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An exploratory study of whether pregnancy outcomes influence maternal self-reported history of child maltreatment

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Abstract

Childhood maltreatment is common and has been increasingly studied in relation to perinatal outcomes. While retrospective self-report is convenient to use in studies assessing the impact of maltreatment on perinatal outcomes, it may be vulnerable to bias. We assessed bias in reporting of maltreatment with respect to women's experiences of adverse perinatal outcomes in a cohort of 230 women enrolled in studies of maternal mental illness. Each woman provided a self-reported history of childhood maltreatment via the Childhood Trauma Questionnaire at two time points: 1) the preconception or prenatal period and 2) the postpartum period. While most women's reports of maltreatment agreed, there was less agreement for physical neglect among women experiencing adverse perinatal outcomes. Further, among women who discrepantly reported maltreatment, those experiencing adverse pregnancy outcomes tended to report physical neglect after delivery but not before, and associations between physical neglect measured after delivery and adverse pregnancy outcomes were larger than associations that assessed physical neglect before delivery. There were larger associations between post-delivery measured maltreatment and perinatal outcomes among women who had not previously been pregnant and in those with higher postpartum depressive

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symptoms. Although additional larger studies in the general population are necessary to replicate these findings, they suggest retrospective reporting of childhood maltreatment, namely physical neglect, may be prone to systematic differential recall bias with respect to perinatal outcomes. Measures of childhood maltreatment reported before delivery may be needed to validly estimate associations between maternal exposure to childhood physical neglect and perinatal outcomes.

Keywords

Child abuse; Child neglect; Memory biases; Pregnancy; Recall

1. Introduction

Childhood maltreatment is a commonly reported experience. In the Adverse Childhood Experiences Study, many women reported histories of abuse (24.7%, 29.1%, and 13.1% for sexual, emotional, and physical abuse, respectively) and neglect (13.1% and 9.2% for physical and emotional neglect, respectively) (Centers for Disease Control & Prevention, 2010; Felitti et al., 1998). Childhood maltreatment has been linked to many forms of distant pathology into adulthood, including vulnerability to psychopathology (Norman et al., 2012), obesity (Hollingsworth, Callaway, Duhig, Matheson, & Scott, 2012), chronic pain syndromes (Afari et al., 2014), and inflammation and cardiovascular outcomes (Dong et al., 2004; Rooks, Veledar, Goldberg, Bremner, & Vaccarino, 2012).

Increasingly, investigators have examined the relationship between childhood maltreatment and pregnancy/perinatal outcomes, including preterm birth, fetal loss, and maternal medical complications during pregnancy, and found positive associations (Hillis et al., 2004; Leeners, Stiller, Block, Gorres, & Rath, 2010; Margerison-Zilko, Strutz, Li, & Holzman, 2017; Noll et al., 2007; Selk, Rich-Edwards, Koenen, & Kubzansky, 2016). However, null findings also exist (Benedict, Paine, Paine, Brandt, & Stallings, 1999; Grimstad & Schei, 1999). A relationship between childhood maltreatment and perinatal outcomes is also plausible because several studies have also reported that stress, broadly defined, is associated with these outcomes, and these associations may be mediated through multiple biological and behavioral mechanisms (Wadhwa, Entringer, Buss, & Lu, 2011). Preconception health and life course psychosocial stressors such as childhood maltreatment have been identified as exposures of particular importance to perinatal research (Kramer, Hogue, Dunlop, & Menon, 2011).

One factor which may explain discrepant findings related to associations between childhood maltreatment and perinatal outcomes is exposure misclassification. Unlike many other exposures, it is difficult to make direct inquiries of affected children, in part due to the ethics of asking minors about abuse and neglect (Amaya-Jackson, Socolar, Hunter, Runyan, & Colindres, 2000). Further, measures that utilize reporting of maltreatment to authorities are relatively uncommon and most cases of abuse are not reported (Macmillan et al., 2009). Thus, there is no agreed upon gold standard measure for child maltreatment, and investigators often rely upon retrospective self-reported measures in part due to their convenience. However, although retrospective self-report may not suffer threats to validity

related to repercussions of disclosure, sensitive topics such as maltreatment are still prone to misclassification, particularly underreporting (Tourangeau & Yan, 2007).

One way of gaining information about possible misclassification of these self-reported measures is through assessment of test-retest reliability. Reliability does not guarantee validity, but poor reliability for sensitive topics such as maltreatment suggests selective underreporting since misreporting a non-event is unlikely (Macmillan et al., 2009). Not remembering or misinterpreting questions may also lead to non-differential underreporting and poor reliability. Reliability of retrospective reporting of child abuse and neglect, particularly with validated scales, has generally shown at least moderate agreement (Cammack et al., 2016; Dube, Williamson, Thompson, Felitti, & Anda, 2004). However, some studies, such as those conducted by Fergusson (Fergusson, Horwood, & Woodward, 2000) reported that physical and sexual abuse had kappas of 0.47 and 0.45, respectively, and (da Silva and da Costa Maia (2013) reported kappas ranging from 0.33 to 0.43 for various domains of maltreatment on the Childhood History Questionnaire, suggesting less than ideal agreement.

