study provided ICD-10 diagnoses $^{46}$ while others combined both DSM and ICD-10 diagnoses. $^{21,32-34,58,62}$ The diagnostic interviews were mostly conducted by psychiatrists, $^{49,54,55,58,60,62,65,67}$ clinical psychologists, $^{21,43,56,72}$ researchers and research assistants, $^{27,36,46,70}$ or teams with diverse backgrounds. $^{19,28,32,35,37,38,40,50,51,59,64}$ Most studies reported the types of offences and in accordance with previous research, $^{74}$ we calculated the proportion of adolescents who committed violent offences, which ranged from 6.0% $^{60}$ to 86.0%. $^{58}$

**Psychotic illnesses**

Twenty-one studies, comprising 27,801 adolescents, reported prevalence of psychotic illness. $^{21,27,28,36,37,40-44,52,54,56,58,59,64,65,68,69,72,73}$ Overall, 683 of 24,261 male adolescents were diagnosed with a current psychotic disorder (random-effects pooled prevalence 2.7%; 95% CI 2.0%-3.4% [Figure 2]).
There was substantial heterogeneity between surveys ($\chi^2_{17} = 71, p < .001; I^2 = 76\%$). Among the female adolescents, 105 of 3540 individuals were diagnosed with a current psychotic disorder (random-effects pooled prevalence 2.9%; 95% CI 2.4%-3.5%). Heterogeneity between studies was low ($\chi^2_{10} = 5, p = .916; I^2 = 0\%$). We found no associations between study characteristics and prevalence estimates in metaregression.

**Major Depression**

We identified 33 studies on major depression in 18,861 adolescents. Overall, 1753 of 15,881 male adolescents (random-effects pooled prevalence 10.1%; 95% CI 8.1%-12.2% [Figure 2]) and 774 of 2,980 female adolescents (25.8%; 95% CI 20.3%-31.3%) had a current major depression. There was considerable heterogeneity among both male samples ($\chi^2_{29} = 339, p < .001; I^2 = 91\%$) and female samples ($\chi^2_{17} = 159, p < .001; I^2 = 89\%$). Metaregression suggested that both gender and study quality were associated with heterogeneity among studies. Male adolescents ($\beta = -.14, SE = .032; p < .001$) and studies with higher quality scores ($\beta = -.08, SE = .036; p = .040$) reported lower prevalence.

**ADHD**

We identified 27 papers reporting on ADHD among 28,749 juveniles in custody. Overall, 4,951 of 24,824 male adolescents (random-effects pooled prevalence 17.3%; 95% CI 13.9%-20.7% [Figure 2]) and 836 of 3,925 female adolescents were diagnosed with current ADHD (17.5%; 95% CI 12.1%-22.9%). Heterogeneity was high for male ($\chi^2_{23} = 824, p < .001; I^2 = 97\%$) and female samples ($\chi^2_{12} = 179, p < .001; I^2 = 93\%$). Metaregression suggested that heterogeneity was partly explained by the publication year (studies published after 2006 reporting a higher prevalence: $\beta = .08, SE = .04; p = .03$). In subgroup analyses, the pooled estimate of prevalence of studies published after 2006 was 20.4% (95% CI 17.4%-23.3%) compared to 13.6% (95% CI 8.4%-18.7%) before 2006.

**Conduct Disorder**
We identified 31 studies on conduct disorder in 28,846 juveniles. Overall, 18,042 of 25,184 male adolescents (random-effects pooled prevalence 61.7%; 95% CI 55.4%–67.9% [Figure 2]) and 2,226 of 3,662 female adolescents (59.0%; 95% CI 44.9%–73.1%) had a diagnosis of any lifetime conduct disorder. Considerable heterogeneity was observed in male ($\chi^2_{28} = 2664, p < .001; I^2 = 99\%$) and female samples ($\chi^2_{12} = 1127, p < .001; I^2 = 99\%$).

In metaregression, studies published after 2006 ($\beta = .19, SE = .07; p = .006$) and those with older participants ($\beta = .12, SE = .05; p = .013$) had higher prevalences. We also found lower prevalences of conduct disorder where the DISC was used ($\beta = -.22, SE = .07; p = .004$). None of these variables remained significant in multivariable metaregression.

**PTSD**

Twenty-one studies reported on PTSD in 16,136 detained adolescents. Among 14,260 male adolescents, 832 (random-effects pooled prevalence 8.6%; 95% CI 6.4%–10.7% [Figure 2]) and 334 of 1,876 female adolescents (18.2%; 95% CI 13.1%–23.2%) were diagnosed with current PTSD with heterogeneity in male ($\chi^2_{19} = 250, p < .001; I^2 = 92\%$) and female samples ($\chi^2_{9} = 41, p < .001; I^2 = 78\%$). Gender was the only factor associated with heterogeneity in metaregression (male adolescents had a lower prevalence: $\beta = -.10, SE = .04; p = .01$).

**Heterogeneity analyses**

Figure 2 presents gender-specific prevalence estimates. Table 2 presents the results from the metaregression analyses assessing sample characteristics as possible sources of heterogeneity between studies. Influence analysis, which was performed by omitting one study at a time, revealed no effect. Egger’s regression test showed publication bias in surveys reporting prevalence of conduct disorder ($t = -4.98, p = .03$) and PTSD ($t = 2.32, p = .02$), both in male adolescents (see Figures S1–S5, available online).

**DISCUSSION**
In this updated systematic review of the prevalence of mental disorders among adolescents in juvenile detention and correctional facilities, we identified 47 studies with 32,787 adolescents from 19 different countries. We doubled the number of primary studies compared to a 2008 systematic review. Moreover, we broadened our scope of search by adding a new psychiatric diagnosis (PTSD) and more carefully analyzed heterogeneity. The prevalence estimates confirm high levels of mental disorders in detained adolescents. The two commonest treatable disorders in male adolescents were depression (about 1 in 10) and ADHD (about 1 in 5). In the female adolescents, approximately 1 in 4 had depression, and 1 in 5 had PTSD. We found higher prevalences of depression and PTSD in girls in custody compared with boys.

