

## Eroticizing Creates Safer Sex: A Research Synthesis

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Published online: 19 October 2006

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*This meta-analytic review examined the effectiveness of sexual risk reduction interventions in 21 studies (N = 5,015) that integrated a safer sex eroticization component. Compared to controls, intervention participants exhibited lower sexual risk on 6 dimensions: HIV-related knowledge, attitudes toward condoms, condom use, overall behavioral risk, communication with sexual partners, and sexual frequency. Additional analyses examined pre- to post-test outcomes and showed significant improvement in condom use in the intervention compared to the control groups. Overall, findings suggest that eroticizing safer sex leads to more risk-preventive attitudes, which in turn facilitates less risky sexual behavior.*

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**KEY WORDS:** eroticization; condoms; HIV prevention; meta-analysis; research synthesis.

An estimated 40 million people worldwide are currently living with HIV (UNAIDS, 2004). In 2004, nearly 5 million people acquired HIV with heterosexual contact as the primary means of infection (UNAIDS, 2004). Within the United States, more than 32,000 people were diagnosed with HIV/AIDS in 2003 with 46% of HIV/AIDS cases among men who have sex with men (MSM) and 34% among heterosexuals (CDC, 2004). Whereas the rate of infection has declined for injection drug users and children, HIV/AIDS cases among MSM and heterosexuals has continued to rise. Moreover, a rise in HIV/AIDS infection among MSM and heterosexuals is not isolated to the United States, but has also been noted in other countries (e.g., Calzavara et al., 2002; Figueroa, 2004; Hocking et al., 2004; Shoumilina, 2001; Tsantes, Nikolopoulos, Masgala, & Paraskeva, 2005; van Grievnsven et al., 2005). Given the pervasiveness of HIV/AIDS infection, determining avenues for improving safer sex is critical to reducing of the spread of HIV.

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Research examining the reasons why people fail to use condoms has shown that people typically associate condom use with decreases in sexual pleasure (Conley & Collins, 2005; Dilley et al., 2002; Fisher, 1984; Oncale & King, 2001; Pinkerton, Cecil, Bogart, & Abramson, 2003). One way to overcome these unpleasant associations with condoms is to focus on the pleasurable aspects of safer sex. Messages focusing on the pleasurable, rather than the preventive, aspects of condom use may motivate greater safer-sex practices (for a discussion, see Adelman, 1992). Emphasizing the sexual or sensory aspects of condom use may also be important among MSM who are unlikely to use condoms for other purposes (e.g., pregnancy prevention; see Scott-Sheldon, Marsh, Johnson, & Glasford, 2006).

The potential benefits of including sexual content in persuasive messages have been well studied. Marketing researchers have found sexual appeals to be more attention grabbing and more likely to induce interest in a topic than nonsexual appeals (Reichert, Heckler, & Jackson, 2001; see review by Reichert, 2003). Not only do sexual appeals attract more attention, sexual images and text embedded in these persuasive messages are more likely to be remembered (providing the sexual content is congruent with the topic) than non-sexual messages (Reichert, 2003). In addition, Reichert and colleagues (2001) find that systematic processing is inhibited after exposure to a sexual appeal and hence these messages are less likely to induce counterarguments—a benefit for HIV-prevention messages for which counterarguments would be an undesirable outcome. Overall, this research suggests that messages focusing on the sensual or sexual aspects of safer sex might attract more attention and may motivate and elicit more safer-sex practices. By captivating people's attention, HIV-related interventions that eroticize safer sex might also impact people's attitudes toward condom use and may increase their HIV-related knowledge given that the sexual content and the message are congruent with one another.

Many HIV researchers have suggested that eroticizing safer sex may be an important component in reducing sexual risk (e.g., Adelman, 1992; Ekstrand, 1992; Essien, Meshack, Peters, Ogunbade, & Osemene, 2005; Harper, Hosek, Contreras, & Doll, 2003; Robinson, Bockting, Rosser, Miner, & Coleman, 2002; Scott-Sheldon et al., in press). Yet, despite the prevailing assumption that eroticizing safer sex is a critical intervention component, few studies have systematically examined whether interventions eroticizing safer sex result in more behaviors that lower risk of infection. Study results have been mixed: For instance, Brown (1983) found that an intervention emphasizing condom eroticization improved condom attitudes among males but not females. Contrasting effects resulted in Ploem's (1992; Ploem & Byers, 1997) study, which examined whether women would improve their condom attitudes and use with a combined intervention of condom eroticization and skills training; in the combined intervention, women improved their attitudes and condom use relative to their pre-test scores but not in comparison to the woman-only control group.

The current study uses meta-analytic techniques to examine the efficacy of sexual risk reduction interventions that eroticized safer sex. We located educational, psychological, or behavioral interventions eroticizing safer sex and advocating sexual risk reduction. Eroticization was defined as any sexually arousing, exciting, or pleasurable material that was used to promote safe sexual behavior. This material included arousing videos/audiotapes/stories, activities, or skills training and explicit instructions (see Table 1). In most instances, the authors focused on testing an intervention that specifically examined eroticization whereas others embedded eroticization into a comprehensive intervention. Intervention efficacy was determined using effect size estimates. The purpose of the current review is to examine the extent to which sexual risk reduction interventions that eroticized safer sex increased HIV-related knowledge, attitudes toward condom use, intentions to use condoms, condom use, and communication with sexual partners, and decreased overall behavioral risk and sexual frequency (frequency and number of occasions). Knowing whether eroticizing safer sex improves HIV-risk related outcomes may inform researchers designing sexual risk reduction interventions and prevention programs.

