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Attentional Bias for Sexual Threat Among Sexual Victimization Survivors: A Meta-Analytic Review

Jessica A. Latack[1], **Anne Moyer**[1], **Valerie A. Simon**[2], and **Joanne Davila**[1]

[1]Stony Brook University, Stony Brook, NY, USA

[2]Wayne State University, Detroit, MI, USA

Abstract

The current meta-analysis examined the effects of sexual victimization (SV) on attentional bias for sexual threat. This relationship was also examined among victims of SV with and without a current diagnosis of post-traumatic stress disorder (PTSD). The broader aim was to elucidate potential mechanisms operating between SV and negative health outcomes. As hypothesized, the findings supported a positive relationship between SV and attentional bias toward sexual threat stimuli, and subanalyses indicated that PTSD symptomatology significantly contributed to this association.

Keywords

attentional bias; attention; sexual victimization; trauma; PTSD

Sexual victimization (SV) encompasses a range of behaviors that include noncontact unwanted sexual experiences (e.g., flashing or being forced to view sexually explicit material or acts), unwanted sexual contact (e.g., kissing, rubbing, or fondling), sexual coercion (e.g., verbal coercion or threat), forcible rape, (in which the perpetrator uses force and involves penetration of the victim's mouth, anus, or vagina), alcohol-involved rape (in which an individual is too incapacitated to provide consent and involves penetration of the victim's mouth, anus, or vagina), and alcohol-involved assaults that do not involve penetration.

SV remains common and constitutes a significant public health concern in the United States and around the world. Recent estimates suggest that in the United States, 25–35% of women and 12–20% of men experience sexual abuse during childhood (Monahan, 2010), and 44.6% of women and 22.2% of men experience some form of SV during their lifetime (Black et al., 2011). In response to these statistics, the White House recently released an updated set of recommendations intended to combat sexual violence on college campuses, an environment

Corresponding Author: Jessica A. Latack, Stony Brook University, 432 Psychology B Building, Stony Brook, NY 11794, USA., jessicalatack@gmail.com.

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in which SV is especially common. These guidelines point to the fact that nearly one in five college women is sexually victimized, typically during her first 2 years of college, and most often by someone she knows (White House Task Force to Protect Students from Sexual Assault, 2014).

The effects of SV may be far-reaching and severe and often impact both the psychological and the physical health of victims (Arriola, Louden, Doldren, & Fortenberry, 2005). A large corpus of research implicates SV as a significant risk factor for numerous mental and physical health problems, such as increased risk for substance use disorders and other forms of psychopathology, interpersonal relationship impairment, and sexual risk behavior (Bensley, Van Eenwyk, & Simmons, 2000; DiLillo, Lewis, & DiLoreto-Colgan, 2007; Walsh, Galea, & Koenen, 2012). Indeed, a history of SV is associated with a sevenfold increase in sexual risk behaviors and, thereby, contributes to higher rates of HIV and other sexually transmitted infections (STIs; Logan, Cole, & Leukefeld, 2002). Engaging in acts such as unprotected sex; sex with multiple partners; and trading sex for money, drugs, or shelter is linked with a history of SV as well as the transmission of HIV (Arriola et al., 2005). Indeed, the most recent meta-analysis conducted on the topic (Arriola et al., 2005) detected a significant positive association between the experience of SV and HIV risk behavior. These sexual risk behaviors are associated with personal cost for victims and public health cost for the country. These negative outcomes underscore the importance of understanding the link between SV and subsequent mental health and behavior problems.

Many explanations for the association between SV and subsequent sexual risk behavior have been proposed. However, the mechanisms operating between the experience of SV and negative health outcomes are not well understood. A nonexhaustive list of possible mechanisms includes impaired risk recognition (Rich, Combs-Lane, Resnick, & Kilpatrick, 2004); increased negative affect (Musliner & Singer, 2014), which leads a subset of individuals to seek sex to enhance mood (Ban-croft, Janssen, Strong, & Vukadinovic, 2003); and altered sexual schemas in which individuals views their worth in terms of sexuality. Individuals with SV histories may engage in sex more quickly with a new partner and be more easily pressured into sexual relationships (Quina, Morokoff, Harlow, & Zurbiggen, 2004). Betrayal in close relationships may render some with SV histories uncomfortable with long-term emotional intimacy, preferring physical intimacy with multiple short-term partners (Quina et al., 2004). A large body of research has also demonstrated that those with histories of SV are at increased risk for future alcohol and illicit drug abuse (Kilpatrick, Acierno, Resnick, Saunders, & Best, 1997; Schacht et al., 2010). “Self-medication theory” posits that the physical and emotional pain of SV may contribute to alcohol or drug consumption as a coping strategy (Agnew, 1992; Dembo et al., 1990). Alcohol and drug use may then increase the likelihood of consensual sexual risk by impairing individuals’ decision making or ability to ward off unwanted sexual advances (Arriola et al., 2005).

While the aforementioned mechanisms likely play a considerable role in the complex relationship between SV and negative health outcomes, the current meta-analysis focuses on the contribution of information processing in individuals with SV histories. Although alterations in information processing are unlikely to account for the full association between

SV and negative health outcomes, we believe that information processing is an important and understudied mechanism operating between SV and poor health outcomes.

An emergent body of research suggests that SV is associated with changes in survivors' processing of sexual information. Specifically, researchers have pointed to survivors' attention to sexually related information (Fani, Bradley-Davino, Ressler, & McClure-Tone, 2010; Pineles, Shipherd, Mostoufi, Abramovitz, & Yovel, 2009) as one possible explanation for the sexual problems observed in victims (Briere et al., 2001). For some, the experience of SV may contribute to a fear response, whereby even neutral sexual information is construed as highly threatening and aversive. Conversely, other victims may be especially quick to detect sexual information because they experience it as appetitive and rewarding (Finkelhor & Brown, 1985; Simon & Feiring, 2008). The manner in which victims attend to and process sexually relevant information many vary and may differentially influence future mental health problems and sexual and risk behavior. For example, those who experience sexual information as aversive or frightening may use alcohol or other substances during sexual encounters in order to passively cope with negative affect, thereby placing themselves at greater risk for SV or consensual risky decision making. In contrast, those who experience sexual information as highly rewarding and appetitive may seek out frequent, multiple, and novel partners, similarly increasing risk exposure. Thus, the role of attention to sexual information is important to understand.