Our review suggests that mental disorders are substantially more common among detained adolescents in comparison to general population counterparts. Approximately 3% of detained adolescents were diagnosed with a current psychotic illness, a tenfold increase compared to age-equivalent individuals in the general population. Higher rates of current major depression were found in both male (10%) and female adolescents (26%) in comparison to the general adolescent population (5% and 11% respectively). About one out of five detained adolescents had ADHD, compared to one out of ten adolescents in the general population. Nearly two thirds of detained adolescents were diagnosed with any lifetime conduct disorder whereas the estimated lifetime rate of conduct disorder in US adolescents is approximately 10%. In addition, adolescents in detention also had higher rates of PTSD than those in the general population, 9% versus 2% in male adolescents and 18% versus 8% in female adolescents. These differences underscore the large burden of psychiatric morbidity in detained adolescents.

Apart from higher prevalence than the general population, the prevalence estimates of mental disorders in adolescent juvenile detention and correctional facilities were also different from those found in adult prison populations. Psychotic illnesses and major depression appear to be more prevalent in adult prison populations than in adolescents custodial populations. The prevalence estimates for PTSD are similar in both groups. These comparisons imply that the mental health needs of detained adolescents could be different from those of adult prisoners and may require separate and specifically targeted programs to meet these needs.
The prevalences for ADHD and conduct disorder are higher than in the previous 2008 review. Regarding ADHD, this upward trend may be specific to detained adolescents, as ADHD diagnoses in general population youth have not increased when standardized diagnostic methods are used. There are two possible explanations for this finding. First, increased prevalence could result from increased awareness of ADHD symptoms amongst health professionals working in custodial services. That is, the true prevalence of these disorders remains unchanged, but clinicians might be identifying them more accurately. Second, higher prevalence may result from improved identification of high-risk adolescents over time. Some individuals with ADHD and conduct disorders, whom previously might not be identified are more likely to be selected for placement in custodial correctional facilities due to improved identification of these disorders over time.

Another main finding was the higher prevalence of major depression and PTSD in female detained adolescents compared to their male counterparts. These results are consistent with those from adult prison samples and also the general population, military personnel, and terror attack survivors. However, the explanations for this specific to incarcerated youth are not clear. Female juvenile delinquency may be more strongly associated with “internalizing” mental disorders than in male adolescents, or girls might be more vulnerable to adverse and traumatic experiences related to an antisocial lifestyle either within or outside the detention centers.

Finally, the funnel plot results suggest publication bias in male adolescents; towards lower prevalence for conduct disorder and towards higher prevalence for PTSD. This could be due to the increased attention that trauma theory has received as a putative causal mechanism for juvenile criminality. In contrast, a highly prevalent descriptive diagnosis such as conduct disorder might be perceived as less useful for etiologic understanding, treatment planning and primary prevention regarding juvenile delinquency.

One implication of this updated review is that there is no pressing need for conducting more primary prevalence studies, especially in high-income countries, considering that the evidence base is quite large and with most prevalence estimates remaining stable over time. Hence, future research could move to treatment and interventions in custodial settings, and investigate modifiable risk factors for adverse outcomes within custody such as self-harm and violence that may be associated with mental
health problems. Effective treatment will likely improve prognosis and reduce suicidality, violence, and reoffending risk.\textsuperscript{88}

Some limitations should be noted. First, due to discrepancies in how substance use disorder and other mental disorders were classified between studies, it was not possible to reliably examine comorbidity. As adolescents who suffer from comorbid disorders generally present an elevated criminogenic risk, future research on comorbidity is needed.\textsuperscript{45,69,89} Second, there were no sufficient data on the type of facilities (pretrial versus post-sentencing; short-term versus long-term) where youth were detained. Therefore, we could not explore whether this variable was associated with heterogeneity. Future studies should consider reporting this information on juvenile justice facilities. Third, our analyses were solely based on formal diagnoses of mental disorders, according to the \textit{DSM} and \textit{ICD} which provide standard ways of communication between mental health professionals. However, we did not report on subthreshold psychiatric symptomatology, which future work could examine, as these individuals could benefit from preventative programs. An additional limitation from this review is that, the quality appraisal scale was not specifically designed for the purpose of prison prevalence studies, and therefore some of the scoring made assumptions that need further examination (including a lower score for interviews conducted by lay persons using standardized measures versus unstructured clinical interviews conducted by psychiatrists or psychologists, although most of the latter also used standardized tools). Further, there were high levels of between-study heterogeneity. This is expected due to the differences in jurisdictions about who they detain, availability and effectiveness of healthcare services, and prison environments. Therefore, further work could examine prevalence rates longitudinally in the same individuals to study trends over time. Moreover, we primarily used US general population data as a point of comparison for the calculated pooled prevalences due to similar diagnostic instruments, age ranges and prevalence periods.\textsuperscript{77-80} Nevertheless, as worldwide rates differ, including for ADHD between high-income countries, prevalences should be interpreted in relation to national or regional general population prevalences. Finally, it was notable that all included studies were conducted in high- and upper middle-income countries despite our global search. Determining whether new research in other countries is required will need to be balanced by information in this review, local needs, and whether such research can be linked to improved services.
In conclusion, our updated systematic review reported high rates of treatable mental disorders in detained adolescents. The findings underscore the importance of access to mental health services and effective treatment. Such treatment will likely improve prognosis of this population, almost all of whom will re-enter the community, decrease their risk of repeat offending, and reduce the substantial social and financial costs related to imprisonment.90
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Figure 1. Flow Diagram Detailing the Search Strategy for the Updated Systematic Review (1966-2019)

Figure 2. Prevalence of Specific Mental Disorders Among Incarcerated Male and Female Adolescents

