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Review article

Association Between Abuse History and Adolescent Pregnancy: A Meta-analysis

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A B S T R A C T

Purpose: Although a purported risk factor for early pregnancy is abuse history, the strength of this association has been inconsistent across studies and may vary as a function of abuse type. The purpose of this meta-analysis was to examine the extent to which sexual, physical, and emotional abuse, as well as neglect, increased the risk of adolescent pregnancy.
Methods: A search of studies through MEDLINE, EMBASE, PsycINFO, Social Work Abstracts, and Web of Science was conducted. Studies were retained if they included (1) women who became pregnant before 20 years of age; (2) a comparison group of nonpregnant adolescents; and (3) abuse experience (<18 years of age).
Results: Thirty-eight independent samples provided 70 estimates of effect sizes, derived from 75,390 participants. Both sexual and physical abuse were associated with an increased risk of adolescent pregnancy (odds ratio [OR], 2.06; 95% confidence interval [CI], 1.75–2.38 and OR, 1.48; CI, 1.24–1.76, respectively). The strongest effect was for the co-occurrence of sexual and physical abuse (OR, 3.83; CI, 2.96–4.97]). Nonsignificant effect sizes were found for emotional abuse (OR, 1.01; CI, .70–1.47) and neglect (OR, 1.29; CI, .77–2.17]), although these were moderated by journal impact factor, that is, greater effect sizes were reported in higher impact journals.
Conclusions: The results of this meta-analysis reveal that the strength of the association between abuse and adolescent pregnancy varies as a function of abuse subtype. Sexual and physical abuse were associated with increased risk for adolescent pregnancy, whereas emotional abuse and neglect were not.

IMPLICATIONS AND CONTRIBUTION

Significant social, economic, and health risks are associated with adolescent pregnancy and parenthood. A history of sexual and physical abuse places female adolescents at increased risk of becoming pregnant. Thus, sexual health counseling is an important preventative initiative that may be especially important for youth with histories of abuse.

In 2011, the female adolescent birthrate in the United States was approximately 3.1% [1]. The long-term economic and social burden of adolescent motherhood is significant, with an estimated cost of 10.9 billion dollars annually in the United States [2]. Adolescent motherhood is also associated with adverse social, psychological, and health outcomes. Compared with adult mothers, adolescent mothers have higher instances of pre- and post-natal complications and preterm births, as well as rapid repeat pregnancies, and their infants are at greater risk of low birth weight, infant mortality, hospitalizations, and emergency room visits [3,4]. Adolescent mothers are also at risk of poverty, dependence on social services, lower levels of educational attainment, and poor parenting skills [5–7]. Exposure to such adverse environments can in turn place the adolescent mother

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and her offspring at risk of various forms of psychopathology [8]. Given the risks associated with being an adolescent mother, enhancing the current understanding of its antecedents is imperative. Moreover, attaining a better understanding of the factors that place adolescents at risk for pregnancy has important implications for health professionals, researchers, and public policy makers alike.

In 2011, over 3.7 million children were the subjects of at least one report of maltreatment, and approximately 685,000 of these reports were substantiated allegations, with the percentage of children reported as victims of specific types of maltreatment as follows: 78.5% neglect, 15% physical abuse, 9% sexual, and approximately 7% emotional [9]. Although it has been proposed that all types of abuse could be associated with adolescent pregnancy, the etiologic mechanisms underlying the association between abuse and adolescent pregnancy are not well understood [10]. Purported mechanisms of influence for sexually abused adolescents include early sexualization behavior, initiation, and promiscuity; however, empirical research suggests that exposure to all types of abuse increases the likelihood of engaging in sexual intercourse at young age [11]. A desire to escape an abusive, chaotic, or dysfunctional family and create a different family environment could lead to becoming pregnant prematurely [12]. Abuse exposure may instigate low self-esteem, acting out behaviors, and/or associations with deviant peer groups [13]. The need to fulfill unmet intimacy needs as a result of emotional deprivation may, in turn, predispose young women to seek out emotional closeness in the form of early sexual relationships that could lead to early pregnancy [14]. Other adverse consequences of abuse, such as neurologic impairments, poor academic achievement, substance use, delinquency, and various forms of psychopathology, could also impact effective decision making which in turn may place youth at risk for unsafe sexual behavior (e.g., poor contraceptive use) that exacerbates the chances of becoming pregnant [15–17]. Finally, the traumatogenic effects of early abuse, including feelings of betrayal, guilt, stigmatization, and powerlessness [18,19], may have profound effects on the cognitive schemas of young women, characterized by pathogenic interpersonal disconnection, rejection, and vulnerability to harm [20,21] that may increase sexual behavior and resultant outcomes, including adolescent pregnancy.