Attention is an early and critical component of the emotion regulation process (Gross, 1998; Wadlinger & Isaacowitz, 2008), which is frequently impaired by SV. Disruption in one's ability to adaptively regulate negative emotions is associated with negative psychological sequelae, such as depressive and anxious symptoms, as well as substance-use disorders (Aldao, Nolen-Hoeksema, & Schweizer, 2010; Fox, Hong, & Sinha, 2008; Gross & Munoz, 1995). Impaired emotion regulation is also associated with future risk behaviors (Leith & Baumeister, 1996). Nevertheless, relatively little empirical research has examined the specific processes and degree of attentional biases among SV survivors.

Another factor that has been considered is the role of post-traumatic stress disorder (PTSD) symptomatology, which may influence SV survivors' attentional deployment in response to sexually threatening information. A number of reviews have linked PTSD and attentional biases in reaction to a range of traumas (Aupperle, Melrose, Stein, & Paulus, 2011; Williams, Watts, MacLeod, & Mathews, 1997). It has been well documented that PTSD patients display attentional bias toward stimuli related to their specific trauma experience (Foa, Feske, Murdock, Kozak, & McCarthy, 1991; McNally, Kaspi, Reimann, & Zeitlin, 1990). Theoretical support for this relationship comes from the emotion processing theory of PTSD (Foa & Kozak, 1985) that assigns attentional bias a prominent role in the etiology and maintenance of PTSD following trauma exposure. Researchers have proposed that higher levels of PTSD symptomatology may be associated with greater attentional biases to salient emotional stimuli (Bar-Haim, 2010). Despite the fact that sexually victimized individuals have very high rates of lifetime PTSD (Breslau et al., 1998), very few studies have examined these processes in SV populations. The small number of studies that have examined attentional biases among SV participants have found mixed results, with some finding attentional bias for sexual stimuli in SV persons as compared to healthy controls, while

others find that a diagnosis of PTSD is more strongly associated with attentional bias than the experience of SV alone.

The current meta-analysis sought to aggregate the available research in order to understand the broader effects of SV on attentional bias to sexual threat stimuli, as well as to examine this relationship among those with and without a current diagnosis of PTSD, in order to parse disruptions in information processing which arise from the victimization itself from those that may be associated with cognitive changes involved in a current diagnosis of PTSD.

Because information processing of sexually threatening stimuli could vary as a function of individual differences and/or characteristics of the victimization, we examined potential moderating variables as well. Factors such as the age at which the victimization occurred, severity of the abuse as well as one's relationship to the perpetrator have all been shown to relate to one's overall level of symptomatology following SV (Browne & Finkelhor, 1986; Easton, Coohey, O'Leary, Zhang, & Hua, 2011). Because women more than men are victims of SV and report more psychopathology and psychosocial sequelae following victimization (Stoltenborgh, van IJzendoorn, Euser, & Bakermans-Kranenburg, 2011; Trickett, Noll, & Putnam, 2011), we also examined the effect of gender. Finally, attentional paradigms differ with respect to their measurement of bias. Therefore, studies that examine interference, or difficulty disengaging from threat (such as studies employing the Stroop paradigm, 1935), may differ from those measuring speed of threat detection (such as studies employing a dot probe or visual search task). Given these disparities in methodology, the effect of paradigm type on observed attentional bias was investigated.

Method

Identification and Selection of Studies for Inclusion

Meta-analysis is a set of statistical methods for pooling information from independent studies. This method was developed by Glass (1976) in an endeavor to understand the overall effectiveness of psychotherapy. The primary strength of meta-analysis as a statistical method lies in its ability to summarize and integrate the results of multiple studies. This is both useful for the field in general and also addresses issues of generalizability common among small-scale, low-powered studies. For the current meta-analysis, we conducted a systematic search of the computerized bibliographic databases Medline, Psycarticles, PsycINFO, Psychological and Behavioral Sciences, and PubMed, and performed manual searches of the reference sections for all identified potentially eligible studies. Search terms included the following key words on the first line, separated by "OR" commands: (a) *attentional bias, eye, tracking, eye-tracking, EM's, gaze, fixation, emotional Stroop, dot-probe, attention*, bias*, selective attention*, probe detection, Posner, spatial cueing, visual search, or emotion* processing* AND the following key words on the second line, separated by "OR" commands (b) *sex*, abuse, molest*, rape, sexual assault, sexual trauma, sodomy*. Asterisks provided a wildcard search allowing for the inclusion of alternate word endings for each search term (e.g., sex* returned articles including sexual, sexuality, etc.).

Additionally, to negate a potential “file drawer” (Dalton, Aquinas, Dalton, Bosco, & Pierce, 2012) effect, in which the sample of included studies was biased toward those which reported significant results and thus were published in peer-reviewed journals, our search included unpublished dissertations, theses, conference presentations, and papers in preparation as well. A request for unpublished data was posted on several professional online message boards, including the listserv for the Association for Behavioral and Cognitive Therapies, the Association for Psychological Science, and the International Society of Traumatic Stress Studies. The search included studies that were published through April 2014 and that were dissertations, theses, or contained within peer-reviewed, English-language journals.

