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Individual-level protective factors for sexual health outcomes among sexual minority youth: a systematic review of the literature

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Abstract

Although factors associated with negative sexual health outcomes among sexual minority youth (SMY) have been well documented, protective factors have been less studied. This review summarises the current state of science on individual-level protective factors for SMY and identifies gaps to inform future research. A systematic search of non-intervention, empirical peer-reviewed research was conducted. Articles that examined an *a priori*-identified individual-level protective factor and at least one sexual health outcome in a sample or subsample of SMY aged 10–24 years in Western, industrialised countries were eligible for inclusion. A total of 21 articles that reported data from 13 unique studies met inclusion criteria. Only two studies described findings for young sexual minority women and thus the literature synthesis was limited to studies reporting on young men who have sex with men (YMSM) in the USA. A total of 11 individual-level protective factors were examined. Subjective peer norms and attitudes about condom use were repeatedly protective in cross-sectional analyses. Findings related to self-efficacy, self-esteem and clear and positive identity were more mixed. The findings of this review suggest that attitudes and subjective peer norms related to condom use are promising intervention targets for YMSM. There is a need, however, for longitudinal research to confirm these protective effects and to consider them among other SMY. Moreover, protective factors related to skills and competencies have been insufficiently studied among SMY. Addressing these gaps will help develop a robust body of evidence to inform interventions.

Keywords

adolescents; condom use; health promotion; young men who have sex with men

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Conflicts of interest

None declared.

Introduction

Sexual minority youth (SMY), adolescents and young adults who experience same-sex attraction and/or behaviour and who may identify as gay, lesbian or bisexual, are at a disproportionate risk for negative sexual health outcomes including HIV and other sexually transmissible infections (STIs). These adolescents are also more likely than heterosexual adolescents to engage in a variety of sexual risk behaviours including sexual intercourse before age 13, having numerous partners and less frequent use of condoms and/or birth control, as appropriate.[1,2] In the United States, HIV rates increased by 27% between 2007 and 2010 (from 114.1/100 000 to 144.9/100 000) among young men who have sex with men (YMSM) aged 13–24 years, with black and Hispanic YMSM accounting for the majority of new infections.[3] In a US-based nationally representative longitudinal survey, YMSM and young women who have sex with men and women were more likely than heterosexual adolescents to report having had a STI.[4] SMY may also be more likely than their heterosexual peers to be involved in an unintended pregnancy.[5,6] Adolescents who identify as bisexual or who engage in sexual activity with both sexes may be especially at risk for HIV, other STIs and unintended pregnancy.[1,2,7]

While much of the existing literature on SMY has focused on risk factors for negative sexual health behaviours and outcomes, a relatively new body of literature has begun to identify protective factors for SMY that can reduce risk and improve outcomes.[7-9] Protective factors are characteristics, conditions and behaviours that can directly influence positive health outcomes and/or reduce the effects of stressful life events and other risk factors.[10] Bronfenbrenner's ecological model[11] provides a useful way to conceptualise protective factors within individual, relationship, community and societal domains. According to this model, an individual interacts with his or her environment at different levels, ranging from close relationships (e.g. partners, peers and family) to more distal community systems (e.g. schools) and societal influences (e.g. laws and policies).

Individual-level protective factors may be especially important for SMY. Many of these youth face discrimination and rejection at home, school, and from society at large and in many instances, these negative circumstances are beyond their control. Complementing efforts to address these contextual factors, promoting individual-level protective factors for SMY may lead to reduced sexual risk behaviour and improved health outcomes.[12,13] Modifiable individual-level protective factors such as self-efficacy and attitudes about condom use offer practical targets for intervention and are often addressed in HIV/STI prevention efforts, including positive youth development programs.[14]

Recognising the nascent literature on protective factors for SMY, a systematic review was conducted to: (i) summarise the current state of observational research on individual-level protective factors for this population; and (ii) identify gaps to inform future research in this area. Understanding what is known thus far can guide the development of a robust body of evidence, with comparable studies that can be meaningfully synthesised to inform programmatic efforts. A well-established body of literature on protective factors among general adolescent populations (Box 1), often assumed to be heterosexual, provides a useful context to begin mapping recent research focussed on SMY.[15,16] Thus, the central

research question was: what theoretical and/or empirical individual-level protective factors are protective for the sexual health of SMY? Ultimately, knowing which individual-level factors might help protect SMY from risk behaviours and adverse sexual health outcomes can inform the development and implementation of evidence-based interventions which may improve the sexual health of this vulnerable population.