To our knowledge, no studies have examined if reliability is affected by the experience of specific perinatal outcomes. Factors that influence memory, such as mood state, are directly influenced by pregnancy and the postpartum periods (Buckwalter, Buckwalter, Bluestein, & Stanczyk, 2001) and women who experience adverse pregnancy outcomes may be more susceptible to such factors, thereby affecting the agreement of their reporting of experiences of childhood maltreatment. Also, mothers who give birth to infants with health problems such as prematurity are at increased risk of postpartum depression (Vigod, Villegas, Dennis, & Ross, 2010). While this association may not necessarily be causal, it suggests that pregnancy specific events may be directly related to factors such as mood, which may in turn affect reporting. Further, an anecdotal literature has suggested that pregnancy specific events such as invasive exams, traumatic labor and breastfeeding may affect recall of childhood trauma (Leeners, Richter-Appelt, Imthurn, & Rath, 2006; Montgomery, Pope, & Rogers, 2015).

It is also plausible that a woman's experience of an adverse pregnancy outcome could lead to increased reporting of maltreatment, relative to individuals who have not experienced such an outcome (i.e., recall bias). Recall bias has been observed for various exposures in relation to perinatal outcomes (Boeke et al., 2012; Drews & Greenland, 1990; Hogue, 1975) although not all studies suggest that it has a strong impact on association effect sizes (Drews, Kraus, & Greenland, 1990). A few studies have examined the relationship between a history of maltreatment and health outcomes, comparing the effects of prospective versus retrospective assessments (with respect to the outcome). Some of these studies report positive effects only for the retrospective assessments (Raphael, Widom, & Lange, 2001; Reuben et al., 2016; Widom, Weiler, & Cottler, 1999), which elicits concerns that such findings may be driven by recall bias and not reflect causality. Within the perinatal literature, many studies examining the relationship between maternal exposure to child maltreatment and a given perinatal outcome rely on retrospective measures (Cammack et al., 2011; Diesel, Bodnar, Day, & Larkby, 2016; Leeners et al., 2010). These assessments are variable in timing with respect to the outcome of interest, but it is unclear if maltreatment history

assessed before delivery yields systematically different findings than postnatally measured maltreatment.

This study aims to examine bias in maternal retrospective self-reporting of childhood maltreatment in relation to perinatal outcomes. In the present study, we assessed whether: 1) agreement of self-reports of childhood maltreatment history captured before and after delivery differed according to whether women experienced adverse perinatal outcomes; 2) women, particularly those experiencing adverse perinatal outcomes, who discrepantly reported maltreatment had a tendency to systematically report maltreatment before or after delivery and 3) associations between perinatal outcomes and childhood maltreatment measured before delivery were meaningfully different than those measured after delivery.

2. Materials and methods

Participants were drawn from a convenience sample of 230 pregnant women aged 18–45 enrolled in prospective observational cohort studies of the perinatal course of psychiatric illness. Women were referred to the research program by community obstetric or psychiatric care providers. All women in this study population had lifetime histories of psychiatric disorders, the majority of which were mood and/or anxiety disorders, and many were receiving psychotropic treatment. The most prevalent diagnoses in the analytic sample included Major Depressive Disorder, Generalized Anxiety Disorder, Panic Disorder, Bipolar Disorder (Type 1) and Post Traumatic Stress Disorder (PTSD) ($N_s = 83, 65, 56, 41$, and 40 respectively; diagnoses are not mutually exclusive). All participants provided written informed consent, and study participation was independent of their treatment. This research was approved by the Institutional Review Board.

2.1. Child abuse and neglect exposures

A retrospective history of childhood maltreatment was assessed using the Childhood Trauma Questionnaire Short-Form (CTQ) (Bernstein et al., 2003), which has been shown to have good internal consistency and validity, as compared to clinical trauma history assessment (Bernstein et al., 2003; Paivio & Cramer, 2004), and has been extensively used in many populations. Three domains of abuse (sexual, physical, and emotional), and two domains of neglect (physical, emotional) are measured with five questions each, on a 5-point likert scale. In this sample, internal consistency was overall good (subscale Cronbach's alphas 0.58–0.93). We examined dichotomized individual trauma scales according to the authors' recommended cutpoints for no or low versus moderate or severe trauma. Finally, the CTQ also contains a denial scale used to identify possible underreporting of trauma. We considered the role of denial at either administration versus no denial as covariates in multivariate modeling and in stratified analyses.

Women participating in the research program completed a CTQ prior to conception or during pregnancy (T1 or pre-delivery). All subjects recruited as part of the present study completed a CTQ before delivery and also completed a second CTQ administration, which was conducted after the completion of pregnancy (T2 or post-delivery). Among these women, 48 had conceived again and were pregnant or had completed a subsequent pregnancy prior to the second administration of the CTQ. 12 subjects completed the repeat

CTQ administration through the mail and the remainder completed the questionnaire during a clinic or research visit.

