Associations Between Child Sexual Abuse and Negative Sexual Experiences and Revictimization Among Women: Does Measuring Severity Matter?

Tamra B. Loeb,
Semel Institute for Neuroscience and Human Behavior, University of California at Los Angeles

Tommi Gaines,
University of California, Los Angeles, School of Public Health, Department of Biostatistics

Gail E. Wyatt, Ph.D,
Semel Institute for Neuroscience and Human Behavior, University of California at Los Angeles

Muyu Zhang, and
Semel Institute for Neuroscience and Human Behavior, University of California at Los Angeles

Honghu Liu
Division of General Internal Medicine and Health Service Research, University of California at Los Angeles

Abstract

Women with histories of child sexual abuse (CSA) are more likely than those without such experiences to report a variety of negative sexual outcomes. This study examines the explanatory power of a CSA summed composite versus dichotomous (presence/absence) measurement in predicting a comprehensive negative sexual behavior outcome. Study participants were obtained from a community based sample examining women's sexual decision-making. The continuous CSA measurement reflects cumulative histories of CSA through a composite score capturing abuse specific characteristics. Using a cross-validation approach, the sample (n = 835) was randomly split and the explanatory power of each measure was examined through a series of multiple linear regressions comparing model fit indexes and performing a formal likelihood ratio test of one model against another. All CSA measures explained a similar percentage of variance but overall the CSA summed composite explained the data significantly better in terms predicting negative sexual experiences and revictimization than a binary measure as demonstrated with the likelihood ratio test. The results were replicated by cross-validating the predictive power of the CSA composite score between the split samples. Consistency of CSA regression estimates for the summed composite between training and validation samples were also confirmed. Given the superiority of the CSA summed composites over the binary variable, we recommend using this measure when examining associations between CSA histories and negative sexual experiences and revictimization.

Correspondence concerning this article should be addressed to Tamra B. Loeb, Ph.D. Semel Institute for Neuroscience and Human Behavior, University of California, Los Angeles 760 Westwood Plaza, Suite C8-871, LA, CA 90024-1759. Tloeb@mednet.ucla.edu.

Keywords

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Research investigating the links between exposure to child sexual abuse (CSA) and negative sexual experiences and revictimization among women has flourished over the past 25 years. Several literature reviews, meta-analyses (Senn, Carey, & Vanable, 2008; Messman-Moore & Long, 2003; Arriola, Louden, Doldren, & Fortenberry, 2005) and individual studies have concluded that compared to non-abused women, those with histories of CSA are more likely to report a variety of subsequent negative sexual outcomes. Comparisons of abused and nonabused samples often focus on sexual behaviors thought to confer risk for negative sexual health outcomes (Chin, Wyatt, Carmona, Loeb, & Myers, 2004; Mason, Zimmereman, & Evans, 1998). Specifically, research suggests that women with histories of CSA are more likely to report engaging in consensual sexual intercourse at an earlier age (Johnsen & Harlow, 1996), more unintended pregnancies (Roode, Dickson, Herbison, & Paul, 2009; Chandy, Blum, & Resnick, 1996) and sexual partners (Merrill, Guimond, Thomsen, & Miller, 2003), a history of sexually transmitted infections (Brown, Lourie, Zlotnick, & Cohn, 2000; Roode, et al., 2009), and greater likelihood of being sexually revictimized as an adult (Messman-Moore & Long (2000). The vast majority of research in this area utilizes binary measurements of CSA which indicate the presence or absence of maltreatment (Slep & Heyman, 2004) rather than examining these experiences on a continuum. The dichotomization of CSA may be due to theoretical differences between abused and non-abused groups, or for methodological simplicity, which limits our understanding of potential differences within the group of CSA survivors (MacCallun, Zhang, Preacher, & Rucker, 2002; Altman, Lausen, Sauerbrei, & Schumacher, 1994; Austin & Brunner, 2004; Cohen, 1983).

This body of research has progressed beyond documenting simple associations between CSA and subsequent sexual risks to testing various conceptual models (Browning & Laumann, 1997), as well as mediators (Fortier, DiLillo, Messman-Moore, Peugh, DeNardi, & Gaffey, 2009) and moderators of the CSA-negative sexual outcomes link (Fortier, et al., 2009; Senn, Carey, Vanable, Coury-Doniger, & Urban, 2006; Senn, et al., 2008). This new generation of research must grapple with the same methodological variations that have historically plagued the field, including discrepancies in definitions of CSA, assessment method, and samples (Paolucci, Genus, & Violato, 2001). Despite these problems, adequate evidence exists to enable researchers to conclude that individuals with histories of CSA are generally at higher risk for subsequent sexual risk behaviors than those without such histories (Senn, et al., 2008).