Methods

Conceptual framework

A list of individual-level factors conceptualised as protective factors in adolescent health research and programs (e.g. 15–17) was developed *a priori* based on a non-systematic scan of peer-reviewed and grey literature (Box 1). A factor was included if it has been theoretically or empirically described as a protective factor for any health outcome among any population of adolescents or young adults. For organisational purposes, the study authors grouped the factors into one of four domains: (i) fixed characteristics, such as age and race/ethnicity;[17] (ii) personality traits, such as constraint,[18] lack of impulsivity[19] and self-regulation;[20] (iii) beliefs and perceptions, such as future orientation and self-efficacy;[16] and (iv) skills and competencies, such as partner communication skills.[15] For the purposes of this study, fixed characteristics were excluded; while such characteristics are often used to target interventions to certain populations, this review focuses on factors that can be modified or strengthened through public health intervention.

Literature search

A systematic search of non-intervention, empirical research published in peer-reviewed journals within the past 15 years (1999 through 2013) was conducted. Keywords from four categories (i.e. adolescence, sexual orientation, sexual health outcomes and protective factors) were used to create the search strategy (Table 1). In order for an article to be captured in the literature search, it had to include at least one keyword from each of the four categories. The search queried 12 databases (Table 1). Manual searches of relevant journals (e.g. *Archives of Sexual Behaviour, Journal of Sex Research, Journal of LGBT Youth, Journal of Homosexuality*) were also performed and the reference list of each included article was reviewed to identify any additional relevant articles.

Inclusion/exclusion criteria and screening process

All authors screened the identified abstracts using a standard form. To be included, an article had to examine the association between an individual-level factor previously conceptualised as protective for adolescent sexual health (Box 1) and at least one sexual health outcome using significance testing. Additionally, the article had to report findings from a sample or subsample of sexual minority youth (including gay, lesbian, bisexual and other non-heterosexual youth, as well as youth reporting same-sex attraction and behaviour) with an average age between 10 and 24 years in Western, industrialised countries (i.e. North America, Europe, Australia, New Zealand). Sociodemographic factors, such as education level, housing status and employment were not included as individual-level protective factors in this analysis. Retrospective studies of adults older than 24 years were not included due to the potential for recall bias. Finally, qualitative studies were excluded given the lack

of significance testing. To determine intercoder reliability, a subset of abstracts was screened by all coders. Articles identified through the abstract screening were subjected to full-text review to confirm eligibility. Any articles that were unclear with respect to inclusion or exclusion were discussed among all coders until consensus was reached.

Data extraction

The first author, in consultation with all authors, used a standard coding sheet to extract the following information from each included article: study design, sampling strategy, sample characteristics, individual-level protective factor(s) and sexual health outcomes. All included articles were reviewed to determine which were based on data from the same source (i.e. the same study). Key findings were summarised and each association between an individual-level factor and a sexual health outcome was classified as protective, null or risk, based on statistical significance (two-tailed, $P < 0.05$) and the direction of the association. Multivariate findings were of primary interest, although bivariate findings (with the exception of correlational analyses) were extracted in the absence of multivariate analyses. Both direct and indirect effects were documented. Similar to previous reviews of protective factors,[15] findings were considered protective if the presence and/or high level of an individual-level factor was associated with a decrease in an adverse sexual health outcome, or if the absence and/or low level of a previously conceptualised individual-level factor was associated with an increase in an adverse sexual health outcome (as some protective factors are operationalised in a risk paradigm). Several articles reported multiple associations because they assessed multiple individual-level factors, sexual health outcomes or mediated pathways; stratified results by sub-group; and/or reported both cross-sectional and longitudinal findings. In these cases, all findings that fit inclusion criteria were extracted.

Data analysis

To summarise the current state of the literature, extracted findings were aligned and grouped with a relevant *a priori* individual-level protective factor (e.g. findings about ‘comfort with one’s homosexuality’ were categorised as relevant to ‘clear and positive identity’). The number of protective, null and risk associations for each factor was then tallied. As in previous reviews,[21] a distinction was mad between cross-sectional and longitudinal findings as longitudinal findings offer stronger evidence of a causal relationship. If an article presented multiple associations for a single factor (e.g. by examining the factor in relation to multiple outcomes, among multiple subpopulations, or via multiple pathways), each association was considered separately. For clarity, the number of studies upon which the total number of associations for a given factor is noted. When multiple articles used the same data source (i.e. the same study) to examine an equivalent relationship between an individual-level construct and a sexual health outcome, all findings were reported. However, only the finding from the most recent analysis was counted, or in such cases where the analytic samples were different but overlapping, only the findings based on the most inclusive sample(s) were counted. Associations were included in this analysis regardless of the quality of the study or magnitude of the point estimate.

Results

The initial database search identified 3947 articles; an additional 38 articles were identified through supplementary search methods. After duplicates were removed, 3401 abstracts were screened and 101 articles were identified for full text review. Intercoder reliability of the abstract screening was 98.8%. A total of 21 articles reporting data from 13 unique studies met inclusion criteria. To enhance the synthesis of literature, the subsequent results present findings from the 20 articles and 12 unique studies that include data from YMSM (operationalised as same-sex attraction, identity and/or behaviour) from the United States (Fig. 1). Although the scope of the literature search included all SMY, only three articles from two studies included findings for young sexual minority women (in addition to findings for YMSM).[22-24] These associations were excluded from the analysis and main results table. Similarly, while the scope included all Western, industrialised countries, only one article presented findings from outside the United States (i.e. the Netherlands)[27] and was subsequently excluded from the analysis to further enhance the synthesis.