Inclusion Criteria

1. The study was published in an English-language journal, Dissertation Abstracts International, or in an English-language conference presentation through April 2014. Papers in preparation and unpublished manuscripts were eligible for inclusion as well.
2. The study employed a modified Stroop paradigm (MSP), probe detection (or dot-probe) task, eye-tracking task, or a variation of the emotional spatial cuing task in order to assess attentional bias.
3. The difference between attention to sexual threat and neutral stimuli could be assessed. Studies that compared attention to sexual stimuli with any other stimuli types (e.g., to other categories of emotional stimuli) were excluded from the meta-analysis. It has been suggested that attention to threat and other emotional stimuli may make the source of the bias difficult to interpret, as the observed bias may be a result of the threat-related stimuli, or to the other emotionally valenced stimuli, or both (Bar-Haim, Lamy, Pergamin, Bakermans-Kranenburg, & van Ijzendoorn, 2007).
4. The study included a group of sexually victimized participants whose attentional measures could be separated from any other victimized participants (such as in the case of childhood physical abuse that was nonsexual in nature), should the study report attentional outcomes for other victimized groups.
5. The study reported data sufficient to calculate an effect size for one of the following outcome measures of attentional bias: a within-group comparison of sexually victimized participants for sexual threat versus neutral stimuli, a within-group comparison of control participants for sexual threat versus neutral stimuli, a between-group comparison between sexually victimized versus nonsexually victimized participants for sexual threat stimuli, or a between-group comparison between sexually victimized participants with and without a current diagnosis of PTSD for sexual threat versus neutral stimuli. For within-group effects, bias was measured as the difference between attention to sexual threat and neutral stimuli by statistics such as means and standard deviations, or *t*- or *F*-values. The between-group effects refer to the attentional bias measured as the difference between sexually victimized and nonsexually victimized participants, reported

with a between-group statistic such as means and standard deviations, or the *t* or *F* statistic.

6. In cases in which an effect was reported as nonsignificant but exact statistics were not provided, we planned to calculate an estimated effect size assuming $p = .50$, in order to ensure a representative sample of outcomes (Cooper & Hedges, 1994).

The initial search yielded 1,911 potential studies, which were then examined for eligibility. After removing duplicate studies, limiting results to English language, and screening titles and abstracts, 1,773 potential studies were eliminated. Due to the inclusiveness of the search criteria, the large majority of identified studies were not related to SV and/or attention to sexual threat. Of those that remained, 138 full-text articles were screened for eligibility. Fifteen studies (including 913 total participants) published between 1991 and 2013 met inclusion criteria and were included in the present meta-analysis. Eleven of these studies were published in peer-reviewed journals, and four were theses or dissertations published in ProQuest or Dissertation Abstracts International online databases. Searches for conference proceedings and requests for unpublished manuscripts or papers in preparation did not yield additional potential studies (see Table 1 for a listing of studies included in the current analysis). All studies used sexually threatening words such as “rape” or “force” as sexual threat stimuli. All but two of the included studies employed an MSP. One study (Bush, 1999) utilized a dot-probe task, and another (Pineles et al., 2009) employed a visual search task. Therefore, for the current meta-analysis, the term *attentional bias* was operationalized as either increased color-naming latency when identifying the color font of a sexual threat–related word, as compared to the color font of a neutral word in an MSP, quicker reaction time to the dot when it occurs in the previous location of a sexual threat word in the dot-probe task, or reaction time in detecting a sexual threat versus neutral word in the visual search task.

Data Coding and Abstraction

The first author and a second independent coder coded all studies. Mean response time, standard deviation, and sample size for sexually victimized participants, healthy controls, sexually victimized participants with PTSD, and sexually victimized participants without PTSD were extracted from the “sexual threat” condition and the “neutral” condition. For between-group comparisons, the mean difference and standard deviation of the difference between the two conditions (sexual threat and neutral) were calculated to indicate an overall “information processing score,” which was then compared between groups.

Coding of Moderator Variables

Age at first victimization—Victimization that occurred prior to age 13 was coded as “childhood victimization” (Table 2). Victimization that occurred between the age 14 and 18 was coded as “adolescent victimization,” and victimization occurring after age 18 was considered “adult victimization.” Samples were assigned a code based on their age at first abuse, and revictimization status (victimization occurring during more than one developmental stage) was recorded as well. Studies reporting insufficient data on age at first

victimization or samples comprised of participants with varying ages at first victimization were coded as "other."

Relationship to perpetrator—If reported, sample participants' specific relationship to their abuser was recorded (e.g., designations such as stranger, neighbor, uncle, and coach). No predetermined categories were created. Studies reporting insufficient data for coding were coded as "other."

Severity of victimization—The presence or absence of victimization involving genital and/or anal penetration was recorded. Additionally, the presence or absence of physical force was recorded. Studies reporting insufficient data to record penetration and/or physical threat or force were coded as "other." These aspects of victimization were coded in light of research that suggests that more severe forms of victimization, such as rape, as well as physical injury during sexual assault, are associated with poorer outcomes (Jonas et al., 2011; Leserman, Drossman, Toomey, Nachman, & Glogau, 1997).

Gender—The gender of the sample was coded as "female," "male," "mixed," or "other," if insufficient data were reported.

Age—The current mean age of each study sample was recorded.

Experimental paradigm—The following experimental paradigms were included and coded: modified Stroop task, dot-probe/probe detection task, visual search task, and eye-tracking task. If the study utilized a modified Stroop task, mode of stimulus presentation (blocked or random) was also recorded.

Publication type—The publication type of each study was recorded as either "thesis/dissertation" or "peer-reviewed journal article."

Coding Reliability of Moderator Variables

The first author and a second independent coder coded all studies included in the analyses. Due to variability in data reporting among studies, only mean age and publication type were examined. Typically, four studies per level of the moderator are considered sufficient (Lipsey & Wilson, 2001) to examine moderation effects, and the remaining variables did not have a sufficient number of studies to be examined. Both coders achieved 100% agreement with respect to articles reporting sufficient data for moderation analyses. Intraclass correlations for both publication type and current age were 1.0.

