Psychological Medicine

Review Article

Cite this article: Angelakis I, Austin JL, Gooding P (2020). Childhood maltreatment and suicide attempts in prisoners: a systematic meta-analytic review. Psychological Medicine 50, 1–10. https://doi.org/10.1017/S0033291719002848

Received: 31 May 2019
Revised: 11 September 2019
Accepted: 13 September 2019
First published online: 30 October 2019

Key words:
Abuse; childhood maltreatment; meta-analysis; neglect; prisoners; suicide attempts; systematic review

Author for correspondence:
Ioannis Angelakis,
E-mail: ioannis.angelakis@southwales.ac.uk

Abstract

In the past decade, the links between core types of childhood maltreatment and suicidal acts have become an increasingly important area of investigation. However, no meta-analytic review has examined this relationship in prisoners. We undertook the first systematic meta-analytic review examining the link between childhood maltreatment and suicide attempts in prisoners to redress this important gap. We searched Medline, PsychINFO, Embase, Web of Science and CINAHL from inception until August 2019. Meta-analyses using random effect models were applied, and heterogeneity was quantified using the $I^2$ statistic. Publication bias and risk of bias across studies were assessed. We identified 24 studies comprising 16 586 prisoners. The rates of different types of childhood maltreatment ranged between 29% and 68% [95% confidence interval (CI) 18–81%]. The rate of suicide attempts in prisoners was 23% (95% CI 18–27%). Main results demonstrated that sexual abuse [odds ratio (OR) 2.68, 95% CI 1.86–3.86], physical abuse (OR 2.16, 95% CI 1.60–2.91), emotional abuse (OR 2.70, 95% CI 1.92–3.79), emotional neglect (OR 2.29, 95% CI 1.69–3.10), physical neglect (OR 1.57, 95% CI 1.27–1.94) and combined abuse (OR 3.09, 95% CI 2.14–4.45) were strongly associated with suicide attempts in prisoners. There was an indication of publication bias. Duval and Tweedie’s trim-and-fill method was applied, which increased the odds for suicide attempts. Given the high rates of prison suicide deaths and suicide attempts, our findings suggest an urgent need for targeted suicide prevention priorities for prisoners, with a particular focus on ameliorating the effects of childhood traumatic experiences on suicidal prisoners.

Suicide fatalities are a major problem facing prisons, with male and female prisoners dying by suicide at a rate that is three- to nine-times higher than that found in the general population (Fazel et al., 2011, 2017). Furthermore, Fazel et al. (2017) reported that such fatalities have been elevated for prisoners in England and Wales, where suicide death rates were reported to be between 6 and 20 times higher than those recorded in the community. With regard to the geographical distribution of suicide deaths, Nordic and Western European countries have reported the highest suicide death rates, with over 100 suicide fatalities per 100 000 prisoners being recorded. In Australasian and North American countries, prison suicide death rates ranged between 23 and 67 per 100 000.

Given the high rates of prison suicide deaths globally, it is imperative to identify key factors that may contribute to suicidal acts in prisoners. Engaging in suicide attempts is a strong predictor of suicide deaths (Joiner, 2005; Johnson et al., 2010). Estimates of the prevalence of suicide attempts while in prison and those of the prevalence of attempts of current prisoners prior to being incarcerated have been reported as ranging between 10% and 31%, and between 10% and 54%, respectively (Godet-Mardirossian et al., 2011; Bhatta et al., 2014; Moore et al., 2015; Power et al., 2016; Sánchez et al., 2019). Estimates of lifetime suicide attempts within the general population range between 0.3% and 3% (Nock et al., 2008; Borges et al., 2010). Thus, an in-depth examination of the key variables that are linked with suicide attempts are essential in reducing the elevated rates of prison suicide deaths.

Adverse childhood experiences have been robustly associated with an increased risk for suicide attempts (Brezo et al., 2008; Kim et al., 2013). For example, a meta-analytic review which examined this association in clinical and non-clinical populations demonstrated a strong link between key types of childhood maltreatment (i.e. sexual, physical and emotional abuse, and emotional neglect) and both suicide attempts and ideation (Angelakis et al., 2019). Notably, these results were unaffected by key methodological variations (e.g. screening tools and/or research designs employed) and individual-level characteristics (e.g. age and gender) across studies. This demonstrates the robustness of this relationship.

In the last decade, links between myriad forms of childhood abuse and suicidal experiences have begun to be explored in incarcerated populations (Bhatta et al., 2014; Boonmann et al., 2016). Previous research has established that prisoners reliably report more childhood traumatic events than those in the general community (Jordan et al., 1996) and that these experiences are strongly linked to suicidal acts (Angelakis et al., 2019). Furthermore, with prison
suicide death rates being substantially higher than those in the general population, a systematic meta-analytic review examining the link between childhood maltreatment and suicide behaviors in prisoners is critical for guiding future research priorities and associated policy changes. Currently, there is no critical synthesis of evidence pertaining to the relationship between childhood abuse and suicidal acts within individuals in custody. Hence, we undertook the first systematic meta-analytic review evaluating this relationship. There were two key objectives:

(i) to quantitatively analyze the associations between core forms of childhood maltreatment and suicide attempts in prisoners;
(ii) to examine the degree to which any links between childhood abuse and suicide attempts also apply to suicidal ideation.

**Method**

The Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA; Moher et al., 2009) and the Meta-Analysis of Observational Studies in Epidemiology (MOOSE; Stroup et al., 2000) statements were employed to conduct and report the findings of this systematic review and meta-analysis. The MOOSE checklist is available in the online supplemental material (Appendix A).

**Eligibility criteria**

Studies were included that:

(a) reported a quantitative outcome of the association between any type of childhood maltreatment (e.g. sexual, physical, emotional abuse; physical and/or emotional neglect) experienced before the age of 18 years and suicide attempts or any other mode of suicidal experiences, such as thoughts, plans, intentions or deaths;
(b) focused on both juvenile (under 18) and adult (18 and over) prisoners;
(c) employed a quantitative research design;
(d) were written in English and published in peer-reviewed academic journals.