Note: Error bars represent 95% CIs of prevalence. Smaller studies (n < 100) were aggregated. Subtotal is pooled prevalence estimate based on random effects models. ES = prevalence estimate
### Table 1. Extracted Information From Included Samples, 1966-2019

| Study       | Country | Population                  | Type of custody                        | Sampling strategy          | Proportion not consenting | Total number interviewed | Instrument          | Diagnostic criteria | Diagnoses reported | Mean age, years | Age range, years | Interviewer                  | Time detained before interview | Proportion committed violent offences |
|-------------|---------|-----------------------------|----------------------------------------|----------------------------|---------------------------|--------------------------|---------------------|-------------------|-------------------|----------------|----------------|-------------------------------|-------------------------------|-------------------------------------|
| Bolton 1976  | USA     | Juvenile detention center   | Not further specified                  | Stratified random          | Not provided              | 502 males                | 149 females       | Semi-structured interview | DSM-II            | PI              | 16              | 16-17                        | Layperson                     | 4 days                             | Not provided                        |
| Chiles 1980  | USA     | Juvenile detention center   | Correctional                           | Consecutive               |                           | 94 males                  | 26 females         | Clinical            | Research criteria of depression | MD               | Not provided  | 13-15                        | Non-psychiatrists               | Up to 2 days                       | Not provided                        |
| Kashani 1980 | USA     | Detention center            | Evaluation and detention               | Consecutive               |                           | 71 males                  | 29 females         | Clinical            | DSM-III           | MD              | 15              | 11-17                        | Psychiatrist                   | Mean 7 days                       | 6%                                |
| Hollander 1985 | USA | Convicted juvenile delinquents | Correctional                           | Consecutive               |                           | 185 males                | Clinical            | DSM-III           | ADHD              | 15              | 12-18                        | Staff psychologist and psychiatrist | Not provided                     | 38%                                |
| Duclos 1998  | USA     | Detention center            | Not further specified                  | Consecutive               |                           | 86 males                  | 64 females         | DISC-2.3            | DSM-III-R         | MD ADHD CD PTSD | 15              | 12-18                        | Non-psychiatrists               | Not provided                     | Not provided                       |
| Shelton 1998 | USA     | Detention facilities        | Committal and detention facilities     | Complete sample           |                           | 252 males                | 60 females         | DISC               | DSM-III           | PI              | 16              | 12-18                        | Non-psychiatrists               | Not provided                     | Not provided                       |
| Ulzen, 1998  | Canada  | Detainees                   | Secure custodial facilities            | Not provided              |                           | 38 males                  | 11 females         | DICA-R             | DSM-III-R         | MD ADHD CD PTSD | 15              | 13-17                        | Research assistant              | Not provided                     | Not provided                       |
| Atkins 1999  | USA     | Central detention facility  | Not further specified                  | Simple random             |                           | 71 males                  | 4 females          | DISC-2.3            | DSM-III-R         | ADHD CD          | 15              | 13-17                        | Social workers, nurses, medical students | Up to 6 months                 | Not provided                       |
| Lader 2000   | UK      | Detainees                   | Local prison Secure juvenile facility (Young Offender's Institution) | Stratified random        |                           | 314 detainees          | 169 sentenced males, and 107 detained/sentenced females | SCAN Clinical | DSM-IV              | ICD-10 (MD) | PI MD Mania BP | Not provided  | 16-20                        | Psychiatrists                 | Modal categories 0-2 months, 6-11 months and 0-2 months | 19%                                |
| Study          | Country | Population       | Type of custody                  | Sampling strategy | Proportion not consenting | Total number interviewed | Instrument          | Diagnostic criteria | Mean age, years | Age range, years | Interviewer | Time detained before interview | Proportion committed violent offences |
|---------------|---------|------------------|----------------------------------|-------------------|---------------------------|--------------------------|----------------------|--------------------|----------------|----------------|-------------|-----------------------------|----------------------------------|
| Nicol 2000    | UK      | Detainees        | Secure juvenile facility (Young Offender's Institution) | Stratified random | Not provided              | 51 juveniles (estimate > 90% males) | K-SADS-E          | DSM-III-R       | Not provided | 13-17          | Psychiatrist and non-psychiatrists | Not provided                       |
| Pliszka 2000  | USA     | Juvenile detention center | Not further specified          | Consecutive       | 0%                        | 45 males 5 females        | DISC-2.3           | DSM-III-R       | 15             | 11-17          | Non-psychiatrists       | Up to 4 days                     |
| Robertson 2001| USA     | Detention centers | Secure detention               | Simple random     | Not provided              | 168 males 79 females      | APS JDI             | DSM-IV            | 15             | 11-18          | Mental health workers (non-psychiatrists) | Mean 10.2 days                    |
| Dimond 2002   | UK      | Remand detainees | Secure juvenile facility (Young Offender's Institution) | Consecutive       | 5%                        | 19 males                 | K-SADS-P           | DSM-IV            | Not provided | 15-16          | Psychiatrist       | Not provided                       |
| Gonzalvo 2002 | Spain   | Juvenile detention center | Correctional                  | Consecutive       | 0%                        | 35 females               | Clinical            | DSM-IV            | 15             | 14-17          | Psychiatrist       | Up to a few days                  |
| Ruchkin 2002  | Russia  | Juvenile detention center | Correctional                  | Complete sample   | 2%                        | 370 males                | K-SADS-PL           | DSM-IV            | 16             | 14-19          | Psychiatrist       | Not provided                       |
| Teplin 2002   | USA     | Detainees in correctional facilities | Pretrial detention center     | Stratified random | 4%                        | 1172 males 657 females   | DISC-2.3           | DSM-III-R       | 15             | 10-18          | Trained interviewers (Master's in psychology or associated field) | Up to 2 days                     |
| Waite 2002    | USA     | Juvenile detention center | Not further specified                  | Consecutive       | 0%                        | 9629 males 1190 females  | Clinical            | DSM-IV            | 16             | 11-18          | Clinical psychologist | Up to a few days                  | 18% (males) 19% (females) |
## Mental disorders among detained adolescents

