

# A Systematic Review and Meta-Analysis of Behavioral Interventions to Reduce HIV Risk Behaviors of Hispanics in the United States and Puerto Rico

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**Abstract** This systematic review examines the overall efficacy of HIV behavioral interventions designed to reduce HIV risk behaviors or incident sexually transmitted diseases (STDs) among Hispanics residing in the United States or Puerto Rico. Data from 20 randomized and nonrandomized trials ( $N = 6,173$  participants) available through January 2006 were included in this review. Interventions successfully reduced the odds of unprotected sex and number of sex partners, increased the odds of condom use, and decreased the odds of acquiring new STD infections. Interventions successful in reducing the odds of any sex risk behavior used non-peer deliverers; included  $\geq 4$  intervention sessions; taught condom use or problem solving skills; or addressed barriers to condom use, sexual abstinence, or peer norms. Interventions that included the Hispanic

cultural belief of *machismo* or those developed based on ethnographic interviews were successful in reducing the odds of sex risk behaviors among non-drug users. Interventions targeting injection drug users (IDUs;  $N = 3,569$ ) significantly reduced the odds of injection drug use and the odds of sharing cotton or cookers, but did not significantly reduce the odds of engaging in risky sex behavior or needle sharing. Further development of culturally appropriate HIV prevention interventions for Hispanic populations, particularly men and persons living with HIV, are warranted.

**Keywords** HIV/AIDS prevention · Behavioral interventions · Hispanics · Sex behavior · Injection drug behavior · Meta-analysis

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Disclaimer: The findings and conclusions in this report are those of the authors and do not necessarily represent the views of the U.S. Centers for Disease Control and Prevention.

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## Introduction

The HIV/AIDS epidemic has had a dramatic and devastating impact on the Hispanic population in the United States. Hispanics comprised approximately 14% of the total US population (including Puerto Rico) in 2003 (U.S. Census Bureau, 2004), yet they accounted for over 20% of the total reported AIDS cases that same year (Centers for Disease Control and Prevention [CDC], 2004b). In addition to having a disproportionately high rate of HIV/AIDS diagnoses—an estimated 39 cases per 100,000 population (CDC, 2005)—Hispanics have experienced higher rates of delayed HIV diagnoses and exhibited more AIDS-defining conditions at time of diagnosis than non-Hispanic Whites (Campo, Alvarez, Santos, & Latorre, 2005; CDC, 2003b). Further, HIV disease is ranked as the third leading cause of death among

Hispanic men between the ages of 35 and 44, and the fourth leading cause of death among Hispanic women in that same age group (Anderson & Smith, 2005). Moreover, high rates of other sexually transmitted diseases (STDs), such as syphilis and chlamydia, which can increase the risk of HIV acquisition or transmission, have also been reported among Hispanic men and women (CDC, 2004c; Wong, Tambis, Hernandez, Chaw, & Klausner, 2003).

Several studies have described the HIV risk behaviors of Hispanic populations. Mexican, Cuban, or Central and South American men are most commonly exposed to HIV through male-to-male sexual contact (CDC, 2005; Pan American Health Organization, 2000), while men from Puerto Rico are predominantly exposed to HIV through injection drug use (Diaz, Buehler, Castro, & Ward, 1993; Diaz & Klevens, 1997). For Hispanic women, the primary route of HIV exposure is through heterosexual contact, usually with a man who engages in injection drug use, has multiple sex partners, refuses to use condoms, or has sex with other men (CDC, 2005; Peragallo, DeForge, Houry, Rivero, & Talashek, 2002). The secondary route of HIV exposure for Hispanic women is through injection drug use (CDC, 2005).

Although Hispanics are comprised of a mixture of cultures, races, and ethnic groups (Deren, Shedlin, Decena, & Mino, 2005; Marín, Tschann, Gómez, & Kegeles, 1993; Marín, Gómez, Tschann, & Gregorich, 1997; Shedlin, Decena, & Oliver-Velez, 2005), there are many shared cultural beliefs that impact HIV risk behavior and present unique challenges for HIV prevention. The traditional gender role of *machismo*, or “male pride,” has many positive aspects, including strength and protection of the family (Díaz, 1998b). However, *machismo* has negative facets as well. For instance, proving masculinity through power and dominance has been shown to lead Hispanic men to engage in risky sex behavior, such as having multiple sex partners (Levy et al., 2005), unprotected sex with women (Galanti, 2003; Goodyear, Newcomb, & Allison, 2000; Marín, 2003; Marín et al., 1993, 1997; Parrado, Flippen, & McQuiston, 2004), or unprotected sex with men (Díaz, 1998b; Jarama, Kennamer, Popen, Hendricks, & Bradford, 2005). Traditional gender roles for women include a cultural emphasis on smooth interpersonal relationships, or *simpatía*, and sexual silence, both of which can impede the discussion of sexual issues (Gómez & Marín, 1996; Marín & Gómez, 1997) and the negotiation of sexual safety with male partners (Amaro & Raj, 2000; Gómez & Marín, 1996; Marín, 2003; Russell, Alexander, & Corbo, 2000).

Studies have also suggested that Hispanic women may be reluctant to ask their partners to use condoms out of fear of physical abuse or violence (Raj, Silverman, & Amaro, 2004; Suarez-Al-Adam, Raffaelli, & O’Leary, 2000).

Other Hispanic cultural beliefs can also contribute to HIV risk or protective behaviors. The concept of *familismo* refers to traditional family values such as maintaining good relations with family members and placing family needs above personal needs (Marín & Marín, 1991). Because homosexuality falls outside this traditional norm, *familismo* can be a source of conflict for both gay and bisexual Hispanic men, resulting in increased risk behavior (Díaz, Ayala, & Bein, 2004; Díaz, Morales, Bein, Dilan, & Rodriguez, 1999; Zea, Reisen, & Díaz, 2003). *Respeto*, the need for respect or personal integrity in social interactions, and *personalismo*, the preference for social interactions that are nurturing and caring, have been theorized to impact the delivery of HIV prevention information and other HIV prevention services (Gómez & Marín, 1996; Marín & Marín, 1991).

Given the rapid increase in the Hispanic population in the US (Pew Research Center, 2005; U.S. Census Bureau, 2005) and increasing prevalence of AIDS within the Hispanic community (CDC, 2005), it is imperative to identify and evaluate HIV prevention interventions for this population. Prior qualitative reviews (Darbes, Kennedy, Peersman, Zohrabyan, & Rutherford, 2002; Marín, 1995) suggested that successful behavioral interventions for Hispanics should be based on behavioral theory, provide skills training, feature culturally sensitive content, and be delivered over multiple sessions. However, those reviews did not quantitatively evaluate the magnitude of intervention effects in reducing HIV risk behaviors among Hispanics, nor did they associate intervention characteristics with overall intervention efficacy.

The purpose of this review is to build upon prior reviews by using a systematic approach to identify HIV behavioral prevention interventions designed to reduce risky sex and drug injection behaviors among Hispanics in the US or Puerto Rico. The goals of this review are threefold. First, we sought to quantitatively assess the overall efficacy of interventions on reducing risky sex and drug injection behaviors that can potentially lead to HIV acquisition or transmission among Hispanics. Our second goal was to identify study, participant, and intervention characteristics associated with the efficacy of HIV behavioral prevention interventions for Hispanics. Our third goal was to examine whether Hispanic cultural features are associated with

intervention efficacy. Together, these findings have the potential to inform future HIV prevention planning and intervention development for Hispanics living in the US and Puerto Rico.

## Method

### Procedures

#### *Database and Search Strategy*

As part of the HIV/AIDS Prevention Research Synthesis (PRS) Project at the U.S. Centers for Disease Control and Prevention (CDC), a cumulative database of the HIV/AIDS and STD behavioral prevention research literature was developed using systematic automated and manual search strategies (Lyles, Crepaz, Herbst, & Kay, 2006; Sogolow, Peersman, Seman, Strouse, & Lyles, 2002). First, we conducted a comprehensive automated search of five electronic bibliographic databases—including AIDSLINE (1988 to discontinuation in December 2000), EMBASE, MEDLINE, PsycINFO, and SocioFile (1988 through November 2005)—to identify published intervention evaluations. This search cross-referenced standardized search terms in three key domains: (a) HIV, AIDS, or STD disease, (b) prevention, intervention, evaluation, education, and (c) behavioral or biologic outcomes (e.g., sex behavior, needle sharing, incident STD or HIV). Citations that intersect all three domains were downloaded into the PRS database. The full search strategy developed for each electronic database is available from the authors.

To reduce publication bias and gaps in the automated search, we implemented five supplementary search strategies to identify additional studies. First, to fill indexing gaps in the electronic databases we conducted a hand search of over 35 key journals published from June 2004 through January 2006 using the same domains as the automated search. Second, we searched the ProQuest Dissertation and Theses Abstracts International database for relevant documents. Third, we searched the published conference abstracts from national and international HIV/AIDS and STD conferences, the online Cochrane Controlled Trials Register, and the National Institutes of Health's Computer Retrieval of Information on Scientific Projects (CRISP) database (<http://crisp.cit.nih.gov>). Fourth, we identified principal investigators in the US and Puerto Rico, and contacted them to obtain recommendations of current and ongoing research, additional published and unpublished reports in English and Spanish, and

other in press publications.<sup>1</sup> Finally, we reviewed the reference lists of all pertinent reports for additional citations. All studies identified through these procedures were entered into the PRS database.