2.2. Outcomes

Perinatal outcomes were ascertained through chart reviews. Outcomes included preterm birth (less than 37 weeks of gestation), low birth weight (less than 2500 g), and neonatal intensive care unit (NICU) admission. We selected these perinatal outcomes because of their relatively high prevalence, importance to maternal and child health, and frequent use in maternal child health studies. Although low birth weight is a relatively imprecise outcome since it reflects either shortened gestation and/or growth restriction, it is commonly utilized and represents a more severe outcome (than preterm birth) since near term infants are often normal birth weight. Similarly, NICU admission is also a less precise outcome, but it allows for a broad estimate of health problems in the newborn that is used in some studies because it is an event accurately recalled by mothers (Dietz et al., 2014). For the minority of women who completed an additional pregnancy at time of the second CTQ, we considered them to have the outcome of interest if they had experienced it at least once.

2.3. Analyses

To look at agreement in reports of maltreatment, we computed Cohen's kappas, with 95% confidence intervals. Kappas were stratified according to the presence or absence of specific perinatal outcomes and were interpreted according to guidelines from Landis & Koch (1977) (0–0.2, poor; 0.2 to < 0.4, fair; 0.4 to < 0.6, moderate; 0.6 to < 0.8, substantial; and 0.8–1.0, almost perfect). Next, we conducted McNemar tests to ascertain any differences in directionality of reporting according to the presence or absence of a given outcome (i.e., whether the number of women who reported a given type of childhood maltreatment before delivery but not after delivery was different than the number reporting after delivery but not before). To compare differences in associations between pre-delivery versus post-delivery measured maltreatment with perinatal outcomes, we used unconditional logistic regression models. The pre-delivery and post-delivery groups were comprised of the same individuals. We adjusted for variables that may be related to recall and could have changed between the two assessments (continuous timing of the CTQs relative to delivery, concurrent depressive symptomatology, concurrent denial scores, maternal age, and gravidity). To make our results more comparable with other studies, we have now also included demographic variables that are often considered confounders of relationship between maternal exposure to childhood maltreatment and perinatal outcomes (race, maternal education, and marital status) in these multivariate models as well. Then we computed the ratio of post-delivery: pre-delivery odds ratios (Cockburn, Hamilton, & Mack, 2001) to help ascertain meaningful differences between the post-delivery and pre-delivery odds ratios; we considered ratios greater than 1.2 or less than 0.83 to indicate a meaningful difference. Finally, we conducted additional analyses that stratified these results on the following variables that may affect reporting of maltreatment and could modify discrepancies between the pre-delivery vs. post-delivery odds ratios and provide insight on potential mechanisms of differential recall : 1) whether the second CTQ visit was more than versus less than one year postpartum, 2) the presence of denial at either time point, 3) maternal age, 4) gravidity, 5) change in depressive symptoms, using the Beck Depression Inventory (BDI) (Beck, Steer, & Brown, 1996) that were

concurrently assessed at the time of the two CTQ assessments; specifically an increase in BDI scores versus a decrease in BDI scores, 6) specific psychiatric diagnosis (Major Depression, Bipolar Type 1, Generalized Anxiety Disorder, Panic Disorder, and PTSD), as assessed via the Structured Clinical Interview for Diagnostic and Statistical Manual of Mental Disorders IV (SCID) (First, Spitzer, Gibbon, & Williams, 2002).

3. Results

Of 1973 participants who completed at least one CTQ, 247 completed two CTQ assessments. Of these 247 women, information on perinatal outcomes was obtained for 230 women (230 women had data on preterm birth, 227 had data on low birth weight, and 229 had data on NICU admissions). A slight majority of these 230 women completed the 1st CTQ questionnaire in the preconception period (Mdn = 44.4 weeks before delivery (IQR: 25.6–96.3 weeks)) and the second questionnaire was completed for most women between six months and four years postpartum (Mdn = 66.4 weeks after delivery; IQR: 35.7–133.5 weeks). The median time between assessments was 144 weeks (IQR: 82.7, 214.1 weeks). Between the first and second CTQ assessment, 19.13% of women (N = 44) had a preterm birth, 10.57% (N = 24) had a low birth weight baby, and 12.23% (N = 28) had a baby that was admitted to the NICU. For low birth weight and preterm birth, except for one subject, all low birth weight babies were also preterm. Women were predominantly, non-Hispanic white, married, and most had at least a four year college degree (Table 1). History of childhood maltreatment was reported by a substantial minority of participants and approximately one quarter of participants indicated denial at one of the two study time points (N = 57, 24.9%). The majority of women had at least one previous pregnancy at the time of the first study assessment (N = 172; 74.78%) and most pregnancies were planned (N = 177; 76.96%). The mean BDI scores at the time of the first and second CTQ assessments were 12.17 (SD = 9.58) and 8.74 (SD = 8.48), respectively, and most women's BDI scores decreased from their first to second CTQ assessment (N = 147, 63.91%). Compared to the overall population of women in the research program who lacked a second CTQ and those with two CTQs but lacked on information on at least one perinatal outcome, the 230 participants in the present study were significantly less likely to report a history of sexual abuse, and significantly differed according to educational level, race, and marital status (Table 1).