Study characteristics are presented in Table 2. The majority of articles (90%) reported only cross-sectional findings. The median sample size was 263 (range: 52–8235). The combined mean age of participants was 20.31 years and across all studies, age ranged from 13 to 29 years. Samples were also racially and ethnically diverse, with 15 of the 20 (75.0%) studies reporting a majority of participants from black, Hispanic/Latino, Asian/Pacific Islander, or mixed/other backgrounds.

A total of 11 theoretical/empirical individual-level protective factors were examined in 77 unique associations. Three associations between the same individual-level construct and sexual health outcome were presented in two or more articles using the same data source. Table 3 summarises the protective, null, and risk associations for each factor (presented alphabetically). Of the total associations examined, seven were longitudinal. Close to half of the associations (n = 37, 48%) examined unprotected anal intercourse (UAI; conceptualised as anal sex without the use of condoms) as the outcome of interest. The individual-level protective factors most studied across the articles were subjective peer norms, attitudes related to sex and sexuality, self-efficacy, and clear and positive identity. All factors are discussed briefly below.

Subjective peer norms

Subjective peer norms (i.e. an individual's perception of peer norms) were examined in 17 associations from seven studies and were associated protectively in most cross-sectional analyses. Twelve cross-sectional associations found a protective relationship between peer norms and sexual risk behaviours, primarily UAI.[22,26-33] This relationship was protective in several analyses for specific racial/ethnic groups, including African American YMSM.[28] However, the only longitudinal analysis involving this factor found that although sexual risk behaviour predicted changes in subjective norms, the reverse relationship was not statistically significant.[31]

Attitudes related to sex and sexuality

Likewise, five of the nine associations about attitudes related to sex and sexuality were protective. These associations, examined in five studies, largely involved attitudes related to condom use, also conceptualised in terms of decisional balance to forego condoms.[34,35] One study considered associations between attitudes towards lesbian, gay, bisexual and transgender people and a sexual risk behaviour scale.[23] Huebner *et al.* reported the only longitudinal association and, similar to their findings about subjective peer norms, they found that over time, sexual behaviour predicted attitudes about safer sex but that attitudes did not significantly predict behaviour.[31]

Self-efficacy

The associations related to self-efficacy were more mixed, both in terms of the constructs measured and the findings reported. Studies examining self-efficacy considered various dimensions, including self-efficacy for reducing HIV risk behaviours,[33] using condoms[36] and negotiating safer sex.[36,37] Although five cross-sectional analyses from three studies found protective associations between a self-efficacy construct and UAI or unprotected oral sex,[22,33,37,38] another three studies reported five null associations in relation to a sexual health outcome.[33,36,39] For example, Fisher examined both safer sex negotiation self-efficacy and condom use self-efficacy as two components of HIV prevention skills self-efficacy[36] and found that this measure was not associated with the sexual risk behaviour scale considered as the primary outcome of a path analysis.

Clear and positive identity

Clear and positive identity was also examined using a variety of constructs, including comfort with others knowing about one's sexual identity,[23,39,40] self-acceptance of sexual identity,[38] and self-labelling as non-heterosexual before same-sex activity.[36] Of the 13 associations from four studies, only two associations were protective,[36,40] whereas eight were null.[24,38,39] Two studies documented three risk associations between comfort with others knowing about one's sexual identity and sexual behaviour (i.e. UAI, unprotected oral sex, and a sexual risk composite).[39,40] One of these risk associations was reported in a longitudinal analysis conducted with YMSM aged 14–21 years.[40]

Condom use intentions

Although slightly fewer findings about intentions to use condoms or the use of other risk-reduction methods were included (eight associations from three studies), four protective cross-sectional and two protective longitudinal associations were reported.[22,28,40] Both longitudinal findings were from Rosario *et al.* who found that poor intentions for 'safer sex' (i.e. condom, finger cot, and/or rubber glove use) predicted unprotected receptive anal intercourse (URAI) and unprotected insertive anal intercourse (UIAI).[40] Additionally, the relationship between this measure of intention and the number of sexual encounters was considered to be significant by the study authors ($P < 0.06$), but is classified here as null given the analytic framework of this review. Only one additional null association between intention and a sexual health outcome was reported. Hart and Peterson found that among those who had insertive anal intercourse, not carrying a condom (a behavioural indicator

of intention) was not associated with UIAI. However, for those who had receptive anal intercourse, not carrying a condom was associated with increased likelihood of URAI.[28]