Variations in definitions of CSA

Variations with defining CSA has received the most attention, and is important because of its potential influence on the associations noted between CSA and negative outcomes. Whereas some definitions of CSA include noncontact behaviors such as exposure or voyeurism (Godbout, Sabourin, & Lussier, 2009), others restrict the behaviors that constitute sexual abuse to those that involve physical contact (Paolucci, et al., 2001; Wyatt, Loeb, Solis, Carmona, & Romero, 1999), involve a 5-year age differential between the victim and alleged perpetrator (Wyatt, et al., 1999; Glover, Loeb, Carmona, Sciolla, Zhang, Myers, & Wyatt, 2010), or included rape or forced sex only (Zierler et al., 1991; Thompson et al., 1997). More restrictive definitions of CSA are thought to be more strongly associated with negative outcomes (DiLillo, 2001), while less restrictive definitions may not allow for the

detection of such relationships (Senn et al., 2008). Although researchers have highlighted the importance of reaching a definitional consensus, an issue that has not received adequate attention is the need for any such definition of CSA to include the entire range of sexual behaviors that involve physical contact (Wyatt, Newcomb, & Notgrass, 1990; Romero, Wyatt, Loeb, Carmona, & Solis, 1999) rather than simply assessing whether or not a woman feels that she was abused. A multidimensional definition including behaviors that range in severity is theoretically important because it will allow researchers to determine if more severe CSA histories (i.e., experiences involving penetration) result in greater negative sexual outcome effects (Kallstrom-Fuqua et al., 2004). However, despite its intuitive appeal, research has yet to fully investigate the issue of CSA severity. When survivors of different CSA experiences are combined into a single group, their experiences are treated statistically as identical, ignoring qualitative and quantitative differences between CSA survivors. Further, dichotomization of CSA variables makes it impossible to examine potential dose-response relationships between severity of CSA experiences and negative outcomes (DiLillo, 2001) and also results in a loss of statistical power (McCallum, Zhang, Preacher, & Rucker, 2002).

Comprehensive reviews of CSA and later sexual risk behavior have been conducted (see Senn, et. al., 2008), and although they review definitional issues, do not adequately address the question of whether the most commonly used single or multiple indicator measures of CSA have greater explanatory power with regard to negative sexual health outcomes and experiences. To date, research is inconclusive regarding whether multiple-indicator measures or single-item instruments are better at conceptualizing the long-term correlates of CSA. One example from martial satisfaction research is Godbout et al's (2009) comparison of single-and multiple-indicator strategies in the assessment of a model in which a latent construct of CSA predicted later marital satisfaction through mediators. They hypothesized that compared with a single-item measure, a multiple-indicator assessment strategy would explain more variance in marital satisfaction. However, results suggested that the dichotomous CSA item was as useful as the multiple-indicator measure with explaining the relationship between CSA and couple adjustment.

Several attempts have also been made to capture the severity of CSA experiences in relation to adult sexual risk. In contrast to group comparisons, some studies have attempted to move beyond single measure items to multidimensional measures designed to capture the severity of CSA experiences. These studies typically utilize a continuous summed score to examine one or more aspects or dimensions of CSA experiences. These variables generally include age of onset of abuse, relationship to the perpetrator, duration and frequency of abuse, use of force, and penetration (Beitman et al., 1992). Several notable examples of this approach include Merrill et al. (2003) creation of a CSA severity index that summed 5 aspects of CSA experiences involving: penetration, use of threats or force, identification of perpetrator as father or stepfather, more than one perpetrator, and more than 5 incidents. The authors reported CSA severity was positively and significantly correlated with number of sex partners. Similarly, Elze, Auslander, McMillen, Edmond & Thompson (2001) constructed a three hierarchical category of CSA severity (e.g., no abuse, unwanted touching, and unwanted intercourse) to assess the association with sexual risks. Using the no abuse group as the referent, severity of sexual abuse was not a significant predictor for consensual sexual intercourse. Fortier, et al. (2009) created a continuous abuse severity score, which was the summed composite of sexual aspects of CSA severity, including frequency, duration, nature of the acts, relationship of the perpetrator, force, and number of perpetrators, and determined that CSA severity was significantly related to coercive revictimization. Thus, findings are conflicted when comparing relationships between adult sexual risk and CSA severity measures on a continuous scale versus a categorical one.

Another method commonly used does not measure the construct of CSA per se, but rather examines abuse-specific characteristics. Typically, this research treats individual CSA dimensions as covariates in a regression model (Paolucci et al., 2001). This approach has appeal because research has noted that specific aspects of CSA may account for the variation in long-term symptomology among CSA survivors (Johnson, Pike, & Chard, 2001). Examples of this approach include Wyatt, Myer, Williams, Kitchen, Loeb, Carmona, Wyatt, Chin, & Presley's, (2002) creation of a categorical CSA variable which included no CSA (0), extrafamilial CSA (1), and intrafamilial CSA (2) in an ethnically diverse community sample of HIV-positive and HIV-negative women. They determined that HIV-positive African American women reported more severe histories of child sexual abuse, that is, abuse perpetrated by a family member. West, Williams, & Siegel (2000) examined associations between adult sexual revictimization and specific CSA characteristics (e.g., youngest age at onset of abuse, physical force, penetration, abuse by family member). Only CSA with physical force distinguished between women who were revictimized from those who were not and increased the likelihood of adult sexual revictimization. However, multicollinearity is a methodological concern when including several CSA dimensions in a regression model, as specific characteristics of abuse including age of onset, relationship with perpetrator, type, and frequency of abuse may be intercorrelated among CSA survivors.