Table 2 shows the distribution of the CTQ data at both time points for individual maltreatment types, stratified according to the presence or absence of preterm birth, low birth weight, and NICU admission. Table 3 shows Cohen's Kappas associated with these data. Estimates were generally at least moderate except for physical neglect in women who had low birth weight or preterm babies, and for physical abuse in women who had babies admitted to the NICU. Table 4 presents the number of women with discrepant reporting of childhood maltreatment between the two study visits and the McNemar p-values associated with these values. Women who discrepantly reported maltreatment and also experienced adverse perinatal outcomes were generally more likely to report maltreatment after delivery than before delivery. However, statistical significance was achieved only among women experiencing low birth weight who discrepantly reported physical neglect (4 versus 0 women, $p = .046$). Among women who did not experience poor perinatal outcomes, those

with discrepant reports were also more likely to report maltreatment after delivery. However, the differences were not as marked and none achieved statistical significance, despite increased statistical power. Moreover, the tendency for discrepant reports of physical neglect to be reported after delivery was not present.

Table 5 shows the associations (odds ratios) between maltreatment and perinatal outcomes, comparing maltreatment measured before versus after delivery. It also shows the ratios of the post-delivery CTQ assessment odds ratio: the odds ratio of the pre-delivery CTQ assessment. For emotional abuse, all perinatal outcomes had larger odds ratios associated with the pre-delivery assessment than the post-delivery assessment (i.e., ratios of odds ratios less than 1). By contrast, odds ratios for physical neglect measured after delivery were meaningfully and sometimes substantially greater than before delivery. For low birth weight and preterm birth, they were also in a different direction than the pre-delivery estimate (i.e., harmful, instead of protective) and ratios of these odds ratios were substantially above 1.2. Some other forms of maltreatment, namely sexual abuse, tended to have larger post-delivery measured odds ratios, although this was not consistently observed. Even though some differences in point estimates were often meaningfully significant (i.e., more than a 20% difference, or a ratio of 1.2), confidence intervals were relatively wide and overlapped for most observed differences. Crude models yielded point estimates that were generally similar to our multivariate models that adjusted for demographic factors and factors that may have varied between the two CTQ assessments as described above, suggesting that these factors did not confound or mediate associations.

In stratified analyses, among women who had not previously been pregnant, associations between maltreatment and perinatal outcomes tended to be higher when maltreatment was measured after delivery, namely for sexual abuse (e.g., when considering low birth weight as the outcome, pre-delivery measured aOR = 1.06 95% CI = 0.09–12.27 versus post-delivery measured aOR = 3.29, 95% CI = 0.40–27.14, and when considering preterm birth as the outcome, pre-delivery aOR = 3.32, 95% CI = 0.57–19.43 versus post-delivery measured aOR = 5.88, 95% CI = 0.89–38.92). Women whose BDI scores increased from the pre-delivery to the post-delivery assessment had mostly larger maltreatment-perinatal outcome associations when maltreatment was measured after delivery, particularly for physical neglect (Table 6). By contrast, in women whose BDI scores did not change or decreased from the pre-delivery to post-delivery assessment, associations between physical neglect and perinatal outcomes did not consistently vary by timing of CTQ administration. There was also evidence that post-delivery measured sexual abuse was more strongly associated with perinatal outcomes only in women with increasing BDI scores (for NICU admission, pre-delivery measured aOR = 3.36, 95% CI = 0.47–24.09 versus post-delivery measured aOR = 6.25, 95% CI: 1.03, 38.02). Thus, our findings suggest that there is a multiplicative interaction between relative change in BDI score and associations between childhood maltreatment and perinatal outcomes, such that women with BDI scores that increased from the first to second assessment had higher postnatally measured CTQ-perinatal outcome associations. Among women who reported denial at either time point, there were several instances where all participants who reported a given maltreatment type and also experienced an adverse perinatal outcome only reported maltreatment after delivery. However, these numbers were very small due to the considerably lower prevalence of all

maltreatment types among these women. There were no clear patterns of associations when stratified by maternal age, SCID diagnosis, and recency of the postpartum CTQ assessment.

4. Discussion

To our knowledge, this is the first study with repeated retrospectively self-reported childhood maltreatment history measures around the time of pregnancy that examined bias in relation to experiences of adverse perinatal outcomes. While most women's reports from before delivery and after delivery agreed, women experiencing adverse perinatal outcomes agreed less for some maltreatment types, in comparison to women not experiencing these outcomes. Moreover, when examined with the assumption that reports may not only lack agreement but also be systematically directional, we found that women whose responses disagreed were more likely to report maltreatment after than before delivery, particularly in those experiencing adverse perinatal outcomes. As a result, associations between outcomes and maltreatment measured after delivery, namely physical neglect, tended to be greater than associations with maltreatment measured before delivery. However, with the exception of physical neglect, overall differences were largely modest and not consistently observed, although stratified analyses suggested larger differences among women with higher postpartum depressive symptomatology and in those who had not previously given birth. Taken together, these novel data indicate possible systematic recall bias that requires further examination.