Computation and Analysis of Effect Sizes

All effect sizes were entered directly and computed within the Comprehensive Meta-Analysis software, Version 2.0 (Biostat, Englewood, NJ). The effect size utilized for outcome measures in the present meta-analysis was Hedges' *g*, which is a variation of Cohen's *d* that corrects for biases due to small sample sizes (Hedges & Olkin, 1985). Hedge's *g* is computed as the difference between the means of two conditions or groups (in this case, either between sexual threat and neutral stimuli or between sexually victimized or

nonvictimized groups) divided by their pooled standard deviation. A random effects model was employed, as many of the included studies were heterogeneous with respect to effect size. Additionally, random effects models are more conservative than fixed effects models when data are heterogeneous (Borenstein, Hedges, Higgins, & Rothstein, 2010), thus the effect sizes and their confidence intervals (CIs) are presented in the context of random effects models.

The final sample consisted of 15 studies, contributing 43 effect sizes. Four separate analyses were conducted, in order to separately examine attentional bias for sexual threat information within sexually victimized participants and control participants, between sexually victimized and control participants, and between sexually victimized participants with and without a current diagnosis of PTSD. Not all 15 studies contributed information sufficient to be included in each analysis, thus certain studies were included in one, but not all, analyses (see Table 1 for information on which studies contributed effect sizes to each analysis).

Results

Narrative Description of Study Characteristics

Tables 3–6 display descriptive information for each of the 15 studies included in the four meta-analyses. Studies were published between January 1991 and 2013, with sample sizes ranging from 21 to 123. Of 15 studies, 13 reported female participants only, while 2 reported samples that consisted of primarily women but included a small percentage of men. All samples aggregated in the current meta-analysis were comprised overwhelmingly of Caucasian participants. Of 15 included studies, 13 were conducted in the United States, while the remaining 2 were conducted in the United Kingdom. Most often, study samples were drawn from community settings, including rape crisis centers, newspaper advertisements, and Veteran's Administration Hospitals. Four studies reported data from undergraduate samples that received course credit for participation. Definitions of SV ranged from "any unwanted sexual contact" to "rape" only, with definitions varying widely from study to study. Finally, methods for assessing PTSD included at least 10 different measures. The results of the four meta-analysis appear in Table 7 and are described in detail below.

Within-Group Effect of Sexual Threat Bias Among Sexually Victimized Participants

Across all the studies that reported within-group effects, the combined effect size of sexual threat related bias was significant among sexually victimized participants ($k = 13$, $n = 567$, $g = .48$, $p < .001$, CI [.31, .66]). We conducted the Q test within the Comprehensive Meta-Analysis program to assess the presence or absence of statistically significant heterogeneity among the effect sizes of the included studies, according to the procedures outlined by Hedges and Olkin (1985). A significant Q statistic causes the researcher to reject the null hypothesis of homogeneity, and to instead assume that the variability in the effect sizes is a function of some other factor than sampling error. The effect size for within-group bias among sexually victimized participants was significantly heterogeneous, $Q(12) = 46.44$, $p \leq .001$, $I^2 = 74.58$.

Within-Group Effect of Sexual Threat Bias Among Control Participants

Sexual threat–related bias was significant for control participants as well (k =12, n = 283, g = .22, p = .001, CI [.09, .35]), however, the analysis of heterogeneity among effect sizes for control participants was not significant, $Q(11) = 8.42$, $p = .68$, $I^2 = .00$.

Thus, both sexually victimized and control participants evidenced bias for sexual threat as compared to neutral stimuli; however, sexually victimized participants displayed attentional biases within the moderate range, while control participants evidenced effect sizes that are characterized as small.

Between-Groups Effect of Sexual Threat Bias in Sexually Victimized Versus Control Participants

Across all studies that reported between-group effects for sexually victimized versus control participants, sexual threat bias was significantly higher for victims of sexual violence (k = 11, n = 738, g = .31, $p < .001$, CI [.14, .48]). This overall between-group effect size was comparable to the difference of the combined within-group effect sizes for sexually victimized and control participants. Analysis of heterogeneity indicated that effect sizes of differences in attentional bias between sexually victimized and control participants were not significantly heterogeneous, $Q(10) = 11.67$, $p = .31$, $I^2 = 14.29$.

Between-Groups Effect of Sexual Threat Bias in PTSD Versus Non-PTSD Participants

In order to examine the role of PTSD on attention, a separate analysis was performed to compare victims with and without PTSD. Across all studies that compared sexually victimized participants with and without a current diagnosis of PTSD, sexual threat–related bias was significantly higher for participants with PTSD (k = 7, n = 253, g = .28, $p < .05$, CI [.04, .54]). Effect sizes in this analysis were not significantly heterogeneous, $Q(6) = 5.49$, p = .49, $I^2 = .00$.

Based on the studies included in the current meta-analysis, data support the hypothesized bias toward sexual threat stimuli among sexually victimized populations, as well as the hypothesis that sexually victimized participants will evidence stronger bias than will control participants. Additionally, sexually victimized participants with a current diagnosis of PTSD evidenced stronger attentional bias than did sexually victimized participants without such a diagnosis. Aggregate effect sizes across all analyses ranged from .03 to .66, indicating that within the current sample, having experienced SV was moderately associated with an attentional bias toward sexual threat stimuli.

Moderators of the Relationship Between SV and Attentional Bias

All studies were coded for multiple potential moderator variables. However, only within-group effects for sexually victimized participants indicated significantly heterogeneous effect sizes, therefore, moderator variables were only examined within this context. All moderator analyses were conducted using a mixed-effect model, as recommended by Borenstein, Hedges, Higgins, and Rothstein (2010).