Study Objectives

For each of the outcomes described above, no comparison of the predictive ability of these three approaches (binary, summed composite, and characteristics of CSA experiences) is available specifically in relation to sexuality outcomes. Despite the amount of research conducted in this area, the question remains, does the way CSA is defined and measured affect the explanatory power of CSA? Therefore, the purpose of this paper is to examine whether a continuous or dichotomous (presence/absence) measurement of CSA is more predictive of comprehensive measure on negative sexual experiences and revictimization. Further, will the inter-relatedness of CSA dimensions present problems with multicollinearity in the proposed analyses when limiting the sample to women with CSA histories? Using data obtained from a community-based sample of ethnically diverse women we used a cross-validation approach to test the following hypothesis:

1. Model fit indexes will indicate more predictive power for the CSA composite score with regard to negative sexual experiences and revictimization.

2. Compared to a binary measure, the CSA composite score will generate more consistent estimates on the association with negative sexual experiences and revictimization.

3. The specific characteristics of abuse (type, frequency, age, and perpetrator) are interrelated items presenting multicollinearity problems in a regression analysis among a sample of women with CSA histories.

Method

Participants and Procedures

Participants were obtained from the Los Angeles Women's Project (LAWP), a stratified probability sample examining women's sexual decision-making in Los Angeles County (Wyatt et al., 1999). Human subject consent approval was obtained in English or Spanish and reviewed by the University of California, Los Angeles IRB. Using 1990 and yearly updated census data, the sample was obtained through random digit telephone dialing procedures. Potential participants were called on the phone, and after screening, were scheduled for a face-to-face interview conducted by trained, racially/ethnically and

linguistically matched female interviewers. Eligibility for participation was limited to females between the ages of 18–50 years old and the sample consisted of women whose self-reported ethnic identification was African-American, European-American, or Latina of Mexican origin as approximately 90% of Latinas in the LAWP were of Mexican ancestry. The LAWP samples were compared to census data for LA county women who matched these characteristics and were found to be similar on age, ethnicity, education, and marital status. The interviews averaged 3 to 5 hours and were tape recorded to ensure accuracy of the interviewer's transcription of responses during data collection. Women were interviewed one time and were paid $32 and given referral information for mental health services upon request. Further details regarding the study have been reported elsewhere (Wyatt et al., 1999). Data from the resulting 835 participants were used in the current study.

Instrument

Sexual experiences were assessed using items from the revised Wyatt Sex History Questionnaire (WSHQ-R), a 478-item structured interview that includes open- and closed-ended items and assesses sexual decision making about consensual and nonconsensual experiences (Wyatt, 1985). The WSHQ-R was administered face-to-face by a trained female interviewer of the same ethnicity and language (English and Spanish). Questions were read to participants from a script to ensure word usage of the interview did not exceed 6th grade level. Anatomical parts and behaviors were defined before questions about behavior were asked. Test-retest reliability on all closed-ended items from the WSHQ-R and the inter-rater reliability established among four interviewers were high (average $r = 0.90$). More detailed information describing the reliability of the WSHQ-R has been reported elsewhere (see Wyatt, 1985). For this study, fourteen items (nine CSA screening questions and five additional WSHQ-R questions were administered to all participants. In addition, women that indicated an affirmative response to any of the CSA screening questions were subsequently questioned on four additional WSHQ-R items relating to the specific characteristics of the abuse.

Dependent Variable – Negative Sexual Experiences and Revictimization

Negative sexual experiences and revictimization were measured from selected items on the WSHQ-R. Participants were asked about the age of first consensual sex, the number of sexually transmitted infections, the number of sexual partners since the calendar year 1980, the number of unplanned pregnancies, and rape or attempted rape during adulthood. The associations between child sexual abuse and these sexual behaviors and sexual health correlates have been examined in previous research (i.e., West et al., 2000; Fortier et al., 2009; Roode et al., 2009; Arriola, Louden, Doldren, & Fortenberry, 2005). A composite measure was constructed from these five variables by summing categories created from the initial responses measured on a continuum. One point was assigned to the each of the following abuse-specific characteristics: age 1st consensual sex occurred between 16–17 years, 1 sexual partner, 1–2 STI's, 1 unplanned pregnancy, and one incident of rape/attempted rape. Respondents received two points on the composite measure for each of the following: age of 1st consensual sex occurred between 12–15 years, 2–4 sexual partners, 3–5 STI's, more than one unplanned pregnancy, and more than one incident of rape/attempted rape. Last, three points were assigned to the measure if a respondent had 5 or more sexual partners or reported 3 or more STI's. The largest response average was the number of sexual partners and lowest was number of rape/attempted rape. To avoid the complication that number of sexual partners would contribute the greatest and the number of rape/attempted rape would contribute least to the overall score, we reweighted each of the response categories such that values within each abuse-specific characteristic ranged from 0 –6 allowing for a maximum composite score of 30. This was done to ensure that each of the five measured sexual behaviors contributed equally to the overall composite measure.