The notion that abuse experiences place young women at risk for early pregnancy has been extensively studied; however, estimates of the strength of this association across these studies have ranged from nonsignificant to strong, and appear to vary across the type of abuse experience under investigation, making the literature difficult to understand and interpret [22–25]. In a review of 14 studies on sexual abuse exclusively, Noll [26] reported that adolescent women who had experienced sexual abuse were more than twice as likely to become pregnant compared with those who had not been abused. The strength of association between early pregnancy and other forms of abuse, such as physical abuse, emotional abuse, and neglect, all of which have been linked to early sexual intercourse, teenage pregnancy, and an array of adverse psychosocial outcomes, is currently unknown [11,27,28]. Moreover, there is a paucity of literature that compares and contrasts effect sizes for the association between abuse type and adolescent pregnancy, thereby limiting conclusions that can be drawn regarding the risk conferred by each type of abuse. A synthesis of the available literature is essential for the development of appropriately targeted intervention research. The primary aim of the present study was to provide a meta-analysis of the literature describing the associations between types of abuse experiences and early pregnancy, with a secondary aim of examining potential moderators of these associations.

Methods

This meta-analysis was based on recommendations by PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) for reporting systematic reviews [29]. Searches were conducted by a medical librarian in MEDLINE, EMBASE, PsycINFO, Social Work Abstracts, and Web of Science, and included articles published between 1965 and April 2013. Database-specific subject headings were selected for the concepts of "adolescent pregnancy" and "abuse" and "neglect." The *Used For* terms in the databases were used to generate text word searches to combine with the selected database subject headings. All teen pregnancy terms were combined first using the Boolean "OR." All abuse history terms were also combined using a Boolean "OR." These two sets of terms were then combined with the Boolean "AND." In all databases, adjacency operators and truncation symbols were used in text word searches when appropriate, to capture variant endings of the search terms and variant spellings. No language or date restrictions were applied.

To identify studies meeting inclusion criteria, two authors reviewed titles and abstracts identified in the search strategy. When titles and abstracts were insufficient to determine inclusion criteria, full articles were retrieved. The full text of all relevant studies was reassessed for inclusion by two reviewers and included or excluded as appropriate. Reference lists of included articles were searched for additional studies. A study was included if it fulfilled the following five criteria: (1) the study involved females who reported a pregnancy under the age of 20 years. We included adolescent samples and adult samples reporting previous experiences of pregnancy under the age of 20 years; (2) there was a direct comparison between pregnant and never pregnant adolescents; (3) a measure of abuse or neglect occurring in childhood and/or adolescence was collected; (4) the study statistic could be transformed into an effect size (when studies did not report sufficient information for the calculation of an effect size, the corresponding authors were contacted; four study authors were emailed, none responded); and (5) the study was available in English.

Studies meeting inclusion criteria were coded using a standard coding form developed to rate each study on measurement characteristics, as well as study-level and sample-level moderators. To ensure accuracy and reliability, a proportion of the studies (20%) was verified by a second coder, and any discrepancies were resolved through conferencing. In view of the variability expected by abuse type, abuse outcomes were divided into four types corresponding to classifications of abuse: sexual abuse, physical abuse, emotional abuse, and neglect.

Several potential moderators were examined to explain heterogeneity of effect sizes, including (1) quality of abuse measure (validated vs. nonvalidated measure); (2) measurement type (questionnaire vs. interview); (3) perpetrator of abuse (family member, dating partner, or otherwise unspecified); (4) type of sexual contact (forced sexual intercourse vs. touching or fondling); (5) mean age at the time of study data collection; (6) prospective versus retrospective study design; and (7) journal impact score as a proxy for study quality. However, if there were fewer than three studies at one level of the moderator variables, these were excluded from analysis because of insufficient power for analyses.

Statistical analyses

Effect sizes were calculated and analyzed using Comprehensive Meta-Analysis version 2.0 software (Biostat, Englewood, NJ) [30]. Where possible, unadjusted odds ratios (OR) and 95% confidence intervals (CIs) were calculated directly from information provided in each study. Otherwise, the reported OR and 95% CIs in studies were used. Effect size calculations were based on random effects models. Random effects models are based on the assumption that each study included in the meta-analysis has its own population parameters [23]. Random effects models more adequately mirror the heterogeneity in behavioral studies and derive noninflated alpha levels when the assumption of homogeneity has not been met [31]. We assessed for heterogeneity of effect size using the *Q* and I^2 statistics [32]. Whereas the Q statistic is a test of the null hypothesis that all studies share a common effect size, the I^2 statistic examines what proportion of the observed variance is real, indexed on a scale from 0 (complete homogeneity) to 1 (complete heterogeneity). The significance of dimensional moderators was assessed using mixed-effect models metaregression [33].

To test and correct for publication bias [34], the trim-and-fill procedure was used. We also performed the *fail-safe N* [31] to estimate the number of unpublished studies with null results required to reduce the effect size into a nonsignificant outcome. Results are considered robust against the file-drawer effect if the *fail-safe N* is greater than or equal to five times the number of studies in the analysis plus ten [31].