| Study           | Country     | Population                  | Type of custody                  | Sampling strategy           | Proportion not consenting | Total number interviewed | Instrument   | Diagnostic criteria | Diagnoses reported | Mean age, years | Age range, years | Interviewer | Time detained before interview | Proportion committed violent offences |
|-----------------|-------------|-----------------------------|----------------------------------|-----------------------------|---------------------------|--------------------------|--------------|-------------------|-------------------|----------------|----------------|-------------|-------------------------------|-------------------------------------|
| Wasserman 2002 | USA         | Reception for juvenile delinquents | Assessment before correctional placement | Simple random               | 3%                        | 292 males                | Voice DISC-IV | DSM-IV             | MD ADHD CD Maria PTSD | 17             | Not provided | Layperson | Mean 18.7 days                | 36%                                |
| Gosden 2003     | Denmark     | Detainees                  | Prison and secure social services facility | Consecutive               | 21%                       | 100 males                | SCAN         | ICD-10 DSM-IV (ADHD) | PI MD ADHD CD      | 17             | 15-17         | Psychiatrist | Mean 11 days                | 86%                                |
| Abram 2004     | USA         | Detainees in correctional facilities | Short-term detention            | Stratified random           | 3%                        | 532 males 368 females  | DISC-IV      | DSM-IV             | PTSD              | 15             | 10-18         | Trained interviewers (Master’s in psychology or associated field) | Up to 2 days | Not provided |                                     |
| Dixon 2004     | Australia   | Juvenile detention center  | For serious girl offenders      | Consecutive                | 5%                        | 100 females              | K-SADS-PL    | DSM-IV             | PI MD ADHD CD      | 16             | 13-19         | Clinical psychologist | Not provided | 71%                               |
| Lederman 2004  | USA         | Juvenile detention         | Before trial or long-term placement | Consecutive                | 27%                       | 493 females              | DISC         | DSM-IV             | MD ADHD CD         | 15             | 10-17         | Non-psychiatrist | Up to 5 days                | 54%                               |
| Vreugdenhil 2004 | Netherlands | Six national detention centres | Not further specified          | Consecutive                | 21%                       | 204 males                | DISC-IV (DISC-2.3 for PI) | DSM-IV (DSM-III-R for PI) | PI ADHD CD      | 16             | 12-18         | Non-psychiatrists | Mean 4 months | 72%                               |
| Yoshinaga 2004 | Japan       | Juvenile Classification Home | Short-term detention           | Consecutive                | 0%                        | 40 males 8 females       | CAPS         | DSM-IV             | PTSD              | 17             | 14-19         | Psychiatrist | Up to 4 weeks                | Not provided |                                     |
| Abrantes 2005  | USA         | 2 juvenile detention centers | Not further specified          | Consecutive                | Not provided              | 218 males 34 females     | PADDI        | DSM-IV             | PI MD ADHD CD      | 16             | 13-18         | Staff (non-psychiatrists) | Not provided | 27% (self-report)  |                                                                                 |
| Study          | Country | Population                          | Type of custody                                      | Sampling strategy   | Proportion not consenting | Total number interviewed | Instrument      | Diagnostic criteria | Diagnoses reported | Mean age, years | Age range, years | Interviewer                  | Time detained before interview | Proportion committed violent offences |
|---------------|---------|-------------------------------------|-----------------------------------------------------|---------------------|---------------------------|--------------------------|----------------|-------------------|------------------|----------------|----------------|-------------------------------|-------------------------------|----------------------------------|
| Kuo 2005[1]   | USA     | Juvenile detention center           | Secure placement                                     | Consecutive         | 31%                       | 36 males 14 females      | Voice-DISC     | DSM-IV            | MD               | Not provided | 13-17          | Non-psychiatrists              | Median 4 days                  | Not provided                     |
| Chitsabesan 2006[2] | UK     | Detainees                           | Secure juvenile facility (Young Offender’s Institution) | Stratified random   | 7%                        | 118 males 33 females     | SNASA          | DSM-IV            | PI MD ADHD       | 16             | 13-18          | Psychiatrist               | Mean 4 months                  | Not provided                     |
| Hamerlynck 2007[3] | Netherlands | Detainees       | Three Juvenile Justice Institutions                 | Complete sample     | 7%                        | 212 females              | K-SADS-P-L     | DSM-IV            | CD               | 16             | 12-19          | Not provided               | Up to 1 month                  | Not provided                     |
| Colins 2009[4] | Belgium | Detainees                           | Three Youth Detention Centers                       | Simple random       | 15%                       | 245 males                | DISC-IV        | DSM-IV            | CD PTSD           | 16             | 12-17          | Trained interviewers (Researcher and university students) | Between 3 days and 3 weeks     | 12%                              |
| Indig 2009[5]  | Australia | Young people held in custody         | Eight Juvenile Detention Centres and one Juvenile Correctional Centre | Simple random       | 5%                        | 245 males 39 females     | K-SADS-P-L     | DSM-IV            | PI MD ADHD CD PTSD | 17             | 13-19          | Trained juvenile justice psychologists | Not provided                  | Not reported for <19 years     |
| Köhler 2009[6] | Germany | Prisoners on remand or in penal detention | Juvenile prison                                      | Complete sample     | 7%                        | 38 males                 | SCID (German version) | DSM-IV            | PI MD CD PTSD  | Not provided | <18            | Psychologists               | Not provided                  | 75% (Not specific to <19 years) |
| Sørland 2009[7] | Norway | Prisoners                           | Not further specified                                | Complete sample     | 5%                        | 40 males                 | K-SADS (Norwegian version) | ICD-10            | MD CD            | 18             | 15-19          | Researcher                 | Not provided                  | 60% during 5 first days of custody, 85% during first 18 days, 6 people had been there for longer (from 25 to 240 days) | Not provided                  |
| Study          | Country | Population      | Type of custody                                                                 | Sampling strategy | Proportion not consenting | Total number interviewed | Instrument | Diagnostic criteria | Diagnoses reported | Mean age, years | Age range, years | Interviewer                                                                 | Time detained before interview | Proportion committed violent offences |
|---------------|---------|-----------------|---------------------------------------------------------------------------------|------------------|---------------------------|--------------------------|------------|--------------------|---------------------|-----------------|-----------------|-----------------------------------------------------------------------------|----------------------------------|-------------------------------------|
| Karnik 2010(1) | USA     | Detainees       | Dep. of Corrections and Rehabilitation, Division of Juvenile Justice            | Consecutive      | 1%                        | 650 males 140 females    | SCID (PI, MD, PTSD) DICA (ADHD) SIDP-IV (CD) | DSM-IV    | PI MD ADHD CD PTSD | 17                  | <16            |                  | Not provided                                               | After 9 months                  | 36%                                                |
| Gretton 2011(2) | Canada  | Incarcerated youth | Provincial youth custody centers                                                  | Complete sample  | Not provided              | 119 males 54 females     | DISC-IV          | DSM-IV             | 16                  | 13-18 (females) 12-19 (males) |                  | Trained interviewers with advanced degrees in psychology | Not provided                  | 83% (males) 74% (females) |
| Mitchell 2011(3) | UK      | Remand and sentenced boys | Young Offender Institution                                                        | Simple random    | 7%                        | 115 males               | K-SADS            | DSM-IV             | 17                  | 15-17          |                  | Researcher with a significant level of clinical experience                  | 24 hours minimum                | 53%                                                |
| Ghanizadeh 2012(4) | Iran    | Incarcerated boys | Prison                                                                          | Not provided     | 0%                        | 100 males               | K-SADS (Farsi version)          | DSM-IV         | PI MD ADHD CD PTSD | 17                  | 12-19          |                  | Researchers                                               | Not provided                  | 83%                                                |
| Harzke 2012(5)  | USA     | Youth entrants  | Youth Commission facilities                                                      | Complete sample  | Not provided              | 10469 males 1134 females | Guided interview structure based on DSM-IV | DSM-IV    | PI MD ADHD CD       | Not provided          | <19            |                  | Psychiatrists, doctoral-level clinical psychologists, master’s-level associate psychologists in consultation with doctoral-level clinicians, physicians, physician assistants, or nurse practitioners | Up to 30 days                   | Assault (52.1%), weapons-related offenses (26.8%), robbery (23.4%), threats (11.4%), sexual offenses (6.6%) and murder or manslaughter (3.1%) |