Independent Variable – Childhood Sexual Abuse

Child sexual abuse was classified using nine screening items from the WSHQ-R that includes an incident-based reporting system for all incidents of coercive sex experienced prior to age 18 (Wyatt, Lawrence, Voudonon, & Mickey, 1992). Each incident reflects the behavior of a different perpetrator or group of perpetrators. Participants were classified as experiencing CSA if they responded "yes" to any of the nine screening questions (yes/no items) related to sexual experiences with an adult or someone 5 years older than the participant before the age of 18 years including fondling, frottage, attempted intercourse, intercourse, oral copulation, and digital or object penetration. If the age difference between perpetrator and victim was less than 5 years, the incident was only classified as abuse if the participant indicated that the contact was either not desired or was coercive (Loeb et al., 2002). Consistent with other research, voluntary sexual activities with a peer were not considered sexual abuse (Fortier et al., 2009). A positive answer to any of these nine screening questions was followed with questions asking more detailed information regarding the nature of the CSA incident that included: 1) type of physical contact, 2) age of the participant at the time of the abuse, 3) frequency of abuse, and 4) relationship of the perpetrator to the participant.

A multidimensional index of CSA capturing the severity of the abuse experience was created using the additional information that have been demonstrated to individually predict a variety of severe outcomes (Johnson et al., 2001; Merrill et al., 2003). We derived the severity index by summing across responses on each dimension listed in Table 1. To identify whether a longer version, which approximated a more continuous variable, provided more explanatory power we compared two indices. Higher scores on any of the dimensions of the CSA experience reflect greater levels of CSA severity (Godbout et al., 2009; Chaffin, Wherry, Newlin, Crutchfield, & Dykman, 1997; Merrill et al., 2003). The scores from the long version CSA severity index were standardized to have a zero mean and variance one so that each dimension weighed equally in deriving the score. Women that did not experience CSA were automatically assigned a zero value for each dimension of a CSA experience. Among women reporting multiple non-overlapping abuse incidents occurring each time with a different perpetrator(s), we derived a cumulative score of CSA severity by summing each multidimensional index corresponding to the separate incidents.

Demographics

Because the focus of this study was to examine the explanatory ability of CSA on negative sexual experiences and revictimization, we considered a limited number of demographic variables (age, ethnicity, and growing up in an intact family) which could be potentially confounded with the dependent variable based on prior studies (Chandy et al., 1996; Elze et al., 2001). For ethnicity, women self-identified as African-American, Latina, or European American. An intact family was assessed by the question "Were you living with both parents most of the time up to the age 18?" with the binary response yes/no.

Data analysis

All analyses were conducted using SAS, version 9.2 and all model assumptions were met for the multivariable linear regression models and the Cox Likelihood ratio test. Pearson correlation coefficients were used to evaluate bivariate associations between the continuous variables that include the dependent composite measure, CSA severity indices, and the abuse specific characteristics (the long versions of age, type, frequency, and perpetrator measured on a continuous scale, see Table 1). We examined the ability of a CSA summed composite versus dichotomous (presence/absence) measurement to explain negative sexual experiences and outcomes using a cross-validation approach. The total sample (N =835) was randomly split with 75% of the observations as a training sample (n = 626) to build the

regression models and 25% as the validation sample (n=209). No significant differences between the training and validation samples were noted on the demographics, CSA measures, or outcome variables. Three CSA measures were compared and include a binary measure, presence versus absence, and two separate CSA severity indices. To test our first hypothesis, we hierarchically derived a series of multiple linear regressions using the developmental sample. The initial model adjusted for demographic variables and subsequent models included one CSA measure. Incremental changes in the model fit measures, including the adjusted R^2 and Prediction Sum of Squares, were compared across all models and a hypothesis test of the competing but non-nested regression models was performed using a likelihood ratio test devised by Cox (1961; 1962). Our second hypothesis was tested by evaluating consistency of CSA regression coefficients and respective standard errors between the training and validation samples. In addition, a calibration of the predictive power of each CSA measure was checked by determining whether predictions generated from regression models of the training sample could be replicated in the validation sample using the Mean Squared Prediction Error statistic (Neter et al., 1996). Lastly, the third hypothesis, examining multicollinearity, was tested by a regression of the dependent variable on each abuse-specific characteristic, treated as a unique independent variable in a multivariable linear model. This was to determine whether the direction and magnitude of associations remained similar between models using the training and validation samples. We confirmed that all parametric assumptions for statistical analyses were met and used two-tailed significance tests.