Results

Our electronic search of five databases yielded 3,837 nonduplicate articles. On review of the titles and abstracts, 162 articles were identified as potentially meeting inclusion criteria and full articles were retrieved. Figure 1 presents a flowchart of the review process. A total of 38 independent samples met inclusion criteria and the number of studies providing analyses involving abuse type was as follows: sexual (N = 35), physical (N = 20), emotional (N = 8), neglect (N = 4), and sexual and physical abuse combined (N = 3). Study characteristics are presented in Table 1.

Sexual abuse

A total of 35 studies and 67,978 adolescents were available for this analysis. Random-effects meta-analysis produced a combined effect size of OR = 2.06 (CI, 1.75–2.38), suggesting that an adolescent with a history of sexual abuse is approximately twice as likely to become pregnant as an adolescent without a sexual abuse history. The majority of effect sizes were positive (89%), demonstrating further support for the link between sexual abuse and adolescent pregnancy (Figure 2). The funnel plot demonstrated the presence of publication bias. Using the trim-and-fill procedure, seven studies were trimmed and replaced, resulting in a significant adjusted effect of OR = 1.73 (CI, 1.47–2.04). The fail-safe number was 5,147. Statistically significant heterogeneity

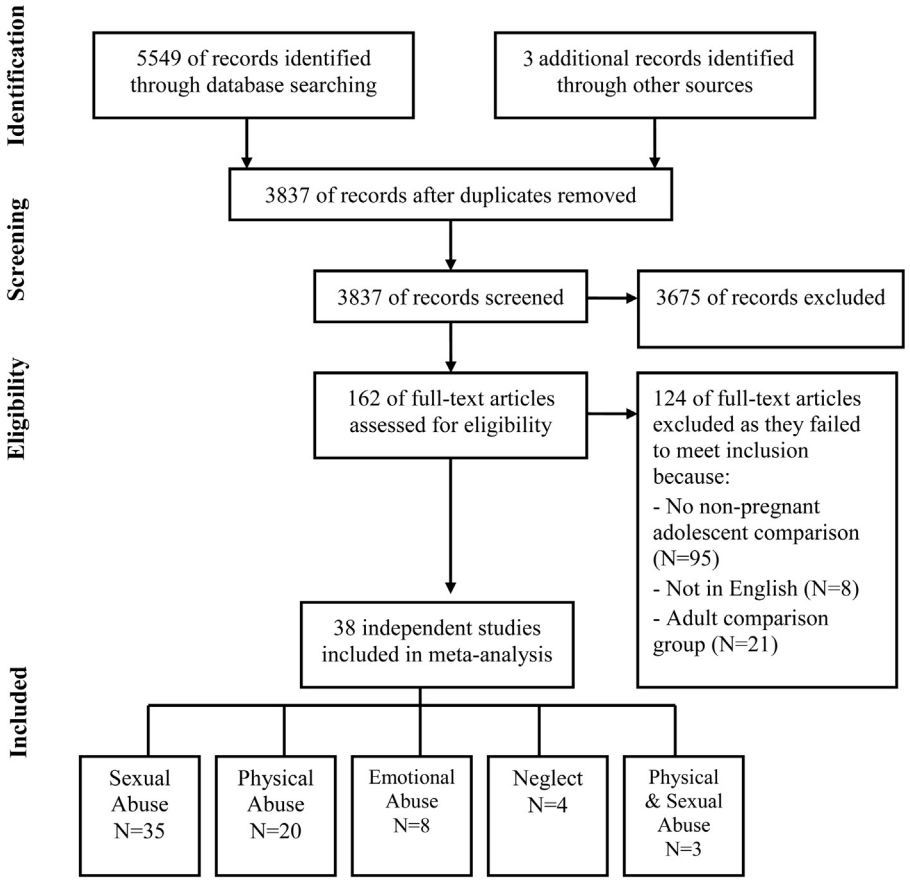

Figure 1. PRISMA flow used to identify studies for detailed analysis of victimization and adolescent pregnancy.

Table 1
Independent samples included in the meta-analysis of abuse and adolescent pregnancy