Self-esteem

Self-esteem was examined in three studies and six associations with mixed findings. Three protective associations, including one longitudinal association, were reported.[29,40] The longitudinal finding showed an indirect association between self-esteem and number of sexual partners via symptoms of anxiety.[40] Garofalo *et al.* reported null associations between self-esteem and a sexual risk composite (i.e. UAI, anal intercourse while intoxicated, insertive and receptive anal intercourse with multiple partners, and receptive anal intercourse with a high-risk partner) for the three racial/ethnic groups included in a stratified analysis.[39]

Other factors

Finally, several factors were examined in a limited number of associations. Four associations from two studies considered perceived susceptibility.[37,39] Among 834 YMSM in California, high perceived risk was associated with increased odds of having UAI.[37] Garofalo *et al.* examined perceived threat and reported null associations for each of the three racial/ethnic groups analysed.[39] Coping skills were examined in three associations from two studies: two of the findings were protective, whereas one was null.[29,41] HIV knowledge/information and skills were examined in two associations from two studies. Higher levels of HIV knowledge/information were associated with a lower score on a sexual risk behaviour scale,[36] while protection skills were protectively associated with UAI.[23] Self-control and religiosity were each examined in one study only. Self-control was not associated with a composite of sexual risk behaviours,[39] nor was religiosity (i.e. a measure of how religious the respondents considered themselves to be) associated with the number of sex acts without a barrier or number of sex partners in the past 6 months.[24]

Discussion

Across the findings for YMSM in the United States, subjective peer norms and attitudes related to sex and sexuality repeatedly showed protective associations in cross-sectional analyses. These findings are consistent with studies with heterosexual adolescents[42,43] and adult MSM.[44] Although less studied, intentions to use condoms were, not surprisingly, protective for sexual risk behaviours in most cross-sectional analyses and one longitudinal study.

Findings related to self-efficacy, self-esteem, and clear and positive identity were more mixed. Self-efficacy, a theoretical protective factor[45] widely explored in relation to sexual and reproductive health among heterosexual adolescents,[46] was not associated with sexual risk behaviours in several cross-sectional analyses. Several null findings were also reported for self-esteem. Although risk and protective effects for self-esteem have been documented among heterosexual youth,[47,48] this review did not identify risk associations for this factor. However, comfort with others knowing about one's homosexuality, a construct related to clear and positive identity, was associated cross-sectionally with increased unprotected oral sex[23] and longitudinally with URAI.[40] Although concerning, this finding is not completely

surprising given that internalised homophobia has been associated with decreased sexual risk behaviours.[49] Individuals who are more comfortable with their sexual orientation may be more likely to participate in activities with gay and lesbian communities and consequently, may have more opportunity to meet and engage in sexual activity with more partners. The only other risk association identified in this review involved perceived susceptibility, which was only examined cross-sectionally.[37,39]

Overall, the body of evidence summarised in this review aligns with initial impressions that the study of protective factors for SMY is an emerging area of inquiry requiring further longitudinal examination in Western, industrialised countries in addition to the United States. The criterion for sufficient evidence used in a previous systematic review of protective factors[21] required protective associations from two longitudinal studies. None of the factors identified in the current study were examined in two or more longitudinal studies. In fact, only two articles reporting longitudinal findings were identified. One reported protective associations between 'safer sex' intentions and two outcomes (i.e. number of sexual encounters, URAI).[40] The other reported null longitudinal associations for subjective peer norms and attitudes about safer sex,[31] which were two of the factors most consistently found to be protective in cross-sectional analyses.

The number of null associations identified in this review warrants further discussion. While the specific reason for a null finding may vary based on the factor in question, there are some general possible explanations. First, in many of the included studies, the small size of the YMSM sample may indicate insufficient power to identify a statistically significant result. Second, measurement of both protective factors and sexual minority status was inconsistent across studies and alternative measurement may produce different results. Of course, it is possible that the null associations accurately reflect a true absence of effect for these factors among SMY suggesting that some factors traditionally considered protective for other populations may not show the same effect for SMY. More study is needed, however, before such a conclusion can be drawn.

By systematically describing the nascent state of this literature, this review offers directions for future research. Based on the included articles, attitudes, intentions, and subjective peer norms surrounding condom use may be promising intervention targets for YMSM. However, there is a need for longitudinal research to confirm these protective effects and to understand whether these factors function as protective for other SMY. Moreover, it will be important to understand how attitudes, intentions, and norms related to new prevention technologies, such as pre-exposure prophylaxis, may impact sexual risk behaviour among YMSM. Given the strong theoretical rationale for addressing attitudes and intentions, intervention research that examines these factors as mediators of individual-level behaviour change may provide empirical evidence of their protective effect while evaluating theory-based programs.

In addition to building the evidence base for factors identified in this review, it will be important for future research to consider theoretical and empirical individual-level protective factors (Box 1) that do not appear to have been studied yet in this population. Skills and competencies, such as problem solving and social competence, may be useful targets for intervention, particularly in contexts where directly addressing sexual health skills

(e.g. condom negotiation) and related attitudes is not feasible. Additionally, understanding dimensions of personality that may be protective among SMY could provide useful context for programmatic efforts with this population.