Although we cannot determine the mechanism, there are a few reasons why women who experienced adverse pregnancy outcomes may be relatively more likely to recall maltreatment after delivery, as compared to before delivery. As previously mentioned, recall bias has been observed in many studies, including those assessing perinatal outcomes. Also, if the women were traumatized by the adverse pregnancy outcome, then perhaps this new trauma may have reactivated memories of old childhood traumas. There is evidence that PTSD can arise from traumatic experiences in pregnancy, such as experiencing an adverse pregnancy outcome, and women who have experienced child maltreatment may be more susceptible to PTSD, even years after delivery (Choi & Seng, 2016; Lev-Wiesel, Daphna-Tekoah, & Hallak, 2009; Misund, Nerdrum, Bråten, Pripp, & Diseth, 2013). Even though there was a long period of time between assessments, it is still plausible that maternal experiences of adverse perinatal outcomes could influence recall of maltreatment years later, particularly since children that are born preterm, at a low birth weight, or have other complications are at risk for adverse cognitive, behavioral, and medical outcomes throughout their lives (Shariat et al., 2017) that could also influence recall. Also, it may make sense that physical neglect, which was operationalized to include withholding of necessary medical services, may be relatively more susceptible to differential recall: perhaps mothers are more likely to connect previous health issues with current ones. Many women report feeling guilt and responsibility for a poor birth outcome (Barr, 2015; Garell, Dardennes, & Blondel, 2007) so it further makes sense that these women may be prone to looking for sources of their own perceived poor health. Our findings in stratified analyses showing that this effect is limited to women who had relatively higher depressive symptoms at the post-delivery assessment falls in line with studies suggesting that mood, specifically negative mood, is associated with increased reporting of negative life events (Bower, 1981;

Moritz, Glascher, & Brassen, 2005; Singer & Salovey, 1988). Also, our findings are supported by a study that found women who reported being depressed while they were pregnant were less likely to later recall having been depressed if they were not depressed at the time when they were asked to recall their prenatal mood (Newport et al., 2008). Finally, it also makes sense that differential recall would be more likely among women in their first pregnancy: the initial transition to motherhood may make a woman reflect relatively more about her childhood experiences. Further, women in their first pregnancies would be experiencing, for the first time, more invasive gynecologic exams or procedures associated with childbirth that could trigger memories of past abuse (Montgomery, 2013); this may explain the tendency for stronger associations between childhood sexual abuse at the post-delivery CTQ assessment in nulligravid women.

Our study has important limitations. First, our sample size was relatively small. However, while our study was not powered to perform hypothesis testing (i.e., detect statistically significant effects), we emphasize that our main goal was to assess bias (i.e., meaningful differences in effect sizes). It is also possible that additional factors which we did not have data on may influence differential recall. However, even if we cannot determine the mechanism(s) through which pregnancy outcomes may be associated with recall of childhood maltreatment, it is still important to demonstrate whether differential recall may exist since many studies rely on measures of maltreatment that are assessed after pregnancy. In such studies, associations between post-pregnancy measured childhood maltreatment and perinatal outcomes would remain vulnerable to recall bias. Further, our study design also limited our ability to design a better controlled study (e.g., assess maltreatment during more precise periods and effects of psychotropic drug use), although we adjusted for the effects of timing and other sources of variation between the two time points in multivariate modeling. Thus, while associations between childhood maltreatment and perinatal outcomes are possibly more valid when measurement of maltreatment occurs before experiencing perinatal outcomes, it is important to confirm our findings in a larger sample and to explore the role of additional factors that may influence recall.

Another limitation is that the study population was a convenience sample that largely consisted of upper middle class white women with a history of psychiatric illness who participated in longitudinal studies. This limits the generalizability of our findings, although we note that psychiatric illness is a common consequence of exposure to childhood maltreatment, so our population captures an important subpopulation of women with histories of childhood maltreatment around the time of pregnancy. The relatively high socioeconomic status is particularly marked in the subpopulation of women participating in this specific study, compared to all women participating in the research program. Because these women complied with demanding data collection efforts, they may have been more conscientious in accurately reporting history of maltreatment. However, if this increased conscientiousness did not vary according to experiences of perinatal outcomes, it would not be expected to create additional differential bias.

This study also has important strengths. We were able to compare associations between childhood maltreatment before versus after delivery in the same individuals, reducing many systematic biases between the pre-delivery and post-delivery groups and helping us isolate

effects specific to whether the CTQ was administered before versus after delivery. Thus, our study utilized a novel approach to assessing internal validity of reporting of childhood maltreatment in relation to perinatal outcomes. We also used a widely utilized and validated scale to assess childhood maltreatment and obtained information on perinatal outcomes from chart reviews, increasing the validity of our data. However, considering that prospective cohort studies are expensive and often only feasible for relatively common perinatal outcomes, we reiterate the importance of further establishing the presence of differential recall bias before dismissing the role retrospective studies play in informing the literature on this topic.