#### *Inclusion and Exclusion Criteria*

We searched the PRS database to identify eligible studies that evaluated an HIV/AIDS or STD prevention intervention seeking to reduce the HIV risk behaviors of Hispanics in the US or Puerto Rico. To be included in the review, studies had to either focus on Hispanics or be comprised of a majority (i.e., >50%) Hispanic participants. We also included studies that analyzed intervention outcome data separately by ethnicity (i.e., stratified data for a subgroup of Hispanic participants). Additional eligibility criteria for this review included studies that (a) assessed the same group of participants or communities prospectively over time; (b) reported data on at least one HIV-related sex (i.e., any unprotected sex, condom use, or number of sex partners), drug injection (i.e., injection drug use, sharing needles, or sharing cookers/cotton), or biologic (i.e., incident STD or HIV) outcome; (c) evaluated an intervention group relative to a control or comparison group; and (d) reported outcome data necessary and sufficient for calculation of effect size estimates. If a study did not report sufficient information to calculate effect sizes, we attempted to obtain additional data from the primary author.

#### *Study Linkage*

For each eligible study, we conducted a search of the PRS database to identify all linked citations reporting information or outcome data for that study. Citations were flagged as potentially linked if they were authored by any of the first three authors or the last author of the eligible citation, or reported the same intervention name in the title or abstract. Citations were also flagged if they were referenced in the eligible citation as reporting on the same study. Once

<sup>1</sup> Requests were sent by e-mail to 23 principal investigators of intervention studies that focused on Hispanics identified through our search of conference abstracts and referrals from experts. Eighteen authors (78%) responded to our requests by either providing additional information about their study design (five authors), sending summary data to facilitate calculation of effect sizes (11 authors), or supplying the names of additional researchers (two authors). Four authors submitted *in press* intervention evaluation reports to the PRS Team for review and potential inclusion in this review (Carballo-Diéguez et al., 2005; Peragallo et al., 2005; Robles et al., 2004; Villarruel, Jemmott, & Jemmott, 2006).

confirmed, all linked citations were included in the coding of the eligible study.

### Data Abstraction and Quality Assessment

Pairs of trained reviewers independently coded information from all potentially relevant studies. Using standardized forms, each intervention was coded for general study characteristics (e.g., study date, location), study quality characteristics (e.g., randomized controlled trial [RCT], length of follow-up, retention rate), participant characteristics (e.g., ethnicity, target population), intervention characteristics (e.g., theory, content, delivery method, duration, setting), and Hispanic cultural features (e.g., intervention developed based on ethnographic formative research, use of a Hispanic deliverer, intervention delivered in the Spanish language, intervention took place in the Hispanic community, statement of “cultural appropriateness,” and the specific Hispanic cultural beliefs including *familismo*, *respeto*, *machismo*, sexual silence, and *personalismo*). The reviewer pairs reconciled all discrepancies, and if reviewers could not reach an agreement then a third independent reviewer helped resolve the discrepancy.

Intercoder agreement for all categories included in the coding form was 92.3% for general study, participant, and intervention characteristics; 92.0% for study quality; and 83.5% for Hispanic cultural features. Intercoder reliability coefficients (kappas for categorical variables and Spearman rank-order correlations for continuous variables) were at acceptable levels for general study characteristics (range .77–1.00; average .94), study quality characteristics (range .88–1.00; average .95), participant characteristics (range .94–1.00; average .99), intervention characteristics (range .63–1.00; average .84), and Hispanic cultural features (range .68–1.00; average .82).

The reviewer pairs independently abstracted data for all sex behavior (any unprotected sex, condom use, and number of sex partners), drug behavior (injection drug use, needle sharing, and cooker or cotton sharing) and biologic outcomes (STD incidence) reported in the studies. Because studies differ in terms of the number of intervention arms, types of outcomes, analyses conducted, and findings reported, we applied the following rules to guide effect size abstraction. We used data from adjusted models reported by study authors for effect size calculation because baseline differences and potential confounding variables are typically controlled in these models. Otherwise, we calculated effect sizes for the follow-up outcome data by adjusting for baseline differences (W. D. Johnson et al., 2002). We

calculated effect size estimates at all reported follow-ups, but the follow-up assessment  $\geq 3$  months or closest to 3 months was selected for calculating the effect size estimate for the overall meta-analysis. For the one study (Raj et al., 2001) that evaluated two intervention arms, we selected the contrast between the HIV intensive program and the wait list control for the meta-analysis because the health promotion intervention did not have an HIV prevention focus.

We chose to address study quality with analytic strategies as opposed to using a composite quality scale due to the potential problems in the interpretation of these scales (Juni, Altman, & Egger, 2001). We assessed overall study quality by separately evaluating the impact of each of the following variables on intervention efficacy: method of assignment (RCT vs. non-RCT), retention during follow-up assessments (i.e.,  $\geq 70\%$  vs.  $< 70\%$ ), length of follow-up (i.e.,  $\geq 3$  months vs.  $< 3$  months), and report of intent-to-treat analysis (i.e., analysis as assigned and regardless of exposure to the intervention; Flores & Crepaz, 2004).

### Quantitative Data Synthesis

For each study, we calculated the odds ratio (OR) to represent the estimated effect size for individual studies so that the meta-analytic findings can be expressed in terms of the relative odds of change for each outcome. The OR estimates the relative effect between the intervention group and a comparison group. ORs were calculated for each outcome reported as categorical data (e.g., percentage of unprotected sex or proportion of condom use) using standard formulas for  $2 \times 2$  tables (Lipsey & Wilson, 2001). For studies that reported means and standard deviations on continuous or interval-level behavioral outcomes (e.g., mean number of unprotected sex occasions), we first calculated the standardized mean difference (SMD) effect size (W. D. Johnson et al., 2002; Lipsey & Wilson, 2001). The SMD was then converted into the OR effect size using standard formulas (Hasselblad & Hedges, 1995). For all outcomes, ORs  $< 1.0$  favor the intervention group in reducing HIV transmission risk (i.e., decreased no/inconsistent condom use, unprotected sex, number of sex partners, injection drug use, needle sharing, cotton/cooker sharing, or incident STDs).

Standard methods of meta-analysis were applied for combining effect sizes across studies to obtain an overall effect estimate (W. D. Johnson et al., 2002; Lipsey & Wilson, 2001). We calculated the natural log OR (lnOR) and corresponding weight (i.e., inverse variance of the lnOR) for each study reporting dichotomous outcome data using standard procedures (Lipsey

& Wilson, 2001). For continuous outcome data, the SMD and corresponding variance were transformed to lnOR using the following approximations provided by W. D. Johnson et al. (2002, p. S71):

$$\ln\text{OR} \approx (\pi/\sqrt{3}) \times \text{SMD}$$

$$\text{Var}(\ln\text{OR}) \approx (\pi^2/3) \times \text{Var}(\text{SMD})$$

In estimating the overall pooled effect estimate, we multiplied each lnOR by its weight, summed the weighted lnOR across studies, and divided by the sum of the weights.

The aggregation of effect sizes were performed using both fixed- and random-effects procedures (Hedges & Vevea, 1998; Lipsey & Wilson, 2001). We then tested the magnitude of heterogeneity of effects by using the  $Q$  statistic, an approximate  $\chi^2$  distribution with degrees of freedom equal to the number of studies minus 1. Each aggregated lnOR was converted back to OR by exponential function, and a 95% confidence interval (95% CI) was derived. All analyses were conducted in SPSS Version 13 for Windows (SPSS Inc., 2004) using macros developed for meta-analysis by Dr. David B. Wilson (<http://mason.gmu.edu/~dwilsonb/ma.html>).

Sensitivity analyses were conducted to determine the robustness of intervention effects. For these analyses, each study was excluded one at a time, and the resulting estimates were compared to the combined effect estimate that included all studies. Stratified analyses were conducted to determine whether particular types of interventions were efficacious in reducing any sex risk behavior. If studies reported more than one sex risk behavior outcome, we selected only one outcome for analysis by prioritizing unprotected sex first, then condom use, and then number of sex partners. We report the results of the stratified analyses based on fixed-effects models. The results of stratified analyses using random-effects models are not reported as the pattern of findings were generally the same as the fixed-effects models with slightly fewer significant effects. We assessed the likelihood of subgroup differences using the between-groups heterogeneity statistic,  $Q_B$ , which has a  $\chi^2$  distribution and degrees of freedom equal to the number of subgroups minus 1 (Hedges & Vevea, 1998).

Publication bias, which may favor studies with significant findings, was ascertained by inspection of a funnel plot of standard error estimates versus effect size estimates from individual samples. The funnel plot (not shown) revealed no asymmetry and no evidence of publication bias.