Studies were excluded that:

(a) focused on adverse childhood experiences other than abuse and neglect (e.g. death of a significant other, experiences of being bullied);
(b) reported data on the link between abuse and neglect experienced in adulthood (e.g. domestic abuse) and suicidal behaviors;
(c) were reviews, position papers, theses, and/or reports.

**Search strategy and data sources**

Five electronic bibliographic databases, including Medline, PsychInfo, Embase, Web of Science, and CINAHL, were searched with an end date of August 2019. The reference lists of the identified studies were also checked to locate eligible studies, and authors were contacted if additional information was needed. The search strategy included both text words and Medical Subjective Headings (MeSH) terms and combined three main blocks of key-terms: suicide (suicid*, self* harm*, suicid* correl*), child/sexual/physical/emotional abuse or neglect or maltreatment or adversities (child*, sex*, phys*, emoti* abuse, negl*, maltreat*, advers*) and prisoners (prison*, inmat*, offend*, jail*, custod*, imprison*, correction*, correctional facilit*, institut*, felon*, delinquen*, disciplin*, criminal*).

**Study selection**

Study selection was conducted in two stages. In stage 1, the first two authors (IA and JA) independently examined the titles and abstracts of the papers. In stage 2, the same raters evaluated whether all the inclusion and exclusion criteria were met. Inter-rater reliability for the title/abstract and full-text screening process was excellent ($\kappa = 0.91$ and 0.93, respectively).

**Data extraction**

An electronic data extraction sheet was devised and piloted in five randomly selected papers to extract descriptive data on key study characteristics, including number and age of participants, research design, method of recruitment, type of childhood maltreatment, mode of suicidal experiences and behaviors, and quantitative data [e.g. odds ratios (ORs) or equivalent measures] for the meta-analysis. Once the data sheet was deemed appropriate, data extraction on the remaining articles was completed by the first two authors (IA and JA). Inter-rater agreement was excellent ($\kappa = 0.93$).

**Risk of bias assessment**

The methodological quality of the studies was critically evaluated using the criteria as adopted by the Centre for Reviews and Dissemination (CRD, 2010) guidance for undertaking reviews in health care. These assessed the research design (cross sectional = 0, prospective/experimental = 1), response rate ($\geq 70\%$ or not reported = 0, $< 70\%$ or not reported = 1), screening tools for childhood maltreatment and for suicide experiences (self-report scale/not reported = 0, structured/semi-structured clinical interview = 1), and control for confounding/other factors in the reported analyses (no control/not reported = 0, controlled = 1). Those studies that were scored with at least four criteria out of five were given a high-quality rating; those with less than or equal to three criteria were given a low-quality rating. A binary critical appraisal item was also created based on these ratings ($1 = $low quality appraisal score; $2 = $high quality appraisal score) which was entered as a moderator in the meta-regression analyses.

**Data analyses**

The primary outcome was the association between different forms of childhood maltreatment and suicide attempts. More than half of the studies ($k = 16$) reported suicide attempts as dichotomous outcomes (number/proportions of prisoners with or without experiences of childhood maltreatment who engaged in suicide behavior in adulthood), whereas the remaining eight studies reported such outcomes in different formats (e.g. mean score of suicide attempts in participants with and without history of childhood maltreatment). ORs were selected as the preferred effect size. Continuous data were converted to ORs by utilizing a widely used formula (Borenstein et al., 2009). Most of the included studies ($n = 18$) contributed more than one relevant effect size. Therefore, we ensured that all the different types of childhood

https://doi.org/10.1017/S0033291719002848 Published online by Cambridge University Press
maltreatment were pooled separately to avoid double counting of studies in the same analysis.

All data were analyzed in Stata 15\textsuperscript{®}. We used the `metan` command to calculate the pooled effect size of the link between the different types of childhood maltreatment and suicide attempts. A random effects model was utilized because substantial heterogeneity was anticipated, which was assessed with the $I^2$ statistic (Higgins \textit{et al}., 2003). Traditionally, values of 25\%, 50\% and 75\% indicate low, moderate and high heterogeneity, respectively. Publication bias was examined with funnel plots and by applying the Egger \textit{et al}.'s (1997) test in cases where the analyses were based on at least nine studies (Saveleva and Selinski, 2008). Duval and Tweedie’s (2000) trim-and-fill method, which yields an estimate of the number of the missing studies, was used to provide an adjusted effect size estimate in case of publication bias. The prevalence rates of the various forms of childhood maltreatment and suicide attempts in prisoners were calculated by using the `metaprop` command (random effects model due to anticipated heterogeneity; Nyaga \textit{et al}., 2014), by excluding controls for those studies which recruited a mixed sample of participants (Rivlin \textit{et al}., 2013; Brewer-Smyth \textit{et al}., 2014). Finally, the extent to which methodological variations across the studies affected the link between childhood maltreatment and suicide attempts in prisoners was examined by applying univariate meta-regression models using the `metareg` command (Harbord and Higgins, 2008). We conducted such analyses only for comparisons comprising eight or more studies (Thompson and Higgins, 2002). Overall, two continuous and four categorical moderators were examined including: participants’ age; percentage of males; screening method for childhood maltreatment and suicide attempts (1 = self-report survey, 2 = interview); timeframe of suicide attempts (1 = lifetime, 2 = prison, 3 = both) and quality appraisal score (1 = low, 2 = high).

\textbf{Results}

We retrieved 2414 articles; 322 were removed as they were duplicates and a further 1974 were excluded because they (a) focused on other forms of adverse childhood experiences (e.g. parental death or divorce), (b) non-suicidal self-harm experiences (e.g. self-mutilation), (c) were non-empirical studies, or (d) were focused on misconduct, inappropriate behaviors, rule violation in prisons among others. The full texts of 118 articles were screened for inclusion. An additional 90 studies were excluded as they did not report data relevant to the link between childhood maltreatment and suicidal thoughts and behaviors. Of the remaining 28 studies, only four focused exclusively on either suicidal ideation (Zhang \textit{et al}., 2010; Boonmann \textit{et al}., 2016), suicide risk (Blauwe \textit{et al}., 2002), or suicidality (a term that may incorporate attempts, ideation, plans, urges and intentions; Sergentanis \textit{et al}., 2014), resulting in 24 independent studies which were focused exclusively on the link between any form of childhood maltreatment and suicide attempts in prisoners (see Fig. 1).