It is important to note that in the absence of a gold standard for maltreatment, we cannot truly assess recall bias; rather, our findings are suggestive in nature. However, we contend that systematic differences in recall between those who experience adverse outcomes versus those with normal pregnancies should elicit concerns for retrospective studies that find only small effects. Future studies, such as those utilizing verified child maltreatment exposures (e.g., Child Protective Services records), may be an important contribution to this literature, although they would introduce biases related to generalizability, given limited reporting of maltreatment (MacMillan, Jamieson, & Walsh, 2003).

5. Conclusions

In summary, these findings offer preliminary evidence that systematic recall of childhood maltreatment, namely physical neglect, is associated with experiencing an adverse pregnancy outcome. It is important to explore links between childhood maltreatment and perinatal outcomes utilizing a variety of study designs, while remaining aware that studies which utilize retrospective reports obtained after delivery may contribute to bias. Future, larger investigations should also determine if specific factors are associated with differential recall, thereby allowing investigators to identify studies that may be particularly vulnerable to bias.

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Table 1

Characteristics of Women Completing Two CTQs and with Perinatal Outcomes (Study Population) Versus Other Women's Mental Health Program (WMHP) Participants.

	Women Completing Two CTQs Who Had Perinatal Outcome Data (N = 230)		All Other WMHP Participants With at Least 1 CTQ (N = 1743)	
	N ^{****}	%	N ^{****}	%
Maternal Age at First CTQ	M = 32.61 years	SD = 4.49	M = 33.33 years	SD = 5.49
Childhood Maltreatment				
T1 Emotional Abuse	45	19.65%	407	23.61%
T2 Emotional Abuse	48	20.87%	N/A	N/A
T1 Physical Abuse	28	12.17%	254	14.91%
T2 Physical Abuse	35	15.22%	N/A	N/A
T1 Sexual [*] Abuse	35	15.22%	361	21.07%
T2 Sexual Abuse	43	18.70%	N/A	N/A
T1 Emotional Neglect	40	17.39%	379	22.05%
T2 Emotional Neglect	43	18.70%	N/A	N/A
T1 Physical Neglect	21	9.13%	234	13.60%
T2 Physical Neglect	22	9.65%	N/A	N/A
Education at First CTQ ^{***}				
12 years or less	2	0.87%	185	10.60%
13–15	39	16.96%	363	18.38%
16+	189	82.17%	1197	68.60%
Race ^{**}				
Asian	7	3.04%	35	2.01%
Black	12	5.22%	170	9.74%
White	207	90.00%	1467	84.07%
Other	4	1.74%	73	4.18%
Ethnicity				
Hispanic	5	2.17%	65	3.76%
non-Hispanic	225	97.83%	1680	96.28%
Marital Status at First CTQ [*]				

	Women Completing Two CTQs Who Had Perinatal Outcome Data (N = 230)	All Other WMHP Participants With at Least 1 CTQ (N = 1743)	
Maternal Age at First CTQ	N ^{****} M = 32.61 years	N ^{****} M = 33.33 years	%
Married	204	1416	SD = 5.49 81.33%
Never Married, Lives with Partner	11	253	13.50%
Other	15	90	5.17%

*

p < .05 for difference between women completing two CTQs who had perinatal outcome data versus other WMHP participants with at least 1 CTQ, using chisquare-test.

**

p < .01 for difference between women completing two CTQs who had perinatal outcome data versus other WMHP participants with at least 1 CTQ, using Fisher's exact test.

p < .01 for difference between women completing two CTQs who had perinatal outcome data versus other WMHP participants with at least 1 CTQ, using Fisher's exact test.

Columns may not total to 230 (women completing two CTQs who had perinatal outcome data) and 1743 (other WMHP participants with at least 1 CTQ) due to missing data.

Table 2

Distributions of Maternal Maltreatment Reports at the Two Time Points, Stratified By Experiencing a Preterm Delivery, Experiencing a Low Birth Weight Baby, and a Baby with a NICU Admission.

Women With All Term Births		Women with Any Preterm Births	
Emotional Abuse		Emotional Abuse	
1st CTQ	2 nd CTQ	1st CTQ	2 nd CTQ
N	N	N	N
Y	Y	Y	Y
136	15	33	0
9	26	3	7
	18.82%		23.26%
	22.04%		16.28%
	186		43
Physical Abuse		Physical Abuse	
1st CTQ	2 nd CTQ	1st CTQ	2 nd CTQ
N	N	N	N
Y	Y	Y	Y
152	11	37	2
5	18	1	4
	12.37%		11.36%
	15.59%		13.64%
	186		44
Sexual Abuse		Sexual Abuse	
1st CTQ	2 nd CTQ	1st CTQ	2 nd CTQ
N	N	N	N
Y	Y	Y	Y
149	10	34	2
3	24	1	7
	14.52%		18.18%
	18.28%		20.45%
	186		44
Emotional Neglect		Emotional Neglect	
1st CTQ	2 nd CTQ	1st CTQ	2 nd CTQ
N	N	N	N
Y	Y	Y	Y
144	11	31	4
8	23	4	5
	16.67%		20.45%
	18.28%		20.45%
	186		44
Physical Neglect		Physical Neglect	
1st CTQ	2 nd CTQ	1st CTQ	2 nd CTQ
N	N	N	N
Y	Y	Y	Y

