Sexual Health Programs for Latinx Adolescents: A Meta-analysis

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abstract

CONTEXT: Latinx adolescents are at risk for negative sexual health outcomes, and many interventions have been developed to reduce this risk.

OBJECTIVE: In this meta-analysis, we synthesized the literature on sexual health interventions for Latinx adolescents and examined intervention effects on 3 behavioral outcomes (abstinence, condom use, number of sex partners) and 3 psychological outcomes (safer sex knowledge, intentions, self-efficacy). Moderators of intervention success were explored.

DATA SOURCES: A systematic search of studies published through January 2019 was conducted by using PubMed, PsycINFO, and Cumulative Index to Nursing and Allied Health Literature databases.

STUDY SELECTION: All studies included a US-based sample of Latinx adolescents, evaluated sexual health intervention by using an experimental or quasiexperimental design, included a behavioral outcome, and were in English.

DATA EXTRACTION: Standardized mean difference (d) and 95% confidence intervals (CIs) were meta-analyzed by using random-effects models.

RESULTS: Effect sizes from 12 studies, sampling 4673 adolescents, were synthesized. Sexual health interventions improved abstinence (d = 0.15, 95% CI: 0.02 to 0.28), condom use (d = 0.44, 95% CI: 0.18 to 0.70), number of sex partners (d = −0.19, 95% CI: −0.37 to −0.001), and sexual health knowledge (d = 0.40, 95% CI: 0.10 to 0.70), compared with control conditions. Effects were consistent across a number of demographic and clinical characteristics, although culturally tailored interventions produced greater change in condom use than nontailored interventions.

LIMITATIONS: There was variation across studies in measures of sexual behavior, and some elements of individual study quality were unclear.

CONCLUSIONS: Sexual health interventions have a small but significant impact on improving safer sexual behavior among Latinx adolescents. Health educators should consider the importance of cultural tailoring to program success.

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Ms Evans and Dr Widman conceptualized the study, conducted primary analyses, and helped draft the initial manuscript; Ms Stokes and Ms Javidi helped conceptualize the study, screened articles for eligibility, coded all articles, and critically reviewed and revised the manuscript; Dr Hope helped conceptualize the study, draft the initial manuscript, and critically reviewed and revised the manuscript; Ms Brasileiro helped draft the initial manuscript and critically reviewed and revised the manuscript; and all authors approved the final manuscript as submitted and agree to be accountable for all aspects of the work.

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Latinx adolescents, defined in this article as people between the ages of 12 and 18 from Latin America or descended from people in Latin America, are at a high risk for experiencing negative sexual health outcomes.[1,2] We use the term Latinx to be inclusive of individuals of all gender identities.[3] In the United States, nearly 17% of female Latinx adolescents will have an infant before their 20th birthday.[1] Teenage pregnancy is related to negative life outcomes, such as failure to complete high school, incarceration, and unemployment.[4] Additionally, Latinx adolescents are more likely to contract sexually transmitted infections (STIs) than white adolescents.[2] If left untreated, these STIs can result in consequences as severe as infertility and death.[5]

There are factors that can make Latinx adolescents more or less likely to experience negative sexual health outcomes compared with their non-Latinx white peers. High rates of school dropout,[6] infrequent parent–child sexual communication,[7] and limited access to health care differentially impact Latinx adolescents[8,9] and can lead to poor general and reproductive health outcomes.[8,10] Cultural socialization in Latinx families may reduce adolescents' sexual health risk, whereas acculturation into mainstream American values often leads to poorer health outcomes.[11–15] For example, Latina girls who strongly endorse the cultural values of familismo ("closeness and interconnectedness between family members and felt responsibility toward each other")[14] and simpatía ("maintaining harmony in relationships")[14] are more likely to delay sexual initiation and less likely to engage in sexual risk behaviors.[16,17]

A number of interventions have been developed to improve sexual health among Latinx youth. Some interventions specifically target Latinx adolescents with programs relevant to Latinx cultural beliefs and practices.[18] Most primarily target adolescents and/or their parents (as opposed to community or society-level factors) and are delivered to youth in school or community settings.[19–23] These programs aim to increase abstinence and/or safer sex behavior and cognitions.[24–26] However, results on the effectiveness of these interventions are somewhat mixed,[21,25,27] suggesting there are important clinical and/or methodologic differences. It is imperative that the effectiveness of interventions aimed at reducing sexual health disparities be examined among Latinx adolescents to inform future interventions by determining what characteristics of interventions make sexual health programs most effective.

Our purpose with the current study is to conduct a meta-analysis to synthesize effect sizes across studies and provide an indication of the average effect of sexual health interventions on safer sex outcomes for Latinx adolescents. Systematic reviews of sexual health interventions for Latinx youth have highlighted the need for culturally tailored and "age-specific" programs[28,29] as well as the need for programs that address gender roles.[18,30,31] However, no researchers have synthesized the effects across studies with a meta-analysis, perhaps because at the time these reviews were published, there were not enough rigorous outcome assessments to make a meta-analysis feasible. The meta-analyses that do exist in related areas have focused more broadly on synthesizing the effectiveness of adolescent sexual health interventions without a specific focus on Latinex youth,[32–34] or they have evaluated the effectiveness of sexual health interventions for Latinx individuals of all ages.[35,36] Yet, interventions for adolescents often look different from those targeting adults, given the unique developmental tasks of adolescence (eg, navigating the hormonal changes associated with puberty, individuating from parents).[37] A meta-analysis is needed to synthesize the literature on sexual health interventions for Latinx adolescents, specifically, so researchers and practitioners can better understand whether current programming strategies are working. Additionally, they may be able to identify components of interventions that most effectively promote sexual health.