The overall sample was 16,586 prisoners across the 24 studies (see Table 1). The mean age was 32.39 (s.d. = 4.64, range: 17–41). Fifty-eight percent of participants were male. Most of the studies were conducted in the United States ($k = 9$; 37.5\%), Italy ($k = 4$; 16.67\%), or Australia ($k = 3$; 12.5\%), whereas a single study...
| Study                        | Country      | Study design | Screening tool for abuse | Mode of childhood abuse          | Screening tool for suicidality | Mode of suicidality | Timeframe of suicidality | Nature of offence                                                                 | Sample size | Men (%) | Age (years) | Q.A. |
|-----------------------------|--------------|--------------|--------------------------|---------------------------------|-------------------------------|---------------------|-------------------------|----------------------------------------------------------------------------------|-------------|---------|--------------|------|
| Altinas and Bilici (2018)   | Turkey       | Cross-sectional | CTQ                      | All forms of abuse and neglect  | CI                            | SA                  | Lifetime                | n/r                                                                              | 216         | 50      | Range: 18 and above | 3/5 |
| Bhatta et al. (2014)        | United States | Cross-sectional | SRQ                      | Sexual abuse                    | SRQ                           | SA                  | Lifetime                | Personal, property, drug, public order and unruly offences                       | 3156        | 78.0    | Range: 12–17            | 4/5 |
| Brewer-Smyth et al. (2014)  | United States | Case-control  | MS                       | Physical and sexual abuse       | n/r                           | SA                  | Current                 | Property and drug offences                                                      | 113         | 0       | n/r          | 2/3 |
| Butler et al. (2001)        | Australia    | Cross-sectional | HSI                      | Sexual Abuse                    | HSI                           | SA                  | Lifetime                | Violent and non-violent offenses                                                | 789         | 83.3    | Median = 30, range: 18–77 | 4/5 |
| Chapman et al. (2014)       | United States | Cross-sectional | CTQ                      | All forms of abuse and neglect  | LPC-II                        | SA                  | Lifetime/current        | Personal, property, drug offenses                                                | 104         | 0       | $M_{age} = 31.94$          | 3/5 |
| Chen and Gueta (2017)       | Israel       | Cross-sectional | CTQ                      | All forms of abuse and neglect  | ASI-I                         | SA                  | Lifetime                | Drug and property offenses, prostitution and assault                            | 46          | 0       | $M_{age} = 34.82$          | 3/5 |
| Clement-Nolle et al. (2009)  | United States | Cross-sectional | CTQ                      | All forms of abuse and neglect  | SBQ                           | SA                  | Lifetime                | n/r                                                                              | 247         | 0       | Median = 43, range: 20–72 | 3/5 |
| DeCou et al. (2016)         | United States | Cross-sectional | LHC                      | Sexual abuse                    | LHC                           | SA                  | Lifetime                | n/r                                                                              | 491         | 0       | $M_{age} = 34$, range: 17–55 | 2/5 |
| Friestad et al. (2014)      | Norway       | Cross-sectional | CI                       | All forms of abuse and neglect  | CI                            | SA                  | Lifetime                | n/r                                                                              | 141         | 0       | $M_{age} = 33$            | 4/5 |
| Godet-Mardirossian et al. (2011) | France     | Cross-sectional | CI                       | Combined forms of childhood maltreatment | MNI                           | SA                  | Current                 | n/r                                                                              | 899         | 100     | Median = 37, range: 19–84 | 3/5 |
| Gorodetsky et al. (2010)    | Italy        | Cross-sectional | CTQ                      | All forms of abuse and neglect  | MNI                           | SA                  | Lifetime                | n/r                                                                              | 702         | 100     | n/r          | 3/5 |
| Hakansson et al. (2011)     | Sweden       | Cross-sectional | ASI                      | Sexual, physical and emotional abuse | ASI                           | SA                  | Lifetime/current        | n/r                                                                              | 1561        | 80.62   | n/r           | 4/5 |
| Study                  | Country     | Study Design          | Questionnaire | Clinical interview | Combined forms of childhood maltreatment | Third party information | SA Type | Lifetime/Current Sexual offenses | Response Rate | Sample Size | M Age | Range |
|-----------------------|-------------|-----------------------|---------------|-------------------|------------------------------------------|-------------------------|---------|---------------------------------|---------------|-------------|-------|-------|
| Jeglic et al. (2013)  | United States | Cross-sectional       | Third party information | Combined forms of childhood maltreatment | Third party information | SA | Lifetime/Current Sexual offenses | Response Rate | Sample Size | M Age | Range |
| Kenny et al. (2008)   | Australia   | Cross-sectional       | CTQ           | All forms of abuse and neglect | CI | SA | Lifetime/Current Violent crimes, property, drug, public order and other offenses | Response Rate | Sample Size | M Age | Range |
| Mandelli et al. (2011)| Italy       | Cross-sectional       | CTQ           | All forms of abuse and neglect | MNI | SA | Lifetime Violent and non-violent offenses | Response Rate | Sample Size | M Age | Range |
| Moore et al. (2015)   | Australia   | Cross-sectional       | CTQ           | All forms of abuse and neglect | SBQ | SA | Lifetime n/r Violent and property offenses | Response Rate | Sample Size | M Age | Range |
| Power et al. (2016)   | Canada      | Cross-sectional       | CTQ           | All forms of abuse and neglect | CI | SA | Lifetime n/r Violent and property offenses | Response Rate | Sample Size | M Age | Range |
| Rivlin et al. (2013)  | England     | Matched-case control  | CTQ           | All forms of abuse and neglect | Third party referrals from prison officers | SA | Current Violent, sexual and property offenses | Response Rate | Sample Size | M Age | Range |
| Roy et al. (2014)     | Italy       | Cross-sectional       | CTQ           | All forms of abuse and neglect | MNI | SA | Lifetime Violent and non-violent offenses | Response Rate | Sample Size | M Age | Range |
| Sanchez et al. (2019) | Spain       | Cross-sectional       | CTQ           | Emotional physical abuse, and sexual abuse | A single question | SA | Current Property offenses | Response Rate | Sample Size | M Age | Range |
| Sarchiapone et al. (2009) | Italy | Cross-sectional       | CTQ           | All forms of abuse and neglect | MNI | SA | Lifetime Violent and non-violent offenses | Response Rate | Sample Size | M Age | Range |
| Swogger et al. (2011) | United States | Cross-sectional       | A single question | Physical abuse | A single question | SA | Lifetime n/r Violent and property offenses | Response Rate | Sample Size | M Age | Range |
| Tripodi et al. (2014) | United States | Cross-sectional       | CTQ           | All forms of abuse and neglect | ASI | SA | Lifetime n/r Violent and property offenses | Response Rate | Sample Size | M Age | Range |
| Verona et al. (2005)  | United States | Cross-sectional       | CI            | Physical and sexual abuse | CI | SA | Lifetime n/r Violent and property offenses | Response Rate | Sample Size | M Age | Range |