## METHOD

### Sample of Studies

We used several strategies to search for relevant studies: (a) electronic reference databases (PubMed, PsycINFO, AIDSearch, CINAHL, Dissertation Abstracts, ERIC) using a Boolean search strategy for abbreviated and full keywords related to sexually transmitted infections (e.g., HIV, AIDS, STD, STI), interventions (e.g., intervention or prevention), and sexually-related keywords (e.g., sex, intercourse, condom, erotic); (b) examining the reference sections of obtained papers; (c) sending letters to individual researchers and electronic listservs requesting relevant published or unpublished papers; (d) manually searching through recent issues of journals likely to publish HIV interventions (e.g., *AIDS Education and Prevention*, *American Journal of Public Health*, *Archives of Pediatric & Adolescent Medicine*, *Health Psychology*, *Journal of Consulting and Clinical Psychology*, and *JAMA: The Journal of the American Medical Association*); and (e) searching through databases and document depository of HIV-related interventions currently held by the NIMH-funded Syntheses of HIV/AIDS Risk Reduction Project (SHARP; an accumulated database of published and unpublished HIV-related interventions available from 1981 to present) at the University of Connecticut. Studies that fulfilled the search criteria and were available as of May 1, 2005 were included. In some cases, several publications provided information about study intervention details or outcomes (e.g., an author may have published a paper on

Table 1. Descriptive Features of Studies

Source	Location	Sample	Intervention	Erotic component	
				Estimated total dosage (minutes)	Type
Antunes et al. (1997, 2002)	São Paulo, Brazil; 4 public night schools	N = 394, 53% Female, 47% White, M Age = 20	4-session RCT intervention emphasizing HIV/AIDS information, sexual norms, condom use, safer sex, and sexual pleasure. Wait-list control	90	Participants used dough to make reproductive parts in order to discuss reproduction and sexual pleasure Stories and erotic condom pamphlets
Brondino (1997)	Columbia, SC; university	N = 288 Male, 74% White, 16% Black	<i>Eroticizing</i> : Single-session RCT intervention emphasizing HIV/AIDS information and condom eroticization based on Prospect Theory. Irrelevant content control	30	Stories and erotic condom pamphlets
Brown (1983)	Athens, GA; university	N = 234, 51% Female, 90% White, M Age = 19	Single-session RCT intervention emphasizing eroticizing condom use through stories based on SLT, scripting, and learning theory. No treatment control	40	Stories
Choi et al. (1996)	San Francisco, CA; community site	N = 329 Male, 89% Asian, M Age = 29	Single-session RCT intervention emphasizing HIV/AIDS information, safer sex, eroticizing safer sex, and negotiation skills based on TRA, SE, and HBM. Wait-list control	40	Self-generated activity and reading of ways to touch erotically; making condoms erotic
Cohen et al. (1992)	Los Angeles, CA; 5 STD clinics	N = 903, 39% Female, 72% Black, 21% Hispanic/Latino, 5% White, 3% Asian, M Age = 27	<i>Social influences</i> : Single-session RCT intervention emphasizing HIV/AIDS/STD information, condom use, social and erotic aspect of condoms, and communication/negotiation skills. No treatment control	5	Erotic instructions

<p>Ehrlhardt et al. (2002a, 2002b); Miller et al. (2000)</p>	<p>Brooklyn, NY; clinic</p>	<p>N = 360 Female, 73% Black, 17% Hispanic/Latino 10% White, M Age = 22</p>	<p>4-session: RCT intervention emphasizing HIV/AIDS information, condom information and skills practice, condom eroticization, and skills training based on the ARRM. No treatment control 8-session: RCT intervention emphasizing HIV/AIDS information, condom information and skills practice, condom eroticization, and skills training based on the ARRM. No treatment control</p>	<p>45</p>	<p>Skills training</p>
<p>Kegeles et al. (1996)</p>	<p>Eugene, OR &amp; Santa Barbara, CA; 2 gay communities</p>	<p>N = 300 Male, 81% White, 7% Asian, 6% Hispanic/Latino, 4% Black, M Age = 23.4</p>	<p>Community outreach and a single-session intervention emphasizing HIV/AIDS information, eroticizing safer sex, condom skills and negotiation/communication skills based on SDT. Wait-list control</p>	<p>45</p>	<p>Activity and exposure to erotic images/ brochures</p>
<p>Kegeles et al. (1999)</p>	<p>Eugene, OR &amp; Santa Barbara, CA; 2 communities</p>	<p>N = 342 Male, 83% White, M Age = 23</p>	<p>Community outreach and a single-session intervention emphasizing HIV/AIDS information, eroticizing safer sex, condom skills and negotiation/communication skills based on SDT. No treatment control</p>	<p>45</p>	<p>Activity and exposure to erotic images/ brochures</p>
<p>Knight (1994)</p>	<p>Kalamazoo, MI; university</p>	<p>N = 114 Male, 99% White, 1% Asian, M Age = 21</p>	<p>Instruction: Single-session RCT emphasizing eroticizing condoms. No treatment control Instruction and modeling: Single-session RCT emphasizing eroticizing condoms, safer sex, and negotiation/communication skills. No treatment control</p>	<p>30</p>	<p>Video</p>
				<p>30</p>	<p>Video</p>