## Results

### Study Selection

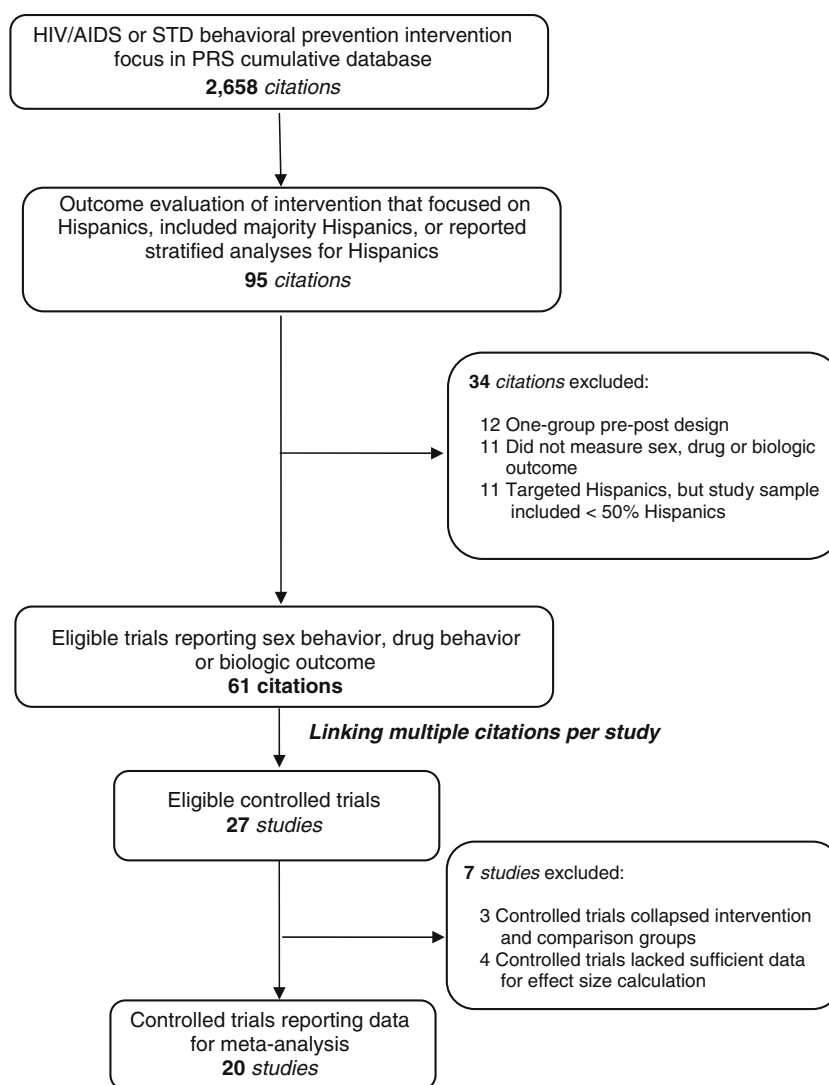
As shown in Fig. 1, among the 2,658 behavioral intervention citations identified through the comprehensive search, 61 citations representing 27 intervention studies were eligible for review. We excluded three studies (Birkel et al., 1993; Flaskerud, Nyamathi, & Uman, 1997; Grella, Annon, & Anglin, 1995) for combining intervention and comparison groups in the evaluation, and four studies for not reporting sufficient data necessary for effect size calculation (Coyle, Kirby, Marin, Gomez, & Gregorich, 2004; Jemmott, Jemmott, Braverman, & Fong, 2005; Kipke, Boyer, & Hein, 1993; Lesser et al., 2005). Thus, 20 intervention studies ( $N = 6,173$  participants) were included in this review and meta-analysis. Eleven studies were comprised of 100% Hispanic participants, five studies were comprised of a majority Hispanic participants (range 63–97.7%; median = 76.8%), and four studies reported stratified outcome data for a subsample of Hispanic participants.

### Description of studies

Table 1 shows details of the 20 included studies. Eight studies (40%) focused exclusively on females, 3 (15%) focused exclusively on males, and the remaining 9 (45%) included both females and males. Seven studies (35%) targeted drug users, with six specifically targeting injection drug users (IDUs). Among the 18 studies conducted in the mainland US, nine were in the Northeast, eight in the Southwest and one in the Midwest. Only two studies, both of which targeted IDUs, were conducted in Puerto Rico. Among studies conducted in the Northeast, the majority of participants were of Puerto Rican descent; whereas studies conducted in the Southwest included predominantly Mexican–American participants. Regardless of location, the majority of study participants had less than a high school education and a median age of 27.2 years (range 14.9–38.9 years). Half of the studies were in the field after highly active antiretroviral therapy (HAART) became available in 1996.

In terms of evaluation design, 15 studies (75%) were RCTs, two used matching to minimize assignment bias, and the remaining three studies employed assignment methods based on convenience factors. Fourteen (70%) studies were designed with an intervention comparison group, while the remaining studies included a wait-list control group. Sixteen studies (80%) had a minimal follow-up that exceeded 3 months (median 4.5 months); 12 (60%) achieved at

**Fig. 1** Selection process for inclusion in systematic review and meta-analysis



least 70% retention of participants (median 84%); and all but one study (Peragallo et al., 2005) conducted intent-to-treat analyses where participants were analyzed as assigned and regardless of intervention exposure. Behavioral outcomes were assessed using face-to-face interviews in 16 studies.

Interventions were administered to small groups (16 studies [80%]), to entire communities (two studies [10%]), or to individuals (two studies [10%]). Eight interventions (40%) were delivered in health or drug treatment clinics, while the remaining were delivered in community settings such as schools (three studies), community-based organizations (three studies), or farm worker campsites (two studies). The majority of interventions (15 studies [75%]) were guided by a behavioral theory, with the most common being the Social Cognitive Theory (Bandura, 1986). Seventeen studies evaluated interventions delivered over an average of five sessions (range 1–15 sessions) with total

time span ranging from 1 to 24 h (median 10 h). All interventions provided facts about HIV/AIDS or STDs, 11 (55%) provided access to condoms, 10 (50%) addressed self-efficacy for sexual safety, 9 (45%) attempted to increase awareness of risk triggers, 7 (35%) discussed sexual abstinence, and 5 (25%) sought to change behavior by modifying peer norms. Sixteen (80%) interventions taught skills, including condom use skills (14 [70%]), problem solving skills (7 [35%]), or skills for safer sex negotiation (11 [55%]). In addition, six interventions provided HIV counseling and testing and two provided STD testing. Fifteen interventions incorporated Hispanic cultural features, including a Hispanic deliverer (14 studies), Spanish language (12 studies), delivery in the Hispanic community (nine studies), or development based on ethnographic formative interviews with the target population (nine studies). Additionally, 12 interventions (60%) included specific Hispanic cultural beliefs

**Table 1** Detailed description of 20 controlled trials included in the meta-analysis

Study <sup>a</sup> location and dates	Evaluation design	Sample and setting	Intervention description	Hispanic cultural features
<b>Carballo-Diéguez et al. (2005)<sup>f</sup></b> New York City, NY, 1998–2002	RCT <i>Comparison:</i> No treatment control <i>Follow-ups:</i> 2, 8 and 14 months <i>Retention:</i> 85% at 8 months <i>Outcome:</i> UPS Non-RCT (convenience) <i>Comparison:</i> Methadone only <i>Follow-up:</i> 2 weeks <i>Retention:</i> NR <i>Outcomes:</i> UPS, sex partners, IDU, needle sharing	180 gay or bisexual Latino men; 36% HIV+ <i>Percent Hispanic:</i> 100% <i>Setting:</i> CBO	<i>Name:</i> Latinos Empowering Ourselves (LEO) <i>Level:</i> Group <i>Theory:</i> Empowerment <i>Content:</i> Self-efficacy, gratification delay, goal setting, and problem solving skills, exploration of emotions, and changing popular cultural norms (8 weekly sessions; 16 h) <i>Deliverer:</i> Gay-identified bilingual peer counselor <i>Name:</i> AIDS Prevention Program <i>Level:</i> Group and individual <i>Theory:</i> NR <i>Content:</i> Methadone treatment, AIDS and HIV testing information, exploration of feelings for recovery, personal skills, and referrals to social services and job placement (continuously over 18 weeks) <i>Deliverer:</i> Counselor and speakers from drug treatment and Narcotics Anonymous	<ul style="list-style-type: none"> <li>• Hispanic community</li> <li>• Hispanic deliverer</li> <li>• Spanish language</li> <li>• Hispanic cultural content (machismo, sexual silence, dichos/cultural stories)</li> </ul> <p>None reported</p>
<b>Castro and Tafoya-Barraza (1997)<sup>f</sup></b> Southwest, USA, dates NR	RCT <i>Comparison:</i> Standard outreach and HIV C&T <i>Follow-up:</i> 7 months <i>Retention:</i> 87% <i>Outcomes:</i> UPS, CU, sex partners, IDU, needle sharing, cooker/cotton sharing	35 injection drug users; 69% male <i>Percent Hispanic:</i> 100% (stratified data) <i>Ethnicity:</i> 100% Mexican <i>Setting:</i> Methadone clinic	<i>Name:</i> Puerto Rico AIDS Prevention Project <i>Level:</i> Group and individual <i>Theory:</i> NR <i>Content:</i> Standard outreach, HIV C&T, referral to drug treatment plus HIV information, condom use and needle cleaning skill building, discussion of risk reduction strategies (three sessions; 1.5–3 h) <i>Deliverer:</i> Peer outreach worker, social worker	None reported
<b>Colón et al. (1993)</b> San Juan, Puerto Rico, 1989–1991	RCT <i>Comparison:</i> Standard outreach and HIV C&T <i>Follow-up:</i> 6 months <i>Retention:</i> 44% <i>Outcomes:</i> UPS, IDU	669 injection drug users; 73% male; 17.3% HIV+ <i>Percent Hispanic:</i> 100% (stratified data) <i>Ethnicity:</i> 100% Puerto Rican <i>Setting:</i> Community and study site	<i>Name:</i> Community Outreach Prevention Effort (COPE II) <i>Level:</i> Group and individual <i>Theory:</i> Communication theory, health belief model, social learning theory, fear arousal <i>Content:</i> NIDA standard plus family and community support groups (five sessions and 1 outreach encounter; minimum 14 days) <i>Deliverer:</i> Indigenous peer outreach worker, community service provider, and counselor	<ul style="list-style-type: none"> <li>• Hispanic community</li> <li>• Hispanic deliverer</li> <li>• Spanish language</li> <li>• Hispanic cultural content (familismo, machismo, respeto)</li> <li>• Ethnographic formative research (participant observations)</li> </ul>
<b>Dushay, Singer, Weeks, Rohena, and Gruber (2001)<sup>f</sup></b> Hartford, CT, 1992–1995	RCT <i>Comparison:</i> NIDA standard <sup>e</sup> <i>Follow-up:</i> 6 months <i>Retention:</i> 44% <i>Outcomes:</i> UPS, IDU	669 injection drug users; 73% male; 17.3% HIV+ <i>Percent Hispanic:</i> 100% (stratified data) <i>Ethnicity:</i> 100% Puerto Rican <i>Setting:</i> Community and study site	<i>Name:</i> Latinos Empowering Ourselves (LEO) <i>Level:</i> Group <i>Theory:</i> Empowerment <i>Content:</i> Self-efficacy, gratification delay, goal setting, and problem solving skills, exploration of emotions, and changing popular cultural norms (8 weekly sessions; 16 h) <i>Deliverer:</i> Gay-identified bilingual peer counselor <i>Name:</i> AIDS Prevention Program <i>Level:</i> Group and individual <i>Theory:</i> NR <i>Content:</i> Methadone treatment, AIDS and HIV testing information, exploration of feelings for recovery, personal skills, and referrals to social services and job placement (continuously over 18 weeks) <i>Deliverer:</i> Counselor and speakers from drug treatment and Narcotics Anonymous	<ul style="list-style-type: none"> <li>• Hispanic community</li> <li>• Hispanic deliverer</li> <li>• Spanish language</li> <li>• Hispanic cultural content (familismo, machismo, respeto)</li> <li>• Ethnographic formative research (participant observations)</li> </ul>