ASI, addiction severity index; ASI-I, Addiction Severity Index Interview; CI, Clinical Interview; CTQ, Child Trauma Questionnaire; HSI, Health Survey Interview; LHC, Life History Calendars; LPC-II, Lifetime Para-suicide Count-II; M, mean; MNI, Mini Neuropsychiatric Interview; MS, Muenzenmaier’s Scale; n/r, not reported; QA, Quality appraisal of the methodology of the included studies; SA, suicide attempts; SBQ, suicidal behaviours; S.D., standard deviation; SRQ, Self Report Questions
(4.17%) was conducted in each of England, France, Spain, Sweden, Norway, Israel, Canada, and Turkey.

As detailed in Table 2, within the current sample, 29% of the prisoners reported being victims of sexual abuse \((k = 11, 95\% \text{ confidence interval (CI) } 18–41, I^2 = 98.76\%\); 43% had experienced physical abuse \((k = 8, 95\% \text{ CI } 29–57, I^2 = 98.08\%\); 49% had experienced emotional abuse \((k = 7, 95\% \text{ CI } 32–65, I^2 = 98.40\%\); and 68% had experienced emotional neglect \((k = 3, 95\% \text{ CI } 53–81, I^2 = 86.16\%)\).

With regard to suicide attempts, 58.33% \((k = 14)\) of the studies reported data on lifetime suicide attempts, which incorporated suicide attempts of prisoners while in prison and attempts prior to or after leaving the prison, 16.66% \((k = 4)\) reported data on suicide attempts while in prison, and the remaining 20.83% \((k = 5)\) focused on a combination of attempts that occurred during or after imprisonment. Hence, provided that lifetime suicide attempts also incorporated those attempts that occurred exclusively in prisons, we pooled and reported the rates of suicide attempts into a single variable. The overall prevalence of the suicide attempts of prisoners was 23% \((95\% \text{ CI } 18–27, I^2 = 97.24\%)\) based on 21 studies (see Table 2; online Supplementary Appendix E).

**Main meta-analyses: associations between types of childhood maltreatment and suicide attempts in prisoners**

All forms of childhood maltreatment were associated with significantly increased odds for suicide attempts in prisoners (see online Supplementary Appendix B for forest plots). Sexual and emotional abuse were associated with a three-fold increased likelihood for suicide attempts \((k = 16, \text{OR } 2.68, 95\% \text{ CI } 1.86–3.86, I^2 = 92.4\%\) and \(k = 9, \text{OR } 2.70, 95\% \text{ CI } 1.92–3.79, I^2 = 74.0\%, \) respectively) whereas physical abuse and emotional neglect were associated with a two-fold increased likelihood for suicide attempts \((k = 11, \text{OR } 2.16, 95\% \text{ CI } 1.60–2.91, I^2 = 86.6\%\) and \(k = 7, \text{OR } 2.29, 95\% \text{ CI } 1.69–3.10, I^2 = 41.9\%, \) respectively). Physical neglect was associated with 1.5-fold increased likelihood for suicide attempts \((k = 7, \text{OR } 1.57, 95\% \text{ CI } 1.27–1.94, I^2 = 89.2\%).\) Almost half of the included studies provided data for the link between unspecified forms of childhood abuse/neglect and suicide attempts. This category was named ‘combined abuse’ and was analyzed separately. Combined abuse was associated with a three times increased likelihood for suicide attempts \((k = 13, \text{OR } 3.09, 95\% \text{ CI } 2.14–4.45, I^2 = 91.9\%).\) As indicated by the \(I^2\) statistic, heterogeneity ranged from medium to high across all analyses, except for the association between emotional neglect and suicide attempts, where heterogeneity ranged from moderate to low.

**Publication bias**

We assessed publication bias across comparisons that included at least nine studies. The screening of the funnel plots (see online Supplementary Appendix C) suggested that there was a publication bias for the relationship between sexual abuse and suicide attempts. Furthermore, the Egger’s et al. (1997) test for publication bias was significant in all the comparisons examined, which was an indication of publication bias (see Table 3). Therefore, we ran the Duval and Tweedie’s (2000) trim-and-fill method, which considerably increased the effect sizes (ORs ranged from 3.54 to 5.28; see Table 3). These results suggest that publication bias may not be an actual concern (Murad et al., 2018).