We have 2 goals for the current study. The first goal is to systematically review the literature on sexual health interventions for Latinx adolescents and meta-analyze their overall efficacy on 3 key behavioral outcomes: abstinence, condom use, and number of sex partners. These outcomes were selected because of their relevance to HIV and STIs and unplanned pregnancy.[38,39] Additionally, we evaluate the effects of these interventions on 3 psychological outcomes tied to sexual health decision-making,[40,41] including sexual health knowledge, sexual health intentions, and sexual health self-efficacy. The second goal with this study is to identify specific components that contribute to the success of sexual health interventions in decreasing sexual risk behavior among Latinx adolescents. We considered several potential moderating variables of intervention success, including demographic, intervention, and methodologic characteristics. We used the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) checklist to guide our reporting for this meta-analysis.[42]

METHODS

Search Strategy

We conducted a comprehensive search of PsycINFO, Cumulative Index to Nursing and Allied Health

Literature, and PubMed databases to extract relevant studies published through January 2019. We used the following key words: youth, adolesc* or teen*; sexual health or safe* sex or sexually transmitted disease or sexually transmitted infection or STD or STI or HIV or AIDS or pregnancy or reproductive health or condom* or contracept* or unprotected sex or abstinence; intervention or program or education or prevention or promotion or trial; latino* or latina* or latinx* or minorit* or ethnic* or hispanic or african american* or black* or race or racial or biracial. As is evidenced by our key words, we initially planned to do one meta-analysis on interventions for Latinx and black adolescents but ultimately determined it would produce more meaningful results to understand each population separately.[43] Other studies were located by examining previous reviews and meta-analyses[18,28–32,44–46] and examining the reference lists of all included articles. This initial search produced 3068 different articles.

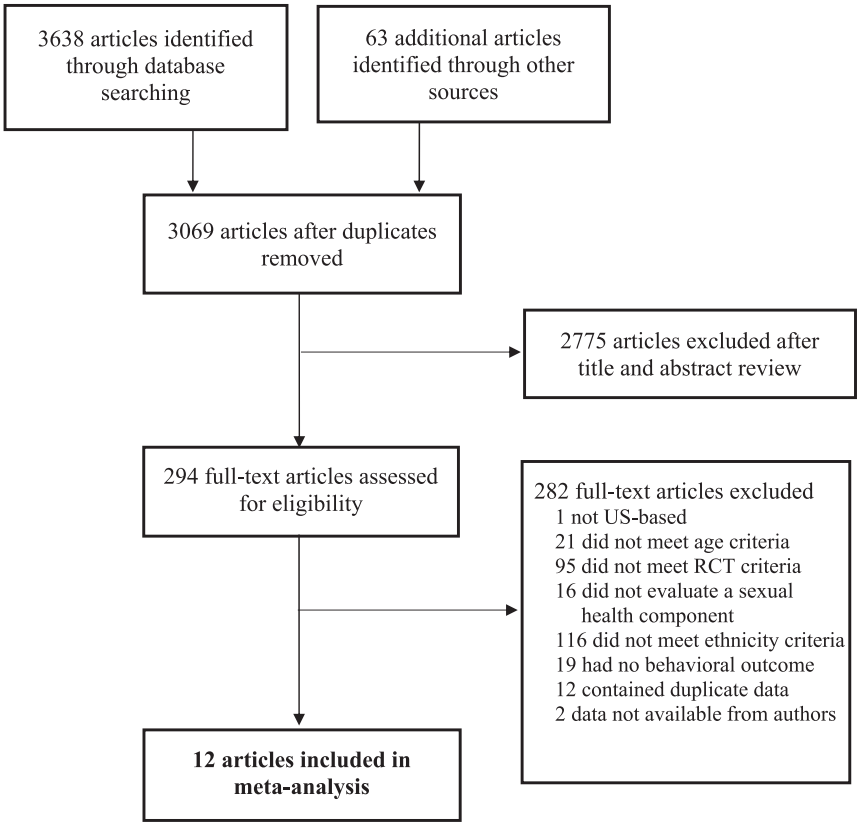

FIGURE 1
Study flow diagram. RCT, randomized controlled trial.

Selection Criteria

Studies were included if they met the following criteria: (1) included a US-based sample; (2) sampled Latinx adolescents (ie, at least 95% of the sample was Latinx, no participants were >24, and the mean sample age was ≤18); (3) evaluated the effects of a primary prevention intervention with a component aimed at promoting abstinence and/or safer sex behavior (as is common in similar meta-analyses,[34,47] studies focused on secondary prevention were excluded[48,49]); (4) evaluated effects of an intervention by using an experimental or quasiexperimental design; (5) included at least 1 of 4 behavioral outcome measures: abstinence, condom use, number of sexual partners, or pregnancy; (6) were published in English; and (7) provided sufficient statistics to calculate effect sizes. When a study had a mixed-ethnicity sample but included subgroup analyses that evaluated intervention effects among only Latinx participants, the results of the subgroup analyses were included.[24,26,50] We selected the sexual health intervention that was most comprehensive when studies had more than one intervention group. If researchers of multiple studies reported findings using the same data, the study with adequate data to calculate effect sizes and reporting results for the longest-term follow-up was included as the most conservative estimate of treatment effects. All other studies using the same data were excluded. Similarly, for studies with multiple follow-up points, we used the longest-term follow-up with adequate data to calculate effect sizes. When studies included more than one indicator for an outcome (eg, multiple indicators of condom use), we used a random number generator to select one outcome to eliminate potential bias.[51]

These selection criteria resulted in a final sample of 12 articles (Fig 1). From these, we calculated 9 independent effect sizes for abstinence, 11 for condom use, 7 for number of sex partners, 3 for sexual health knowledge, 3 for sexual health intentions, and 2 for sexual health self-efficacy. Only researchers of 1 study examined pregnancy as an outcome,[23] so we were not able to meta-analyze the effectiveness of pregnancy prevention across studies. See Table 1 for examples of outcome variables from primary studies that were used in analyses.