We report results in two sections. The first presents sample characteristics in terms of demographics, the prevalence of CSA, the distribution of negative sexual experiences and revictimization, and bivariate associations between in CSA histories and the dependent variable evaluated in this study. The second section presents the results testing the hypotheses using a cross-validation approach to ascertain model fit indexes, consistency of regression parameters, and an evaluation of multicollinearity.

Results

Sample Characteristics

The average age of female participants was 34.4 years (SD = 8.3) and was equally distributed among African American (33%), European American (33%), and Latina (34%) women. More than three-fourths of the women reported at least a high school diploma (78%), over half were married (62%), and the average monthly income was approximately $2,000. The majority of women (66%) reported living with both parents until 18 years of age. In the present sample, 33% (n = 278) of the women experienced CSA and among these women, 42% (n = 117) reported more than one non-overlapping CSA incident to age 18. Between 1 to 7 separate CSA incidents were reported with an average of 1.6 (SD = 0.9) incidents. The specific characteristics of the abuse incidents varied with respect to type of abuse, relationship to the perpetrator, age at which it occurred, and how long it lasted. Approximately 60% of the women were under the age of 12 at the first CSA incident, and 75% of those who reported two or more incidents were under the age of 12. Similarly, 46% of the sample reported penetrative abuse at the first incident whereas 79% of women with two or more incidents reported penetration. Over a third of women with only one CSA incident reported abuse incidents that occurred more than one time; this proportion was much larger (55%) for women reporting more than once CSA incident. Overall, women in this sample reported experiencing very severe CSA characteristics.

In regards to specific items forming the outcome measure, negative sexual experiences and revictimization, participants reported on average 8.2 (sd = 61.3) sexual partners since 1980, 0.9 (sd = 09) STI's, 1.5 (sd = 1.8) unplanned pregnancies, 0.7 (sd = 5.1) rape/attempted rape,

and average the age of first consensual sex was 18.0 years (sd = 3.2). The composite measure summarizing these five reported sexual behaviors ranged between 0–28 with an overall average of 11.3 (sd = 5.8), where larger values are indicative of greater sexual health risks and revictimization over a woman's lifetime.

Intercorrelations between CSA and composite of negative sexual experiences and revictimization are shown in Table 2 for which all were significantly different from zero (p-values < 0.025). Strong correlations among each of the dimensions of CSA experiences was observed and each of the CSA measures was similarly correlated with the composite outcome (CSA binary r = 0.234, CSA short index r = 0.256, CSA long index r = 0.261. These associations were slightly attenuated when considering the CSA victims only, however, among the dimensions of CSA experiences, moderate correlations persisted ranging from 0.593 to 0.704 where frequency and type had the smallest correlation and frequency and age had the largest. When we limited the CSA reports to the worst incident of abuse, the correlations among perpetrator, type, age, and frequency of abuse were markedly attenuated ranging from −0.29 to 0.20 with age and type having the smallest correlation and frequency and perpetrator the largest (results not shown).

Cross-Validation

Table 3 displays the results from examining the predictive ability of the three CSA measures using the training sample (n = 626) to address the first hypothesis. The baseline model, M1, adjusted for demographic variables only and was used as the comparison against all other models. The inclusion of a CSA measure, either binary or multidimensional, explained between 5 percent points to 6.2 percent points more variance and significantly differed from the baseline model, M1 (p-value < 0.001). We further compared the four regression models by deriving the prediction sums of squares (PRESS) which deletes the ith observation then fits the regression model (Neter et al., 1996). Using the fitted values we obtained a prediction of the dependent variable for the ith deleted value and compared it to its actual value. The sum of the squared difference between the predicted and actual value for the 626 women in the training sample provided us with the PRESS statistic where smaller PRESS values are indicative of a better fitting model. Table 4 shows that PRESS decreases substantially by including a CSA measure with gradual declines between the binary CSA measure (PRESS = 355.16), the CSA short index (PRESS = 351.06), and the CSA long index (PRESS = 349.90). These two statistical measures of model fit, adjusted R^2 and PRESS, suggest a CSA severity index offers limited improvement over a CSA binary measure. However, more conclusive results were reached by using Cox likelihood ratio test for non-nested models, which indicated that both CSA index measures, short and long, provided more explanatory power than the CSA binary measure (p-value < 0.001). There was no significant difference in explanatory power between the two CSA indices (p-value > 0.05). The p-values were adjusted using a Bonferroni correction method to account for the multiple comparisons of three linear regression models.