Table 1. Continued

Source	Location	Sample	Intervention	Erotic component	
				Estimated total dosage (minutes)	Type
Krause et al. (2000)	New York, NY; housing community	N = 90 Female, 45% Hispanic/Latina, 38% Black, 16% White, M Age = 37	<i>Pamphlet and safer sex alternative:</i> Single-session RCT emphasizing HIV/AIDS information, discussion of condom skills and eroticization, and demonstrations of communication and planning strategies based on SCT. Education-only control	12	Verbal erotic instructions
Kyes, (1990); Black, (1989)	Athens, GA; university	N = 160, 50% Female, 93% White, M Age = 19	<i>Pamphlet and skills practice:</i> Single-session RCT emphasizing HIV/AIDS information, eroticizing safer sex, condom skills, role-playing, and active planning based on SCT. Education-only control	12	Skills training
Kyes et al. (1991)	Southern, US; university	N = 210, 51% Female, 90% White, M Age = 20	<i>Condom information film:</i> Single-session RCT intervention emphasizing eroticizing safer sex. <i>Study 1:</i> Single-session RCT intervention accounts of explicit sexual activity based on SLT and punishment theory. No treatment control <i>Study 2:</i> Single-session RCT intervention emphasizing reading of condom eroticization based on SLT and punishment theory. Brief form of experimental condition control	4 10 20	Video Stories Stories

Lowenherz (1991)	New York, NY; university	N = 83, 51% Female, M Age = 20	<p><i>Fear/explicit video:</i> Single-session RCT intervention emphasizing HIV/AIDS/condom information, condom eroticization, and fear induction based on the HBM, PMT, and ELM. Education-only control</p> <p><i>Health/explicit video:</i> Single-session RCT intervention emphasizing HIV/AIDS/condom information and condom eroticization based on the HBM, PMT, and ELM. Education-only control</p>	10	Video
Ploem and Byers (1997); Ploem (1992)	Frederickton, New Brunswick, Canada; university	N = 112 Female, M Age = 19	<p><i>Combination:</i> Single-session RCT intervention emphasizing AIDS information, condom use and eroticization, and communication skills based on the TRA, SE, and Sexual Behavior Sequence Theory. No treatment control</p>	10	Audiotape
Rosser (1990)	Auckland, New Zealand; community	N = 159 Male, 91% White, M Age = 34	<p><i>Eroticizing safer sex:</i> Single-session RCT intervention emphasizing condom eroticization and skills training based on the HBM. No treatment control</p>	75	Eroticizing safer sex workshop
Rosser et al. (2002)	Minneapolis-St. Paul, MN; community	N = 422 Male, 89% White, 2% Black, 2% Asian, 2% Hispanic/Latino	<p><i>Man-to-man sexual health seminar:</i> Two-day RCT intervention emphasizing HIV/STD information, sexuality, eroticization, desensitization, and identity formation specific to a MSM population and based on the Sexual Attitude Reassessment methodology. Education-only control</p>	270	Video, skills training, story-telling

Table 1. Continued

Source	Location	Sample	Intervention	Erotic component	
				Estimated total dosage (minutes)	Type
Sanderson (1999)	Princeton, NJ; university	N = 202, 50% Female, 70% White, 10% Black, 9% Asian, 8% Hispanic/Latino, M Age = 20	<i>Technical skills</i> : Single-session RCT intervention emphasizing HIV and condom information and condom eroticization based on TRA and SE. Wait-list control <i>Combined skills</i> : Single-session RCT intervention emphasizing HIV and condom information, condom eroticization, and communication skills. Wait-list control	31.50	Video
Struckman-Johnson et al. (1994)	Vermillion, SD; university	N = 236, 48% Female, M Age = 21	<i>Erotic</i> : Single-session RCT intervention emphasizing HIV information and condom eroticization. Irrelevant content control	1	Television advertisement
Tanner (1990)	Athens, GA; university	N = 290, 52% Female, 95% White, M Age = 19	Single-session RCT intervention emphasizing condom eroticization based on SE. Irrelevant content control	60	Video and writing of sexual fantasy
Tanner and Pollack (1988)	Athens, GA; university	N = 72, 50% Female	<i>Condom and erotic instruction</i> : Single-session plus 2-week journal writing RCT intervention emphasizing condom information, skills, and eroticization. No treatment control	15	Verbal and written condom eroticization instructions

*Note.* RCT, randomized controlled trial; ARRM, AIDS risk reduction model; ELM, Elaboration likelihood model; HBIM, Health belief model; IMB, Information-motivation-behavioral skills model; PMT, Protection motivation theory; SAM, Social action theory; SE, Self-efficacy theory; SDT, Social diffusion theory; SLT, Social learning theory; TRA, Theory of reasoned action.