Data Extraction

Two authors independently coded each of the studies during the month of June 2019, which involved reading the full text of each article included in

TABLE 1 Definition and Example Measurement From Primary Studies for Each Behavioral and Psychological Outcome

Variable	Definition	Example Measurement
Abstinence	Abstinence from sex, which may include oral, anal, and/or vaginal sex, for a certain period of time.	Oral, vaginal, or anal sexual initiation in the last 90 d.[22] Had vaginal sex in the past 2 mo.[25]
Condom use	Use of a condom during sexual encounters (oral, anal, and/or vaginal) over a certain period of time.	Average percentage of sex acts protected by condoms in the last 3 mo.[23] Inconsistent condom use during vaginal or anal sex in the past 90 d[22]
No. sex partners	No. people a participant has had oral, anal, and/or vaginal sex with during a certain period of time.	No. lifetime vaginal sex partners.[26] No. vaginal sex partners in the past 90 d.[20]
Sexual health intentions	Intentions to remain abstinent or practice safer sexual behavior (eg, use a condom).	Intentions to remain abstinent until the end of high school.[26] Intentions to use condoms in the next 3 mo.[24]
Sexual health knowledge	Knowledge of sexual health, which may be general or specific to a sexual health topic (eg, STI knowledge).	STI knowledge.[25] General condom knowledge.[26]
Sexual health self-efficacy	Self-efficacy to remain abstinent or practice safer sexual behavior (eg, use a condom or refuse sex).	Self-efficacy to refuse sex.[24,26]

the meta-analysis and recording study characteristics. The following data were extracted: (1) demographic and sample characteristics (eg, mean age, sex), (2) intervention characteristics (eg, setting, dose), and (3) methodologic characteristics (eg, length of follow-up, retention rate). The mean percentage agreement across all coding categories was 94%. Discrepancies between coders were resolved through group discussion until a consensus was reached. Risk of bias was calculated by using criteria adapted from the Cochrane risk-of-bias tool.[52]

Calculation of Effect Sizes

As the indicator of effect size, the standardized mean difference, Cohen's *d*, was used. Effect size *d* can be interpreted as small (0.20), medium (0.50), or large (0.80).[53] If *d*'s and confidence intervals (CIs) were reported in an article, they were extracted. Otherwise, other statistics that could be converted to *d*'s (eg, summary statistics, odds ratios) were calculated, using Comprehensive Meta-Analysis V2.0[54] and the Practical Meta-Analysis Effect Size Calculator.[55] When no statistics in the study could be converted to a *d*, appropriate data were requested from study authors. To ensure consistency and interpretability of effect sizes, higher values for the following outcomes always indicate that the sexual health intervention group performed better than the control: abstinence, condom use, sexual health knowledge, sexual health intentions, and sexual health self-efficacy. Lower values for number of sex partners always indicate that the sexual health intervention group performed better than the control.

Analyses

To allow for the possibility of differing variances across studies, random-effects meta-analytic procedures were used for the primary analyses across all independent effect sizes.[51] As recommended by the Cochrane Collaboration,[56] sensitivity analyses were conducted for behavioral outcomes: studies with high risk of bias were excluded to determine if they were effecting the results.

The Q statistic and I^2 were used to determine if significant statistical heterogeneity existed among effect sizes. Effect sizes and 95% CIs for hypothesized categorical moderators were calculated, and those effect sizes were compared by using the Q_b statistic. For categorical moderators, mixed effects models were used for these analyses to allow for the possibility of differing variances across subgroups. To test continuous moderators, random-effects meta-regression was used. The Q-value model statistic was used to determine if there was significant moderation for these models. Analyses were conducted by using Comprehensive Meta-Analysis V2.0.[54]

RESULTS

Study Characteristics

A summary of the studies included in this meta-analysis is presented in Table 2. A total of 4673 Latinx adolescents (weighted mean age = 14.34) were included across 12 studies. Researchers of most studies targeted mixed-sex samples (10), whereas 2 included only female adolescents, and no studies included only male adolescents. Substantial cultural tailoring, defined as the incorporation of Latinx-specific practices and values (eg, familialism) into intervention materials, was included in 8 of the 12 studies. Intervention dose varied widely across studies: 3 studies included <10 hours of program content, and 4 studies included >20 hours of content. Only researchers of one study specified that all participants received the full program dose; many did not provide information about the dose participants received.

Risk of Bias

Risk of bias was low across studies (see Supplemental Table 6).