Given the significant difference between the dichotomous and continuous CSA measures, we addressed the second hypothesis by evaluating the consistency between regression estimates on the CSA severity indices and respective standard errors using the cross-validation samples. Moderate changes were observed between regression coefficients and respective standard errors in both the CSA short index, $\beta_{training} = 0.24$ (0.04) and $\beta_{validation} = 0.31$ (0.06), and CSA long index, $\beta_{training} = 0.22$ (0.03) and $\beta_{validation} = 0.31$ (0.05). We calibrated the predictive ability of the two CSA indices by checking whether the regression model fitted to the training sample would predict outcome values similar to the actual observed values in the validation sample. The mean squared prediction error, MSRP, was derived which is a function of the averaged sum of squared differences between the observed composite outcomes for the ith validation case and the predicted value for the ith

validation case where predictions are made with the fitted values of the training sample (Neter et al., 1996). The root mean squared error (MSE) was calculated using the training sample and MSRP with the validation sample. Both were compared for consistency and found to be similar, CSA short index: 0.741 (root MSE) vs. 0.738 (root MSRP) and CSA long index: 0.737 (root MSE) vs. 0.734 (root MSRP), indicating either measure provides similar predictions on the dependent variable lifetime sexual health risks and revictimization.

Results from testing the third hypothesis of this study are presented in Table 4. None of the abuse specific characteristics were significantly associated with the outcome, which is in contrast to the significant associations as measured by the correlation coefficients of Table 2. Moderate changes between regression estimates of the training and validation samples are noted but it is the direction of association between age at onset of abuse, frequency of abuse and the dependent variable that is inconsistent with prior knowledge. The estimates reflect a negative association in the training sample but a positive association in the validation sample between age and negative sexual experiences and revictimization ($\beta_{training} = -0.17$ and $\beta_{validation} = 0.06$). Similarly, conflicting associations were found between perpetrator of abuse and negative sexual experiences and revictimization in the split samples ($\beta_{training} = 0.21$ and $\beta_{validation} = -0.24$) demonstrating the presence of multicollinearity during the estimation of abuse specific characteristics.

Discussion

There are two unique contributions of this study towards examining the measurement of CSA. The first is that we conducted a significance test of non-nested models to determine which measure was most worthwhile in terms of explaining the contribution of CSA to negative sexual experiences and revictimization. We determined that both the short and long summed composites of CSA explained a similar percentage of variance as a binary measure assessing a history of exposure to CSA (presence or absence). However, the significance tests identified both summed composites as a better fit to the data offering more explanatory power than the binary measure. These results differ from those reported by Godbout et al., (2009), which concluded that the presence of CSA, regardless of its severity, was a risk factor for adult interpersonal difficulties. Further, whereas the analyses conducted by Godbout were limited to comparing the statistical fit between models, including R square, our evaluation of the explanatory power through hypothesis tests revealed statistically significant differences between models. When we only compared fit statistics, including R square and PRESS, the binary measure and summed composites explained similar amounts of variation. However, the hypothesis test for non-nested models provided overwhelming evidence in favor of the summed composite over solely assessing the presence of CSA. The main advantage of the Cox Likelihood Ratio tests is that it allowed us to statistically compare model performance under different CSA measures and offer information beyond model fit indexes as to which CSA measure was the best with respect to generating the outcome.

The second contribution of this study is that we checked whether our results could be replicated by cross-validating the predictive power of each CSA composite score. We confirmed moderately consistent CSA regression estimates within training and validation samples for both summed composites and we demonstrated that using fitted values from the training sample produced predictions on the outcome in the validation sample that were similar to actual observed values. These findings suggest that the predictive ability observed in our study between CSA severity and lifetime sexual risks and revictimization could be replicated in other settings.

It is important to note that the summed composites of CSA (both short and long) reflect women's cumulative histories. This stands in contrast to studies which restrict their examination of CSA to the first incident (Glover et al., 2010) or the type of incident, for instance, the most intrusive or abuse involving penetration (Godbout et al., 2009). It is not always clear which incident is the subject of focus in other studies. For women who report more than one abuse incident, the characteristics of these incidents are likely to differ. The summed composite utilized here takes these differences into account and more accurately reflects the cumulative burden, or severity, of CSA experiences before age 18. Despite this benefit, the summed composite assumes that discrete CSA incidents are additive, which may not reflect the actual impact of these experiences and continues to be a challenge for the field.

The characteristics included in our summed composite are thought to represent distinct, but shared aspects of CSA experiences. In this sample of CSA victims and non-victims, the individual dimensions correlated with the outcome in a similar manner as the CSA severity indices. However, methodological considerations for subsequent studies are that the four dimensions were highly interrelated and susceptible to multicollinearity when included as independent variables in a regression analysis. To address this issue, individual dimensions should be deleted or combined into a meaningful construct, for example, the CSA severity composite used in this study. When we restricted our sample to CSA survivors only, moderate to high correlations among the individual dimensions persisted. However, when we examined only the worst type of abuse incident, rather than considering all incidents of CSA cumulatively, the correlations between CSA dimensions were drastically reduced, and were consistent with those obtained by prior research (Godbout et al., 2009). We hypothesize that multicollinearity would hinder subsequent analysis if each dimension were left as independent variables and we were able to demonstrate inconsistent negative associations between age of onset of abuse, perpetrator of abuse, and lifetime health risks and revictimization. In the future, research utilizing different dimensions of CSA must address the issue of multicollinearity, as each of these characteristics is measuring a distinct aspect of CSA.