Women With All Normal Birth Weight Babies				Women with At Least One Low Birth Weight Baby			
Emotional Abuse				Emotional Abuse			
1st CTQ	2nd CTQ			1st CTQ	2nd CTQ		
	N	Y	N		Y		
	149	15	18		0		
N			N				
Y	11			Y	1		
	27				5		
	18.81%				25.00%		
20.79%				20.83%			
24				24			
Physical Abuse				Physical Abuse			
1st CTQ	2nd CTQ			1st CTQ	2nd CTQ		
	N	Y	N		Y		
	169	10	19		2		
N			N				
Y	5			Y	1		
	19				2		
	11.82%				12.50%		
14.29%				16.67%			
24				24			
Sexual Abuse				Sexual Abuse			
1st CTQ	2nd CTQ			1st CTQ	2nd CTQ		
	N	Y	N		Y		
	164	10	18		2		
N			N				
Y	4			Y	0		
	25				4		
	14.29%				16.67%		
17.24%				25.00%			
24				24			
Emotional Neglect				Emotional Neglect			
1st CTQ	2nd CTQ			1st CTQ	2nd CTQ		
	N	Y	N		Y		
	156	12	18		2		
N			N				
Y	10			Y	1		
	25				3		
	17.24%				16.67%		
18.23%				20.83%			
24				24			
Physical Neglect				Physical Neglect			
1st CTQ	2nd CTQ			1st CTQ	2nd CTQ		
	N	Y	N		Y		
	156	12	18		2		
N			N				
Y	10			Y	1		
	25				3		
	17.24%				16.67%		
18.23%				20.83%			
24				24			

No NICU Admission		Any NICU Admission			
N	177	6	N	18	4
Y	8	11	Y	0	1
		8.42%	202		21.74%
					4.35%
					23
Emotional Abuse		Emotional Abuse		2 nd CTQ	
1st CTQ	N	Y	1st CTQ	N	Y
N	151	13	N	17	2
Y	9	27	Y	3	6
		20.00%	18.00%		32.14%
			200		28.57%
					28
Physical Abuse		Physical Abuse		2 nd CTQ	
1st CTQ	N	Y	1st CTQ	N	Y
N	169	8	N	20	4
Y	4	20	Y	2	2
		11.94%			14.29%
		13.93%	201		21.43%
					28
Sexual Abuse		Sexual Abuse		2 nd CTQ	
1st CTQ	N	Y	1st CTQ	N	Y
N	163	9	N	19	3
Y	4	25	Y	0	6
		14.43%			21.43%
		16.92%	201		32.14%
					28
Emotional Neglect		Emotional Neglect		2 nd CTQ	
1st CTQ	N	Y	1st CTQ	N	Y
N	156	13	N	18	2
Y	9	23	Y	3	5
		15.92%			28.57%
		17.91%	201		25.00%
					28
Physical Neglect		Physical Neglect		2 nd CTQ	
1st CTQ	N	Y	1st CTQ	N	Y
N	178	7	N	19	3

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2	Y	9	Y
4	7.04%	8	7.54%
25.00%	199		
21.43%			
28			

Table 3

Cohen's Kappas (95% CI) of Individual Childhood Maltreatment Types, Stratified by Experiences of Adverse Perinatal Outcomes.

Perinatal Outcome	Maltreatment Type	Outcome Present	Outcome Absent
Low Birth Weight	Emotional Abuse	0.88 (0.66–1.00)	0.60 (0.45–0.74)
	Physical Abuse	0.50 (0.01–0.99)	0.67 (0.52–0.83)
	Sexual Abuse	0.75 (0.43–1.00)	0.74 (0.61–0.87)
	Emotional Neglect	0.59 (0.18–1.00)	0.63 (0.49–0.77)
	Physical Neglect	0.28 (–0.16–0.73)	0.57 (0.37–0.77)
Preterm Birth	Emotional Abuse	0.78 (0.55–1.00)	0.60 (0.46–0.75)
	Physical Abuse	0.69 (0.36–1.00)	0.64 (0.48–0.80)
	Sexual Abuse	0.78 (0.55–1.00)	0.75 (0.62–0.88)
	Emotional Neglect	0.44 (0.12–0.77)	0.65 (0.50–0.79)
	Physical Neglect	0.39 (–0.03–0.81)	0.57 (0.36–0.78)
NICU Admission	Emotional Abuse	0.58 (0.25–0.91)	0.64 (0.51–0.78)
	Physical Abuse	0.28 (–0.15–0.71)	0.74 (0.59–0.88)
	Sexual Abuse	0.73 (0.45–1.00)	0.76 (0.63–0.88)
	Emotional Neglect	0.55 (0.20–0.90)	0.61 (0.46–0.76)
	Physical Neglect	0.50 (0.12–0.88)	0.52 (0.29–0.75)

Table 4
Discrepant Reports of Childhood Maltreatment, Stratified by Experiences of Adverse Perinatal Outcome Status.