Individual-level factors not currently conceptualised as protective for adolescent sexual health may also warrant further study among both SMY and heterosexual adolescents. Several factors emerged as potentially protective for YMSM specifically, such as acculturation, romantic ideation, and body image. For example, two studies reported protective associations between acculturation and UAI,[50,51] and Bauermeister *et al.* have published several articles suggesting that seeking romantic, as opposed to casual, partners and desiring high levels of commitment and relationship exclusivity may be protective for sexual minority adolescents.[52,53] Just as the larger body of literature on protective factors for adolescents should inform research on SMY, so too should emergent findings for this population be considered within a broader context.

Finally, analyses focused on subpopulations of SMY, beyond YMSM, would help to inform appropriate interventions. Given that YMSM account for nearly three-quarters of new HIV infections among youth,[3] research on sexual minority young men is critical. However, the disproportionate risk of teen pregnancy among SMY[5,54] merits more research into protective factors for sexual minority females. Similarly, bisexual youth may be at particular risk for adverse health outcomes[1,2,7] and should be considered independently of youth who engage in exclusively same-sex behaviour or who identify as gay/lesbian. Other subpopulations of SMY that were unable to be specifically examined in this review, including younger SMY, racial/ethnic minorities, youth who have experienced violence and homeless youth, should also be considered.

There are several limitations to this review that should be noted. By design, the search strategy focused specifically on identifying studies that framed their variables of interest as protective for sexual health outcomes. Therefore, papers that described their variables within a risk paradigm may not have been detected in this search, even if those variables could be conceptualised as protective factors. Additionally, variation in measurement also precluded meta-analysis and limited the ability to make comparisons across studies. It is important to note that the scope of this review was limited to individual-level protective factors among SMY in Western, industrialised countries. We identified several factors that may be considered at multiple levels of the social ecology model (e.g. subjective peer norms) and these were included in this review if they were conceptualised and measured at the individual level. Greater understanding of relationship-, community- and social-level factors that protect SMY from adverse sexual health outcomes would enhance prevention efforts. Finally, protective factors for the sexual health of SMY in non-Western regions of the world, as well as for gender minority (e.g. transgender or gender variant) youth, should be considered.

Despite these limitations, this research is the first to systematically synthesise literature on individual-level protective factors for the sexual health of SMY. This study was motivated in part by the growing recognition that researchers and programmers concerned about the sexual health of SMY are looking to move beyond risk factors and consider the assets

these adolescents and young adults have or can develop. This review summarises what is known and just as importantly, what remains understudied with respect to protective factors for this population. This review can serve as a model for mapping an emerging literature, particularly one that is (or at least should be) based on prior theoretical and empirical work, as is the case for protective factors for adolescent sexual health. Although individual-level protective factors can contribute to improved sexual health and well-being for adolescents, it is clear that insufficient attention has been given to understanding protective factors for SMY. These findings point to promising individual-level intervention targets and research priorities that will ultimately improve the health and well-being of sexual minority young people.

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Box 1.

Theoretical/empirical individual-level protective factors

Fixed

- Age
- Race/ethnicity
- Biological sex

Personality

- Tendency to seek meaning
- Temperament
- Extraversion
- Adaptability

Beliefs/Perceptions

- Belief in moral order
- Respect for standards of correct behaviour
- Integrity
- Belief in the future (confidence, sense of hopefulness, optimism)
- Locus of control
- Self-worth
- Clear and positive identity
- Self-esteem
- Self-efficacy
- Self-acceptance
- Beliefs and attitudes related to sex
- Subjective norms
- Academic motivation
- Educational aspirations
- Self-determination
- Autonomy
- Individual expectations
- Intentions
- Religiosity

Skills/Competencies

- Social skills (empathy and caring, sense of humour, responsiveness, ability to communicate)
- Positive social orientation
- Aptitude (resourcefulness, intellectual mastery)
- Problem solving skills
- Conflict resolution and negotiation skills
- Coping skills
- Self-regulation
- Cognitive, behavioural, emotional, and moral competence
- Knowledge and skills related to sex and sexual health