A limitation of the current study is the use of retrospective, unsubstantiated self-report of child sexual abuse experiences, although this data is commonly used in CSA research. Second, the prevalence rate of approximately 33 percent obtained in this study is consistent with typical national estimates of CSA prevalence among females (Senn, et al., 2006). The women in this study also reported experiencing very severe CSA characteristics, somewhat in contrast to other community samples (Godbout et al., 2009; Kallstrom-Fuqua, Weston, & Marshall, 2004). At least half of the women experienced penetration and identified a family member as the perpetrator. In contrast, only 15 percent of Godbout et al. (2009) sample reported penetrative CSA and approximately one-fourth of the women in another community sample reported abuse by a father figure (Kallstrom-Fuqua et al., 2004). This may be due, in part, to the nature of the questions used to assess CSA. Whereas some studies (Godbout et al., 2009) ask respondents to endorse whether or not they were sexually abused, the questions used in this study did not require participants to label their experiences as abusive. Rather, participants were asked whether or not they had experienced one of nine behaviorally oriented screening questions. Child sexual abuse questions were also administered face-to-face in a private interview room, as one component of a larger questionnaire, which allowed for rapport to be established and may have led participants to feel more comfortable revealing and discussing CSA incidents (Senn et al., 2006). It is likely that asking the questions utilized in this study outside of the context of the larger interview would decrease the comfort level of patients in a clinical setting and result in a lower prevalence rate. Further, although research is identifying intervening variables that moderate the CSA - negative outcomes relationship, this study examined only direct associations

between CSA severity and negative sexual experience and outcomes. We were also unable to control for or examine the contributions of other types of child maltreatment or negative experiences to negative sexual experiences and outcomes (Glover et al., 2010), potentially limiting our understanding of other potential risk factors.

Another limitation was the inability to examine more aspects of CSA experiences, including use of force and duration of CSA incidents, characteristics commonly used to describe CSA (West et al., 2000; Beitman et al., 1992; Weaver, Chard, Mechanic, & Etzel, 2004). As such, our summed composite does not reflect the degree to which CSA incidents involved coercion or force per se. Similarly, our outcome did not comprehensively measure sexuality per se, but was constructed using a limited number of sexual risk measures, including adult sexual revictimization, unintended pregnancy, sexually transmitted diseases including HIV, number of sexual partners since 1980, and age of first consensual sex. As such, the number of sexual partners variable used in this study did not represent lifetime number of sexual partners for all participants in the study due to differences in current age of participants. The selection of these measures was driven by prior research linking CSA to these outcomes. An exploratory factor analysis (results not shown) suggested that these measures could represent a unified construct of negative sexual experiences and revictimization. Further, combining these sexual experiences into a single dependent variable builds upon prior literature that found independent associations between CSA, number of sexual partners, and coercive revictimization (Merrill et al., 2003; Fortier et al., 2009). We demonstrate that CSA severity not only significantly relates to but better explains the variance in negative sexual experiences and revictimization. It is worth noting that approximately five percent of the sample reported age of first consensual sex before age 12; these women were deleted from the analyses, as they were developmentally unable to truly consent to intercourse at such a young age. Due to the cross-sectional nature of this data, we are also faced with a temporal limitation, as we were unable to be certain that some measures included in the outcome (i.e., number of sexual partners, sexually transmitted infections, and unintended pregnancies) occurred after the CSA incident(s) occurred (Elze et al., 2001).

The superiority of the CSA summed composites over the binary variable in this study is limited to associations with negative sexual experiences and outcomes. The application of these measures often will depend on the type of inference to be gained. The utility of a binary measure of CSA may be adequate when research is focused on calculating prevalence rates, but the field is increasingly focusing on measuring the severity of experiences in relation to negative outcomes for which CSA survivors are thought to be vulnerable. In this context, the use of a binary CSA variable is inherently limited, because it can only capture whether or not abuse occurred at any point in childhood, and cannot capture any characteristics of a single CSA incident or more than one CSA incident that occurs over time. However, results of this study and Godbout et al., (2009) do suggest that the presence of CSA itself is a risk factor for later negative sexual experiences and outcomes.

The severity of CSA, rather than its occurrence, is more useful in making clinical decisions that impact a child's life (Slep & Heyman, 2004) and the qualitative and quantitative differences between CSA experiences have been hypothesized to explain variations in outcomes (DiLillo, 2001). As performed within this study, future research should assess the explanatory power and calibrate the predictive ability of summed composites that reflect cumulative histories of CSA with regard to other psychological and physical outcomes. This may allow researchers and clinicians to more fully understand the vulnerabilities that CSA survivors with different experiences may face and could eventually lead to consistent universal guidelines for defining CSA severity in relation to a broad range of outcomes. This includes defining which characteristics of abuse are most important aspects to consider in relation to CSA severity. At a minimum, the four characteristics of the summed composite