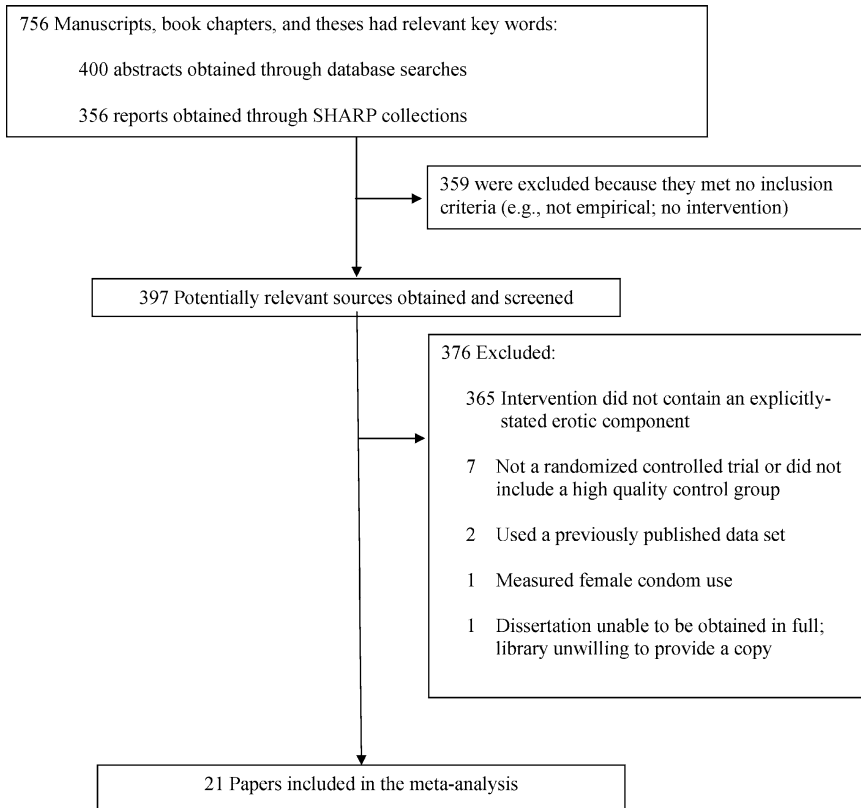
methodological details, one referring to the baseline and first follow-up results and another with 12-month outcomes). In these instances, multiple publications reporting on the same sample were content coded and effect sizes were calculated separately for each measurement occasion (due to sample size, this study only focuses on the first measurement occasion). When there was insufficient methodological or statistical information available to evaluate the intervention or calculate effect sizes, authors were contacted for additional information.

### Selection Criteria

Studies were included if they (a) examined any educational, psychosocial, or behavioral intervention advocating sexual risk reduction, (b) included some type of safer sex eroticization component as part of the intervention, (c) used a randomized controlled trial (RCT) or a quasi-experimental design with an adequate control group, (d) assessed condom use attitudes, intentions, or behavior, and (e) provided sufficient information to calculate effect size estimates. Any amount of eroticization was sufficient to qualify a study for the review so long as its report made clear that a form of eroticization was present (i.e., any sexually arousing, exciting, or pleasurable material that was used to promote safe sexual behavior). Consistent with the above criteria, studies were excluded if (a) details about the eroticization component were insufficient (e.g., report stated that eroticization was encouraged but offered no information regarding the content), (b) outcomes other than condom attitudes, intentions, and risk behaviors were measured, (c) an adequate comparison condition was not included, and (d) there was insufficient information available to calculate effect sizes. Using these criteria, 21 studies qualified for the meta-analysis (Fig. 1). From these studies, included in analyses were outcomes taken at the first measurement occasion following the intervention ( $N = 5,015$  participants). Consistent with meta-analytic convention (Crepaz, Hart, & Marks, 2004; B. T. Johnson, Carey, Marsh, Levin, & Scott-Sheldon, 2003; Weinhardt, Carey, Johnson, & Bickham, 1999), each intervention was treated as an individual study during analysis.

### Study Information

Two raters independently coded overall study information (e.g., estimated year of data collection, type of theory used), sample demographics (e.g., ethnicity, gender, age), risk characteristics (e.g., proportion sexually active, HIV status), design and measurement specifics (e.g., recruitment method, type of control group), and content of control and intervention condition(s) (e.g., number of sessions, specific content of the intervention). Across the study- and intervention-level categorical dimensions, raters agreed on 57–100% of judgments (mean Cohen's  $\kappa = .86$ ).



**Fig. 1.** Selection process for study inclusion in the meta-analysis.

Reliability for the continuous variables was calculated using the Spearman–Brown correction, which takes into account the mean interrater correlation as well as the number of raters; reliabilities ranged from .81 to 1.00, with an average of .96 across categories. Disagreements were resolved through discussion.

### Study Outcomes

For each study, effect size estimates for sexually-related outcomes were calculated from the information provided in the report or a related report. We calculated effect sizes for educational, psychological, and behavioral outcomes. Specifically, the *educational* outcome was HIV-related knowledge; *psychological* outcomes included: (a) condom use attitudes and (b) condom use intentions; and the *behavioral* outcomes included (c) condom use, anal and unspecified type

(when studies did not explicitly report which type of condom use (vaginal or anal) was measured), (d) sexual frequency, (e) number of partners, (f) communication with sexual partners, and (g) overall behavioral risk (when studies did not separate behavioral outcomes).