Publication type—The contribution of the publication type variable (peer-reviewed journal or dissertation) was analyzed using analogue-to-analysis of variance (ANOVA). In primary studies, ANOVA is used to compare categorical subgroups by assessing the variance across group means relative to the variance within groups. In analogue-to-ANOVA for meta-analysis, we employ a similar approach; however, we compare subgroups of studies rather than subgroups of individuals (Borenstein et al., 2010). The categorical variable publication type was examined in order to investigate whether dissertations versus studies published in peer-reviewed journals derived significantly different effect sizes. The results of this analysis indicate that publication type did not account for a significant amount of the overall heterogeneity, $Q(1) = 0.014$, $p \leq .05$, which suggests that for the current sample, the effect sizes garnered from peer-reviewed journal articles and dissertations were comparable.

Age—One continuous moderator variable (mean age of current sample) was analyzed via meta-regression. Meta-regression is a statistical tool available within the Comprehensive Meta-Analysis software (Biostat, Englewood, NJ). It is analogous to regression or multiple regression used in primary studies; however, the moderators or covariates are at the level of the study (e.g., mean age of current sample) versus the level of the individual (e.g., age of individual participant). Additionally, in meta-regression, dependent variables are effect sizes, rather than subject scores (Borenstein et al., 2010).

Age is related to attentional functioning in general and to responses to SV more specifically (Simon & Feiring, 2008). Results of the meta-regression indicated that, within sexually victimized participants, mean age did not account for a significant amount of variance within the current model. Thus, the mean age of each study's sample did not explain a significant amount of heterogeneity among the effect sizes within the current meta-analysis. Moderator analyses are depicted in Tables 8 and 9.

Discussion

The current meta-analysis reviewed 15 empirical studies conducted over more than 20 years, which explored the relationship between the experience of SV and the attentional bias toward sexual threat stimuli, a subset of which were further meta-analyzed to elucidate the role of PTSD in attentional bias.

As hypothesized, the current meta-analysis supported a positive relationship between SV and attentional bias toward sexual threat. The aggregate effect sizes for all analyses were small to moderate but positive in nature. There was significant heterogeneity when examining within-group effects of sexually victimized participants, indicating that investigation of potential moderator variables was appropriate. However, of the two moderators, we were able to test (publication type and mean sample age), neither accounted for a significant portion of the overall heterogeneity of the current sexually victimized sample.

It is important to note that additional theoretically driven, a priori moderators were unable to be tested, either due to a lack of variance within this small number of studies or due to a lack of adequate information provided by the authors of these studies. For instance, moderators

such as gender, age at the time of abuse, severity of abuse, relationship to abuser, presence or severity of PTSD symptoms, and paradigm-type may have explained additional heterogeneity in the current analysis, however, we were unable to examine these variables.

Given the PTSD-related findings described below, we would hypothesize that this type of symptomatology exerted an effect on attentional deployment among sexually victimized participants. Unfortunately, studies that measured PTSD symptomatology usually did not report findings separately for individuals with and without the diagnosis. Thus, it is quite possible that PTSD symptomatology contributed to the variance of observed effect sizes observed within SV participants, however, we were only able to examine the role of PTSD in a small subset of the included studies.

Of the seven studies reporting adequate comparison data for participants with and without a current diagnosis of PTSD, attentional bias was examined in a separate meta-analysis. It was observed that participants differed in their level of attentional bias for sexual threat as a function of current PTSD diagnoses. This suggests that the cognitive symptoms often associated with PTSD may significantly contribute to the attentional biases observed in sexually victimized populations. It should be noted, however, that the majority of sexually victimized individuals do not go on to develop PTSD. Therefore, additional mechanisms contributing to this information processing bias must be clarified.

For instance, there is some evidence to suggest that self-report data collected following an incident of SV may predict one's specific risk trajectory in adulthood. These reactions are termed either an "eroticized" or "anxious" reaction and are characterized by an increase in sexual risk behavior following abuse, or a marked decrease in adult sexual activity (Simon & Feiring, 2008). These fairly distinct groups may differ with respect to attention to sexual stimuli generally as well as to vulnerability to PTSD. As such, they may shed light on future pathways of risk and inform prevention efforts for survivors of SV. If we were able to reliably characterize an individual's reaction to SV shortly following victimization, these maladaptive patterns of information processing and risk may be prevented from developing. Future research should examine bias within these groups.

Another source of potential variance relates to the high co-occurrence of maltreatment subtypes (Edwards, Holden, Felitti, & Anda, 2003). Although we included only studies that reported results for SV individuals separately, if not reported—we were unable to ensure that studies comprehensively assessed all forms of maltreatment—isolating those who experienced SV alone. Given the high co-occurrence of abuse and neglect subtypes, it is possible that participants had additional, nonassessed maltreatment experiences. The presence of other types of maltreatment poses difficulties in interpretation of effects, and thus this limitation should be considered.

The small body of available research limited our ability to aggregate findings in the current meta-analysis, and the disparate methods employed, as well as the inconsistency of the data reported, limited our ability to draw further conclusions. It also impeded the analysis of moderators that may have shed light on factors associated with the overall heterogeneity of the sample and which may have had implications for clinical work and future research. For

instance, all studies assessed history of SV via self-report rather than via legally documented cases, which may impact the validity of the reported findings. Unfortunately, despite a comprehensive literature search of both the published and the unpublished literature, relatively little research has examined bias toward sexual threat in sexually victimized samples in which the abuse was legally substantiated. Further, the definitions of SV employed by research teams varied substantially from study to study. The field would be well served to achieve consensus in terms of terminology and methodology for examining the effects of SV (Haugaard, 2000). Without a consensus and a common language among researchers, designing and implementing effective interventions remains highly challenging. Nonetheless, despite the relative paucity of studies meeting criteria, the current meta-analysis makes a meaningful contribution to the literature. There are numerous examples of authoritative meta-analyses conducted on fewer than 15 studies (e.g., Stroud, Davila, & Moyer, 2008), and researchers examining meta-analytic power have concluded that meaningful meta-analyses can be conducted on as few as two studies (Valentine, Pigott, & Rothstein, 2010).