TABLE 2 Study Characteristics

Authors	Sample	Study Location	Intervention Description	Theory	Description of Cultural Tailoring	Outcomes
Bull et al[23]	*N* = 852 youth from Boys and Girls Clubs; mean age = 14.9 y, range = 14–18 y; 322 (51%) female; 272 (43%) Hispanic[a], 123 (19%) black, 54 (9%) white, 182 (29%) other; 154 (25%) ever had sex; 228 (39%) of participants' parents not born in the United States	Denver, CO	Youth All Engaged! 25 (1-h) in-person sessions in a community center; 20 h of community service learning; 5–7 texts for 25 wk	ITmH	No tailoring reported	Condom
Estrada et al[22]	*N* = 160 ninth-grade Latino adolescents and their families; mean age = 15.3 y; 37 (51%) female; 38 (24%) had vaginal, anal, or oral sex in their lifetime; 87 (54%) born in the United States. Immigrant adolescents and parents were born in the following countries: 59 (37%) in Cuba, 9 (12%) in Honduras, 7 (10%) in Nicaragua; median annual household income = $10 000–$15 000	Miami, FL	Familias Unidas 5: (2-h) in-person sessions for parents in a community center, 3 parent homework assignments, 1 (1-h) family visit for parents and teenagers	EDT	Program is culturally informed and has been tested with different populations of Latino youth. Program incorporates Latino cultural values and norms to improve processes occurring within the family unit, such as family functioning	Abstinence, condom
Estrada et al[21]	*N* = 746 Hispanic eighth-graders in a public-school system; mean age = 13.86 y, range = 12–16 y; 357 (48%) female; 57 (8%) had vaginal, anal, or oral sex; 409 (55%) born in the US; 384 (52%) with family income <$20 000	Florida	Familias Unidas: 8 in-person, school-based sessions for parents; 4 sessions for parents and teens; 2 homework assignments	EDT	Program was specifically designed for Hispanic families. All facilitators were fluent in Spanish	Condom
Harper et al[25]	*N* = 378 Mexican American female adolescents; mean age = 15.2 y, range = 12–21 y; 121 (32%) had vaginal sex in their lifetime	A large US midwestern city	The SHERO's Program: 9 (2-h) in-person sessions in a community center	ARRM	Intervention developed collaboratively with a Latino-focused community-based organization, university-based researchers and evaluators, and Mexican American adolescents from the community. Narrative ethnographic methods were used to reveal community and cultural narratives that are barriers and facilitators of sexual health among Mexican American young women. Program facilitated by Mexican American female staff members of community-based organization	Abstinence, condom, sex partners, knowledge, intentions
Markham et al[26]	*N* = 1258 predominantly African American and Hispanic seventh-grade students from urban middle schools; mean age = 12.6 y; 751 (60%) female; 609 (48%) Hispanic[a], 494 (39%) African American, 153 (12%) other; 138 (12%) had any sex	A large south-central US school district	24 (50-min) in-person, school-based lessons with computer activities and 6 homework assignments	SCT	The majority of facilitators of the intervention were African American or Hispanic. Otherwise, no tailoring was reported	Abstinence, condom, sex partners, knowledge, self-efficacy, intentions
Pantin et al[57]	*N* = 213 eighth-grade Hispanic adolescents with behavior problems from an urban, low-income school district; mean age = 13.8 y; 77 (36%) female; 34 (16%) had	Miami, FL	Familias Unidas: 9 (2-h) in-person sessions and 10 (1-h) in-person, family visits; 4 (1-h) booster sessions for families	EDT	Program is a Hispanic-specific, family-based preventive intervention; cultural issues integrated into all aspects of the intervention: underlying theory, specific	Abstinence, condom

TABLE 2 Continued

Authors	Sample	Study Location	Intervention Description	Theory	Description of Cultural Tailoring	Outcomes
	vaginal sex in the past 90 d; 119 (56%) born in the United States; of participants not born in the United States: 25 (27%) born in Honduras, 19 (20%) born in Cuba, 15 (16%) born in Nicaragua; 28 (13%) annual family income >$30 000 per y				content of sessions, and format of intervention activities. Facilitators were Hispanic and had clinical experience working with urban, low-income, Hispanic immigrant families	
Peskin et al[24]	*N* = 1374 eighth-grade students from 19 schools in a large, urban school district; mean age = 14.3 y; 810 (59%) female; 1012 (74%) Hispanic[a], 238 (17%) African American, 124 (9%) other; 267 (19%) ever had any sex in their lifetime	Southeast TX	It's Your Game-Tech: 13 (35–45 min) computer-based sessions at school	SCBT	No tailoring reported	Abstinence, condom, sex partners, knowledge, self-efficacy, intentions
Prado et al[19]	*N* = 266 eighth-grade Hispanic adolescents; mean age = 13.4 y; 138 (52%) female; 106 (40%) born in the United States. Among immigrant adolescents: 64 (40%) born in Cuba, 40 (25%) born in Nicaragua, 14 (9%) born in Honduras, 6 (4%) born in Colombia, 35 (22%) born in other Hispanic countries; 48 (18%) annual family income >$30 000	Miami, FL	Familias Unidas + PATH: 15 in-person sessions for parents; 8 in-person family visits; 2 in-person parent–adolescent circles; induction video. In total, sessions and activities took 49 h	EDT	Familias Unidas intervention component developed for Hispanic families. Underlying theoretical model, intervention content, and format of activities all take into consideration cultural values and expectations. PATH intervention component adapted for Hispanic samples (eg, use of Spanish telenovela to address cultural taboos around sex). Interventions conducted by Hispanic facilitators	Condom
Prado et al[20]	*N* = 242 Hispanic delinquent youth; mean age = 14.7 y, range = 12–17 y; 86 (36%) female; 123 (51%) had vaginal sex in their lifetime; 158 (65%) born in the United States. Country of origin for foreign-born adolescents: 21 (25%) born in Cuba, 8 (10%) born in Nicaragua, 13 (15%) born in Honduras, 6 (7%) born in Dominican Republic, 36 (43%) born in other countries; 50 (21%) family income >$30 000	Miami, FL	Familias Unidas: 8 (2-h) in-person sessions for parents; 4 (1-h) in-person, family visits for parents and teenagers	EDT	Program is influenced by culturally specific models developed for Hispanic populations in the United States and incorporates sex-specific aspects of Latino cultural values or norms. Facilitators were Hispanic and had at least 2 y of experience working with Hispanic families	Abstinence, condom, sex partners
Roye et al[50]	*N* = 400 black and Latina teen-aged women; mean age = 18, range = 15–21; 220 (55%) Latina[a], 180 (45%) black; 400 (100%) had vaginal sex in their lifetime	New York, NY	1 (15–20 min) in-person clinic-based session; 2 videos (21 min total)	SCT, TRA, HBM	Program informed by qualitative and quantitative studies with black and Latino teens from a similar neighborhood. Three focus groups of minority adolescents informed final video editing so it reflected learning needs of the target population. The videos included HIV-positive black and Latino youth	Condom
Sellers et al[58]	*N* = 586 Latino adolescents; age range = 14–20 y; 280 (52%) had vaginal or anal intercourse in their lifetime; 550 (94%) Puerto Rican	Boston, MA	18-mo intervention including school-based workshops, community-based organizations and health centers; in-person group sessions in the homes of youth,	Not reported	No tailoring reported	Abstinence, sex partners