Effect sizes were calculated as the standardized mean difference ( $d$ ) given that the majority of the outcomes were continuous rather than dichotomous. Specifically, the effect sizes were calculated as the difference between the intervention and controls divided by the pooled  $SD$ . If the pooled  $SD$  was unavailable or could not be derived from the reported statistics, the denominator was instead another form of  $SD$  (e.g., the  $SD$  of the paired comparisons). Other available statistical information (e.g.,  $F$  or  $t$  values) was used instead or as a supplement to means and standard deviations (Johnson, 1993; Johnson & Eagly, 2000). In calculating  $ds$ , we controlled for baseline differences when pre-intervention measures were available. When studies reported odds ratios, we transformed them to  $d$  using the Cox transformation (Sanchez-Meca, Marin-Martinez, & Chacon-Moscoso, 2003). As a supplement to this overall strategy, in cases for which the information was available,  $ds$  were also calculated for time-related change for both the intervention and control groups. These effect sizes are instructive about whether the observed between-group intervention  $ds$  accurately reflect the amount of change exhibited by the intervention group, as it is possible that the control groups exhibit positive change as well.

Effect sizes with a positive sign indicated greater risk reduction among participants in the intervention condition or improved pre- to post-test outcomes among the intervention group; effect sizes were corrected for sample size bias (Hedges & Olkin, 1985). We calculated multiple effect sizes from individual studies when they had more than one behavioral measure, multiple intervention conditions, or when outcomes were separated by gender. Effect sizes calculated for each intervention and by gender (when studies provided intervention outcomes by gender) were analyzed as separate interventions. If a study contained multiple measures of the same outcome, the effect sizes were averaged. Effect sizes were calculated on the measures provided at the first available follow-up after the intervention.

Weighted mean effect sizes,  $d_+$ s, were calculated using fixed- and random-effects procedures (Lipsey & Wilson, 2001), such that individual studies' effect sizes were weighted by the inverse of their fixed- or random-effects. The homogeneity statistic,  $Q$ , was computed to determine whether each set of  $d_+$ s shared a common effect size. The homogeneity of variance statistics has an approximate chi-square distribution with the number of effect sizes ( $k$ ) minus 1 degrees of freedom (Hedges & Olkin, 1985). By convention, if  $Q$  is large or significant, analysts examine the relation between study characteristics and the magnitude of the effects; in the current review, these analyses were not conducted because (1) insufficient numbers of studies were available for each dependent variable, and (2)  $Q$  statistics tended to suggest that studies exhibited a high degree of

homogeneity. We also calculated the between-groups-of-studies measure,  $Q_B$ , which is the weighed sum of squares of group mean effect sizes about the grand mean effect size (Hedges, 1994) to examine pre- to post-test differences between the intervention and control groups.

## RESULTS

### Description of Studies

Table 1 describes the 21 studies' locations, sample, and intervention content. The studies appeared between 1983 and 2002, all were in English, 16 (76%) were published in journals, and 16 (76%) stated they used theory to guide their intervention design (48% based their interventions on multiple theoretical perspectives). Studies were predominately located in North America (90%) within small- to medium-sized cities (67%), and most (62%) were conducted at universities or schools. On average, the study samples were primarily men (60%), of Caucasian background (65%), and 23-years old ( $SD = 5.4$ ). Of the 13 studies that reported sexual activity, 92% of participants were sexually active. Four studies (19%) sampled gay men or MSM.

Most studies (90%) randomly assigned participants or groups (e.g., classrooms) to conditions, 81% had both pre- and post-intervention risk assessments, and included an average of 1.2 ( $SD = 0.6$ ) follow-ups after baseline data collection. The first post-intervention risk assessments, which were the focus of this review, occurred an average of 9.3 ( $SD = 14.0$ ) weeks after the intervention. Twelve (57%) of the studies attempted to control bias by using nonintervention personnel to collect responses. Participants were generally (57%) recruited through university courses, participant pools, or schools, although 33% were recruited from the community and 10% through clinical contact. Eleven (52%) studies stated that preliminary research was used to tailor the intervention.

Interventions were primarily conducted one-on-one (52%) or in small groups (43%) and met for a median of 1 session of 42 min each with a median of 1 facilitator. Although all interventions eroticized safer sex, the amount of emphasis that they placed on it ranged from 7.5% to 100% of the total intervention time ( $M = 62%$ ,  $SD = 36%$ ) with an average of 26 min of safer sex eroticization per session; 64% provided HIV-related education, 36% simple condom information and demonstrations, and 33% included active (practiced by participant) interpersonal skills training. Interventions infrequently included condom information and skills practice (20%), passive (no practice by participants) interpersonal skills training (18%), intrapersonal skills training (18%), and motivation (16%). Safer sex was eroticized using several methods: 61% of interventions employed a visual erotic component (e.g., video, erotic posters/brochures), 43% included an erotic activity (e.g., generating erotic ways to use condoms/have safer sex, writing a

sexual fantasy), and 20% had participants read erotic stories. A small percentage (20%) of the interventions used more than one method of eroticizing safer sex. Only 10 (29%) of the interventions provided condoms as part of the intervention or controls. Finally, control groups were predominantly established (81%) as having either no treatment, irrelevant content, or through use of a wait list.