Study	N	Country	Age	Abuse type	Measure	Validated measure	Study design
Adams and East (1999) [43]	100	U.S.A.	16.5	SA, PA, EA	I	NV	Retro
Anteghini et al. (2001) [44]	1,140	Brazil	15.0	SA	Q	NV	Retro
Baumgartner et al. (2009) [45]	750	Jamaica	16.0	SA, PA, EA	I	NV	Retro
Buzi et al. (1998) [46]	520	U.S.A.	17.1	SA, PA, EA, neglect	Q	NV	Retro
Buzi et al. (2003) [47]	124	U.S.A.	16.3	SA	Q	NV	Retro
Chandy et al. (1996) [48]	2,022	U.S.A.	15.3	SA	Q	NV	Retro
Devries et al. (2009) [22]	445	Canada	15.8	SA	Q	NV	Retro
Fergusson et al. (1997) [49]	520	New Zealand	17.0	SA	I	NV	Retro
Freitas et al. (2008) [50]	220	Brazil	17.0	PA, EA	I	NV	Retro
Goicolea et al. (2009) [51]	402	Ecuador	16.7	SA, PA, EA	Q	V	Retro
Guijarro et al. (1999) [52]	135	Ecuador	15.7	SA	Q	NV	Retro
Haley et al. (2004) [53]	225	Canada	17.8	SA	Q	NV	Pro
Herrenkohl et al. (1998) [54]	389	U.S.A.	17.5	SA	I	NV	Pro
Hillis et al. (2004) [55]	9,088	U.S.A.	—[a]	SA, PA, EA	Q	V	Retro
Jewkes et al. (2001) [23]	544	South Africa	16.4	SA, PA	Q	NV	Retro
Kenney et al. (1997) [56]	1,973	U.S.A.	20.0	SA	Q	V	Retro
Milan et al. (2005) [57]	328	U.S.A.	17.3	PA	Q	V	Retro
Nagy et al. (1995) [58]	3,124	U.S.A.	15.0	SA	Q	NV	Retro
Noll et al. (2003) [59]	147	U.S.A.	20.4	SA	I	V	Pro
Noll and Shenk (2013) [60]	514	U.S.A.	15.3	SA, PA, neglect	I	V	Pro
O'Donnell et al. (2009) [24]	581	U.S.A.	23.0	SA	I	NV	Retro
Oz and Fine (1998) [61]	74	Canada	17.0	SA, PA	Q	NV	Retro
Pallitto and Murillo (2008) [62]	3,753[b]	El Salvador	19.0	SA, PA, EA	Q	NV	Retro
Romans et al. (1997) [63]	447	New Zealand	—[a]	SA	Q	NV	Retro
Roosa et al. (1997) [64]	2,003	U.S.A.	19.9	SA	Q	V	Retro
Saewyc et al. (1998) [65]	1,693	U.S.A.	15.8	SA, PA	Q	NV	Retro
Saewyc et al. (2004) [66] sample 1	13,741	U.S.A.	16.0	SA	Q	NV	Retro
Saewyc et al. (2004) [66] sample 2	12,159	U.S.A.	16.0	SA	Q	NV	Retro
Shaeff and Talashek (1995) [67]	139	U.S.A.	15.0	SA, PA	Q	NV	Retro
Silverman et al. (2001) [68] sample 1	1,977	U.S.A.	16.0	SA, PA	Q	NV	Retro
Silverman et al. (2001) [68] sample 2	2,186	U.S.A.	16.0	SA, PA	Q	NV	Retro
Silverman et al. (2004) [69]	6,864	U.S.A.	16.0	PA	Q	NV	Retro
Stock (1997) [70]	3,128[b]	U.S.A.	15.0	SA, PA	Q	NV	Retro
Thompson et al. (2008) [27]	951	U.S.A.	16.0	SA, PA, EA, neglect	I	NV	Retro
Trent et al. (2007) [71]	917	U.S.A.	20.0	SA	I	NV	Retro
Widom and Kuhns (1996) [25]	584	U.S.A.	18.0	SA, PA, neglect	CR	V	Pro
Woodward et al. (2001) [72]	533	New Zealand	17.5	SA, PA	I	NV	Pro
Young et al. (2011) [38]	1,970	U.S.A.	19.9	SA	Q	V	Retro

CR = chart review; EA = emotional abuse; I = interview; N = neglect; NV = nonvalidated measure; PA = physical abuse; Pro = prospective study; Q = questionnaire; Retro = retrospective study; SA = sexual abuse; V = validated measure of abuse.
[a] *Dashed cells* indicate insufficient information available in study.
[b] Adjusted effect size was used in analyses.

between the studies was found ($Q = 276.17$, $p < .001$; $I^2 = 87.69$), and potential moderator analyses were explored.

Several moderators were examined to explain between study heterogeneity, including those related to the measurement of abuse and to pregnancy, as well as sample-level and study-level moderators. Effect size did not vary as a function of whether sexual abuse was measured using validated ($k = 8$, OR = 2.14; CI, 1.54–2.95) versus nonvalidated ($k = 26$, OR = 1.99; CI, 1.65–2.40) measures of sexual abuse and whether questionnaire ($k = 24$, OR = 2.23; CI, 1.88–2.64) versus interview ($k = 10$, OR = 1.70; CI, 1.26–2.29) measures were used. There was no statistically significant heterogeneity based on perpetrator subgroup (family member $k = 3$, OR = 2.95, CI: 1.56–5.60; dating partner $k = 3$, OR = 1.55, CI: .88–2.72; unspecified perpetrator $k = 24$, OR = 1.87, CI: 1.57–2.22). Effect size did not vary as a function of the type of sexual contact (forced sexual intercourse $k = 11$, OR = 1.89, CI: 1.43–2.49; touching or fondling $k = 7$, OR = 2.16, CI: 1.44–2.49). A metaregression revealed no statistically significant relationship between age and effect size ($k = 32$, $b = -.03$, $p < .60$).