TABLE 2 Continued

Authors	Sample	Study Location	Intervention Description	Theory	Description of Cultural Tailoring	Outcomes
			presentations at large community events, and door-to-door and street corner canvassing; distribution of condoms and pamphlets on how to use condoms; radio and television public service announcements, posters in businesses and public transit, and newsletter			
Villarruel et al[59]	N = 553 Latino adolescents; mean age = 14.9 y, range = 13–18 y; 304 (55%) female; 235 (43%) had sexual intercourse in their lifetime; 249 (45%) born outside of mainland US; 472 (85%) Puerto Rican	Philadelphia, PA	iCudate!: 8 h of in-person sessions in a community center	SCT, TRA, TPB	Program incorporated salient aspects of Latino culture, specifically familialism and gender role expectations. Abstinence and condom use were presented as culturally accepted and effective ways to prevent HIV and STDs. Intervention focused on behaviors related to significant health issues affecting Latinos. Latino cultural values were presented as an important context that supported positive health behaviors. Some facilitators were bilingual	Abstinence, condom, sex partners

Outcomes are those reported by authors and synthesized in this meta-analysis. Abstinence = abstinence or delayed sexual activity; condom = condom use; sex partners = number of sexual intercourse partners; knowledge = sexual health knowledge; intentions = intentions to be abstinent or practice safer sex; and self-efficacy = sexual health self-efficacy. ARRM, AIDS Risk Reduction Model; CO, Colorado; EDT, Ecodevelopmental Theory; FL, Florida; HBM, Health Belief Model; ITmH, Integrated Theory of mHealth; MA, Massachusetts; NY, New York; PA, Pennsylvania; PATH, Parent–Preadolescent Training for HIV Prevention; SCBT, Social Cognitive Behavioral Theories; SCT, Social Cognitive Theory; SHERO, a female-gendered version of the word hero[60]; STD, sexually transmitted disease; TPB, Theory of Planned Behavior; TRA, Theory of Reasoned Action; TX, Texas.

[a] Outcomes for subsample including only Latinx participants were used in all analyses including this study.

Researchers of >80% of studies randomly assigned participants to study conditions, and 11 out of 12 studies had <30% of participants in the full sample drop out or become lost to follow-up. However, in many studies, it was unclear if other relevant data were gathered that were not reported.

Behavioral Outcomes

Abstinence

Individual study effect sizes for abstinence ranged from $d = -0.12$ (95% CI: −0.69 to 0.45) to $d = 1.39$ (95% CI: 0.28 to 2.51), with an overall weighted mean effect size across studies of $d = 0.15$ (95% CI: 0.02 to 0.28; $P = .02$) (Fig 2). This suggests that, on average, sexual health interventions have a small but significant effect at improving rates of abstinence among Latinx adolescents (Table 3). We calculated a fail-safe N to determine the robustness of this finding: 12 additional nonsignificant studies would have to exist for the combined P value to exceed .05. There was not significant statistical heterogeneity among studies (Q = 10.13, $df = 8$, $P = .26$, $I^2 = 21.06$); thus, we did not examine moderators of intervention success for abstinence.

Condom Use

Individual study effect sizes for condom use ranged from $d = -0.31$ (95% CI: −0.59 to −0.02) to $d = 1.26$

FIGURE 2
Forest plot for abstinence outcome. Forest plot displaying effect sizes and 95% CIs for abstinence. Positive effects indicate that sexual activity was reduced in intervention participants relative to controls.