Table 1 continued

Study <sup>a</sup> location and dates	Evaluation design	Sample and setting	Intervention description	Hispanic cultural features
<b>Harvey et al. (2004)</b> <sup>f</sup> Los Angeles, CA, 2000–2002	RCT <i>Comparison:</i> HIV/STD information and referral to HIV C&T <i>Follow-up:</i> 3 and 6 months <i>Retention:</i> 73% at 3 months, 60% at 6 months <i>Outcomes:</i> UPS, CU	107 young couples <i>Percent Hispanic:</i> 98% <i>Ethnicity:</i> 86% Mexican <i>Setting:</i> Community-based clinic	<i>Name:</i> The PARTNERS Project <i>Level:</i> Couples (alone or in group) <i>Theory:</i> Information-Motivation-Behavior <i>Content:</i> HIV and STD information, referral to HIV C&T, perceived vulnerability, control triggers for risky sex, condom skills, and safe sex communication skills (three session; 7.5 h; 3 weeks) <i>Deliverer:</i> Male and female bilingual facilitator	<ul style="list-style-type: none"> <li>• Hispanic community</li> <li>• Hispanic deliverer</li> <li>• Spanish language</li> <li>• Hispanic cultural content (personalism, sexual silence)</li> <li>• Ethnographic formative research</li> </ul>
<b>Koniak-Griffin et al. (2003)</b> <sup>f</sup> Los Angeles, CA, dates NR	RCT <i>Comparison:</i> Health promotion comparison <i>Follow-up:</i> 3, 6, 12 months <i>Retention:</i> 92% at 12 months <i>Outcomes:</i> UPS, CU, sex partners	497 adolescent mothers <i>Percent Hispanic:</i> 78% <i>Setting:</i> Alternative schools for pregnant minor and parenting program	<i>Name:</i> Project CHARM (Children's Health and Responsible Mothering) <i>Level:</i> Group <i>Theory:</i> SCT; theory of reasoned action <i>Content:</i> Discuss vulnerability to HIV, attitudes and beliefs about HIV and safe sex, self-efficacy for condom use, abstinence, condom use skills, and negotiation and refusal skills (four sessions, 8 hours) <i>Deliverer:</i> Nurse facilitator	<ul style="list-style-type: none"> <li>• Culturally appropriate</li> </ul>
<b>Mishra and Conner (1996)</b> San Diego County, CA, dates NR	RCT <i>Comparison:</i> No treatment control <i>Follow-up:</i> Immediate post-tx only <i>Retention:</i> NA <i>Outcome:</i> CU	89 migrant farm workers <i>Percent Hispanic:</i> 100% <i>Ethnicity:</i> 100% Mexican <i>Setting:</i> Farm worker camps	<i>Name:</i> Tres Hombres sin Fronteras [Three Men without Borders] <i>Level:</i> Individual <i>Theory:</i> NR <i>Content:</i> Condom use skills, where to obtain condoms, sexual abstinence and needle sharing risk (15 radionovela segments over 3 weeks; 1.25 hours) <i>Deliverer:</i> fotonovela and radionovela series	<ul style="list-style-type: none"> <li>• Hispanic community</li> <li>• Spanish language</li> <li>• Hispanic cultural content (fotonovela and radionovela)</li> </ul>
<b>Mishra et al. (2004)</b> San Diego County, CA, dates NR	RCT <i>Comparison:</i> No treatment control <i>Follow-up:</i> 3.5 months <i>Retention:</i> 65% <i>Outcome:</i> CU	432 migrant farm workers <i>Percent Hispanic:</i> 100% <i>Ethnicity:</i> 100% Mexican <i>Setting:</i> Farm worker camps	<i>Name:</i> Tres Hombres sin Fronteras [Three Men without Borders] Plus Group Discussion <i>Level:</i> Group <i>Theory:</i> NR <i>Content:</i> Condom use skills, where to obtain condoms, sexual abstinence, goal setting, problem solving, and needle sharing risk (four sessions, 8 h, 2 weeks; 2 radionovela segments) <i>Deliverer:</i> fotonovela and radionovela series and group facilitator	<ul style="list-style-type: none"> <li>• Hispanic community</li> <li>• Spanish language</li> <li>• Hispanic cultural content (machismo, fotonovela and radionovela)</li> <li>• Ethnographic formative research</li> </ul>

Table 1 continued

Study <sup>a</sup> location and dates	Evaluation design	Sample and setting	Intervention description	Hispanic cultural features
<b>Nyamathi, Flaskerud, Bennett, Leake, and Lewis (1994)</b> Los Angeles, CA, dates NR	RCT <i>Comparison:</i> HIV C&T and AIDS education <i>Follow-up:</i> 2 wk <i>Retention:</i> 91% <i>Outcomes:</i> Sex partners, IDU	213 impoverished drug using women <i>Percent Hispanic:</i> 100% <i>Ethnicity:</i> 43.9% Mexican, 9.4% Central American, 2.8% South American, 2.4% Puerto Rican <i>Setting:</i> Drug treatment (15% IDU) and homeless shelter	<i>Name:</i> UCLA AIDS Nursing Network Specialized Intervention <i>Level:</i> Group <i>Theory:</i> NR <i>Content:</i> HIV C&T, AIDS education, role model stories, condom use and needle cleaning skill building, self-esteem and interpersonal relationships (one session; 2 h) <i>Deliverer:</i> Latina nurse counselor and outreach workers	<ul style="list-style-type: none"> <li>• Hispanic deliverer</li> <li>• Spanish language</li> <li>• Hispanic cultural content (familismo, machismo, personalismo, respeto, and sexual silence)</li> </ul>
<b>O'Donnell et al. (1995)</b> and <b>O'Donnell et al. (1998)</b> South Bronx, NY, 1991–1994	RCT <i>Comparison:</i> Standard STD counseling and services <i>Follow-up:</i> 12, 16, 20, and 24 months <i>Retention:</i> NA (STD surveillance up to 24 months) <i>Outcome:</i> STD	761 STD clinic patients <sup>d</sup> <i>Percent Hispanic:</i> 100% (stratified data) <i>Ethnicity:</i> 69.3% Puerto Rican, 21% Dominican <i>Setting:</i> STD clinic	<i>Name:</i> Video Opportunities for Innovative Condom Education and Safer Sex (VOICES/VOCES) <i>Level:</i> Group and individual <i>Theory:</i> Health Belief Model and Theory of Reasoned Action <i>Content:</i> Standard STD services plus video for condom use skill building and group discussion for condom negotiation skill building (one session; minimum 40 min plus clinic examination) <i>Deliverer:</i> Physician, facilitator, and video <i>Name:</i> Salud, Educacion, Prevencion y Autocuidado (SEPA) [Health, Education, Prevention and Self-Care] <i>Level:</i> Group <i>Theory:</i> SCT <i>Content:</i> HIV/AIDS awareness, STD information, self-efficacy, misperceptions of condoms, and role-playing of condom use skills, and safer sex negotiation skills (6 weekly sessions) <i>Deliverer:</i> Latinas who were Red Cross-certified HIV counselors	<ul style="list-style-type: none"> <li>• Hispanic community</li> <li>• Hispanic deliverer</li> <li>• Spanish language</li> <li>• Hispanic cultural content (machismo, sexual silence)</li> <li>• Ethnographic formative research</li> </ul>
<b>Peragallo et al. (2005)</b> Chicago, IL, 1999–2001	RCT <i>Comparison:</i> No treatment control <i>Follow-up:</i> 3 and 6 months <i>Retention:</i> 60% at 3 months; 64% at 6 months <i>Outcome:</i> CU	657 low-income women <i>Percent Hispanic:</i> 100% <i>Ethnicity:</i> 85% Mexican, 15% Puerto Rican <i>Setting:</i> NR	<i>Name:</i> Salud, Educacion, Prevencion y Autocuidado (SEPA) [Health, Education, Prevention and Self-Care] <i>Level:</i> Group <i>Theory:</i> SCT <i>Content:</i> HIV/AIDS awareness, STD information, self-efficacy, misperceptions of condoms, and role-playing of condom use skills, and safer sex negotiation skills (6 weekly sessions) <i>Deliverer:</i> Latinas who were Red Cross-certified HIV counselors	<ul style="list-style-type: none"> <li>• Hispanic community</li> <li>• Hispanic deliverer</li> <li>• Spanish language</li> <li>• Hispanic cultural content (relevance of HIV to Latino community)</li> <li>• Ethnographic formative research (focus groups)</li> </ul>
<b>Raj et al. (2001)<sup>f</sup></b> Boston, MA, dates NR	Non-RCT (matching) <i>Comparison:</i> No treatment control <i>Follow-up:</i> 3 and 15 months <i>Retention:</i> 91% at 3 months <i>Outcome:</i> CU	162 women <i>Percent Hispanic:</i> 100% <i>Ethnicity:</i> 55% Dominican, 13% Puerto Rican, 13% Central American or Mexican <i>Setting:</i> Community center	<i>Name:</i> HIV Intensive Program (HIV-IP) <i>Level:</i> Group <i>Theory:</i> SCT, Empowerment, Self-in-Relation Theory, Diffusion of Innovations, and Theory of Gender and Power <i>Content:</i> HIV/STD education, HIV risk with substance use, partner violence, and body image (12 weekly sessions; 18–24 h) <i>Deliverer:</i> Community health educator and facilitator	<ul style="list-style-type: none"> <li>• Hispanic community</li> <li>• Hispanic deliverer</li> <li>• Spanish language</li> </ul>