Despite the inconsistencies in the literature with regard to PTSD measurement and methodology, the present PTSD-related findings do correspond to those found in more comprehensive reviews of attentional bias among anxious individuals (Bar-Haim et al., 2007). More specifically, the observed attentional bias for threat among PTSD patients is in line with a large body of research demonstrating that individuals with PTSD, as well as other anxiety disorders, evidence attentional bias for threat. That this bias was detected despite the wide variety of methods suggests a robust phenomenon.

Other methodological issues hindered our ability to draw firm conclusions as well. For instance, samples were often comprised of individuals meeting criteria for multiple mental health diagnoses, including Major Depressive Disorder, Phobia, Panic Disorder, Schizophrenia, Eating Disorders, Substance Use Disorders, and Social Phobia. It is likely that symptoms associated with these disorders also affect attentional deployment. Additionally, the wide variety of methods for assessing both SV and PTSD outlined previously made the task of literature synthesis difficult. Finally, given that the MSP was utilized in the majority of studies, it should be noted that this task is not without criticism. It has been suggested that the attentional effects observed in the MSP may reflect anxiety or negative affect in response to threatening stimuli, rather than attention per se (Bar-Haim et al., 2007).

Nonetheless, there are important strengths within the current meta-analysis. For instance, all the studies included reported adequate sample sizes and attrition rates in each study were quite low. Further, the “gray literature” was sought out in order to include all relevant studies, rather than just those reporting significant effects or those published in peer-reviewed journals. Finally, most study samples were drawn from community settings, suggesting potentially greater heterogeneity among participants than is typically found in either clinical or student samples (Arriola et al., 2005). This increases the likelihood that the meta-analytic findings may generalize to a variety of populations.

Because the small size of the current meta-analyses precluded the parsing of differential effects based on theory-driven moderators, future research should continue to explore these potential moderators with an eye toward understanding the complex nature of the association between SV and attentional bias to sexual threat. It is clear that the majority of the research to date has not thoroughly examined such issues, at least thoroughly enough for these variables to be reliably coded for meta-analysis. In the past 20-years, research on SV has received increased attention; however, most research to date has failed to examine potential mechanisms between the experience of victimization and the adverse outcomes in a systematic way. Clearly, more high-quality research is needed in order to understand the complex effects of SV on negative physical and mental health outcomes.

In conclusion, the results of this meta-analysis supported the hypothesis that individuals with a history of SV display attentional bias for sexual threat over and above that observed in healthy controls. Further, it is possible that this information processing bias may be partially driven by the cognitive effects of PTSD, as sexually victimized individuals with a current diagnosis of PTSD displayed a stronger attentional bias than those without such a diagnosis, suggesting the effects of SV alone may not account for the observed bias. Indeed, additional cognitive processes, such as assessment of sexual risk (Yeater, Treat, Viken, & McFall, 2010), are important to understand with respect to victimization history. Further, the interaction of alcohol and sexual risk assessment has been shown to differ in sexually victimized populations (George et al., 2014), and thus is an important area of future research. Attentional bias for sexual information may be another important mechanism, as hypervigilance to sexual information may reflect highly aversive or appetitive reactions. Both reactions may be associated with increased risk behavior, either directly or through passive coping strategies aimed at avoiding negative affect. Thus, reactions to sexual information could be an important target for intervention. Future research should examine this issue in order to further shed light on this, and additional mechanisms contributing to the association between SV and biased information processing of sexual threat.

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Biographies

Jessica A. Latack, MA, MS, is a doctoral candidate in clinical psychology at Stony Brook University. Her research focuses on the psychosocial sequelae of sexual trauma, and the mechanisms that operate between the experience of sexual trauma and later sexual risk behavior, substance abuse, and impaired relationship functioning.

Anne Moyer, PhD, is an Associate Professor of social and health psychology at Stony Brook University. Her research interests include psychosocial issues surrounding cancer and cancer risk, medical decision making, research methodology and research synthesis, and meta-analysis.

Valerie A. Simon, PhD, is an Associate Professor in the Department of Psychology and the Merrill Palmer Skillman Institute for Children and Families at Wayne State University in Detroit, MI. Her research examines the long-term consequences of child maltreatment with a particular interest in friend, romantic, and sexual development among adolescents with histories of childhood sexual abuse.

Joanne Davila, PhD, is a Professor of psychology and the director of clinical training at Stony Brook University. Her research focuses on adolescent and adult romantic relationships, interpersonal functioning, and psychopathology.

Implications for Practice, Policy, and Research

- Understanding the mechanism(s) operating between SV and increased sexual risk behavior and HIV/STI exposure is critical for designing and implementing interventions for this high-risk population.
- One potential mechanism is information processing, or how people with SV histories attend to, and process, sexual information in their environments. For instance, being more aware of, and responding to, sexual cues may lead to increased risk behavior. More research is needed to fully explicate this relationship.
- Evidence from the current meta-analyses suggests that those with SV histories do indeed process sexual information differently than do nonvictimized controls. That is, their attention is more quickly captured by sexual information. Further, within those with SV histories, they are more attentive toward sexual than neutral stimuli, more so than controls.
- The role of PTSD symptomatology is important to understand. In the current meta-analysis, those with SV and PTSD displayed more attentional bias than those with SV alone. The manner in which cognitive symptoms of PTSD may contribute to attentional bias for sexual information and possibly increased sexual risk behavior should be explored in future research.
- More research is needed to fully understand the effects of SV on future risk behavior, including the investigation of other potential mechanisms.
- The field would be well served to develop more systematic methodologies for studying sexual victimization. Currently, wide variations in language and research methods muddy the picture and renders systematic review of the literature difficult.

Table 1

Total Studies (k = 15) Contributing Effect Sizes to Each Meta-Analysis.