TABLE 3 Main Effects of Sexual Health Interventions on Latinx Adolescent Sexual Health Outcomes

Variable	Weighted Mean Effect Size			
	k	*d*	95% CI	*P*
Behavioral outcomes				
Abstinence	9	0.15	0.02 to 0.28	.02
Condom use	11	0.44	0.18 to 0.70	.001
No. sex partners	7	−0.19	−0.37 to −0.001	.049
Psychological outcomes				
Sexual health knowledge	3	0.40	0.10 to 0.70	.01
Sexual health intentions	3	−0.001	−0.18 to 0.18	.995
Sexual health self-efficacy	2	−0.06	−0.16 to 0.05	.30

(95% CI: 0.69 to 1.83), with an overall weighted mean effect size of d = 0.44 (95% CI: 0.18 to 0.70; P = .001) (Fig 3). On average, sexual health interventions have a significant effect of moderate size on condom use among Latinx adolescents (Table 3). A fail-safe N indicated that there would have to be 121 additional nonsignificant studies for the combined P value to exceed .05.

There was significant statistical heterogeneity among studies for the condom use outcome (Q = 48.33, df = 10, $P < .001$, I^2 = 79.31); thus, we examined moderators of intervention success (see Tables 4 and 5). Cultural tailoring moderated the association between sexual health interventions and condom use. Effect sizes were larger for studies that evaluated interventions that were culturally tailored (d = 0.57, 95% CI: 0.33 to 0.81; $P < .001$), compared with those that evaluated interventions that were not culturally tailored (d = 0.01, 95% CI: −0.39 to 0.42; P = .68). Effect sizes did not significantly differ across the following moderators: participant age, parent involvement in the intervention, intervention completion, inclusion of communication skills training in the intervention, inclusion of condom skills training in the intervention, dose of the intervention, intervention setting, year of study publication, and length of follow-up. We examined sex as a moderator and found no significant differences between the effectiveness of interventions with mixed-sex samples and those with girls only; however, there were no studies examining the effectiveness of a sexual health intervention among boys only. This limited our ability to evaluate sex as a moderator.

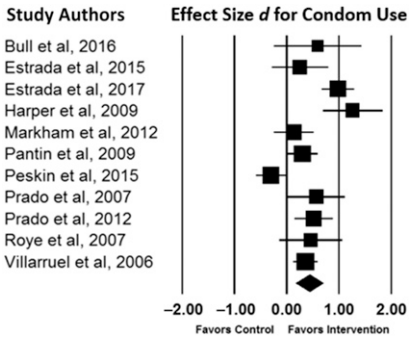

FIGURE 3
Forest plot for condom use outcome. Forest plot displaying effect sizes and 95% CIs for condom use. Positive effects indicate that condom use was increased in intervention participants relative to controls.

Number of Sex Partners

Individual study effect sizes for number of sex partners ranged from d = −1.55 (95% CI: −2.59 to −0.51) to d = −0.03 (95% CI: −0.55 to 0.50), with an overall weighted mean effect size of d = −0.19 (95% CI: −0.37 to −0.001; P = .049) (Fig 4). This indicates that compared with control conditions, across studies, the sexual health interventions were associated with a reduction in the number of sex partners among Latinx adolescents (Table 3). There was not significant heterogeneity among studies (Q = 9.25, df = 6, P = .16, I^2 = 35.11); thus, we did not examine moderators of intervention success. We calculated that there would have to be 8 additional nonsignificant studies for the combined P value to exceed .05 (fail-safe N = 8).

Psychological Outcomes

Individual study effect sizes for sexual health knowledge ranged from d = 0.13 (95% CI: 0.01 to 0.26) to d = 0.58 (95% CI: 0.33 to 0.84), with an overall weighted mean effect size across studies of d = 0.40 (95% CI: 0.09 to 0.70; P = .01), indicating that overall, sexual health interventions were efficacious in promoting sexual health knowledge. However, there was no significant association between sexual health interventions and sexual health intentions or sexual health self-efficacy. Effect sizes for sexual health intentions ranged from d = −0.13 (95% CI: −0.33 to 0.07) to d = 0.39 (95% CI: −0.14 to 0.92), with an overall weighted mean effect size of d = −0.001 (95% CI: −0.18 to 0.18; P = .995). Effect sizes for sexual health self-efficacy ranged from d = −0.05 (95% CI: −0.17 to 0.08) to d = −0.08 (95% CI: −0.28 to 0.11), with an overall weighted mean effect size of d = −0.06 (95% CI: −0.16 to 0.05; P = .30). We did not test for heterogeneity in these outcomes because of the small number of studies for each (knowledge k = 3; intentions k = 3; self-efficacy k = 2 [k refers to the number of studies]).

Sensitivity Analyses

Three studies were determined to have high risk of bias.[25,50,58] When these studies were excluded from analyses, there were no substantial differences in our findings for the 3 behavioral outcomes: abstinence, d = 0.16 (original d = 0.15); condom use, d = 0.36 (original d = 0.44); and number of sex partners, d = −0.19 (original d = −0.19). All effects remained significant.