Table 1 continued

Study <sup>a</sup> location and dates	Evaluation design	Sample and setting	Intervention description	Hispanic cultural features
<b>Robles et al. (2004)<sup>f</sup></b> Vega Baja, Puerto Rico 1998–2001	RCT <i>Comparison:</i> Standard comparison <i>Follow-up:</i> 6 months (post-baseline) <i>Retention:</i> 79% <i>Outcomes:</i> Sex partners, IDU, needle sharing, cooker/cotton sharing	557 injection drug users; 90% male; 11.3% HIV+ <i>Percent Hispanic:</i> 100% <i>Ethnicity:</i> 100% Puerto Rican <i>Setting:</i> Study site and community	<i>Name:</i> Proyecto de Intervencion, Cuidado y Utilization de Servicios de Salud (ICUSS) <i>Level:</i> Individual <i>Theory:</i> NR <i>Content:</i> Comparison intervention plus self-efficacy, negotiating safe sex encounters, and case management (eight sessions plus outreach) <i>Deliverer:</i> Registered nurse, social worker (case manager), and outreach worker <i>Name:</i> AIDS Prevention Skills <i>Level:</i> Group <i>Theory:</i> SCT <i>Content:</i> AIDS information, barriers to safer sex, skill building for condom use, problem solving and condom negotiation, and assertiveness and communication skill training (five sessions; 10 h) <i>Deliverer:</i> Female drug counselors	None reported
<b>Schilling, El-Bassel, Schinke, Gordon, and Nichols (1991)</b> Bronx, NY 1988–1990	RCT <i>Comparison:</i> AIDS information only <i>Follow-up:</i> 2 weeks and 15 months <i>Retention:</i> 67% at 15 months <i>Outcomes:</i> CU, sex partners	91 women in methadone treatment <i>Percent Hispanic:</i> 64% <i>Ethnicity:</i> 96% Puerto Rican <i>Setting:</i> Methadone clinic	<i>Name:</i> Association of Drug Abuse Prevention and Treatment (ADAPT) <i>Level:</i> Community and individual <i>Theory:</i> NR <i>Content:</i> Outreach worker accompany client to clinic and provide support to enter drug treatment or other services (continuously over 18 months) <i>Deliverer:</i> Outreach worker and referral specialist	None reported
<b>Schilling, Fernando, Fontdevila, and El-Bassel (2000)<sup>f</sup></b> South Bronx, NY, 1993–1995	Non-RCT (convenience) <i>Comparison:</i> Standard outreach <i>Follow-up:</i> 6 months <i>Retention:</i> NA (cross-sectional cohorts) <i>Outcomes:</i> UPS, IDU, needle sharing, cooker/cotton sharing	1,943 injection drug users; 67% male; 19% HIV+ <i>Percent Hispanic:</i> 65% <i>Setting:</i> Community	<i>Name:</i> Poder Latino <i>Level:</i> Community and group <i>Theory:</i> Empowerment <i>Content:</i> Multi-faceted intervention that included HIV awareness, self-efficacy, promotion and distribution of condoms, negotiation of safer sex, and a media campaign: (18 months) <i>Deliverer:</i> Hispanic peer leaders, parents and outreach workers	None reported
<b>Sellers, McGraw, and McKinlay (1994)</b> and McGraw et al. (2002) <sup>f</sup> Boston, MA and Hartford, CT, 1989–1992	Non-RCT (convenience) <i>Comparison:</i> No treatment control <i>Follow-up:</i> Immediate post-intervention <i>Retention:</i> 91% <i>Outcomes:</i> CU, sex partners	481 inner-city youth; 52% male <i>Percent Hispanic:</i> 100% <i>Ethnicity:</i> 94% Puerto Rican <i>Setting:</i> Community	<i>Name:</i> Poder Latino <i>Level:</i> Community and group <i>Theory:</i> Empowerment <i>Content:</i> Multi-faceted intervention that included HIV awareness, self-efficacy, promotion and distribution of condoms, negotiation of safer sex, and a media campaign: (18 months) <i>Deliverer:</i> Outreach worker and referral specialist	<ul style="list-style-type: none"> <li>• Hispanic community</li> <li>• Hispanic deliverer</li> <li>• Spanish language</li> <li>• Hispanic cultural content (Hispanic cultural pride)</li> <li>• Ethnographic formative research (interviews with target population)</li> </ul>

Table 1 continued

Study <sup>a</sup> location and dates	Evaluation design	Sample and setting	Intervention description	Hispanic cultural features
Shain et al. (1999) and Korte et al. (2004) San Antonio, TX, 1993–1995	RCT <i>Comparison:</i> HIV and STD C&T <i>Follow-up:</i> 6 and 12 months <sup>b</sup> <i>Retention:</i> 82% at 6 months; 89% at 12 months <i>Outcomes:</i> UPS, STD	424 women with nonviral STD <i>Percent Hispanic:</i> 100% (stratified data) <i>Ethnicity:</i> 100% Mexican <i>Setting:</i> Study research clinic	<i>Name:</i> Sexual Awareness for Everyone (SAFE) <i>Level:</i> Group and individual <i>Theory:</i> ARRM <i>Content:</i> HIV and STD C&T; self-efficacy and risk awareness; group support; condom use skills; and decision-making, communication and negotiation skills (3 weekly sessions; 9–12 h) <i>Deliverer:</i> Hispanic female facilitator and nurse	<ul style="list-style-type: none"> <li>• Hispanic deliverer</li> <li>• Hispanic cultural content (familismo, machismo, respeto, sexual silence)</li> <li>• Ethnographic formative research (focus groups and interviews)</li> </ul>
Shain et al. (2004) San Antonio, TX 1996–2000	RCT <i>Comparison:</i> HIV C&T, STD C&T, and risk information <i>Follow-up:</i> 6, 12 and 24 months <sup>c</sup> <i>Retention:</i> 91% at 12 months; 91% at 24 months <i>Outcomes:</i> UPS, sex partners, STD	775 women with nonviral STD <i>Percent Hispanic:</i> 77% <i>Ethnicity:</i> 100% Mexican <i>Setting:</i> STD and study research clinic	<i>Name:</i> Enhanced Sexual Awareness for Everyone (SAFE-2) <i>Level:</i> Group and individual <i>Theory:</i> ARRM <i>Content:</i> HIV C&T, STD C&T, self-efficacy, perception of risk, condom use skills, decision-making, communication and negotiation skills, support groups (eight sessions; 23 weeks) <i>Deliverer:</i> Hispanic female facilitator and nurse	<ul style="list-style-type: none"> <li>• Hispanic deliverer</li> <li>• Hispanic cultural content (familismo, machismo, respeto, sexual silence)</li> <li>• Ethnographic formative research (focus groups and interviews)</li> </ul>
Suarez-Al-Adam et al. (2000) New Jersey, 1992–1993	RCT <i>Comparison:</i> Health promotion control <i>Follow-up:</i> 3 months <i>Retention:</i> 77% <i>Outcomes:</i> UPS, CU	46 women <i>Percent Hispanic:</i> 100% <i>Ethnicity:</i> 60% Puerto Rican, 18% Latin American, 4% Caribbean <i>Setting:</i> STD clinic	<i>Name:</i> NIMH Collaborative <i>Level:</i> Group <i>Theory:</i> SCT <i>Intervention content:</i> HIV information, social efficacy, condom use skills, and safe sex negotiation skill (7 biweekly sessions; 10.5 h) <i>Deliverer:</i> Female bilingual facilitator	<ul style="list-style-type: none"> <li>• Hispanic deliverer</li> <li>• Spanish language</li> </ul>

**Table 1** continued

Study <sup>a</sup> location and dates	Evaluation design	Sample and setting	Intervention description	Hispanic cultural features
<b>Villarruel et al. (2006)</b> <sup>f</sup> Philadelphia, PA, 2000–2003	RCT <i>Comparison:</i> Health promotion control <i>Follow-up:</i> 3, 6 and 12 months <i>Retention:</i> 93% at 3 months <i>Outcomes:</i> UPS, CU, sex partners	553 Latino adolescents; 55% male <i>Percent Hispanic:</i> 100% <i>Ethnicity:</i> 85.4% Puerto Rican <i>Setting:</i> Schools on the weekend	<i>Name:</i> <i>U+00/A/Cuidate!</i> (Take Care of Yourself) <i>Level:</i> Group <i>Theory:</i> SCT, theory of reasoned action <i>Intervention content:</i> HIV/AIDS/STD information, self-efficacy with abstinence, normative beliefs, condom use skills, communication and negotiation of condom use and abstinence (six sessions; 8 h; 2 weeks) <i>Deliverer:</i> Adult bilingual facilitator	<ul style="list-style-type: none"> <li>• Hispanic deliverer</li> <li>• Spanish language</li> <li>• Hispanic cultural content (familismo, machismo,</li> <li>personalismo, respeto)</li> <li>• Ethnographic formative research</li> </ul>

*Note.* ARRM indicates AIDS Risk Reduction Model; CBO, community-based organization; CU, condom use; C&T, counseling and testing; HS, high school; IDU, injection drug use; MSM, men who have sex with men; NA, not applicable; NR, not reported; OR, odds ratio; post-tx, post-intervention; SCT, Social Cognitive Theory; STD, sexually transmitted disease; UAI, unprotected anal intercourse; UPS, unprotected sex

<sup>a</sup> Citation in bold type provided the outcome data used in this review

<sup>b</sup> Data for Hispanic women only provided at 12 month follow-up (see Korte et al., 2004)

<sup>c</sup> Sex behavior data only reported at 12 month follow-up; STD incidence rates reported at 12- and 24-month follow-ups (see Shain et al., 2004)

<sup>d</sup> Intervention designed for male and female STD clinic patients, but evaluated relevant outcome (i.e., STD incidence) only among men. C. O'Donnell provided STD outcome data for Hispanic men

<sup>e</sup> NIDA standard intervention includes outreach, HIV C&T, referrals to drug treatment, risk reduction supplies, and condom and needle cleaning skill building

<sup>f</sup> Principal investigator provided additional information to facilitate study coding and data abstraction

including *machismo* (eight studies), sexual silence (six studies), *familismo* and *respeto* (five studies), or *personalismo* (three studies).