Study	Sample Size	W/N Control	W/N SV	B/N SV Versus No-SV	B/N PTSD Versus NPTSD
Bremner et al. (2004)	21				X
Bush (1999)	122	X	X	X	
Cassiday, McNally, and Zeitlin (1992)	36	X	X	X	
Field et al. (2001)	51			X	
Foa, Feske, Murdock, Kozak, and McCarthy (1991)	44	X			X
Freeman and Beck (2000)	53	X	X	X	X
Garcia (2006)	58	X	X	X	X
Klewchuk, McCusker, Mulholland, and Shannon (2007)	53	X	X	X	
Lambourn-Kavcic (1998)	33	X	X	X	
Martinson, Sigmon, Craner, Rothstein, and McGillicuddy (2013)	101	X	X	X	X
McNally, Clancy, Schacter, and Pitman (2000)	55	X	X	X	
Patriquin, Wilson, Kelleher, and Scarpa (2012)	123	X	X	X	
Pineles, Shipherd, Mostoufi, Abramovitz, and Yovel (2009)	43			X	
Sawhney (2002)	65	X	X	X	X
Waller and Ruddock (1995)	80	X	X	X	
Number studies (k)	15	12	11	13	7

Notes. SV = sexually victimized; No SV = never sexually victimized; PTSD = current diagnosis of post-traumatic stress disorder; NPTSD = no current diagnosis of post-traumatic stress disorder; W/N = within; B/N = between; X = indicate whether or not a given paper contributed an effect size to each of the four sub-meta-analyses reported in this article.

Table 2

Coding Scheme for Moderator Variables.

Variable	Coding Description
1. Age at first sexual victimization (FV)	• Developmental stage at sexual victimization. • 1 = childhood (by age 13) • 2 = adolescent (age 14–18) • 3 = adult (age 19+) • 9 = revictimization
2. Relationship to perpetrator (RP)	Victim's relationship to sexual perpetrator
3. Victimization severity (VS)	• Abuse included genital penetration and/or physical force. • 1 = no • 2 = yes
4. Gender	• Gender of sample • 1 = female • 2 = male • 9 = mixed; other
5. Age	Current mean age of sample in years
6. Paradigm (P)	• Paradigm type • 1 = modified Stroop • 2 = dot probe • 3 = visual search
7. Publication type (PT)	• Type of publication from which ES extracted • 1 = thesis or dissertation • 2 = peer-reviewed journal article

Note. ES = effect size.

Table 3

Meta-Analytic Results of Within-Group Sexual Threat–Related Bias Among Sexually Victimized Participants (k = 13 Outcomes).

Study	*n*	*g*	95% CI	*p*	FV	RP	VS	G	Age	P	Pub
Bush (1999)	62	.07	[0.31, 0.52]	.61	—	—	—	1	22.52	2	1
Cassiday et al. (1992)	24	.50	[0.09, 0.92]	.02	—	—	2	9	32.17	1	2
Field et al. (2001)	51	.55	[0.26, 0.85]	.00	—	—	—	1	38.40	1	2
Freeman and Beck (2000)	33	.40	[0.05, 0.75]	.02	—	—	—	1	13.98	1	2
Garcia (2006)	37	.08	[−0.24, 0.39]	.64	—	—	—	1	18.68	1	1
Klewchuk et al. (2007)	21	.83	[0.35, 1.31]	.01	—	—	—	9	40.80	1	2
Lambourn-Kavcic (1998)	20	.60	[0.14, 1.05]	.01	—	—	2	1	35.70	1	1
Martinson et al. (2013)	66	.58	[0.32, 0.84]	.00	—	—	—	9	21.97	1	2
McNally et al. (2000)	15	.20	[−0.28, 0.69]	.41	—	—	—	1	48.00	1	2
Patriquin et al. (2012)	94	.42	[0.21, 0.63]	.00	—	—	—	1	18.84	1	2
Pineles et al. (2009)	46	.17	[−0.12, 0.45]	.25	—	—	—	1	46.91	3	2
Sawhney (2002)	44	1.38	[0.97, 1.79]	.00	—	—	2	1	35.63	1	1
Waller and Ruddock (1995)	54	.69	[0.40, 0.99]	.00	—	—	—	1	25.00	1	2

Note. n = number of participants in subsample; g = Hedge's g (effect size); CI = confidence interval; p = p value; FV = age first victimized; RP = relationship to perpetrator; VS = victimization severity; G = gender of sample; Age = mean age of sample; P = paradigm; Pub = publication type. Dashes indicate that moderator variable could not be computed.

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Table 4

Meta-Analytic Results of Within-Group Sexual Threat–Related Bias Among Control Participants (k = 12 Outcomes).

Study	*n*	*g*	95% CI	*p*	FV	RP	VS	G	Age	P	Pub
Bush (1999)	60	.00	[−0.51, 0.51]	1.00	NA	NA	NA	1	20.78	2	1
Cassiday et al. (1992)	12	.00	[−1.21, 1.21]	1.00	NA	NA	NA	9	34.33	1	2
Foa et al. (1991)	16	.00	[−1.03, 1.03]	1.00	NA	NA	NA	1	28.69	1	2
Freeman and Beck (2000)	20	.59	[0.13, 1.05]	.01	NA	NA	NA	1	14.60	1	2
Garcia (2006)	21	.01	[−0.40, 0.42]	.97	NA	NA	NA	1	19.00	1	1
Klewchuk et al. (2007)	18	.40	[−0.06, 0.35]	.09	NA	NA	NA	9	40.8	1	2
Lambourn-Kavcic (1998)	13	.11	[−0.40, 0.62]	.67	NA	NA	NA	1	29.00	1	1
Martinson et al. (2013)	35	.25	[−0.08, 0.58]	.13	NA	NA	NA	9	19.20	1	2
McNally et al. (2000)	12	.01	[−0.52, 0.53]	.98	NA	NA	NA	1	36.5	1	2
Patriquin et al. (2012)	29	.33	[−0.04, 0.69]	.08	NA	NA	NA	1	18.84	1	2
Sawhney (2002)	21	.40	[0.01, 0.87]	.05	NA	NA	NA	1	35.29	1	1
Waller and Ruddock (1995)	26	.02	[−0.05, 0.87]	.92	NA	NA	NA	1	24.20	1	2

Note. n = number of participants in subsample; g = Hedge's g (effect size); CI = confidence interval; p = p value; FV = age first victimized; RP = relationship to perpetrator; VS = victimization severity; G = gender of sample; Age = mean age of sample; P = paradigm; Pub = publication type; NA = nonapplicable. Dashes indicate that moderator variable could not be computed.