DISCUSSION

In this meta-analysis, we synthesized >20 years of research on the efficacy of sexual health interventions among

TABLE 4 Intervention Impact on Condom Use: Weighted Mean Effect Sizes by Categorical Moderator Variables

	k	*d*	95% CI	*P*	Between Groups	
					Q_B	*P*
Sex					2.41	.12
Girls only	2	0.87	0.22 to 1.52	.01		
Mixed sex	9	0.36	0.09 to 0.63	.01		
Cultural tailoring[a]					5.39	.02
Tailored	8	0.57	0.33 to 0.81	<.001		
Not tailored	3	0.01	−0.39 to 0.42	.68		
Parent involvement					0.05	.83
Involved	6	0.46	0.11 to 0.82	.01		
Not involved	5	0.41	−0.01 to 0.82	.05		
Intervention dose completion[b]					0.01	.95
All completed	1	0.46	−0.59 to 1.51	.36		
All did not complete	8	0.42	0.08 to 0.76	.01		
Communication skills training					0.05	.83
Included	5	0.41	−0.01 to 0.82	.05		
Not included	6	0.47	0.11 to 0.82	.01		
Condom skills training					0.68	.41
Included	4	0.30	−0.11 to 0.71	.16		
Not included	6	0.52	0.18 to 0.87	.003		
Dose					5.18	.08
≤10 h	3	0.13	−0.27 to 0.53	.52		
11–20 h	4	0.75	0.38 to 1.12	<.001		
>20 h	4	0.35	−0.03 to 0.74	.07		
Setting[c]					0.51	.78
School	3	0.27	−0.41 to 0.94	.44		
Community center	4	0.60	−0.02 to 1.23	.06		
Clinic	1	0.46	−0.82 to 1.73	.48		

[a] Studies in which researchers included a description of substantial intervention components developed or adapted specifically for Latinx adolescents were considered tailored for the cultural tailoring moderator.

[b] Studies in which all participants completed all program components were coded as "all completed" for the "intervention dose completion" moderator. Two studies were missing data on this moderator.

[c] Three studies were missing data on setting, and 1 did not evaluate condom use as an outcome.

Latinx adolescents. Overall, results from 12 experimental or quasiexperimental studies with 4673 Latinx adolescents reveal that youth who participated in a sexual health intervention, compared with a control group, were significantly more likely to abstain from sexual activity, use condoms, have fewer sex partners, and report greater sexual health knowledge. Latinx adolescents are disproportionately burdened with unplanned pregnancy and STIs.[1] In this meta-analysis, it is shown that sexual health interventions can play a role in combatting these health disparities.

Although sexual health interventions had a significant protective influence on Latinx adolescents' sexual behavior, these effects were, on average, small to moderate. The overall effect sizes for the abstinence and sex partners outcomes were particularly small (abstinence d = 0.15; number of sex partners d = −0.19). This could be because there are factors that impact the sexual behavior of Latinx adolescents that are outside of the scope of most sexual health interventions. Most of the interventions included in this meta-analysis targeted individual or family-level risk and protective factors (eg, sexual health knowledge; parent–child sexual communication); however, there are factors at community and society levels that also impact Latinx sexual health (eg, access to sexual health care; stigma).[61] If sexual health interventions target factors beyond individual and interpersonal levels of influence, they may have an even larger effect on the sexual behavior of Latinx adolescents.[62] Researchers may consider developing and evaluating interventions with components that increase the cultural

TABLE 5 Meta-Regression To Test Continuous Moderators of Association Between Interventions and Condom Use

	k	Coefficient	95% CI	*z* Value	*Q*	*P*
Age	11	0.05	−0.17 to 0.26	0.43	0.19	.67
Year of study publication	11	−0.01	−0.08 to 0.07	−0.22	0.05	.83
Length of follow-up	11	−0.003	−0.03 to 0.02	−0.21	0.04	.84

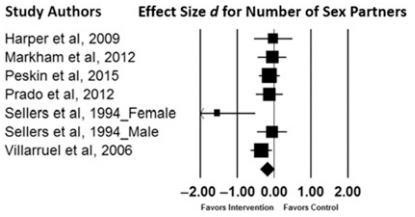

FIGURE 4

Forest plot for number of sex partners outcome. Forest plot displaying effect sizes and 95% CIs for number of sex partners. Negative effects indicate that number of sex partners was reduced in intervention participants relative to controls.

understanding of clinicians that work with Latinx communities or that provide low-cost, ongoing sexual health services in Latinx communities.

Although the overall effect of sexual health interventions on condom use was protective, there was a significant amount of statistical heterogeneity; thus, this finding must be considered in light of moderation analyses that elucidate which interventions were most effective: namely, those with cultural tailoring. Most interventions (8) were culturally tailored. For example, in the ¡Cuídate! program,[59] salient aspects of Latino culture, specifically familialism and gender role expectations, were incorporated. The ¡Cuídate! program highlighted Latino cultural values and targeted behaviors related to health issues affecting Latino individuals. Cultural tailoring moderated the association between sexual health interventions and condom use, such that interventions that were specifically tailored to meet the needs of Latinx adolescents were more effective than those with no explicit cultural tailoring. Indeed, 2 studies that found interventions had a significant, large effect on condom use included cultural tailoring,[21,25] and in the study with the largest effect size, researchers collaborated closely with community members to develop the intervention being tested. In the other study with large effects,[21] the program was specifically designed for Hispanic families. Researchers of many studies with moderate to large effect sizes evaluated the Familias Unidas intervention,[19–21] which was grounded in ecodevelopmental theory, a theory that highlights the influence of family and culture on individuals.[63] These findings are consistent with previous meta-analyses, which found that culturally sensitive programs are effective in reducing externalizing behaviors among Latino youth.[64] Researchers of the current study extend this line of work by illustrating that sexual health interventions, specifically, are more effective in promoting condom use among Latinx adolescents when they are tailored. This may be because culturally tailored interventions are more congruent with the identities and lived experiences of Latinx adolescents, which increases the likelihood that these programs will modify adolescent behavior.[65] Additionally, culturally tailored programs may promote cultural identity, which is tied to healthier lifestyles among Latinx adolescents.[66] Interventionists should consider the importance of cultural relevance to intervention success.