Finally, we assessed whether the strength of the relationship between sexual abuse and adolescent pregnancy is contingent on two dimensions of study quality, including the type of research design used (e.g., prospective vs. retrospective), and the quality of the publication outlet (journal impact score). No significant heterogeneity was found across study designs: prospective studies ($k = 6$; OR = 1.85, CI: 1.22–1.76) had similar effect sizes compared with retrospective studies ($k = 39$; OR = 2.07; CI: 1.75–2.46). A metaregression revealed that there was no statistically significant relationship between journal impact score and effect size ($k = 33$, $b = -.003$, $p < .81$).

Physical abuse

A total of 20 studies and 32,163 adolescents were available for this analysis. The association between physical abuse and adolescent pregnancy yield an OR of 1.48 (CI, 1.23–1.77; Figure 3), suggesting that an adolescent with a history of physical abuse is approximately 1.5 times more likely to become pregnant as an adolescent without a physical abuse history. The funnel plot demonstrated no indication of publication bias. The fail-safe number was 521. Statistically significant heterogeneity between the studies was found ($Q = 98.27$; $p < .001$; $I^2 = 80.66$), and potential moderator analyses were explored.

Effect size did not vary as a function whether abuse was measured using a validated ($k = 5$, OR = 1.31, CI: .76–2.23) versus a nonvalidated ($k = 15$, OR = 1.55, CI: 1.23–1.95) measure of

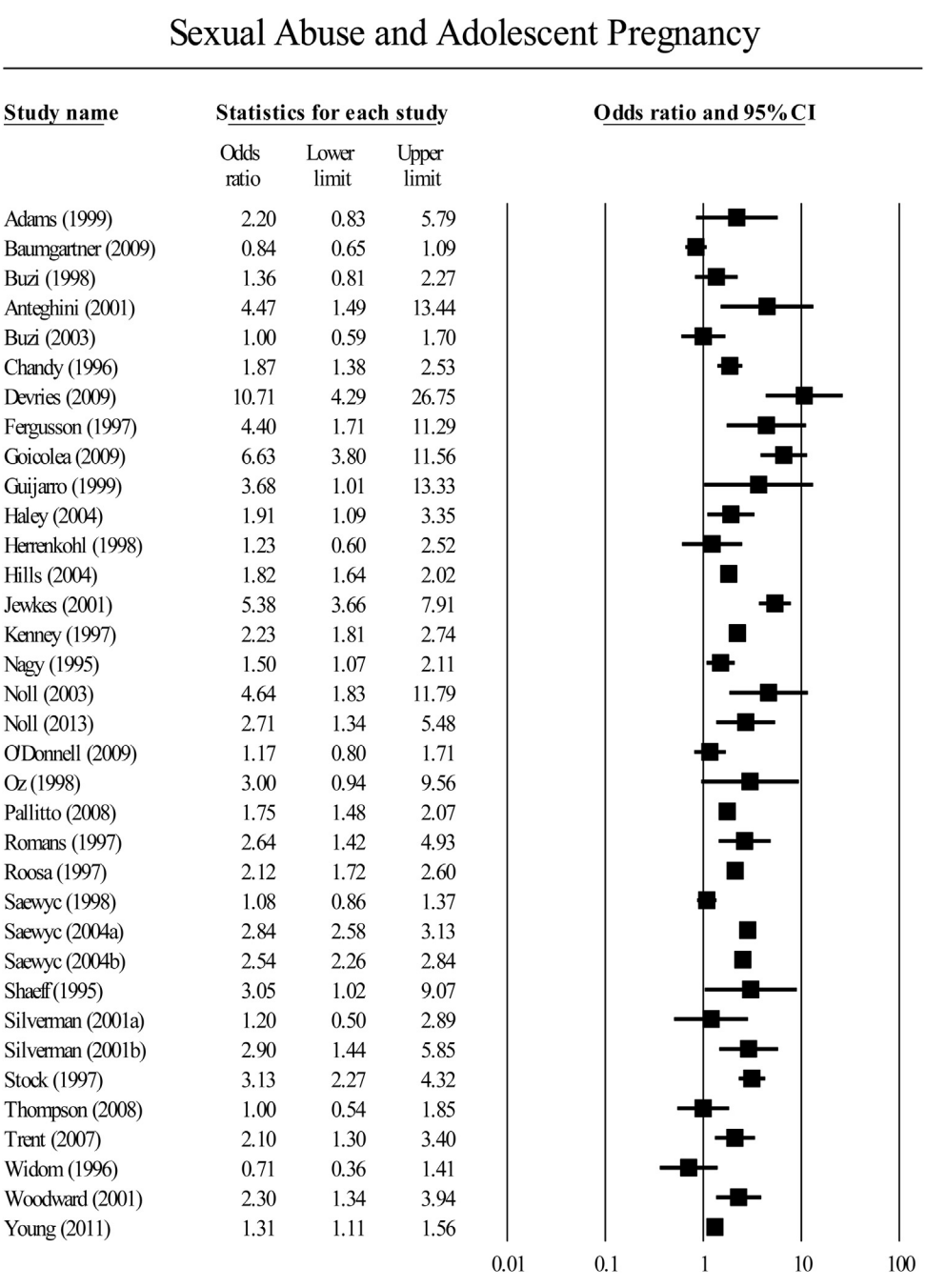

Figure 2. Forest plots showing the unadjusted association between history of sexual abuse and risk of adolescent pregnancy. Odds ratios >1.0 represent an increased risk of adolescent pregnancy and are statistically significant, if the 95% confidence intervals (CI) do not fall <1.0.