**Meta-regressions examining the impact of methodological variations on the associations between distinct forms of childhood maltreatment and suicide attempts in prisoners**

The number of pooled studies only allowed meta-regression analyses to be conducted for the associations between sexual, physical, emotional and combined abuse, and suicide attempts. The results of the univariate meta-regression analyses revealed that participant variables, including mean age \((p \text{ values ranged between 0.61 and 0.87})\) and percentage of males \((p \text{ values ranged between 0.34 and 0.97})\), and methodological variations, such as screening measures for childhood maltreatment \((p \text{ values ranged between 0.44 and 0.86})\), screening measures for suicide attempts \((p \text{ values ranged between 0.73 and 0.96})\), timeframe of suicide attempts \((p \text{ values ranged between 0.40 and 0.79})\) and critical appraisal score \((p \text{ values ranged between 0.31 and 0.87})\), across studies did not affect the strength of the associations between different forms of abuse and suicide attempts (see online Supplementary Appendix D for the results of the meta-regression analyses).

**Discussion**

This is the first systematic meta-analytic review to examine the relationship between core forms of childhood maltreatment and suicide attempts in prisoners. We reported results from a total of 16 586 prisoners. The rates of childhood maltreatment experiences ranged from 29% to 68%, whereas the rate of suicide attempts in prisoners was 23%. There were two key findings. First, we demonstrated that suicide attempts were strongly linked, cross-sectionally, with experiences of childhood abuse and/or neglect in prisoners, which remained unaffected by methodological variations. In particular, prisoners who reported experiences of combined abuse/neglect, sexual and emotional abuse were three times more likely to engage in suicide attempts compared to those prisoners who had not experienced such events. Physical abuse and emotional neglect were associated with twice the likelihood for suicide attempts. Finally, prisoners who reported being physically neglected during childhood were found to have 1.5 more suicide attempts in adulthood compared with prisoners who had not experienced abuse or neglect. It must be highlighted that these results reflect cross-sectional rather than longitudinal data. Consequently, neither temporal precedence nor causation can be demonstrated.
To date there have been limited attempts to link the strong relationship between forms of childhood maltreatment and suicidal experiences, with contemporary models of suicidal thoughts and behaviors (Johnson et al., 2008; O’Connor and Nock, 2014; Klonsky and May, 2015; O’Connor and Kirtley, 2018; O’Connor and Portzky, 2018). Four key priorities would advance this literature. First, researchers should identify socio-economic and epidemiological factors which are associated with a high prevalence of suicidal thoughts, acts, and fatalities in vulnerable prisoners (Rivlin et al., 2013; Fazel et al., 2017). Second, a better understanding of the ways in which different forms of childhood abuse may exacerbate symptoms of mental health problems is needed. Examples of such symptoms include avoidance, hyperarousal, and command hallucinations which may trigger and/or amplify suicidal thoughts and behaviors (Panagioti et al., 2017). Third, future research should examine the ways in which experiences of childhood abuse feed into more transdiagnostic approaches which seek to better understand the psychological pathways leading to suicidal thoughts, urges, plans, acts and deaths (Bolton et al., 2007; Johnson et al., 2008; O’Connor and Kirtley, 2018). The fourth issue follows in that there should be an endeavor to investigate how symptom-specific contributors to suicidal experiences interact with putative psychological suicide mechanisms (Goody et al., 2015). Many of the contemporary models of suicide highlight that important mediators in the relationship between childhood maltreatment and suicide attempts, which include perceptions of being socially isolated, feeling a burden, being overwhelmed by, for example, strong labile emotions, feeling defeated and/or trapped, and having no hope for the future, are central to the pathways to suicidal experiences (Johnson et al., 2008; Van Orden et al., 2010; Palmier-Claus et al., 2012; O’Connor and Kirtley, 2018). Therefore, it is paramount that future studies explore the interactions between past and current traumatic experiences in prisoners that may amplify these types of feelings and perceptions using qualitative and quantitative longitudinal and micro-longitudinal designs. Finally, a key component to consider is the development and activation of suicide schema in people who have experienced child abuse (Lau et al., 2004). Suicide schemas are under-researched but have been found to be extensive in people with non-affective psychosis and also post-traumatic stress disorder (Tarrrier et al., 2007; Pratt et al., 2010; Panagioti et al., 2015). It is important to determine how suicide schema develop and become more extensive over time as a result of current and past childhood abuse and/or neglect, especially in those vulnerable to suicidal experiences (i.e. prisoners).

None of the identified studies examined the impact of potentially important moderators on the relationship between childhood maltreatment and suicide attempts. Examples might include such variables as length of offense, life events, such as homelessness or running away from home as an adolescent (Kenny et al., 2008; Rivlin et al., 2013; Bhatta et al., 2014; Sánchez et al., 2019), and adverse prison-related experiences, including social isolation and victimization by other prisoners (Blaauw et al., 2002; Suto and Arnaut, 2010). Perhaps most importantly, we should prioritize studies examining key factors that attenuate or buffer the relationship between childhood abuse/neglect and suicide attempts. For example, Rivlin et al. (2011) suggested that an increased level of care from professionals or prison staff, especially when prisoners engage in precursor non-suicidal self-harm behaviors, may be effective at reversing such outcomes. However, while examination of mediators and/or moderators is important, studies have rarely been able to examine these types of mediators and moderators in prisoners who have attempted or died by suicide, because converging data on pertinent and meaningful mediators and/or moderators together with suicide attempts and fatalities are rare. Clearly, future research should further explore the significance of these factors on suicidal experiences in prisoners.

Second, we identified a paucity of studies exploring the link between childhood abuse/neglect and the different modes of suicide behavior other than attempts, including suicidal ideation, urges, and plans. We only identified four studies exploring the link between any form of childhood maltreatment and suicidal ideation or suicide risk (Blaauw et al., 2002; Zhang et al., 2010; Sergentanis et al., 2014; Boonmann et al., 2016). This is an important gap in the literature because there is compelling evidence suggesting that among those individuals experiencing lifetime suicidal ideation with or without plans the likelihood of acting upon their thoughts ranges between 30% and 55% (Nock et al., 2008). Furthermore, alleviating the immense psychological distress associated with having suicidal thoughts, urges and/or forming suicide plans is an important clinical target (Tarrrier et al., 2013).