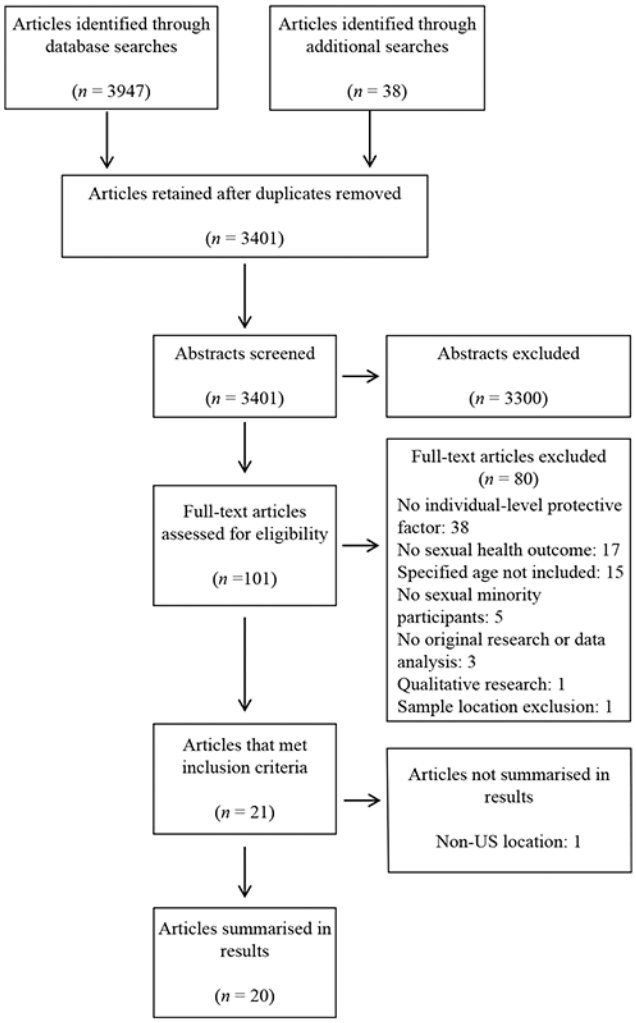

Fig. 1.
Flow diagram for inclusion and exclusion of articles.

Table 1.

Search strategy

MSM, men who have sex with men; WSW, women who have sex with women; STI, sexually transmissible infection

Category	Search terms
Adolescence	adolescen* or youth* or teen* or high school or middle school or pubert* or tween* or student* or young adult* or emerg* adult*
Sexual orientation	sex* orientation* or sex* identit* or gay* or lesbian* or bisex* or queer* or sex* minorit* or nonheterosex* or homosex* or same-sex* behaviour* or same-sex* attract* or MSM or men who have sex with men or WSW or women who have sex with women or same-gender* behavior* or same-gender* attract*
Sexual health outcomes	sex* health or reproduct* health or pregnan* or STI* or STD* or sex* transmitted infection or sex* transmitted disease or HIV or sex* risk behaviour or condom or early sex* initiation or early sex* debut or contracept* or birth control or sex* partner* or multiple partners or sex*
Protective factors	protect* factor* or resilien* or asset* or skill* or competen* or resourceful* or coping or cope* or psychological endurance or hardiness or adapt* or adjust* or empower* or health promot* or persistenc* or positive youth development
Databases used	PsychInfo, PsychArticles, Web of Science, Medline, Sociological Abstracts, ERIC, CINAHL, Embase, Global Health, CAB Abstracts, ASSIA, & ProQuest

Table 2.

Characteristics of included articles on young men who have sex with men (YMSM) in the United States

Id, identity; g, gay; b, bisexual; l, lesbian; q, queer; het, heterosexual; oth, other; und, undecided; non-His, non-Hispanic; PI, Pacific Islander; NR, study name not reported/data not reported

Article	Year	Study	Study design (Cross-sectional/ Longitudinal)	*n*	Sex (%)	Sexual orientation measure	Sexual identity (%)	Mean age in years (range)	Race/ethnicity (%)
Bauermeister *et al.*[34]	2012	Virtual Love Study	Cross-sectional	376	male: 100	Behaviour + Id	g: 88.8 b: 11.2	21.5 (18–24)	White, non-His: 73.1 Black, non-His: 5.9 Hispanic/Latino: 9.8 Asian/PI: 7.7 Mixed/Other: 3.5
Choi *et al.*[26]	2002	Community Intervention Trial for Youth (CITY)	Cross-sectional	253	male: 100	Behaviour + Id	g: 72.0 b: 20.0 het: 1.0 und: 5.0 oth: 2.0	21.0 (15–25)	Asian/PI: 100
Fisher[55]	2011	NR	Cross-sectional	156	male: 100	Behaviour + Id	g: 71.8 b: 19.2 oth: 9.0	18.6 (14–21)	White, non-His: 18.6 Black, non-His: 67.3 Hispanic/Latino: 3.9 Biracial: 8.3 Native American: 1.9
Fisher[36]	2012	NR	Cross-sectional	156	male: 100	Behaviour + Id	g: 72.0 b: 19.0 oth: 9.0	18.6 (14–21)	White, non-His: 19.0 Black, non-His: 67.0 Hispanic/Latino: 4.0 Biracial: 8.0 Native American: 2.0
Forney *et al.*[32]	2012	Community Intervention Trial for Youth (CITY)	Cross-sectional	8235	male: 100	Behaviour + Id	g: 74.2 b: 19.9 het: 0.5 oth: 5.4	21.5 (15–25)	White, non-His: 22.4 Black, non-His: 28.1 Hispanic/Latino: 34.2 Mixed/Other: 15.3
Garofalo *et al.*[39]	2010	NR	Cross-sectional	273	male: 100	Id	g: 82.0 b: 16.0 oth: 2.0	20.0 (16–24)	White, non-His: 34.1 Black, non-His: 37.0 Hispanic/Latino: 28.9
Hart & Peterson[28]	2004	Community Intervention Trial for Youth (CITY)	Cross-sectional	758	male: 100	Behaviour + Id	g: 53.4 b: 32.6 het: 0.8 und: 5.6 oth: 7.8	21.6 (18–25)	Black, non-His: 100
Huebner *et al.*[31]	2011	Young Men's Survey	Longitudinal	1465	male: 100	Id	g: 83.5 b: 15.1 oth: 1.4	23.3 (18-27)	White, non-His: 59.7 Black, non-His: 5.5 Hispanic/Latino: 27.6 Asian/PI: 3.2 Mixed/Other: 0.1 Native American: 3.9