*Percentages do not add up to 100%
# Mental disorders among detained adolescents

| Study     | Country | Population | Type of custody | Sampling strategy | Proportion not consenting | Total number interviewed | Instrument | Diagnostic criteria | Diagnoses reported | Mean age, years | Age range, years | Interviewer | Time detained before interview | Proportion committed violent offences |
|-----------|---------|------------|-----------------|-------------------|---------------------------|--------------------------|------------|-------------------|-------------------|-----------------|-----------------|-------------|-------------------------------|-------------------------------|
| Zhou 2012[12] | China | Detainees | 2 Youth Detention Centers | Complete sample | 9% | 232 males | K-SADS-PL | DSM-IV | MD DP ADHD CD | 17 | 15-17 | Psychiatrists | Not provided | 73% |
| Lennox 2013[13] | UK | Adolescent offenders | Young Offender Institution | Consecutive | 3% | 219 males | K-SADS | DSM-IV | PI MD PTSD | 17 | 15-18 | Not provided | Between 0 to 26 days | 72% |
| Aida 2014[14] | Malaysia | Detainees | Five prisons that are designated centres for juvenile offenders | Simple random | 0% | 105 juveniles (estimate >90% males) | MINI-KID | DSM-IV ICD-10 | PI MD ADHD CD | 17 | 14-17 | Psychiatrist | Not provided | 38% |
| Guebert 2014[15] | Canada | Adolescents adjudicated under the Youth Criminal Justice Act or the former Young Offenders Act | Not further specified | Not provided | Not provided | 109 males 77 females | Diagnostic interview | DSM-IV IV-TR | MD ADHD CD | 16 | Not provided | Pediatric psychologist (usually doctoral level) | Not provided | 83% (males) 74% (females) |
| Aebi 2015[16] | Austria | Male juvenile detainees | County jail | Consecutive | 3% | 259 males | MINI-KID | DSM-IV ICD-10 | ADHD PTSD | 17 | 14-19 | Psychiatry residents | up to 4 days | 8.5% |
| Dória 2015[17] | Brazil | Incarcerated boys | Socio-education center | Simple random | Not provided | 69 males | K-SADS-PL (Brazilian version) | DSM-IV | MD ADHD CD | 16 | 12-16 | Trained interviewers | Between 15 to 30 days | Not provided |
| Lindblad 2015[18] | Russia | Incarcerated delinquents | Juvenile correctional center | Consecutive | 2% | 370 males | K-SADS-PL | DSM-IV | PI ADHD CD PTSD | 16 | 14-19 | Child psychiatrists | Not provided | 49% |
| Aebi 2016[19] | Switzerland | Detainees | Juvenile Detention Center | Consecutive | 2% | 158 males | MINI-KID | DSM-IV ICD-10 | ADHD CD PTSD | 17 | 13-19 | Psychiatrists Forensic psychologist | Not provided | 63.9% |
| Study          | Country      | Population                                           | Type of custody                  | Sampling strategy | Proportion not consenting | Total number interviewed | Instrument                  | Diagnostic criteria | Diagnoses reported | Mean age, years | Age range, years | Interviewer            | Time detained before interview | Proportion committed violent offences |
|---------------|--------------|------------------------------------------------------|----------------------------------|-------------------|---------------------------|--------------------------|------------------------------|---------------------|-------------------|----------------|----------------|----------------------|-------------------------------|-------------------------------------|
| Kim 2017      | South Korea  | Male Juvenile Detainees                              | Male Juvenile Detention Centre   | Consecutive       | 0%                        | 173 males                | MINI K-SADS-PL (Korean version) | DSM-IV              | PI MD ADHD CD PTSD | 18             | 15-19          | Clinical psychologist | Not provided                   | 60%                                 |
| Schorr 2019   | Brazil       | Juvenile offenders in temporary custody              | Provisional Detention Center     | Consecutive       | 0%                        | 74 males                 | Clinical                    | DSM-IV              | CD                | Not provided | 15-17          | Psychiatrist           | Not provided                   | 24% committed homicide offenses |