abuse and whether questionnaire (k = 13, OR = 1.50, CI: 1.22–1.83) versus interview (k = 6, OR = 1.56, CI: 1.00–2.43) measures were used. There was no statistically significant heterogeneity based on perpetrator subgroup (family member OR = 1.84, k = 4, CI: 1.18–2.86; dating partner OR = 1.72, k = 4, CI: 1.13–2.62; unspecified perpetrator = 1.31, k = 8, CI: .97–1.76). Metaregression revealed no statistically significant relationship between age and effect size (k = 18, b = −.02, p < .90). No significant heterogeneity was found across study designs: prospective studies (k = 3, OR = 1.83, CI: .94–3.57) had similar effect sizes compared with retrospective studies (k = 17, OR = 1.44, CI: 1.19–1.74). There was no statistically significant relationship between journal impact score and effect size (k = 20, b = .01, p < .47).

Co-occurrence of physical and sexual abuse

There were a total of three studies with 2,569 adolescents that examined co-occurring physical and sexual abuse and its association with adolescent pregnancy. The effect size was robust

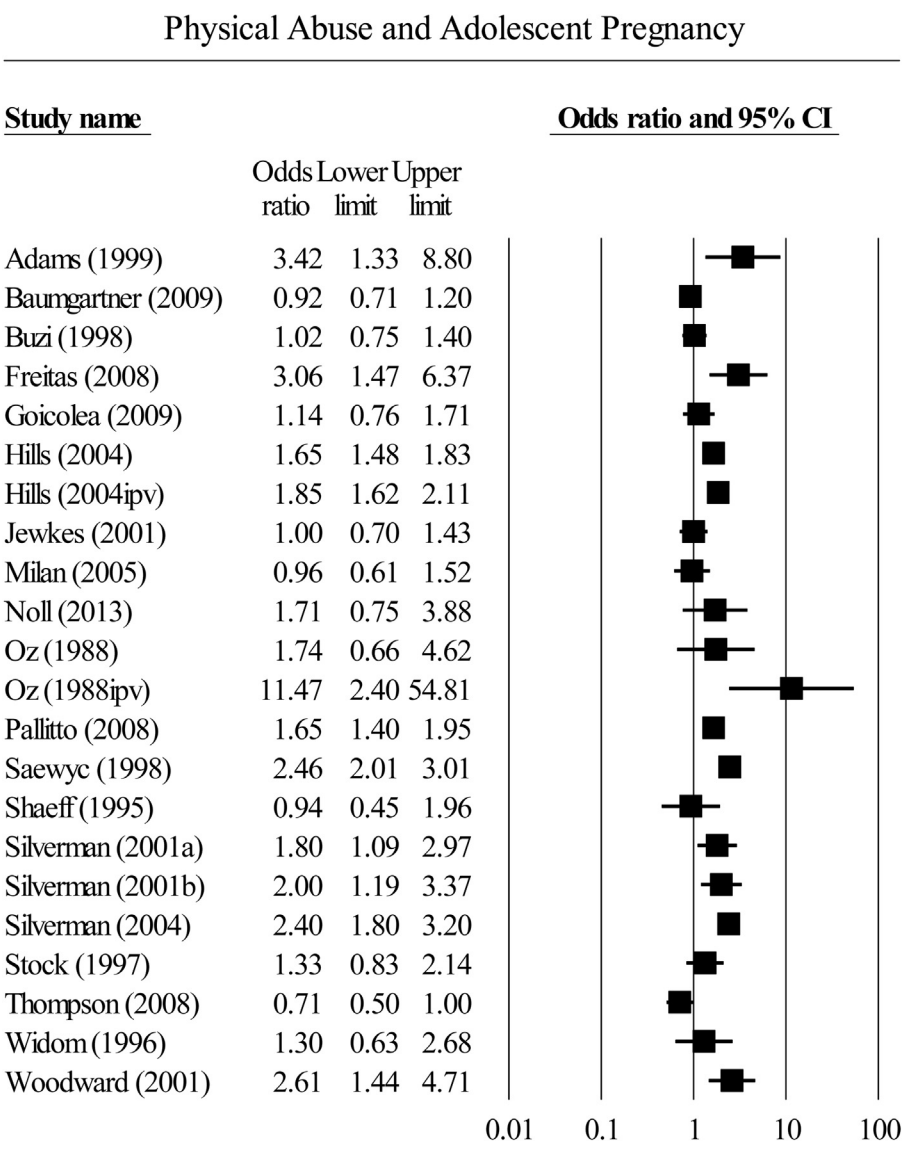

Figure 3. Forest plots showing the unadjusted association between history of physical abuse and risk of adolescent pregnancy. Odds ratios >1.0 represent an increased risk of adolescent pregnancy and are statistically significant, if the 95% confidence intervals (CI) do not fall <1.0.