Article	Year	Study	Study design (Cross-sectional/ Longitudinal)	*n*	Sex (%)	Sexual orientation measure	Sexual identity (%)	Mean age in years (range)	Race/ethnicity (%)
Molitor *et al.*[37]	1999	NR	Cross-sectional	834	male: 100	Behaviour	NR	21.9 (17–25)	White, non-His: 63.3 Black, non-His: 11.1 Hispanic/Latino: 15.8 Asian/PI: 4.8
Peterson *et al.*[30]	2009	NR	Cross-sectional	158	male: 100	Behaviour	NR	23.0 (19–29)	African American:[B] 100
Rosario *et al.*[22]	1999	NR	Cross-sectional	156	male: 51.3 female: 48.7	Id	g/l: 66.0 b: 31.0 het: 1.0 oth: 2.0	18.3 (14–21)	White, non-His: 22.0 Black, non-His: 35.0 Hispanic/Latino: 37.0 Asian/PI: 5.0 Mixed/Other: 2.0
Rosario *et al.*[23]	2001	NR	Cross-sectional	156	male: 51.3 female: 48.7	Id	g/l: 66.0 b: 31.0 oth: 3.0	18.3 (14–21)	White, non-His: 22.0 Black, non-His: 35.0 Hispanic/Latino: 37.0 Asian/PI: 5.0 Mixed/Other: 2.0
Rosario *et al.*[40]	2006	NR	Longitudinal	80	male: 100	Id	g: 65.0 b: 31.0 oth: 4.0	18.1 (14–21)	White, non-His: 24.0 Black, non-His: 34.0 Hispanic/Latino: 35.0 Asian/Other Ethnic Backgrounds: 8.0
Stein *et al.*[29]	2005	NR	Cross-sectional	248	male: 100	Id	g: 76.6 b: 13.3 het: 10.1	21.3 (15–24)	White, non-His: 22.0 Black, non-His: 19.0 Hispanic/Latino: 43.0 Asian/PI: 4.0 Mixed/Other: 12.0
Stueve *et al.*[27]	2002	Community Intervention Trial for Youth (CITY)	Cross-sectional	2624	male: 100	Behaviour + Id	g: 71.5 b: 23.8 und/oth: 4.7	21.3 (15–25)	White, non-His: 20.0 Black, non-His: 30.5 Hispanic/Latino: 36.6 Asian/PI: 8.5
Torres *et al.*[33]	2013	NR	Cross-sectional	52	male: 100	Behaviour	g: 61.5 b: 38.5	17.8 (15–19)	White, non-His: 9.6 Black, non-His: 71.2 Hispanic/Latino: 1.9 Mixed/Other: 17.3
Waldo *et al.*[38]	2000	Young Men's Survey II	Cross-Sectional	719	male: 100	Behaviour + Id	g: 63.3 b: 27.3 het: 3.9	NR (15–22)	White, non-His: 30.7 Black, non-His: 18.9 Hispanic/Latino: 29.5 Asian/PI: 16.3 Mixed/Other: 4.6
Wong *et al.*[41]	2010	Healthy Young Men's Study	Cross-sectional	526	male: 100	Attraction + Behaviour + Id	g: 74.0 b: 16.0 het: 1.0 oth: 9.0	20.1 (18–24)	White, non-His: 37.0 Black, non-His: 24.0 Mexican Descent: 39.0
Wright & Perry[24]	2006	Indiana Youth Access Project	Cross-sectional	156	male: 51.3 female: 48.7	Id	g/l: 69.9 b:30.1	18.2 (13–21)	White, non-His: 85.3 Black, non-His: 5.1

Article	Year	Study	Study design (Cross-sectional/ Longitudinal)	*n*	Sex (%)	Sexual orientation measure	Sexual identity (%)	Mean age in years (range)	Race/ethnicity (%)
									Mixed/Other: 3.2 Native American: 6.4
Yeagley *et al.*[35]	2014	Virtual Love Study	Cross-sectional	366	male: 100	Behaviour	g: 89.1 b: 10.9	21.5 (18–24)	White, non-His: 73.0 Black, non-His: 5.5 Hispanic/Latino: 10.1 Asian/PI: 7.9 Native American/Other: 3.6

*A*Of the 156 YMSM in the sample, 92.3% reported their gender identity as male and 7.7% as transgender.