## Overall Efficacy of Interventions

### Sex Risk Behaviors

As shown in Table 2, the 19 studies that assessed any sex risk behavior (i.e., unprotected sex, condom use, or number of sex partners) varied considerably ( $Q_{18} = 58.68$ ,  $P < .001$ ). The overall pooled effect estimate (OR = .75, 95% CI = .66–.85) indicated that participants in the intervention groups experienced a significant 25% reduced odds of engaging in sex risk behaviors relative to participants in the control groups. Sensitivity analyses did not reveal any single study that influenced this effect. Analyses using the longest available follow-up in the meta-analysis (i.e., average 7.5 months) also showed protective and significant intervention effects (OR = .78, 95% CI = .67–.91).

We also examined intervention efficacy for each sex behavior outcome separately (see Table 2). For the condom use outcome, the overall intervention effect was statistically significant (OR = .64, 95% CI = .54–.75). Because condom use is a protective behavior, to facilitate interpretation of this finding we calculated the inverse of the OR (OR = 1.56), which indicates intervention group participants had 56% greater odds of using condoms during sexual intercourse than control group participants. Significant reductions favoring the intervention groups were also found among the 10

studies reporting unprotected sexual intercourse (OR = .75, 95% CI = .63–.89) and eight studies reporting number of sex partners (OR = .75, 95% CI = .66–.86). As reported in Table 2, the results for each of the sex risk behavior outcomes were comparable using either fixed- or random-effects models.

### Incident STD Infections

Three studies (O'Donnell, O'Donnell, San Doval, Duran, & Labes, 1998; Shain et al., 1999, 2004) evaluated the efficacy of interventions in reducing incident STDs (i.e., chlamydia or gonorrhea reinfection). Pooling the effects of these three studies yielded a significant 31% reduced odds of new STD infections (OR = .69, 95% CI = .54–.88). While this effect was homogeneous ( $Q_2 = 2.56$ ,  $P = .28$ ), the random-effects model yielded a slightly wider confidence interval and thus a non-significant overall effect (see Table 2).

### Drug Risk Behaviors

As shown in Table 2, six studies (Castro & Tafoya-Barraza, 1997; Colón, Robles, Freeman, & Matos, 1993; Dushay et al., 2001; Nyamathi et al., 1994; Robles et al., 2004; Schilling et al., 2000) reported the following drug injection risk behaviors: injection drug use frequency (six studies), needle sharing (four studies), and cotton/cooker sharing (three studies). The six studies reporting injection drug use frequency were homogeneous ( $Q_5 = 9.46$ ,  $P = .09$ ), and produced a statistically significant overall pooled effect (OR = .83,

**Table 2** Efficacy of interventions designed to reduce risk of HIV transmission among Hispanics

Outcome	<i>k</i>	<i>N</i>	Odds ratio (95% CI)		Homogeneity of effect sizes	
			Fixed effects	Random effects	<i>Q</i>	<i>P</i>
<i>Sex risk behavior</i>						
Any sex risk behavior <sup>a</sup>	19	5,412	.75 (.66, .85)**	.67 (.52, .86)**	58.68	<.0001
No/inconsistent condom use <sup>b</sup>	11	3,305	.64 (.54, .75)**	.52 (.37, .72)**	33.13	.0003
Unprotected sex	10	2,492	.75 (.63, .89)**	.73 (.56, .96)*	19.51	.021
Number of sex partners	8	3,742	.75 (.66, .86)**	.73 (.58, .91)**	15.06	.04
<i>Incident STDs</i>						
	3	1,849	.69 (.54, .88)**	.65 (.39, 1.08)	2.56	.278
<i>Drug risk behavior</i>						
Injection drug use	6	3,569	.83 (.72, .96)*	.76 (.58, .99)*	9.46	.092
Sharing needles	4	2,855	.92 (.81, 1.04)	.92 (.80, 1.05)	3.13	.373
Sharing cotton/cooker	3	3,016	.73 (.63, .85)**	.73 (.63, .85)**	1.71	.426

*Note.* Odds ratios <1.0 favor the intervention group in reducing risk of HIV transmission. *k* indicates number of studies; *N*, pooled sample size across studies; CI, confidence interval; *Q*, homogeneity index with degrees of freedom equal to the number of studies–1; STD, sexually transmitted disease

<sup>a</sup> Any reported sex risk outcome, prioritizing unprotected sex, then condom use, and then number of sex partners

<sup>b</sup> The odds of increasing condom use using the fixed-effects model: OR = 1.56, 95% CI = 1.33 to 1.85

\*\* $P < .01$ ; \* $P < .05$

95% CI = .72–.96). This finding suggests that participants in the intervention groups had a 17% reduced odds of engaging in injection drug use relative to control group participants. Sensitivity analyses did not reveal any single study that influenced this effect.

Among the four studies reporting needle sharing, statistical testing indicated no significant heterogeneity ( $Q_3 = 3.1$ ,  $P = .37$ ) and no significant overall intervention effect (OR = .92, 95% CI = .81–1.04). However, three studies reporting the sharing of either cotton or cookers resulted in a 27% reduced odds of sharing these injection paraphernalia (OR = .73, 95% CI = .63–.85). Because only six studies reported drug outcomes, we could not conduct stratified analyses to explore whether study or intervention features were associated with intervention efficacy in reducing drug injection behaviors.

#### Intervention Features Associated with Reduced Sex Risk Behaviors

Stratified analyses included the 19 studies reporting any sex risk behavior outcome to determine whether overall intervention efficacy varied by study quality, study design, participant or intervention characteristics (see Table 3).<sup>2</sup> None of the study quality features were found to be significantly associated with intervention efficacy (i.e., all  $Q_B$  test statistics,  $P > .05$ ). However, a non-significant trend suggested that RCTs were more efficacious than non-RCTs ( $P = .13$ ). Although no study characteristics were found to be associated with intervention efficacy, two participant characteristics were associated with greater intervention efficacy. Studies that targeted either females only or males only were successful in reducing sex risk behavior,  $P < .01$ , and studies that targeted non-drug users had a borderline association with reduced sex risk behavior,  $P = .06$ .

Next we evaluated associations of intervention characteristics with intervention efficacy. As shown in Table 3, significantly greater efficacy was found among interventions that did not use peer outreach methods,  $P < .01$ ; were delivered by non-peers such as health care providers, counselors or other professional facilitators,  $P < .05$ ; or were comprised of 4 or more sessions,  $P < .05$ . Other intervention characteristics associated with significantly greater efficacy included problem solving skills such as personal goal setting,  $P < .01$ ; discussions of barriers to condom use,

$P < .01$ ; discussions of sexual abstinence,  $P < .05$ ; or use of peer norms to encourage behavior change,  $P < .05$ . Finally, a borderline finding suggested that interventions including role-plays or practice of condom use skills may be more efficacious in reducing the odds of any sex risk behavior than interventions not including condom use skills,  $P = .08$ .

Among the 19 studies reporting any sex risk behavior outcome, none of the Hispanic cultural features were significantly associated with intervention efficacy. Because five of the seven studies targeting drug users did not report the use of Hispanic cultural features (see Table 1), we repeated the stratified analysis of cultural features by restricting the analyses to the 12 studies targeting non-drug users. As shown in Table 4, significantly greater intervention efficacy was observed among interventions that reported the use of ethnographic formative interviews with the target population,  $P < .05$ , or included intervention content that addressed the Hispanic traditional gender norm of *machismo*,  $P < .05$ .

#### Discussion

Our systematic search of the literature identified 20 randomized and non-randomized controlled trials that provided sufficient data to evaluate the effects of HIV behavioral interventions for Hispanics. In summary, the meta-analyses of intervention studies reporting sex risk behavior data yielded a significant 56% increased odds of condom use, 25% reduced odds of unprotected sex, 25% reduced odds of multiple sex partners, and 31% reduced odds of acquiring an incident STD. When translated into final health outcomes, effect sizes of this magnitude are well within the range of those considered to be cost-effective (Holtgrave, 2002; Kahn & Sanstad, 1997). Significant effects for reducing the odds of any sex risk behavior were found among interventions that targeted either females only or males only, but not among interventions that targeted both sexes. This finding is consistent with prior reports suggesting that Hispanic men and women often experience discomfort when asked to discuss sexual matters in each others presence (Gómez & Marín, 1996; Marín, 2003; Marín & Gómez, 1997). Therefore, HIV prevention providers should consider delivering interventions to Hispanic females and males separately.