### Intervention Impact Compared to Controls

#### *Condom Use Attitudes, Intentions, and Behavior*

Twelve interventions were evaluated using only attitudes toward condom use, four were examined using only intentions to use condoms, seven were examined using condom use only, and two used both condom attitudes and condom use measures. Relative to controls, sexual risk reduction intervention that included an eroticization component improved attitudes toward using condoms,  $d_+ = 0.22$  (95% CI 0.12, 0.33) (Table 2). Compared to control participants, intervention participants did not increase their intentions to use condoms,  $d_+ = 0.13$  (95% CI  $-0.08, 0.34$ ). Of the studies that assessed condom use, interventions significantly increased unspecified type of condom use,  $d_+ = 0.25$  (95% CI 0.09, 0.42), but did not increase anal condom use,  $d_+ = 0.12$  (95% CI  $-0.01, 0.26$ ), compared to controls. These results were parallel across models using either fixed- or random-effects assumptions. All of these mean effect sizes exhibited homogeneity with one exception, intentions to use condoms,  $Q(3) = 11.50, p < .01$ , implying that the weighted mean effect size cannot adequately describe the variability in the intervention effectiveness at improving intentions. The small number of intention effect sizes precluded moderator analyses.

For subsequent analyses, highly correlated ( $r = 1.00$ ) effect sizes for unspecified type and anal condom use were averaged (Table 2). Compared to controls, participants in the intervention reduced their overall condom use,  $d_+ = 0.18$  (95% CI 0.07, 0.29). The same results were found using random-effects assumptions (Table 2). All of these mean effect sizes exhibited homogeneity,  $Q(8) = 3.21, p = .92$ . Additional analyses investigated whether MSM improved their condom use. Four interventions that sampled MSM and measured anal condom use (none examined unspecified condom use) were evaluated: relative to controls, interventions improved anal condom use among MSM,  $d_+ = 0.16$  (95% CI 0.10, 0.30). These results matched those found using random-effects assumptions. The effect sizes were homogeneous,  $Q(3) = 0.93, p = .82$ .

#### *Other Risk-Related Outcomes*

Of the five interventions evaluating HIV-related knowledge, participants in the intervention improved their HIV knowledge compared with controls,  $d_+ = 0.36$

**Table 2.** Efficacy of Interventions Compared to Controls to Promote Risk Reduction in the First Follow-up Assessments of Interventions Including an Erotic Component

Outcome	<i>k</i>	Weighed mean <i>d</i> (and 95% confidence interval)		Homogeneity of effect sizes	
		Fixed effects	Random effects	<i>Q</i>	<i>p</i>
HIV/AIDS Knowledge	5	0.36 (0.21, 0.51)	0.38 (0.20, 0.56)	4.91	.30
Condom attitudes	14	0.22 (0.12, 0.33)	0.23 (0.10, 0.37)	20.15	.09
Condom use intentions	4	0.13 (−0.08, 0.34)	0.18 (−0.28, 0.64)	11.50	<.01
<i>Behavioral Outcomes</i>					
Condom use					
Unspecified	5	0.25 (0.09, 0.42)	0.25 (0.09, 0.42)	0.70	.95
Anal	6	0.12 (−0.01, 0.26)	0.12 (−0.01, 0.26)	3.46	.63
Averaged	9	0.18 (0.07, 0.29)	0.18 (0.07, 0.29)	3.21	.92
Sexual frequency					
Frequency	3	0.04 (−0.11, 0.19)	0.04 (−0.11, 0.19)	0.41	.82
No. of sexual partners	2	0.41 (0.17, 0.64)	0.41 (0.17, 0.64)	0.97	.32
Averaged	5	0.14 (0.02, 0.27)	0.14 (−0.05, 0.33)	8.21	.08
Communication with sexual partners	5	0.22 (0.07, 0.37)	0.24 (0.05, 0.43)	5.48	.24
Overall behavioral risk	5	0.28 (0.14, 0.42)	0.23 (−0.01, 0.47)	11.03	.03

(95% CI 0.21, 0.51). Compared to controls, interventions did not impact the frequency of sex occasions,  $d_+ = 0.04$  (95% CI −0.11, 0.19) but did reduce participants' number of sexual partners,  $d_+ = 0.41$  (95% CI 0.17, 0.64). Relative to controls, interventions eroticizing safer sex improved communications with sexual partners,  $d_+ = 0.22$  (95% CI 0.07, 0.37). These results were parallel across models using either fixed- or random-effects assumptions. All mean effect sizes exhibited homogeneity (Table 2). Of the five studies that measured overall behavioral risk (combination of several behavioral risk measures), interventions showed improvement compared to controls,  $d_+ = 0.28$  (95% CI 0.14, 0.42). The effect sizes varied widely,  $Q(4) = 11.03$ ,  $p = .03$ . Moderator analyses were not conducted due to insufficient sample sizes.

Effect sizes for sexual frequency and number of sexual partners were averaged into one measure. Participants in the intervention reduced their sexual frequency compared to controls,  $d_+ = 0.14$  (95% CI 0.02, 0.27), although strictly speaking this result did not achieve significance with random-effects assumptions,  $d_+ = 0.14$  (95% CI −0.05, 0.33). These effects were homogeneous (Table 2).