Perinatal Outcome	Maltreatment Type	N Reporting Abuse Before Delivery but not After	N Reporting Abuse After Delivery but not Before	McNemar p-value
Women With No Low Birth Weight Babies				
	Emotional Abuse	11	15	0.43
	Physical Abuse	5	10	0.20
	Sexual Abuse	4	10	0.11
	Emotional Neglect	10	12	0.67
	Physical Neglect	8	6	0.59
Women with At Least One Low Birth Weight Baby				
	Emotional Abuse	1	0	0.32
	Physical Abuse	1	2	0.56
	Sexual Abuse	0	2	0.16
	Emotional Neglect	1	2	0.56
	Physical Neglect	0	4	0.046
Women With No Preterm Babies				
	Emotional Abuse	9	15	0.22
	Physical Abuse	5	11	0.13
	Sexual Abuse	3	10	0.05
	Emotional Neglect	8	11	0.49
	Physical Neglect	7	6	0.78
Women With at Least One Preterm Birth				
	Emotional Abuse	3	0	0.08
	Physical Abuse	1	2	0.56
	Sexual Abuse	1	2	0.56
	Emotional Neglect	4	4	1.00
	Physical Neglect	1	4	0.18
Women With No Babies Admitted to the NICU				
	Emotional Abuse	9	13	0.39
	Physical Abuse	4	8	0.25
	Sexual Abuse	4	9	0.17

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Perinatal Outcome	Maltreatment Type	N Reporting Abuse Before Delivery but not After	N Reporting Abuse After Delivery but not Before	McNemar p-value
Women With At Least One Baby Admitted to the NICU	Emotional Neglect	9	13	0.39
	Physical Neglect	6	7	0.78
	Emotional Abuse	3	2	0.65
	Physical Abuse	2	4	0.41
	Sexual Abuse	0	3	0.08
	Emotional Neglect	3	2	0.65
	Physical Neglect	2	3	0.65

Table 5

Associations of Maternal Exposure to Abuse and Neglect Measured Before vs. After Delivery with Perinatal Outcomes.

	Maltreatment Subtype	Pre-Delivery Measured OR (95% CI)	Post-Delivery Measured OR (95% CI)	Ratio of Post-Delivery / Pre Delivery Odds Ratios
Preterm Birth	Emotional Abuse	1.56 (0.66–3.70)	0.68 (0.25–1.80)	0.44
	Physical Abuse	1.07 (0.35–3.30)	0.98 (0.34–2.83)	0.92
	Sexual Abuse	1.66 (0.63–4.39)	1.55 (0.60–4.01)	0.93
Low Birth Weight	Emotional Neglect	1.45 (0.60–3.49)	1.65 (0.63–4.32)	1.14
	Physical Neglect	0.74 (0.20–2.82)	1.96 (0.65–5.94)	2.65
NICU Admission	Emotional Abuse	1.53 (0.52–4.51)	0.84 (0.26–2.71)	0.55
	Physical Abuse	0.92 (0.22–3.87)	1.08 (0.30–3.93)	1.17
	Sexual Abuse	1.31 (0.35–4.81)	1.89 (0.58–6.17)	1.44
	Emotional Neglect	0.97 (0.29–3.28)	1.28 (0.39–4.27)	1.32
	Physical Neglect	0.37 (0.04–3.19)	3.24 (0.92–11.39)	8.76
	Emotional Abuse	2.87 (1.09–7.59)	1.66 (0.61–4.58)	0.58
	Physical Abuse	1.61 (0.46–5.67)	1.70 (0.55–5.29)	1.06
	Sexual Abuse	2.51 (0.82–7.69)	3.46 (1.20–9.97)	1.38
	Emotional Neglect	2.65 (0.99–7.10)	1.88 (0.64–5.56)	0.71
	Physical Neglect	5.36 (1.61–17.83)	4.32 (1.34–13.90)	0.81

All ORs adjusted for weeks from delivery, concurrent depressive symptomatology, concurrent denial scores, maternal age, gravidity, race/ethnicity, concurrent maternal education, and concurrent marital status.

Table 6

Associations of Maternal Exposure to Physical Neglect Measured Before Versus After Delivery with Perinatal Outcomes, Stratified by Change in Depressive Symptoms.

Change in Depressive Symptoms (Post Delivery – Pre Delivery)	Pre-Delivery Measured OR (95% CI)	Post-Delivery Measured OR (95% CI)	Ratio of Post-Delivery / Pre Delivery Odds Ratios
Preterm Birth			
No Change or Decrease	1.44 (0.26–8.02)	1.31 (0.24–7.31)	0.91
Increase	0.21 (0.02–2.55)	3.51 (0.61–20.09)	16.71
Low Birth Weight			
No Change or Decrease	None exposed with low birth weight	1.32 (0.13–13.36)	N/A
Increase	0.35 (0.03–4.55)	13.84 (1.62–118.48)	39.54
NICU Admission			
No Change or Decrease	4.78 (0.95–23.99)	1.94 (0.33–11.50)	0.41
Increase	8.55 (0.97–75.55)	16.28 (2.06–128.8)	1.90

All ORs adjusted for weeks from delivery, concurrent depressive symptomatology, concurrent denial scores, maternal age, gravidity, race/ethnicity, concurrent maternal education, and concurrent marital status.