Recent evidence suggests that cognitive-behavioral suicide prevention therapies can be successfully extended within prison...
settings. For example, Pratt et al. (2015) found that this treatment approach was promising in reducing suicide risk in male prisoners considered at high risk for suicide. Given preliminary evidence suggesting that the format of cognitive-behavioral therapy (e.g. individual v. group) does not alter its effectiveness in reducing psychological symptoms such as depression and anxiety in prisoners (Khodayarifard et al., 2010), which are strongly linked to suicidal acts, research on scaling up clinical therapies for groups of high-risk prisoners is essential.

It is also worth noting that more than half of the included studies were undertaken in the USA, followed by Italy and Australia. This is not a surprising, given that the USA has among the highest rates of incarceration globally (U.S. Department of Justice, 2016). However, the USA is among the countries with the lowest rates of prison suicide (Fazel et al., 2017). Countries such as England, France, Norway and Sweden, where incarceration rates are lower, contributed a single study (per country) to the analysis. Interestingly, these countries have the highest prison suicide death rates worldwide. Differences in definitions of suicide deaths in prisoners, which was initially suspected to account for this discrepancy, did not affect overall prison suicide rates. It is, therefore, important that more research is conducted to identify key factors that contribute to these outcomes, including country specific provision of mental health care, amount of daily activity, and quality of staff-prisoner relationships, among others.

There are five main limitations of the current study which warrant discussion. First, heterogeneity across the majority of the comparisons undertaken was moderate to high, which is, perhaps, to be expected. To address this, we applied random effect models to adjust for between-study variations. Second, we found an indication of publication bias for the majority of the comparisons undertaken was moderate to high, which is, perhaps, to be expected. To attenuate this bias, we employed the fill-and-trim approach which increased the effect sizes. Although these results suggest that the strong link between experiences of childhood maltreatment and suicide attempts in prisoners may remain unaffected (e.g. Murad et al., 2018), they should still be interpreted with caution. Third, the number of studies included in some comparisons was small. As such, these findings may warrant further investigation. Fourth, this review focused exclusively on core types of childhood maltreatment and, as such, particular types of adverse childhood events (e.g. parental deaths and divorces) were not considered. Future research should explore these relationships in more depth. Fifth, although it would have been more informative to differentiate between the prevalence of lifetime suicide attempts and those attempts that occurred while in the prison system, the lack of such information from the included studies prevented this distinction from being made. However, it is acknowledged that the most helpful information for correctional staff would be rates of suicide attempts while in prison separated from those which preceded incarceration or followed release from prison. That said, it is important to note that many prisoners return to prison after release, making the dynamic between factors which precipitate suicide attempts in prison and those which precipitate suicide attempts after release difficult to capture. In this regard, qualitative work which probes the triggers for suicidal thoughts, plans and attempts while in prison and after release, and the interactions between the effects of such different contexts with child abuse, may be of optimal practical help going forward. With these caveats acknowledged, a clear message from this meta-analysis is that prisoners who have experienced child abuse and/or neglect may be the most vulnerable with respect to having different forms of suicidal thoughts, plans and acts.

This study has three noteworthy strengths. First, it is the first systematic review with meta-analysis which incorporated an extensive synthesis of the association between core forms of childhood maltreatment and suicide attempts in prisoners confirming their robust associations with suicide attempts. Second, the current meta-analysis was conducted in compliance with PRISMA and MOOSE guidelines. Third, the methodological quality of the included studies was critically evaluated and rated.

Conclusions

In summary, this is the first systematic meta-analytic review of the relationship between childhood maltreatment and suicide attempts that was conducted in prisoners. Although this relationship has yet to be fully explored, we demonstrated that a strong link exists between forms of childhood maltreatment and suicide attempts. No evidence exists regarding other modes of suicide behaviors, including suicidal ideation, suicide plans and deaths by suicide. We recommend that further research employ more robust, higher quality designs, such as, longitudinal, micro-longitudinal, qualitative and/or mixed designs, to corroborate and expand the findings of the current review. Taken together, these findings highlight, as a matter of urgency, the need for targeted suicide prevention priorities for prisoners with a focus on ameliorating the effects of childhood maltreatment on suicidal thoughts, behaviors and attempts (House of Commons Library, 2018). These initiatives should be a priority at the levels of policy making and institutional reform, whereby the provision of different modes of suicide focused psychological therapy targeting childhood experiences of maltreatment (Pratt et al., 2015) is conducted in tandem with robust staff awareness and training programs (Joe et al., 2017).

Supplementary material. The supplementary material for this article can be found at https://doi.org/10.1017/S0033291719002848.

Acknowledgements. We thank Matilda Angelaki for comments that greatly improved the manuscript.

Financial support. No financial support has been received for this piece of work.

Conflict of interest. All other authors declare that they have no conflicts of interest.

References

Altintas M and Bilici M (2018) Evaluation of childhood trauma with respect to criminal behavior, dissociative experiences, adverse family experiences and psychiatric backgrounds among prison inmates. Comprehensive Psychiatry 82, 100–107.

Angelakis I, Gillespie El and Panagioti M (2019) Childhood maltreatment and adult suicidality: a comprehensive systematic review with meta-analysis. Psychological Medicine 49, 1057–1078.

Bhatta M, Jeffers E, Kavadas A, Alemagno S and Shaffer-King P (2014) Suicidal behaviors among adolescents in juvenile detention: role of adverse life experiences. PLoS ONE 9, e89408.

Blauw E, Arensman E, Kraaij V, Winkel F and Bout R (2002). Traumatic life events and suicide risk among jail inmates: the influence of types of events, time period and significant others. Journal of Traumatic Stress 15, 9–16.