Note: ADHD = attention-deficit/hyperactivity disorder; APS = Adolescent Psychopathology Scale; BP = bipolar disorder; CD = conduct disorder; DICA = Diagnostic Interview for Children and Adolescents (R = Revised); DISC = Diagnostic Interview Schedule for Children; ICD = International Classification of Diseases; JDI = Juvenile Detention Interview; K-SADS = Schedule for Affective Disorders and Schizophrenia for School Aged Children (P = Present, L = Lifetime, E = Epidemiologic); MD = major depression; MINI = Mini-International Neuropsychiatric Interview (KID = for Children and Adolescents); PADDI = Practical Adolescent Dual Diagnostic Interview; PI = psychotic illnesses; PTSD = posttraumatic stress disorder; SCAN = Schedules for Clinical Assessment in Neuropsychiatry; SCID = Structured Clinical Interview for DSM-IV Axis I, II and Personality; SIDP = Structured Interview for DSM-IV Personality; SNASA = Salford Needs Assessment Schedule for Adolescents.
Table 2. Univariate Metaregression Analyses Examining Possible Sources of Between-Study Heterogeneity Among Adolescents in Juvenile Detention

| Variable                                      | Psychotic Illnesses | Major Depression | ADHD | Conduct Disorder | PTSD  |
|-----------------------------------------------|---------------------|------------------|------|------------------|-------|
|                                               | \(\beta\) SE \(p\) | \(\beta\) SE \(p\) | \(\beta\) SE \(p\) | \(\beta\) SE \(p\) | \(\beta\) SE \(p\) |
| Year of publication: ≤ 2006 vs. > 2006       | -.005 .004 .22     | -.072 .037 .06   | .081 .035 .028* | .194 .066 .005* | -.029 .039 .47 |
| Gender: male vs. female                       | -.004 .005 .42     | -.144 .032 <.001*| .002 .040 .96    | .028 .079 .72    | -.012 .037 .01   |
| Mean age (continuous)                         | -.003 .004 .53     | -.033 .024 .18   | .003 .027 .91    | .124 .047 .01    | -.014 .027 .60   |
| Mean age: ≤ 15 vs. > 15 years                 | -.005 .007 .46     | -.048 .073 .52   | -.022 .079 .79   | .182 .163 .27    | -.007 .050 .89   |
| Study size (continuous)                       | .000 .000 .97      | .000 .000 .69    | .000 .000 .65    | .000 .000 .38    | .000 .000 .44    |
| Study size: ≤ 250 vs. > 250 adolescents       | .005 .005 .26      | -.022 .045 .63   | .002 .040 .96    | -.001 .082 .99   | .031 .038 .43    |
| Study origin: USA vs. elsewhere               | .003 .005 .52      | .044 .037 .25    | -.029 .039 .46   | -.094 .073 .21   | -.016 .038 .67   |
| Instrument: DISC vs. another                  | -.005 .005 .33     | -.051 .040 .21   | -.057 .041 .17   | -.218 .071 .004* | -.071 .038 .07   |
| Diagnostic criteria: ICD vs. DSM              | .006 .005 .20      | .034 .074 .64    | .008 .080 .92    | -.123 .122 .32   | -.050 .053 .36   |
| Interviewer: psychiatrist vs. non-psychiatrist| -.006 .005 .19     | -.050 .042 .25   | -.012 .041 .78   | .118 .073 .11    | -.004 .045 .93   |
| Sampling strategy: stratified/non stratified vs. consecutive/complete | -.003 .005 .53 | -.021 .040 .60 | -.010 .042 .81 | .099 .080 .22 | -.030 .039 .45 |
| Study quality (continuous)                    | .003 .002 .17      | -.029 .013 .04*  | .007 .018 .71    | .048 .033 .16    | -.004 .017 .81   |
| Study quality: high quality studies vs. low and medium quality studies | .007 .004 .12 | -.756 .036 .04* | -.013 .041 .76 | .044 .073 .55 | -.003 .039 .93 |

Note: ADHD = attention-deficit/hyperactivity disorder; DISC = Diagnostic Interview Schedule for Children; ICD = International Classification of Diseases PTSD = posttraumatic stress disorder, SE = standard error.

*p < .05.
Records identified through database searching (PTSD – 1980-2006) (n = 2716)

Records after duplicates removed (n = 2097)

Records screened (n = 2097)

Records excluded according to titles and abstracts (n = 2047)

Full-text articles assessed for eligibility (n = 50)

New studies included (n = 2)

Full-text articles excluded, with reasons (n = 48)

Study already included in previous review (n = 5)

Same sample as another report (n = 7)

Not detained or incarcerated sample (n = 1)

Selected sample (n = 2)

Impossible to extract specific data (n = 15)

Symptoms rather than formal diagnosis (n = 21)

Not a single-study report (n = 6)

Age range not < 19 years (n = 5)

Self-report instruments (n = 17)

Studies included in qualitative synthesis (n = 47)

Studies included in quantitative synthesis (meta-analysis) (n = 47)

Records identified through database searching (2006 – ) (n = 3958)

Records after duplicates removed (n = 2469)

Records screened (n = 2557)

Full-text articles assessed for eligibility (n = 147)

New studies included (n = 20)

Records excluded according to titles and abstracts (n = 2410)

Full-text articles excluded, with reasons (n = 127)

Same sample as another report (n = 33)

Not detained or incarcerated sample (n = 8)

Selected sample (n = 22)

Impossible to extract specific data (n = 15)

Symptoms rather than formal diagnosis (n = 21)

Not a single-study report (n = 6)

Age range not < 19 years (n = 5)

Self-report instruments (n = 17)

Studies included in qualitative synthesis (n = 47)

Records identified through other sources (n = 4)

Records after duplicates removed (n = 2097)

Records screened (n = 2097)

Full-text articles assessed for eligibility (n = 50)

New studies included (n = 2)

Full-text articles excluded, with reasons (n = 48)

Study already included in previous review (n = 5)

Same sample as another report (n = 7)

Not detained or incarcerated sample (n = 1)

Selected sample (n = 2)

Impossible to extract specific data (n = 15)

Symptoms rather than formal diagnosis (n = 21)

Not a single-study report (n = 6)

Age range not < 19 years (n = 5)

Self-report instruments (n = 17)

Studies included in qualitative synthesis (n = 47)