(OR = 3.83; CI: 2.96–4.97). There was no heterogeneity between studies ($Q = 1.08$; $I^2 = 0$).

Emotional abuse

A total of eight studies and 13,869 adolescents were available for this analysis. The association between emotional abuse and adolescent pregnancy was nonsignificant with an OR of 1.01 (CI: .70–1.47). Statistically significant heterogeneity between the studies was found ($Q = 94.83$; $p < .001$; $I^2 = 92.62$), and only measurement type, age of adolescent, and journal impact score were examined as moderators as other potential moderators had an insufficient number of studies at each level of moderator variable. Effect size did not vary as a function whether abuse was measured via questionnaire ($k = 4$, OR = .82, CI: .46–1.44) or interview ($k = 4$, OR = 1.28, CI: .65–2.52) measure. There was no significant association with age ($k = 8$, $b = -.29$, $p < .69$), but there was a nonsignificant trend between journal impact score and effect size ($k = 8$, $b = .20$, $p < .08$). These results indicate that the association between emotional abuse and adolescent pregnancy was greater in studies published in higher impact journals.

Effects of neglect

A total of four studies and 2,569 adolescents were available for this analysis. The association between neglect and adolescent pregnancy was assessed in four studies, yielding a nonsignificant OR of 1.29 (CI: .77–2.16). Statistically significant heterogeneity between the studies was found ($Q = 11.04$; $p < .01$; $I^2 = 74.00$), and only age and journal impact score were examined because of limited power for other moderator analyses. A metaregression revealed no statistically significant relationship between age and effect size ($k = 4$, $b = -.36$, $p < .28$). There was a statistically significant positive relationship between journal impact score

and effect size ($k = 4$, $b = .62$, $p < .001$). These results indicate that the association between neglect and adolescent pregnancy increased as the journal impact score strengthened.

Discussion

Our results indicate a significant association between abuse experience and adolescent pregnancy, and that the strength of this association varies as a function of abuse type: sexual and physical abuse are associated with an increased risk of adolescent pregnancy, whereas emotional abuse and neglect are not. The fail-safe *N* for sexual and physical abuse were robust, indicating that 5,147 and 521 studies, respectively, with null results would be needed to cancel out the effect sizes. No significant moderators were identified to explain the existing heterogeneity in effect sizes for physical and sexual abuse.

In 35 independent samples, we demonstrated that a history of sexual abuse places an adolescent female at a two-fold risk of adolescent pregnancy. This finding corroborates the meta-analysis on 14 studies by Noll [26] indicating a two-fold increase risk for adolescent pregnancy and a recent meta-analysis indicating an approximate five-fold increase of pregnancy involvement for boys with histories of sexual abuse [35]. Although type of contact in the present study (i.e., forced sexual intercourse vs. touching or fondling) was not found to be a significant moderator of this association, these results must be considered in light of study heterogeneity and the frequently vague or incomplete descriptions of abuse severity found in individual studies. Future research in this area is needed to systematically investigate variables related to sexual abuse (e.g., the type of contact, single vs. multiple events, and age at the time of contact) on the risk of adolescent pregnancy and to provide more detailed classifications of these variables.

It was also shown that young women with a history of physical abuse were 1.5 times more likely to become pregnant as adolescents. Moreover, a critical finding of the current meta-analysis was that the effect of co-occurring physical and sexual abuse was stronger than for any single form of abuse, increasing the risk of early pregnancy nearly four-fold. Thus, the co-occurrence of multiple abuse types may be linked to more profoundly adverse outcomes. These results are consistent with studies that document a large degree of co-occurrence among self-reported abuse experiences and models positing that multiple victimizations (i.e., polyvictimization) are more predictive of traumatic and psychiatric symptoms compared with single-victimization experiences [36,37]. The results of the current meta-analysis suggest that adverse abuse outcomes associated with polyvictimization may be at the root of adolescent pregnancy. However, only two types of abuse were available together in this analysis, and the literature around polyvictimization generally includes other forms of victimization and stressful life events (e.g., bullying, crime, intimate partner violence). It has also been shown that the risk of early pregnancy is exacerbated by the co-occurrence of sexual abuse in childhood and adolescence compared with either time period alone [38]. Unfortunately, a lack of study power and clarity around abuse frequency precluded the current meta-analysis from teasing apart the differences between single versus multiple abuse experiences and single versus recurrent abuse across childhood and adolescence, on adolescent pregnancy. Indeed, the role of both polyvictimization and polyepisode abuse across developmental periods warrants further investigation.