## Intervention Impact at Post-Test

### *Efficacy of the Interventions*

Compared to their pre-test scores, Table 3 shows that exposure to a sexual risk reduction intervention eroticizing safer sex improved participants' attitudes toward

**Table 3.** Efficacy of Interventions or Controls Pre- to Post-test to Promote Risk Reduction in the First Follow-up Assessments of Intervention Including an Erotic Component

Outcome	Eroticizing interventions		Controls		Between-groups heterogeneity of effect sizes	
	<i>k</i>	<i>d</i> <sub>+</sub> (95% CIs)	<i>k</i>	<i>d</i> <sub>+</sub> (95% CIs)	<i>Q</i> <sub>B</sub>	<i>p</i>
Condom attitudes	2	0.53 (0.22, 0.84)	2	0.09 (−0.28, 0.45)	3.32	.07
Behavioral Outcomes						
Condom use						
Unspecified	5	0.16 (−0.07, 0.38)	3	0.04 (−0.26, 0.34)	0.36	.55
Anal	5	0.12 (−0.03, 0.28)	5	−0.03 (−0.18, 0.12)	2.33	.13
Averaged	9	0.13 (0.02, 0.55)	7	−0.01 (−0.15, 0.12)	7.90	<.01
Communication with sexual partners	3	0.43 (0.14, 0.71)	3	0.09 (−0.32, 0.49)	1.78	.18

Note: Results using random effect assumptions were identical.

condom use, *d*<sub>+</sub> = 0.53 (95% CI 0.22, 0.84). At post-test, neither unspecified type, *d*<sub>+</sub> = 0.05 (95% CI −0.32, 0.43), nor anal condom use, *d*<sub>+</sub> = 0.10 (95% CI −0.03, 0.23) was improved. Again, the condom use outcomes were highly correlated and an averaged measure was created; overall condom use was improved at post-test, *d*<sub>+</sub> = 0.13 (95% CI 0.02, 0.55). Communication with sexual partners was improved at post-test among intervention participants, *d*<sub>+</sub> = 0.43 (95% CI 0.14, 0.71). For each outcome, parallel results were found using random-effects assumptions. HIV/AIDS knowledge, condom use intentions, sexual frequency, number of sex partners, and overall behavioral risk measures were not analyzed due to either insufficient studies reporting pre- and post-test outcomes or insufficient information available to calculate pre- and post-test effects. None of the measured outcomes (attitudes toward condoms, condom use, or communication with sexual partners) were significant when comparing pre- to post-test outcomes of the control conditions (see Table 3). Again, each group of effect sizes exhibited homogeneity, *ps* > .05.

Further analyses examined the pre- to post-test anal condom use outcomes among MSM. MSM in the intervention condition improved their post-test anal condom use, *d*<sub>+</sub> = 0.17 (95% CI −0.01, 0.34); this effect was not replicated among MSM in the control condition, *d*<sub>+</sub> = −0.01 (95% CI −0.17, 0.15). The effect sizes for both the intervention and control groups exhibited homogeneity, *ps* > .05. These two mean effect sizes differed only marginally, *Q*<sub>B</sub>(1) = 3.02, *p* = .08

To examine whether there was any variation across the intervention and control groups, we calculated *Q*<sub>B</sub>. There were no differences between groups for attitudes toward condom use, unspecified condom use, anal condom use, or communication with sexual partners (see Table 3). Yet, the two groups differed

significantly on the averaged condom use measure,  $Q_B(1) = 7.90, p < .01$ . Participants in the intervention condition ( $M = 0.13, SE = .06$ ) improved their overall condom use at post-test compared to those in the control condition ( $M = -0.01, SE = .07$ ).

## DISCUSSION

Because of the magnitude of the worldwide HIV epidemic and because of the fact that behavior change remains the most viable means of prevention, discovering avenues for improving sexual risk reduction must be a priority. Reviews of the sexual risk reduction literature have begun to delineate intervention components that are important to risk reduction, but very little quantitative research has examined specific intervention components (for exceptions see, Albarracín et al., 2003; Burke, Arkowitz, & Menchola, 2003; Johnson, Carey, Chaudoir, & Reid, 2006; B. T. Johnson et al., 2003). This quantitative analysis is the first to examine the impact of sexual risk reduction interventions that eroticize safer sex on educational, psychological, and behavioral risk-related outcomes. Specifically, this review focused on HIV knowledge, condom attitudes, condom use intentions, reported condom use, sexual frequency (frequency and number of occasions), communication with sexual partners, and overall behavioral risk. Analyses examined differences between participants in intervention and control groups and participants' pre- and post-test outcomes (when available). In total, 21 studies and 35 interventions qualified for the review; only 10 of these studies provided pre- and post-test outcomes for analysis.

Overall, the results from the review showed that interventions eroticizing safer sex improved sexual risk outcomes both compared to the controls and at post-test. Results revealed that compared to controls, interventions with some amount of eroticization component are successful in reducing sexual risk as measured by increases in HIV-related knowledge, attitudes toward condoms, reported condom use (unspecified and averaged condom use), communication with sexual partners, overall behavioral risk, and decreases in sexual frequency (number of sexual partners and averaged sexual frequency measure). The results were relatively consistent for all study outcome dimensions ( $d_+$ s ranged from 0.18 to 0.41) except for the averaged sexual frequency measure, for which the magnitude of effect was small ( $d_+ = 0.14$ ). The magnitude of effect for the averaged sexual frequency measure is consistent with effects reported in other meta-analyses of sexual risk reduction interventions ( $d_+$ s ranging from 0.05 to 0.18; e.g., B.T. Johnson et al., 2003; W. D. Johnson et al., 2003; Mullen, Ramirez, Strouse, Hedges, & Sogolow, 2003; Smoak, Scott-Sheldon, Johnson, & Carey, 2006). It represents an improvement relative to a recent meta-analysis of 174 HIV-prevention studies ( $N = 116,735$  participants), which on average found null effects for sexual frequency outcomes such as examined here (Smoak et al., 2006). Eroticizing



safer sex, in contrast, doesn't appear to impact the frequency of sex occasions ( $d_+ = 0.04$ ) suggesting that this strategy, consistent with other research examining condom availability and sexual activity (see Guttmacher et al., 1997; Kirby, 2002; Smoak et al., 2006), does not inadvertently increase sexual activity.