Regarding abstinence and number of sex partners, readers should note that our fail-safe *n* was small, indicating that only 8 to 12 nonsignificant studies would be needed for the overall weighted effect of sexual health interventions to be nonsignificant. Thus, readers should take caution in interpreting these findings.[67]

In conducting this review, limitations and future directions related to intervention design, evaluation, and reporting became clear. First, although we evaluated the association between sexual health interventions and 3 potential psychological mediators of intervention effects on sexual behavior (knowledge, self-efficacy, intentions),[40,41] only improvements in sexual health knowledge were significantly associated with sexual health interventions among Latinx adolescents. This is likely because few studies could be included in this analysis: for example, researchers of only 2 studies examined sexual health self-efficacy. If researchers evaluating behavior change also more frequently evaluated psychological mediators, this might provide a better understanding of how the most effective programs are working. In this case, future sexual health programs could target the mediators that more frequently lead to behavior change. Additionally, there may not have been significant changes in self-efficacy and intentions because oftentimes adolescents start "high" on these protective constructs at pretest. If adolescents are already high in self-efficacy and have strong intentions to practice safer sexual behaviors before they take part in a sexual health program, then there is not much room to improve in response to the intervention.

Second, there was methodologic heterogeneity in the measures used to evaluate sexual health outcomes across studies. For example, in evaluating abstinence, some researchers asked about "vaginal intercourse,"[25] whereas others asked about "vaginal, oral, and anal sex."[26,57] Also, the time frame participants were asked to report on varied. Some researchers asked participants about their condom use the last time they had sex,[24,26,50] whereas others asked about condom use in the last 2 to 3 months.[21–23] Because there is currently no "gold standard" for assessing adolescent sexual behavior, variability in outcome assessments across studies is expected. Yet, more meaningful synthesis of research would be possible if the methods used to assess adolescent sexual health outcomes were standardized, as the World Health Organization is currently proposing in their development of

a population-representative sexual health survey instrument.[68]

Third, data regarding many important sample characteristics were missing from studies included in this meta-analysis. We hoped to more thoroughly report and analyze participant characteristics, thus highlighting the clinical heterogeneity that exists across groups of Latinx adolescents in the United States. However, inconsistent and brief reporting of participant characteristics across studies made this difficult. For example, researchers of only 6 studies reported the percentage of participants born in the United States. More thorough reporting of this participant characteristic could have been informative; however, we recognize that this could be a sensitive topic with respect to immigration issues, and researchers may have decided to omit questions regarding country of origin and citizenship to protect participants.

Fourth, initially we planned to analyze the association between sexual health interventions and pregnancy among Latinx adolescents; however, only 1 study that met our inclusion criteria evaluated pregnancy as an outcome.[23] This is unfortunate considering Latinx adolescents experience unplanned pregnancies at high rates[1]; thus, programs that are successful at reducing unplanned pregnancy are urgently needed. Researchers of future studies should evaluate biological outcomes, such as pregnancy and HIV transmission.[33,69]

Fifth, programs must evaluate and improve their implementation strategies. Of the 12 studies included in this review, only 1 indicated that all participants completed the entire intervention. Research on general educational opportunities suggests Latinx adolescents face barriers that may affect their intervention attendance[70]; however, if these barriers are not identified through implementation evaluation, they will be impossible to eliminate. Emerging literature on intervention science insists that to maximize the sustained success of evidence-based interventions, the appropriateness and feasibility of health programming must be evaluated.[71] Researchers evaluating sexual health interventions might consider including a comprehensive process or implementation evaluation to understand why some Latinx adolescents are not receiving the full program dose. Although researchers of some studies included in this meta-analysis evaluated attendance,[24] attrition,[20,59] and/or intervention fidelity,[19,20,57] feasibility and cost were only assessed in 1 study.[23]

Finally, none of the interventions we identified in this review specifically targeted Latinx boys. Intersectionality theory contends that we cannot address disparities by focusing solely on race or ethnicity and must also consider within group experiences across sex and class.[72] Thus, Latinx boys' experiences of health and well-being and intervention may be distinct from Latinx girls.[72,73] It follows then that sexual health programs must target the unique needs of this group specifically to be most effective, and effects of these programs should be considered separately.

CONCLUSIONS

Results from 12 studies with 4673 Latinx adolescents reveal that sexual health interventions are associated with improvements in abstinence, condom use, number of sex partners, and sexual health knowledge. Although effect sizes are small to moderate, sexual health programs do improve some sexual behaviors among Latinx adolescents. Findings from this meta-analysis highlight the following important future directions for those invested in improving the sexual health of Latinx adolescents: (1) sexual health interventions must be tailored specifically to the practices and experiences of Latinx adolescents, (2) there is a need for more thorough evaluation of sexual health outcomes and reporting of sample characteristics, (3) future research could evaluate the impact of sexual health interventions on biological outcomes, (4) more research is needed on how to successfully implement sexual health programs in real-world settings, and (5) additional programs aimed at improving the sexual health of Latinx boys are needed. Finally, these sexual health interventions are largely effective at improving the sexual health of Latinx adolescents; therefore, it is important that culturally tailored sexual health programs be available to Latinx communities across the United States.

ABBREVIATIONS

CI: confidence interval
STI: sexually transmitted infection

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