Table 5

Meta-Analytic Results of Between-Group Sexual Threat–Related Bias for Sexually Victimized Versus Nonsexually Victimized Participants (k = 11 Outcomes).

Study	*n*	*g*	95% CI	*p*	FV	RP	VS	G	Age	P	Pub
Bush (1999)	122	.00	[−0.35, 0.35]	1.00	—	—	—	1	21.66	2	1
Cassiday et al. (1992)	26	.86	[0.15, 1.57]	.02	—	—	2	9	32.89	1	2
Freeman and Beck (2000)	53	.48	[−0.08, 1.03]	.09							
Garcia (2006)	58	.08	[−0.45, 0.61]	.77	—	—	—	1	18.79	1	1
Klewchuk et al. (2007)	53	.63	[0.08, 1.19]	.03	—	—	—	9	40.30	1	2
Lambourn-Kavcic (1998)	33	.75	[0.05, 1.46]	.04	—	—	2	1	33.06	1	1
Martinson et al. (2013)	101	.36	[−0.05, 0.77]	.09	—	—	—	9	21.01	1	2
McNally et al. (2000)	27	.21	[−0.52, 0.95]	.57	—	—	—	1	42.73	1	2
Patriquin et al. (2012)	123	.15	[−0.27, 0.56]	.49	—	—	—	1	18.84	1	2
Sawhney (2002)	65	.07	[−0.45, 0.58]	.89	—	—	2	1	36.12	1	1
Waller and Ruddock (1995)	67	.61	[0.01, 1.22]	.05	—	—	—	1	24.70	1	2

Note. n = number of participants in subsample; g = Hedge's g (effect size); CI = confidence interval; p = p value; FV = age first victimized; RP = relationship to perpetrator; VS = victimization severity; G = gender of sample; Age = mean age of sample; P = paradigm; Pub = publication type. Dashes indicate that moderator variable could not be computed.

Table 6

Meta-Analytic Results of Between-Group Sexual Threat–Related Bias for PTSD Versus Non-PTSD Participants (k = 7 Outcomes).

Study	*n*	*g*	95% CI	*p*	FV	RP	VS	G	Age	P	Pub
Bremner et al. (2004)	21	.00	[−0.83, 0.83]	1.00	—	—	—	1	36.14	2	1
Cassiday et al. (1992)	24	1.05	[0.22, 1.88]	.01	—	—	2	9	32.17	1	2
Foa et al. (1991)	28	.63	[−0.11, 1.34]	.10	—	—	—	1	29.77	1	2
Freeman and Beck (2000)	33	.04	[−0.64, 0.72]	.90	—	—	—	1	13.98	1	2
Garcia (2006)	37	.16	[−0.49, 0.82]	.63	—	—	—	1	18.68	1	1
Martinson et al. (2013)	66	.27	[−0.21, 0.75]	.27	—	—	—	9	21.97	1	2
Sawhney (2002)	44	.12	[−0.46, 0.70]	.70	—	—	2	1	35.63	1	1

Note. n = number of participants in subsample; g = Hedge's g (effect size); CI = confidence interval; p = p value; FV = age first victimized; RP = relationship to perpetrator; VS = victimization severity; G = gender of sample; Age = mean age of sample; P = paradigm; Pub = publication type. Dashes indicate that moderator variable could not be computed.

Table 7

Key Findings of the Four Meta-Analyses.

	k	*n*	*g*	*p* Value
w/n SV	13	567	.48	.001***
w/n Control	12	283	.22	.001***
b/n SV, Control	11	737	.31	.001***
b/n PSTD, NPTSD	7	253	.28	.05*

Note. Q = model heterogeneity; w/n SV = comparison of attention to sexual versus neutral stimuli within sexually victimized participants; w/n control = comparison of attention to sexual versus neutral stimuli among control participants; b/n SV, control = comparison of attention to sexual stimuli between sexually victimized and control participants; b/n PTSD, NPTSD = comparison of attention to sexual stimuli between sexually victimized participants with and without current diagnosis of PTSD.

* $p \leq .05$.

** $p \leq .01$.

*** $p \leq .001$.

Table 8

Results of Categorical Moderator Analysis for Sexually Victimized Participants (k = 12 Outcomes).

Moderator	*Q*	*df*	GrpN	*g*	95% CI
Publication type					
Thesis/dissertation	33.44	3	4	.51	[−0.06, 1.08]
Peer-reviewed journal article	11.25	8	9	.48	

Note. Q = model heterogeneity; *df* = degrees of freedom, GrpN = number of studies in the group, *g* = Hedge's *g* (effect size); CI = confidence interval.

Table 9

Results of Continuous Moderator Analysis for Sexually Victimized Participants (k = 12 Outcomes).

	Q	*df*	*p* Value
Age of sample			
Model	0.91	1	.34
Residual	45.45	11	.00
Total	46.36	12	.00
Point estimate	Slope	Intercept	τ^2
	.004	.325	.082

Note. Q = model heterogeneity; *df* = degrees of freedom.

* $p \leq .05$.

** $p \leq .01$.

*** $p \leq .001$.