Furthermore, the current meta-analysis revealed no significant association between a history of emotional abuse or neglect and adolescent pregnancy. This was somewhat surprising, as both forms of abuse have been linked to the most significant emotional, mental health, and neurologic outcomes [39]. One plausible explanation for the lack of association between emotional abuse and neglect is measurement issues. Although neglect is the most common form of abuse, it also has various working definitions and thus can be difficult to measure consistently across studies. Journal quality, indexed by impact factor, also moderated the relationship between emotional abuse and adolescent pregnancy, as well as neglect and adolescent pregnancy, with higher journal quality related to larger effect sizes. This could reflect a bias for publishing stronger effects. The limited sample size for both emotional abuse and neglect requires that these results be interpreted with caution. Further studies examining the association between these forms of abuse and adolescent pregnancy are needed before definitive conclusions can be drawn.

The results presented in this meta-analytic study should be considered in light of several limitations. First, as mentioned previously, operational definitions of abuse types vary widely across studies and this variation creates significant challenges for cross-study comparability [38]. We examined this methodological limitation by testing the validity of the abuse measure as a moderator in the present study; however, it did not explain between-study heterogeneity. In addition, distinct terminology for abuse was only available in a subset of studies. This made it difficult to determine whether adolescent pregnancy was more strongly related to a specific type of victimization (childhood abuse vs. victimization) and whether the perpetrator was a family or nonfamily member (e.g., peer, partner, authority figures, strangers, and so forth). For instance, in 11 out of 20 studies on physical abuse, there was no indication of the precise type of perpetrator. This creates methodological difficulties in performing moderator analyses, as we cannot reliably test for moderation effects if these forms of abuse are not effectively defined and delineated. Moreover, examination of such effects in those studies for which abuse type was clearly defined runs the risk providing either an under- or over-estimation of the magnitude of those effects, as additional cases could be present in the studies that failed to provide clear definitional or descriptive criteria. The same applies to studies of sexual abuse, where differentiation of the type and/or perpetrator of abuse is limited by the definitional criteria of included studies, which was often vague or incomplete. Although abuse by a parent, peer, or partner can each be traumatizing, these different types of victimization experiences may have distinct psychological sequelae. Thus, definitional shortcomings of the extant literature indicate a need for more refined and explicitly detailed definitions of abuse. Indeed, it may be the case that the mechanisms through which various forms of abuse relate to adolescent pregnancy may vary in quality or severity; and the state of the current literature places limits on our ability to disentangle these as-yet unspecified pathways to adolescent pregnancy.

Emerging studies have begun to address the question of severity of abuse on pregnancy risk; however, additional research is needed to draw firm conclusions and to test meta-analytic associations. Also, abuse is often embedded in an ecologic environment that contains multiple domains of risk. We focused on abuse experience as a risk factor for pregnancy, but several other risk factors for pregnancy likely exist. Moreover, the association

between abuse and adolescent pregnancy is susceptible to third-variable explanations, such as emotional distress, early sexual initiation, and contraceptive use and accessibility [11,40]. It could be the case that a variety of mediators account for the associations presented herein, and future studies are required to better understand the mechanism through which abuse is causally related to pregnancy risk. Third, although moderator analyses were conducted on several sample- and study-level variables, certain moderators may have lacked sufficient power to yield meaningful results. For example, the number of prospective longitudinal studies in this field is sorely lacking, forcing us to rely primarily on retrospective, cross-sectional designs. Future research using longitudinal designs that incorporate moderator and mediator variables is needed to determine whether specific types of abuse are causally related to adolescent pregnancy, and how the pathways to adolescent pregnancy differ across abuse types. Finally, there is a need for greater transparency in study methodology, such as the explicit reporting of demographic factors such as socioeconomic status. As mentioned, a significant hurdle to testing potential moderator variables in meta-analyses is the absence of adequate information in individual study methodology.

Several intervention programs have been developed to mitigate the impact of youth abuse and/or prevent revictimization [41]. There are significant potential long-term medical and mental health benefits of child abuse prevention, and one additional impact may be on pregnancy rates in both male and female adolescents. Results from the current meta-analysis suggest that sexual health counseling is especially important for youth with histories of sexual and/or physical abuse, particularly when these types of abuse coexist. Recent recommendations [42] for pediatric providers working with pregnant adolescents include a routine examination of adverse childhood and youth experiences via brief screening tools, which can provide an entrée into further conversations regarding the impact of adverse experiences on the adolescents' functioning. Finally, uncovering the potential mechanisms explicating the association between early abuse and pregnancy (e.g., attitudes towards sex and intimacy, sexual risk-taking behaviors, changes in social supports, and so forth) will provide policy makers and clinicians with targets for implementing effective interventions to reduce adolescent pregnancy and will mitigate this impact of child abuse.

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