Bolton C, Gooding P, Kapur N, Barrowclough C and Tarrier N (2007) Developing psychological perspectives of suicidal behaviour and risk in people with a diagnosis of schizophrenia: we know they kill themselves but do we understand why? Clinical Psychology Review 27, 511–536.
Boonmann C, Grisso T, Guy L, Collins O, Mulder E and Vahl P (2016) Childhood traumatic experiences and mental health problems in sexually offending and non-sexually offending juveniles. Child and Adolescent Psychiatry and Mental Health 10, 45–45.

Borenstein M, Hedges L, Higgins J and Higgins D (2009) Introduction to Meta-Analysis, 2nd Edn. Hoboken: Wiley.

Borges G, Nock M, Haro-Abad J, Hwang I, Sampson N, Alonso J, Andrade LH, Angermeyer MC, Beauvais A, Bromet E, Bruferaerts R, de Girolamo G, Florescu S, Gureje O, Hu C, Karam EG, Kovess-Masfety V, Lee S, Levison D, Medina-Mora ME, Orel M, Posada-Villa J, Sager R, Tomoy T, Uda H, Williams DR and Kessler RC (2010) Twelve-month prevalence of and risk factors for suicide attempts in the World Health Organization World Mental Health Surveys. The Journal of Clinical Psychiatry 71, 1617–1628.

Brewer-Smyth K, Burgess A and Shults J (2014) Physical and sexual abuse, salivary cortisol, and neurologic correlates of violent criminal behavior in female prison inmates. Biological Psychiatry 55, 21–31.

Brezo J, Paris J, Vitaro F, Hébert M, Tremblay R and Turecki G (2008) Predicting suicide attempts in young adults with histories of childhood abuse. The British Journal of Psychiatry: The Journal of Mental Science 193, 134–139.

Butler T, Donovan B, Fleming J, Levy M and Kaldor J (2001) Childhood sexual abuse among Australian prisoners. Venereology 14, 109–115.

Centre for reviews and dissemination (2010) Twelve-month prevalence of and risk factors for suicide attempts in the World Health Organization World Mental Health Surveys. The Journal of Clinical Psychiatry 71, 1617–1628.

Chapman A, Gratz K and Turner B (2014) Risk-related and protective correlates of nonsuicidal self-injury and co-occurring suicide attempts among incarcerated women. Suicide and Life-Threatening Behavior 44, 139–154.

Chen G and Gueta K (2017) Lifetime history of suicidal ideation and attempts among incarcerated women in Israel. Psychological Trauma: Theory, Research, Practice, and Policy 9, 596–604.

Clements-Nolle K, Wolden M and Bargmann-Losche J (2009) Childhood trauma and risk for past and future suicide attempts among women in prison. Women's Health Issues 19, 185–192.

DeCou C, Lynch S, Dehart D and Belknap J (2016) Evaluating the association between childhood sexual abuse and attempted suicide across the life-span: findings from a nationwide study of women in jail. Psychological Services 13, 254–260.

Duval S and Tweedie R (2000) Trim and fill: a simple funnel-plot-based method for testing and adjusting for publication bias in meta-analysis. Biometrics 56, 455–463.

Egger M, Smith G, Schneider M and Minder C (1997) Bias in meta-analysis detected by a simple, graphical test. BMJ 315, 629–634.

Fazel S, Grann M, Kling B and Hawton K (2011) Prison suicide in 12 countries: an ecological study of 861 suicides during 2003–2007. Social Psychiatry and Psychiatric Epidemiology 46, 191–195.

Fazel S, Ramesh T and Hawton K (2017) Suicide in prisons: an international study of prevalence and contributory factors. The Lancet Psychiatry 4, 946–952.

Friedstad C, Åse-Bente R, Kjelsberg E and Friedstad C (2014) Adverse childhood experiences among women prisoners: relationships to suicide attempts and drug abuse. The International Journal of Social Psychiatry 60, 40–46.

Godet-Mardirossian H, Jehel L, Falissard B and Godet-Mardirossian H (2011) Suicidality in male prisoners: influence of childhood adversity mediated by dimensions of personality. Journal of Forensic Sciences 56, 942–949.

Gooding P, Tarrier N, Dunn G, Shaw J, Awenat Y, Ulph F and Pratt D (2015) Effect of hopelessness on the links between psychiatric symptoms and suicidality in a vulnerable population at risk of suicide. Psychiatry Research 230, 464–471.

Gorodetsky E, Carli V, Sarchiapone M, Roy A, Goldman D and Enoch M (2016) Predictors for self-directed aggression in Italian prisoners include externalizing behaviors, childhood trauma and the serotonin transporter gene polymorphism 5-HTTLPR. Genes, Brain and Behavior 15, 465–473.

Hakansson A, Bradvik L, Schlyter F and Berglund M (2011) Variables associated with repeated suicide attempt in a criminal justice population. Suicide and Life-Threatening Behavior 41, 517–531.

Harbord R and Higgins JPT (2008) Meta-regression in Stata. Stata Journal 8, 493–519.

Higgins J, Thompson S, Deeks J and Altman D (2003) Measuring inconsistency in meta-analyses. BMJ 327, 557–560.

House of Commons Library (2018) Suicide prevention: Policy and strategy. Available at https://researchbriefings.parliament.uk/ResearchBriefing/Summary/CRB-8221 (Accessed 7 February 2019).

Jeglic EL, Spada A and Mercado CC (2013) An examination of suicide attempts among incarcerated sex offenders. Sexual Abuse: A Journal for Research and Treatment 25, 21–40.

Joe R, Drake GB, Shaffer JS and Jackson BA (2017) Envisioning an Alternative Future for the Corrections Sector within the U.S. Criminal Justice System. Santa Monica, CA: RAND Corporation.

Johnson J, Gooding P and Tarrier N (2008), Suicide risk in schizophrenia: explanatory models and clinical implications. Psychology and Psychotherapy: Theory, Research and Practice 81, 55–77.

Johnson J, Gooding PA, Wood AM, Taylor PJ, Pratt D and Tarrier N (2010) Resilience to suicidal ideation in psychosocial positive self-appraisals buffers the impact of hopelessness. Behaviour Research and Therapy 48, 883–889.