Characteristics of interventions related to greater efficacy in reducing the odds of sex risk behaviors include using non-peer deliverers, using methods other than peer outreach, having four or more intervention sessions, addressing barriers to condom use or sexual

<sup>2</sup> The number of studies included in the stratified analyses was reduced from 20 to 19 because the study reported by O'Donnell et al. (1995; 1998) did not report unprotected sex, condom use, or number of sex partners.

**Table 3** Stratified analyses of intervention features on any sex risk behavior<sup>a</sup> (19 studies)

Stratified variable	Subgroup	<i>k</i>	Odds ratio (95% CI)	Test statistic ( <i>Q<sub>B</sub></i> )
<i>Study quality</i>				
Design	RCT	14	.72 (.62, .82)*	2.31
	Non-RCT	5	.93 (.68, 1.28)	
Follow-up	≥3 months	13	.71 (.61, .83)*	1.19
	<3 months	6	.82 (.67, 1.01)	
Retention	≥70%	12	.79 (.69, .91)*	1.35
	<70%	4	.64 (.45, .89)*	
Intent-to-treat analysis <sup>b</sup>	Conducted	18	.75 (.66, .86)*	–
	Not conducted	1	–	
<i>Study characteristics</i>				
Study date <sup>c</sup>	1988–1995	9	.78 (.66, .94)*	.52
	1996–2002	10	.71 (.60, .85)*	
Control group	Treatment comparison	13	.78 (.68, .89)*	1.46
	No treatment control	6	.64 (.48, .85)*	
Outcome assessment	Self-administered	3	.60 (.41, .88)*	1.44
	Interviewer-administered	16	.77 (.67, .88)*	
Location	Northeast or Midwest	9	.78 (.63, .97)*	1.55
	Southwest	8	.68 (.56, .83)*	
	Puerto Rico	2	.82 (.64, 1.05)	
<i>Participant characteristics</i>				
Education level	<High school	16	.72 (.63, .83)*	2.45
	≥High school	3	.99 (.68, 1.43)	
Age	Mean age < 20	3	.75 (.58, .98)*	2.06
	Mean age 20–29	7	.65 (.52, .82)*	
	Mean age ≥ 30	9	.81 (.68, .98)*	
Proportion Hispanic	100% Hispanic <sup>d</sup>	14	.75 (.64, .87)*	.01
	<100% Hispanic	5	.75 (.60, .95)*	
Hispanic ethnicity	>50% Mexican	8	.67 (.53, .83)*	1.56
	>50% Puerto Rican or Dominican	9	.80 (.67, .95)*	
Drug use	Target drug users	7	.86 (.71, 1.05)	3.42 <sup>†</sup>
	Target non-drug users	12	.68 (.57, .80)*	
Injection drug use	Target injection drug users (IDU)	6	.81 (.66, 1.00)	.92
	No IDU target	13	.71 (.61, .84)*	
Gender	Target females only	8	.67 (.55, .81)*	10.40**
	Target males only	3	.42 (.25, .68)*	
	Target both males and females	8	.88 (.74, 1.05)	
<i>Intervention characteristics</i>				
Theoretic basis	Theory reported	12	.80 (.68, .93)*	1.93
	No theory reported	7	.66 (.53, .82)*	
Unit of delivery	Individual only	2	.77 (.49, 1.21)	2.81
	Group	15	.72 (.63, .83)*	
	Community	2	1.04 (.69, 1.58)	
Delivery method	Outreach	5	.92 (.75, 1.12)	6.90**
	No outreach reported	14	.65 (.55, .77)*	
Deliverer	Peer	4	.89 (.72, 1.10)	3.73*
	Non-peer	15	.68 (.58, .80)*	
Setting	Healthcare only	4	.71 (.55, .94)*	.14
	Other sites in community	15	.76 (.66, .87)*	
Number of sessions	≥4 sessions	14	.66 (.56, .78)*	4.64*
	<4 sessions	4	.87 (.72, 1.06)	
<i>Intervention content</i>				
Technical skills	Condom use skill building	13	.71 (.62, .82)*	3.00 <sup>†</sup>
	No condom use skill reported	6	.94 (.71, 1.26)	
Interpersonal skills	Communication skill building	10	.73 (.62, .87)*	.12
	No communication skill reported	9	.77 (.63, .93)*	
Self-management skills	Problem solving skill building	5	.50 (.38, .66)*	10.00**
	No problem solving skill reported	14	.83 (.72, .95)*	
Self-efficacy	Self-efficacy for safe sex	10	.76 (.64, .89)*	.06
	No self-efficacy reported	9	.73 (.60, .89)*	
Risk triggers	Triggers of sex risk behavior	9	.72 (.62, .84)*	.57
	No triggers reported	10	.80 (.64, 1.00)	

**Table 3** continued

Stratified variable	Subgroup	<i>k</i>	Odds ratio (95% CI)	Test statistic ( $Q_B$ )
Barriers	Barriers to condom use	5	.53 (.41, .69)*	8.69**
	No barriers reported	14	.83 (.72, .96)*	
Abstinence	Abstinence component	7	.62 (.50, .75)*	5.89*
	No abstinence reported	12	.85 (.72, 1.00)	
Normative influence	Peer influence/social norms	5	.59 (.46, .76)*	4.31*
	No peer influence reported	14	.81 (.70, .93)*	
HIV C&T	HIV C&T provided	6	.81 (.68, .97)*	1.59
	No HIV C&T reported	13	.69 (.58, .82)*	

*Note.* Odds ratios <1.0 favor the intervention group in reducing risk of HIV transmission. Analyses based on fixed-effects weighted models of any sex behavior outcome reported in 19 studies. The  $Q_B$  test statistic measures the homogeneity for the difference between subgroups, and is distributed as a chi-square with degrees of freedom equal to the number of subgroups—1. When the  $Q_B$  is significant, there is a statistically significant difference among the effects of the involved subgroups. *k* indicates number of studies; CI, confidence interval

<sup>a</sup> Any reported sex risk outcome, prioritizing unprotected sex, then condom use, and then number of sex partners

<sup>b</sup> Analysis as assigned and regardless of exposure to the intervention

<sup>c</sup> If study date was not reported, then publication date was used for stratification

<sup>d</sup> Includes three studies reporting stratified data for Hispanic participants

\*\* $P < .01$ , \* $P < .05$ , †  $P < .10$

**Table 4** Stratified analyses of Hispanic cultural features on any sex risk behavior outcome<sup>a</sup>. Reported in studies not targeting drug users (12 studies)

Stratified variable	Subgroup	<i>k</i>	Odds ratio (95% CI)	Test statistic ( $Q_B$ )
Formative research	Ethnographic interviews	6	.60 (.48, .75)*	5.30*
	No interviews reported	6	.83 (.71, .96)*	
Deliverer	Hispanic deliverer	10	.66 (.55, .80)*	.18
	Non-Hispanic deliverer	2	.72 (.52, 1.00)	
Language	Intervention delivered in Spanish	7	.66 (.51, .84)*	.10
	Intervention delivered in English	5	.69 (.56, .86)*	
Community	Hispanic community	6	.69 (.52, .91)*	.03
	No Hispanic community reported	6	.67 (.55, .82)*	
Culturally appropriate	Statement of cultural appropriateness	10	.65 (.54, .77)*	2.13
	No statement of cultural appropriateness	2	.95 (.59, 1.54)	
Hispanic beliefs	Any Hispanic cultural belief	9	.62 (.50, .76)*	2.20
	No Hispanic cultural belief reported	3	.80 (.61, 1.07)	
<i>Familismo</i> and <i>respeto</i>	<i>Familismo</i> and <i>respeto</i>	3	.55 (.41, .74)*	2.90 <sup>†</sup>
	No <i>familismo</i> and <i>respeto</i> reported	9	.75 (.61, .91)*	
Gender norms	<i>Machismo</i>	5	.53 (.41, .69)*	5.44*
	No <i>machismo</i> reported	7	.79 (.64, .98)*	
Sexual silence	Sexual silence	4	.75 (.58, .97)*	1.01
	No sexual silence reported	8	.63 (.51, .78)*	
<i>Personalismo</i>	<i>Personalismo</i>	2	.88 (.60, 1.28)	2.28
	No <i>personalismo</i> reported	10	.64 (.53, .76)*	

*Note.* Odds ratios <1.0 favor the intervention group in reducing risk of HIV transmission. Analyses are based on fixed-effects weighted models of any sex risk behavior outcome reported in 12 studies of non-drug using Hispanics. The  $Q_B$  test statistic measures the homogeneity for the difference between subgroups, and is distributed as a chi-square with degrees of freedom equal to the number of subgroups minus 1. When the  $Q_B$  is significant, there is a statistically significant difference among the effects of the involved subgroups. *k* indicates number of studies; OR, odds ratio, 95% CI, 95% confidence interval

<sup>a</sup> Any reported sex risk outcome, prioritizing unprotected sex, then condom use, and then number of sex partners

\* $P < .05$ , †  $P < .10$

abstinence, attempting to change peer norms, practicing condom use skills, or improving problem solving skills such as personal goal setting. While these intervention characteristics may not act independently of

one another or of other characteristics to reduce the sex risk behaviors of Hispanics, HIV program planners, prevention providers and researchers should consider these characteristics when developing or selecting

behavioral interventions for their Hispanic constituents. The importance of several intervention characteristics identified in this review has been suggested by other meta-analyses reported in the literature. For example, our finding of greater efficacy among interventions delivered by non-peer deliverers (e.g., health care providers, counselors or other trained facilitators) is consistent with a recent meta-analysis that found interventions delivered by expert interventionists produced greater behavior change (i.e., increased condom use) than lay community members (Durantini, Albarracín, Mitchell, Earl, & Gillette, 2006). In addition, the finding of greater efficacy among interventions attempting to change peer norms reported in this review coincides with the results of a meta-analysis suggesting that positive social norms ought to be incorporated into HIV behavioral interventions for populations lacking social influence, such as women, those with lower education levels, or ethnic minorities (Albarracín, Kumkale, & Johnson, 2004).