Additional records identified through other sources (n = 4)
### Current Attention-Deficit/Hyperactivity Disorder

| Study ID          | ES (95% CI)   | Weight |
|-------------------|---------------|--------|
| Males             |               |        |
| Ruchkin, 2002     | 0.14 (0.10, 0.17) | 5.27   |
| Teplin, 2002      | 0.17 (0.14, 0.19) | 5.46   |
| Wasserman, 2002   | 0.02 (0.00, 0.04) | 5.51   |
| Waite, 2002       | 0.23 (0.22, 0.24) | 5.56   |
| Gosden, 2003      | 0.11 (0.05, 0.17) | 4.72   |
| Vreugdenhil, 2003 | 0.08 (0.04, 0.12) | 5.23   |
| Chitaseban, 2006  | 0.07 (0.02, 0.11) | 5.07   |
| Indig, 2009       | 0.28 (0.22, 0.33) | 4.84   |
| Karnik, 2010      | 0.10 (0.07, 0.13) | 5.30   |
| Gretton, 2011     | 0.13 (0.06, 0.19) | 4.71   |
| Mitchell, 2011    | 0.08 (0.03, 0.13) | 4.99   |
| Ghanizadeh, 2012 | 0.33 (0.24, 0.42) | 3.95   |
| Harzke, 2012      | 0.19 (0.18, 0.19) | 5.57   |
| Zhou, 2012        | 0.10 (0.06, 0.14) | 5.19   |
| Aida, 2014        | 0.25 (0.17, 0.33) | 4.19   |
| Aebi, 2015        | 0.18 (0.13, 0.22) | 5.05   |
| Lindblad, 2015    | 0.18 (0.14, 0.21) | 5.20   |
| Aebi, 2016        | 0.18 (0.12, 0.24) | 4.74   |
| Kim, 2017         | 0.35 (0.28, 0.42) | 4.47   |
| 5 smaller studies | 0.24 (0.19, 0.29) | 4.99   |
| Subtotal (I-squared = 97.3%, p = 0.000) | 0.17 (0.13, 0.20) | 100.00 |

### Females

| Study ID          | ES (95% CI)   | Weight |
|-------------------|---------------|--------|
| Teplin, 2002      | 0.21 (0.18, 0.24) | 16.85  |
| Waite, 2002       | 0.24 (0.22, 0.27) | 17.15  |
| Dixon, 2004       | 0.06 (0.01, 0.11) | 15.99  |
| Lederman, 2004    | 0.34 (0.30, 0.38) | 16.28  |
| Harzke, 2012      | 0.15 (0.13, 0.17) | 17.27  |
| 8 smaller studies | 0.16 (0.13, 0.20) | 16.46  |
| Subtotal (I-squared = 95.6%, p = 0.000) | 0.20 (0.14, 0.26) | 100.00 |

**NOTE:** Weights are from random effects analysis
### Any Lifetime Conduct Disorder

| Study ID          | ES (95% CI) | Weight |
|-------------------|-------------|--------|
| Males             |             |        |
| Shelton, 1998     | 0.36 (0.30, 0.42) | 5.27   |
| Rushkin, 2002     | 0.70 (0.65, 0.75) | 5.34   |
| Teplin, 2002      | 0.38 (0.35, 0.41) | 5.41   |
| Wasserman, 2002   | 0.31 (0.26, 0.36) | 5.30   |
| Waite, 2002       | 0.67 (0.66, 0.68) | 5.45   |
| Gosden, 2003      | 0.31 (0.22, 0.40) | 5.03   |
| Vreugdenhil, 2003 | 0.73 (0.67, 0.79) | 5.26   |
| Abrantes, 2005    | 0.82 (0.77, 0.87) | 5.31   |
| Colins, 2009      | 0.60 (0.53, 0.66) | 5.25   |
| Indig, 2009       | 0.58 (0.51, 0.64) | 5.25   |
| Karnik, 2010      | 0.93 (0.91, 0.96) | 5.41   |
| Gretton, 2011     | 0.74 (0.66, 0.82) | 5.12   |
| Ghanizadeh, 2012  | 0.55 (0.45, 0.65) | 4.97   |
| Harzke, 2012      | 0.83 (0.83, 0.84) | 5.45   |
| Zhou, 2012        | 0.78 (0.73, 0.84) | 5.30   |
| Aida, 2014        | 0.59 (0.50, 0.68) | 5.00   |
| Lindblad, 2015    | 0.73 (0.69, 0.78) | 5.34   |
| Kim, 2017         | 0.55 (0.47, 0.62) | 5.16   |
| 11 smaller studies| 0.55 (0.51, 0.60) | 5.36   |
| Subtotal (I-squared = 99.3%, p = 0.000) | 0.62 (0.54, 0.69) | 100.00 |

| Females           |             |        |
| Teplin, 2002      | 0.41 (0.37, 0.44) | 16.74  |
| Waite, 2002       | 0.51 (0.48, 0.53) | 16.80  |
| Dixon, 2004       | 0.91 (0.85, 0.97) | 16.57  |
| Hamerlynck, 2007  | 0.55 (0.48, 0.62) | 16.43  |
| Harzke, 2012      | 0.83 (0.81, 0.85) | 16.83  |
| 8 smaller studies  | 0.57 (0.52, 0.62) | 16.64  |
| Subtotal (I-squared = 99.2%, p = 0.000) | 0.63 (0.46, 0.80) | 100.00 |

**NOTE:** Weights are from random effects analysis.
### Current Major Depression

| Study ID           | ES (95% CI)          | % Weight |
|-------------------|----------------------|----------|
| **Males**         |                      |          |
| Shelton, 1998     | 0.06 (0.03, 0.09)    | 5.28     |
| Robertson, 2001   | 0.14 (0.09, 0.20)    | 4.41     |
| Ruchkin, 2002     | 0.09 (0.06, 0.12)    | 5.24     |
| Teplin, 2002      | 0.13 (0.11, 0.15)    | 5.53     |
| Wasserman, 2002   | 0.08 (0.05, 0.11)    | 5.23     |
| Gosden, 2003      | 0.02 (0.00, 0.07)    | 5.08     |
| Vreugdenhil, 2003 | 0.06 (0.03, 0.09)    | 5.17     |
| Abrantes, 2005    | 0.24 (0.18, 0.30)    | 4.26     |
| Chitaseban, 2006  | 0.13 (0.07, 0.19)    | 4.12     |
| Indig, 2009       | 0.13 (0.09, 0.18)    | 4.80     |
| Karnik, 2010      | 0.03 (0.01, 0.05)    | 5.55     |
| Gretton, 2011     | 0.04 (0.01, 0.08)    | 5.04     |
| Mitchell, 2011    | 0.04 (0.01, 0.08)    | 5.00     |
| Ghanizadeh, 2012  | 0.11 (0.05, 0.17)    | 4.08     |
| Harzke, 2012      | 0.11 (0.11, 0.12)    | 5.73     |
| Zhou, 2012        | 0.01 (0.00, 0.03)    | 5.62     |
| Lennox, 2013      | 0.07 (0.04, 0.10)    | 5.13     |
| Lindblad, 2015    | 0.11 (0.08, 0.15)    | 5.16     |
| Kim, 2017         | 0.17 (0.12, 0.23)    | 4.27     |
| 11 smaller studies| 0.14 (0.11, 0.17)    | 5.32     |
| **Subtotal (I-squared = 94.1%, p = 0.000)** | 0.09 (0.07, 0.12) | 100.00  |