Joiner T (2005) Why People Die by Suicide. Cambridge, MA: Harvard University Press.

Jordan BK, Schlenzer WE, Fairbank JA and Caddell JM (1996) Prevalence of psychiatric disorders among incarcerated women: convicted felons entering prison. Archives of General Psychiatry 53, 513–519.

Kenny DT, Lennings CJ and Munn OA (2008) Risk factors for self-harm and suicide in incarcerated young offenders: implications for policy and practice. Journal of Forensic Psychology Practice 8, 358–382.

Khodayarifard M, Shokoochi-Yeka M and Hamot GE (2010) Effects of individual and group cognitive-behavioral therapy for male prisoners in Iran. International Journal of Offender Therapy and Comparative Criminology 54, 743–755.

Kim S, Kang H, Kim S, Kim J, Yoon J, Jung S, Lee M, Yim H and Jun T (2013) Impact of childhood adversity on the course and suicidality of depressive disorders: the crescend study. Depression and Anxiety 30, 965–974.

Klonsky ED and May AM (2015) The Three-Step Theory (3ST): a new theory of suicide rooted in the ‘ideation-to-action’ framework. International Journal of Cognitive Therapy 8, 114–129.

Lau MA, Segal ZV and Williams JMG (2004) Teasdale’s differential activation hypothesis: implications for mechanisms of depressive relapse and suicidal behaviour. Behaviour Research and Therapy 42, 1001–1017.

Mandelli L, Carli V, Roy A, Serretti A and Sarchiapone M (2011) The influence of childhood trauma on the onset and repetition of suicidal behavior: an investigation in a high-risk sample of male prisoners. Journal of Psychiatric Research 45, 742–747.

Moher D, Liberati A, Tetzlaff J and Altman DG (2009) Preferred reporting items for systematic reviews and meta-analyses: the PRISMA statement. V o l u c e l l a 3 3 9 , e 1 0 0 0 0 9 7 .

Moore E, Gaskin C and Indig D (2015) Attempted suicide, self-harm, and psychological disorder among young offenders in custody. Journal of Correctional Health Care 21, 243–254.

Murad MH, Chu H, Lin L and Wang Z (2018) The effect of publication bias magnitude and direction on the certainty in evidence. BMJ Evidence-Based Medicine 23, 84–86.

Nock M, Borges G, Bromet E, Alonso J, Angermeyer M, Beauarts A, Bruferaerts R, Chiu WT, de Girolamo G, Gluzman S, de Graaf R, Gureje O, Haro J-M, Huang Y, Karam E, Kessler RC, Lepine JP, Levinson D, Medina-Mora ME, Ono Y, Posada-Villa J and Williams D (2008) Cross-national prevalence and risk factors for suicidal ideation, plans and attempts. The British Journal of Psychiatry 192, 98–105.

Nyaga VN, Arbyn M and Aerts M (2014) Matapop: a Stata command to perform meta-analysis of binomial data. Archives of Public Health 72, 39.

O’Connor RC and Kirmley OJ (2018) The integrated motivational-volitional model of suicidal behaviour. Philosophical Transactions of the Royal Society B-Biological Sciences 373, 20170268.

Psychological Medicine
O’Connor RC and Nock MK (2014) The psychology of suicidal behaviour. The Lancet. Psychiatry 1, 73–85.

O’Connor RC and Portzky G (2018) Looking to the future: a synthesis of new developments and challenges in suicide research and prevention. Frontiers in Psychology 9, 2139.

Palmier-Claus JE, Taylor PJ, Gooding P, Dunn G and Lewis SW (2012) Affective variability predicts suicidal ideation in individuals at ultra-high risk of developing psychosis: an experience sampling study. The British Journal of Clinical Psychology 51, 72–83.

Panagioti M, Angelakis I, Turrier N and Gooding P (2017). A prospective investigation of the impact of distinct posttraumatic (PTSD) symptom clusters on suicidal ideation. Cognitive Therapy and Research 41, 645–653.

Panagioti M, Gooding PA, Pratt D and Tarrier N (2015) An empirical investigation of suicide schemas in individuals with posttraumatic stress disorder. Psychiatry Research 227, 302–308.

Power J, Gobeil R, Beaudette J, Ritchie M, Brown S and Smith H (2016) Childhood abuse, nonsuicidal self-Injury, and suicide attempts: an exploration of gender differences in incarcerated adults. Suicide and Life-Threatening Behavior 46, 745–751.

Pratt D, Gooding P, Johnson J, Taylor P and Tarrier N (2010) Suicide schemas in non-affective psychosis: an empirical investigation. Behaviour Research and Therapy 48, 1211–1220.

Pratt D, Tarrier N, Dunn G, Awenat Y, Shaw J, Ulph F and Gooding P (2015) Cognitive-behavioural suicide prevention for male prisoners: a pilot randomized controlled trial. Psychological Medicine 45, 3441–3451.

Rivlin A, Fazel S, Marzano I and Hawton K (2011) The suicidal process in male prisoners making near-lethal suicide attempts. Psychology, Crime & Law 19, 305–327.

Rivlin A, Hawton K, Marzano I and Fazel S (2013) Psychosocial characteristics and social networks of suicidal prisoners: towards a model of suicidal behaviour in detention. PLoS ONE 8, e68944.

Roy A, Carli V, Sarchiapone M and Branchey M (2014) Comparisons of prisoners who make or do not make suicide attempts and further who make one or multiple attempts. Archives of Suicide Research 18, 28–38.

Sánchez FG, Ignatyev Y and Mundt A (2019) Associations between childhood abuse, mental health problems, and suicide risk among male prison populations in Spain. Criminal Behaviour and Mental Health, CBMH 29, 18–30.

Sarchiapone M, Carli V, Di Giannantonio M and Roy A (2009) Risk factors for attempting suicide in prisoners. Suicide and Life-Threatening Behavior 39, 343–350.