The meta-analytic findings in the current review also indicated the efficacy of interventions in reducing the odds of injection drug use and sharing injection paraphernalia (i.e., cotton or cookers) among Hispanic IDUs. However, these interventions were not efficacious in reducing needle sharing, the behavior that places IDUs at the greatest risk of HIV acquisition and transmission. Evidence suggests that needle-exchange programs effectively reduce needle sharing among IDUs (Ksobiech, 2003; Office of the Surgeon General, 2000; Strathdee & Vlahav, 2001), but no needle exchange evaluation studies met the inclusion criteria for this review because they neither focused on nor reported stratified data for Hispanics. Our meta-analysis also indicated that interventions were not successful in reducing sex risk behaviors among drug users. Because sex-related risks may be as important as drug-related risks for IDUs (Copenhaver, Johnson, Lee, Harman, & Carey, in press; Strathdee, 2003), interventions developed for drug users must integrate risk reduction strategies for both drug and sex risk behaviors. A prior review of 33 HIV behavioral intervention studies for drug users found an overall significant reduction in unsafe sex behaviors (Semaan et al., 2002). That review, however, included studies for IDUs and crack users whose participants varied by race and ethnic background. More research is needed to assess intervention effects on reducing sex risk behaviors among Hispanic drug users.

There is consensus in the field that HIV prevention interventions for Hispanics should include culturally appropriate content (Díaz, 1998b; Gómez & Marín, 1996; Marín, 2003; Page, 2005). Unfortunately, only

two of the seven studies targeting drug users reported the inclusion of Hispanic cultural features, making it impossible for us to evaluate the importance of these features in reducing HIV risk behaviors among this population. Our analyses of non-drug using Hispanics offer the best evidence to date that intervention efficacy may be associated with the inclusion of key cultural features. First, studies reporting the use of ethnographic formative research methods for intervention development (e.g., interviews with the target population) reduced the odds of risky sex behavior more than studies not reporting these methods. The use of ethnographic research methods, in developing intervention content indicates that these interventions were tailored to meet the needs of the Hispanic target population (Villarruel, Jemmott, & Jemmott, 2005). Researchers and prevention providers are strongly encouraged to conduct ethnographic and formative research to strengthen the cultural sensitivity and ecologic validity of HIV prevention interventions (Bernal, Bonilla, & Bellido, 1995; Resnicow, Baranowski, Ahluwalia, & Braithwaite, 1999). The meta-analysis also revealed that interventions integrating the Hispanic cultural belief of *machismo* were associated with greater efficacy than interventions not reporting the use of this belief. This finding is consistent with studies examining the behavioral correlates of sex risk behavior among Hispanic men and women (Díaz, 1998b; Goodyear et al., 2000; Marín, 2003; Marín et al., 1997), and suggests the importance of incorporating cultural features in behavioral interventions. While non-significant, the inclusion of the Hispanic cultural beliefs of *familismo* and *respeto* may also be associated with greater intervention efficacy. Additional research is clearly needed to determine whether these Hispanic cultural beliefs improve intervention efficacy.

Several societal, policy and economic factors that can influence the HIV risk and protective behaviors of Hispanics have been identified in the literature (Cargill & Stone, 2005). These factors include poverty (Nyamathi & Vasquez, 1995), migration (Deren et al., 2005; Organista, Carrillo, & Ayala, 2004b), access to health care (Fisher et al., 2004), homelessness (Nyamathi & Vasquez, 1995; Reyes et al., 2005), religious beliefs (Romo, Berenson, & Segars, 2004), education level (Ebrahim, Anderson, Weidle, & Purcell, 2004; van Servellen, Brown, Lombardi, & Herrera, 2003), and childhood sexual abuse (Arreola, Neilands, Pollack, Paul, & Catania, 2005; Dolezal & Carballo-Diéguez, 2002). However, too few of the interventions in this review addressed these structural factors to allow analysis of their influence on HIV risk behaviors.

Future researchers should consider more complex or structural interventions that go beyond typical individual or group-level behavioral interventions to better understand how structural factors shape risk behaviors and ultimately affect HIV risk and other health outcomes (Sumartojo, 2000). In addition, Hispanic cultural features should be studied along with structural factors to further disentangle the moderators of HIV risk behavior among Hispanics (Page, 2005).

Although our systematic search yielded only three controlled studies focusing exclusively on Hispanic men (Carballo-Diéguez et al., 2005; Mishra & Conner, 1996; Mishra, Sanudo, & Conner, 2004), the meta-analysis indicated that pooling the effects of these interventions resulted in a significant reduction in the odds of risky sex behaviors. Because only one study (Carballo-Diéguez et al., 2005) targeted gay or bisexual men, the generalizability of this finding to Hispanic men who have sex with men remains unknown (Herbst et al., 2005). Given the burden of HIV disease among Hispanic men and given that same-sex behaviors are their most common route of exposure (CDC, 2005); more research clearly needs to target this population. It is also unfortunate that this review did not identify any studies targeting Hispanic persons living with HIV (PLWH). The development of culturally appropriate interventions for Hispanics living with HIV is warranted given the increasing prevalence of HIV/AIDS in the US Hispanic population (CDC, 2005), the potential cost-savings of prevention with PLWH (Holtgrave, 2002), the recent meta-analytic findings suggesting the efficacy of behavioral interventions targeting PLWH (Crepaz et al., 2006; Johnson, Carey, Chaudoir, & Reid, 2006), and the CDC's Advancing HIV Prevention initiative for PLWH (CDC, 2003a).

There are several limitations to consider when interpreting the results of this review and meta-analysis. As mentioned above, the small number of studies for Hispanic drug users did not permit us to perform stratified analyses of intervention efficacy in reducing drug injection behaviors. In addition, the small number of studies for Hispanics limited the statistical power of the analyses reported here and precluded the use of more sophisticated meta-analytic procedures that can not only control for potential confounders but can also identify moderators of intervention efficacy (e.g., meta-regression). Limited statistical power may have prevented the current analyses from detecting effects suggested in prior qualitative reviews, such as the use of behavioral theory in designing interventions (cf. Darbes et al., 2002; Marín, 1995). Another limitation involves the reliance on self-reports of sex behavior, which can be susceptible to recall bias or socially

desirable responding (Schroeder, Carey, & Venable, 2003). While most studies collected outcome data using face-to-face interviews as a consequence of participants' low literacy, all studies took steps to reduce recall bias by asking respondents to self-report sex behaviors over brief recall periods. Technologic advances, such as audio computer-assisted self-interviews (ACASI), are now available that can not only help improve the internal consistency of self-reported sex behavior, but increase the reporting of stigmatized behaviors (A. M. Johnson et al., 2002; Newman et al., 2002). In addition, ACASI software provides a voice-over for behavioral surveys that can be useful for individuals with low educational attainment, thus eliminating the need for face-to-face interviews.

Additional limitations involve the reporting of data in the studies themselves. Three studies (Birkel et al., 1993; Flaskerud et al., 1997; Grella et al., 1995) were excluded because intervention and comparison groups were pooled in the reported analyses. Four additional studies (Coyle et al., 2004; Jemmott et al., 2005; Kipke et al., 1993; Lesser et al., 2005) were excluded because outcome data were not reported in a manner that permitted calculation of effect size estimates. Further, many studies did not report critical participant characteristics (e.g., level of acculturation, generation status in the US, and income level) that could provide additional insights into intervention efficacy and applicability. Finally, none of the studies reported cost data to determine cost-effectiveness of interventions for Hispanics. Clear and transparent reporting of these and other important elements in intervention trials would greatly improve the quality of future meta-analyses (Des Jarlais, Lyles, Crepaz, & the TREND Group, 2004; Drummond & Jefferson, 1996; Moher, Schulz, & Altman, 2001).

Our systematic search of the literature identified several one-group pretest–posttest evaluations of interventions for Hispanics: three developed for gay or bisexual men (Díaz, 1998a; Rotheram-Borus, Reid, & Rosario, 1994; Toro-Alfonso, Varas-Díaz, & Andujar-Bello, 2002), two for women (Cervantes, Kappos, Duenas, & Arellano, 2003; Gómez, Hernandez, & Faigeles, 1999), and one each for IDUs (González, Muñoz, Pérez-Arce, & Batki, 1993), migrant farm workers (Organista, Alvarado, Balblutin-Burnham, Worby, & Martinez, 2004a), and young immigrants (Maxwell, Bastani, & Warda, 2002). Since one-group studies suffer from numerous threats to internal validity (i.e., maturation and historical biases) and do not provide definitive evidence of intervention efficacy (Lyles et al., 2006; Shadish, Cook, & Campbell, 2002), these studies were excluded from this review. Considering

that many of these studies demonstrated significant pre- to post-intervention changes in sex or drug risk behaviors, these interventions may be potential candidates for more rigorous evaluation (CDC, 2004a).

Because HIV/AIDS has had a dramatic impact on the Hispanic community in the US and Puerto Rico, it is important to identify and examine the behavioral intervention research conducted with this population. The findings of this review demonstrate the efficacy of interventions in reducing the odds of HIV-related risk behaviors among Hispanic populations. Specific intervention characteristics or strategies associated with efficacy were identified, and these findings provide HIV program planners, prevention providers and researchers with the empirical evidence necessary to help guide the development and implementation of HIV prevention efforts in the Hispanic community. It is evident from this review that further research is needed among Hispanic populations, particularly PLWH, men who have sex with men, heterosexual men, and IDUs. In the mean time, investigators of large-scale efficacy trials could make a substantial contribution in advancing research among Hispanic populations by reporting their findings stratified by ethnicity and gender.

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