Analyses with pre- and post-test outcomes showed that at post-test, intervention participants improved their condom attitudes, condom use, and communication with sexual partners. On average, these effects were small to medium in size, with  $d_+$ s ranging from 0.13 to 0.53. When pre- to post-test outcomes for control participants were examined, sexual risk levels remained the same for each of the measured dimensions, further confirming that intervention rather than control conditions were effective at reducing sexual risk. In addition, between-group analyses on the pre- and post-test measures showed that condom use was significantly improved at post-test for intervention participants but not for control participants. Although these results are based on the few studies available, sexual risk reduction interventions that eroticize safer sex, to some degree, appear to be efficacious in improving condom use.

Although we cannot make causal conclusions regarding the impact of eroticization above and beyond other types of intervention components (e.g., condom negotiation skills training), our results do show an improvement over other meta-analyses. For instance, the magnitude of the condom use outcomes comparing interventions vs. controls (unspecified,  $d_+ = 0.25$ , and averaged condom use,  $d_+ = 0.18$ ) is consistent or better than condom use outcomes reported in other meta-analyses of controlled trials ( $d_+$ s ranging from 0.07 to 0.19; e.g., B. T. Johnson et al., 2003, 2006; Logan, Cole, & Leukefeld, 2002; Mullen et al., 2003). These results suggest that including a safer sex eroticization component may be an important component of a sexual risk reduction intervention. Although many researchers have advocated for safer sex eroticization, only 5% of the studies retrieved for this review included a specific eroticization component. Surprisingly, only 20% of the studies included in this review sampled MSM; most sampled young adults—in particular university students. The paucity of studies using eroticization strategies for MSM and other key risk groups is most troublesome given these groups may benefit the most from this type of intervention. MSM, in particular, are unlikely to use condoms except for STD risk protection and may choose to forgo the use of condoms if condoms are viewed as decreasing pleasure (Carballo-Diequez & Bauermeister, 2004; Mansergh et al., 2002). Although there were few studies to evaluate, we found that interventions including an eroticization component improved anal condom use among MSM when compared to controls as well as from pre- to post-test. Similarly, eroticization strategies may hold an added benefit for people living with HIV or AIDS, as it is for them that motivational strategies appear crucial. B. T. Johnson and colleagues (2006) recent meta-analysis demonstrated that strategies for sexual risk reduction for this target group have succeeded no better than risk reduction for those who know (or believe)

that they are HIV negative. They also showed that when these studies used motivational strategies, condom use improved substantially. These disparate pieces of evidence, coupled with the results of the current review, point to the conclusion that eroticization *could* be a crucial prevention component for positives. Future primary-level research should address this issue.

## LIMITATIONS AND CONCLUSIONS

Although our review provided empirical evidence that eroticizing condom use may be beneficial for reducing sexual risk, there are several limitations that should be noted. The eroticization component of the interventions varied widely (7.5% to 100% of the total intervention time) with most interventions comprised of several other components (e.g., skills training). Because few studies were eligible for inclusion in this paper it is difficult to ascertain whether eroticization or eroticization in addition to another intervention component (e.g., eroticization + communication skills) is key to reducing sexual risk. Nonetheless, comparisons of the magnitude of effect sizes with other meta-analyses strongly suggests that including an eroticization component is an improvement over other interventions. Others (e.g., Herek, Gonzalez-Rivera, Fead, & Welton, 2001) have suggested that exposing participants to pleasurable or sexual imagery might encourage the participant to be more engaged than he/she would be otherwise. Thus, although this meta-analysis cannot make assertions as to whether eroticization alone is sufficient to reduce sexual risk (compared to other types of intervention components), it is plausible that eroticization embedded in an intervention would be sufficient to increase involvement among participants.

In conclusion, this review has demonstrated that interventions that include some type of safer sex eroticization component successfully reduce risky sexual behavior. Future research should examine the efficacy of variations of safer sex eroticization on risk reduction. In particular, research should evaluate the amount and type of eroticization necessary to reduce sexual risk especially among groups particularly affected by HIV (e.g., MSM, women, African-Americans). Knowing what type of HIV-related intervention components work and for whom is vital information that all interventionists must be made aware of in order to decrease the number of people contracting or spreading HIV infections throughout the U.S. and worldwide.

## ACKNOWLEDGMENTS

This research was supported by National Institutes of Health grant R01-MH58563 to Blair T. Johnson. We thank the following study authors and associates who provided additional intervention details or data: Gregory M. Rebchook, Ph.D.,

Beatrice J. Krauss, Ph.D., B. R. Simon Rosser, Ph.D., Catherine Sanderson, Ph.D., and Cathy Struckman-Johnson, Ph.D. We thank Marcella B. Boynton, MA, Page Jerzak, Ph.D., Jessica M. La Croix, BA, I-Ching Lee, MS, Kerry L. Marsh, Ph.D., and Allecia E. Reid, BA, for assistance in preparing and in organizing the study data.

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