comprising CSA severity should be considered in clinical settings when working therapeutically with women at risk for or reporting negative sexual experiences and outcomes. In addition, clinicians may be well advised to ask about whether or not force was a factor in CSA incidents. The questions used in this study to capture CSA, though designed by researchers, can be readily used by clinicians in everyday practice. Despite their sensitive nature, they are not difficult nor time consuming to administer, qualities promoted by researchers in the field (Slep & Heyman, 2004). However, despite its clinical utility, we caution against the idea of categorizing CSA histories (i.e., mild, moderate, and severe), as clinical cut-points have yet to be empirically determined and await future research. Although other indexes that capture multiple forms of maltreatment have been designed to produce such categories, we feel that they are somewhat arbitrary for both research and clinical purposes, as they do not take into account a host of variables other than CSA that may be important. Furthermore, prior research has shown the difficulty with identifying ideal clinical cut-points to define appropriate categories (Altman, Lausen, Sauerbrei, & Schumacher, 1994; Austin & Brunner, 2004; Cohen, 1983). Clinical decisions and treatment implications are more likely to hinge on a variety of background and current experiences and characteristics in addition to the severity of CSA experiences. Nonetheless, understanding where CSA victims fall on a continuum of CSA experiences may be helpful in designing treatment options for these women.

Acknowledgments

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Table 1

Two separate versions for scoring CSA Severity[a].

An Affirmative response to at least one of nine behaviorally oriented questions assessing 7 types of CSA results in the following WSHQ-R question:			
CSA Dimension	**WSHQ-R**	**Short**	**Long**
Type of Abuse	"Please describe what took place."	**1** – Non- penetration **2** - Penetration	**1** – Rub Genitals **2** – Fondling **3** – Digital Penetration **4** – Attempted Rape **5** – Oral Sex **6** – Rape/Date Rape **7** – Anal Sex
Relationship of Victim to Perpetrator	"What was his/her relationship to you?"	**1** – Extrafamilial **2** - Intrafamilial	**1** – Stranger **2** - Extrafamilial[c] **3** - Intrafamilial[c] **4** – Parent/Stepparent
Frequency of Abuse	"How long did this go on?"	**1** – Once **2** – More than Once	**1** – Once **2** – 2–5 times **3** – 6–9 times **4** – 10 or more times
Age of Victim at Onset of Abuse	"How old were you at the time?"	**1** - > 12 years old **2** - 12 years old	**1** – 16–17 years old **2** – 12–15 years old **3** – 6–11 years old **4** – 1–5 years old

[a]Non-CSA victims were assigned a value of zero across all dimensions. Some victims reported multiple CSA events where the score for each index ranged from 0–8 (short) or 0–19(long).

[c]Extrafamilial includes casual acquaintance, mother's boyfriend, neighbor, friend of the family, authority figure, date or boyfriend

[d]Intrafamilial includes aunt/uncle, grandparent, brother, stepsister, and excludes parental figures.

Table 2

Correlation among the four dimensions of CSA severity index and Lifetime Sexual Health Risks/Revictimization for the full sample (N=835)[a]

	1	2	3	4	5	6	7	8
1. CSA(Y/N)	1.000	0.976	0.976	0.976	0.936	0.974	0.973	0.234
2. Type	-	1.000	0.985	0.980	0.981	0.991	0.990	0.257
3. Perpetrator	-	0.689	1.000	0.985	0.983	0.994	0.991	0.252
4. Frequency	-	0.593	0.682	1.000	0.986	0.993	0.994	0.255
5. Age	-	0.604	0.651	0.704	1.000	0.992	0.989	0.246
6. CSA short	-	0.817	0.870	0.857	0.850	1.000	0.998	0.256
7. CSA long	-	0.808	0.826	0.879	0.777	0.965	1.000	0.261
8. Negative Sexual Outcomes	-	0.229	0.200	0.225	0.140	0.225	0.265	1.000

[a]Correlations above the diagonal are among the sample with CSA and non-CSA victims (n = 835) whereas correlations below the diagonal are among the sample of CSA victims only (n = 278).

Table 3

Comparison of Models using three separate measures of CSA using the Development sample (n = 626)

CSA Measure	R^2	R^2 Change[a]	PRESS
M1: Demographics Only	.1467		376.75
M2: Demographics + CSA (Y/N)	.1969	.0502	355.16
M3: Demographics + CSA (short)	.2060	.0593	351.06
M4: Demographics + CSA (long)	.2086	.0619	349.90

[a]M2, M3, M4 were compared against M1 and found to significantly differ (p-value < 0.001)

Table 4

Comparison of regression estimate (standard error) for abuse specific characteristics[a]

Cross-Validation Samples	Type	Age	Perpetrator	Frequency
Training	0.21(.14)	−0.17(.23)	0.22 (.23)	0.21(.21)
Validation	0.22(.34)	0.06(.48)	−0.24 (.50)	0.75(.39)

[a]Both regression models adjusted for demographic variables: age, race/ethnicity, living in an intact family