| Study ID           | ES (95% CI)          | % Weight |
|-------------------|----------------------|----------|
| **Females**       |                      |          |
| Teplin, 2002      | 0.21 (0.18, 0.25)    | 22.07    |
| Dixon, 2004       | 0.33 (0.24, 0.42)    | 12.86    |
| Lederman, 2004    | 0.36 (0.31, 0.40)    | 20.50    |
| Harzke, 2012      | 0.25 (0.23, 0.28)    | 22.84    |
| 14 smaller studies| 0.23 (0.20, 0.27)    | 21.73    |
| **Subtotal (I-squared = 87.7%, p = 0.000)** | 0.27 (0.22, 0.32) | 100.00  |

**NOTE:** Weights are from random effects analysis.
Current Psychotic Illnesses

Study ID | ES (95% CI) | Weight
--- | --- | ---
Males
Bolton, 1976 | 0.04 (0.02, 0.05) | 7.20
Hollander, 1985 | 0.02 (0.00, 0.04) | 5.64
Shelton, 1998 | 0.02 (0.00, 0.04) | 6.95
Robertson, 2001 | 0.01 (0.00, 0.04) | 5.69
Teplin, 2002 | 0.03 (0.02, 0.04) | 9.69
Wasserman, 2002 | 0.02 (0.01, 0.04) | 6.74
Waite, 2002 | 0.04 (0.03, 0.04) | 11.98
Gosden, 2003 | 0.02 (0.00, 0.07) | 2.86
Chitaseban, 2006 | 0.05 (0.01, 0.09) | 2.34
Indig, 2009 | 0.05 (0.02, 0.08) | 4.14
Karnik, 2010 | 0.05 (0.02, 0.07) | 4.90
Gretton, 2011 | 0.01 (0.00, 0.05) | 4.94
Mitchell, 2011 | 0.03 (0.00, 0.05) | 2.80
Ghanizadeh, 2012 | 0.02 (0.00, 0.07) | 2.86
Harzke, 2012 | 0.02 (0.02, 0.02) | 12.21
Lennox, 2013 | 0.02 (0.00, 0.04) | 6.67
2 smaller studies | 0.02 (0.00, 0.08) | 2.38
Subtotal (I-squared = 77.4%, p = 0.000) | 0.03 (0.02, 0.03) | 100.00

Females
Bolton, 1976 | 0.03 (0.00, 0.05) | 4.58
Teplin, 2002 | 0.03 (0.01, 0.04) | 19.78
Waite, 2002 | 0.03 (0.02, 0.04) | 33.33
Dixon, 2004 | 0.05 (0.01, 0.09) | 1.69
Harzke, 2012 | 0.03 (0.02, 0.04) | 33.19
6 smaller studies | 0.04 (0.01, 0.06) | 7.36
Subtotal (I-squared = 0.0%, p = 0.925) | 0.03 (0.02, 0.03) | 100.00

NOTE: Weights are from random effects analysis
### Current Posttraumatic Stress Disorder

| Study ID          | ES (95% CI)  | Weight |
|-------------------|--------------|--------|
| Males             |              |        |
| Wasserman, 2002   | 0.05 (0.02, 0.07) | 6.39   |
| Abram, 2004       | 0.11 (0.08, 0.14) | 6.30   |
| Abrantes, 2005    | 0.15 (0.10, 0.20) | 5.22   |
| Collins, 2009     | 0.02 (0.00, 0.04) | 6.64   |
| Indig, 2009       | 0.18 (0.13, 0.22) | 5.22   |
| Karnik, 2010      | 0.07 (0.04, 0.10) | 6.19   |
| Gretton, 2011     | 0.02 (0.00, 0.06) | 6.17   |
| Mitchell, 2011    | 0.13 (0.07, 0.19) | 4.47   |
| Ghanizadeh, 2012 | 0.03 (0.01, 0.09) | 5.59   |
| Harzke, 2012      | 0.04 (0.04, 0.05) | 6.93   |
| Zhou, 2012        | 0.02 (0.00, 0.03) | 6.67   |
| Lennox, 2013      | 0.04 (0.01, 0.07) | 6.31   |
| Aebi, 2015        | 0.25 (0.19, 0.30) | 4.95   |
| Lindblad, 2015    | 0.24 (0.19, 0.28) | 5.46   |
| Aebi, 2016        | 0.12 (0.07, 0.17) | 5.05   |
| Kim, 2017         | 0.03 (0.00, 0.05) | 6.37   |
| 4 smaller studies | 0.05 (0.02, 0.09) | 6.08   |
| Subtotal (I-squared = 93.5%, p = 0.000) | 0.08 (0.06, 0.11) | 100.00 |

| Females           |              |        |
|-------------------|--------------|--------|
| Abram, 2004       | 0.15 (0.11, 0.18) | 25.90  |
| Dixon, 2004       | 0.20 (0.12, 0.28) | 7.01   |
| Harzke, 2012      | 0.19 (0.17, 0.21) | 47.73  |
| 8 smaller studies | 0.17 (0.13, 0.21) | 19.36  |
| Subtotal (I-squared = 23.1%, p = 0.272) | 0.17 (0.15, 0.20) | 100.00 |

**NOTE:** Weights are from random effects analysis.