*B*It is not clear whether black men of Hispanic descent are included.

Table 3.

Associations between theoretical and/or empirical individual-level protective factors and sexual health outcomes among young men who have sex with men (YMSM) in the United States

LBGT, lesbian, bisexual, gay, and transgender; UAI, unprotected anal intercourse; URAI, unprotected receptive anal intercourse; UIAI, unprotected insertive anal intercourse; ns, not significant; OR, odds ratio; AOR, adjusted odds ratio; CI, confidence interval; N/A, not applicable; SEM, structural equation modelling (referring to path analysis with latent variables); MANOVA, multivariate analysis of variance; df, degrees of freedom

Theoretical/ empirical protective factor	Individual-level factor[A]	Outcome[A]	Sub-population	Type of analysis[B]	Finding[C]	Type of effect[D]	First author, year	Summary
Attitudes related to sex and sexuality	Attitudes toward LBGT people	Sexual risk scale[E]	N/A	Path analysis	β: −0.20; $P < 0.05$	Protective	Fisher 2012[36]	Protective: 7 associations, 5 studies
	Attitudes toward protection	UAI	N/A	Path analysis (indirect)	β: 0.40 attitudes to poor protection skills; $P < 0.05$ β: 0.35 poor protection skills to UAI; $P < 0.05$	Protective (inverse)	Rosario 1999[22]	Null: 2 associations (1 longitudinal), 2 studies Risk: 0 associations Total: 9 associations (1 longitudinal),
	Attitudes toward safe sex	UAI with a casual, non-monogamous, or serodiscordant partner	N/A	SEM (cross-sectional)	β: −0.28 (time 1); −0.15 (time 2); $P < 0.001$	Protective	Huebner 2011[31]	5 studies
	Attitudes toward safe sex	UAI with a casual, non-monogamous, or serodiscordant partner	N/A	SEM (longitudinal)	β: −0.05; ns	Null	Huebner 2011[31]	
	Attitudes toward safe sex	UAI	N/A	Logistic regression	AOR: 1.4; 95% CI 1.2, 1.6	Protective (inverse)	Molitor 1999[37]	
	Attitudes toward alcohol and sex	UAI	N/A	Logistic regression (unadjusted)	OR: 1.1; ns	Null	Molitor 1999[37]	
	Decisional balance to forego condoms[F]	UIAI	Participants who reported IAI	Poisson regression	AOR: 1.82; $P < 0.001$	Protective	Bauermeister 2012[34]	
	Decisional balance to forego condoms[F,G]	URAI	Participants who reported RAI N/A	Poisson regression. Negative binomial regression	AOR: 1.62; $P < 0.001$ AOR: 1.56; 95% CI: 1.30, 1.87; $P < 0.001$	Protective	Bauermeister 2012[34] Yeagley 2013[35]	

Theoretical/ empirical protective factor	Individual-level factor[A]	Outcome[A]	Sub-population	Type of analysis[B]	Finding[C]	Type of effect[D]	First author, year	Summary
	Decisional balance to forego condoms[F]	Number of URAI partners	Participants who reported at least one occasion of URAI	Negative binomial regression	AOR: 2.52; 95% CI: 2.09, 3.05, $P < 0.001$	Protective	Yeagley 2013[35]	
Clear and positive identity	Attitudes about (one's) homosexuality	Sexual risk composite[H]	Caucasian	Linear regression	β: 0.12; ns	Null	Garofalo 2010[39]	Protective: 2 associations (1 longitudinal), 2 studies
	Attitudes about (one's) homosexuality	Sexual risk composite	African American	Linear regression	β: 0.07; ns	Null	Garofalo 2010[39]	Null: 8 associations, 3 studies
	Attitudes about (one's) homosexuality	Sexual risk composite	Latino	Linear regression	β: −0.05; ns	Null	Garofalo 2010[39]	Risk: 3 associations (1 longitudinal), 2 studies
	Attitudes toward (one's) homosexuality	Number of sexual partners	N/A	Path analysis (indirect)	β: −0.31 attitudes to anxious symptoms; $P < 0.05$; β: 0.50 anxious symptoms to number of sexual partners; $P < 0.05$	Protective (inverse)	Rosario 2006[40]	Total: 13 associations (2 longitudinal), 4 studies
	Attitudes toward (one's) homosexuality	Number of sexual encounters	N/A	Path analysis	β: −0.30; $P < 0.06$ (ns)	Null	Rosario 2006[40]	
	Comfort with (one's) homosexuality	Sexual risk composite	Caucasian	Linear regression	β: 0.27; $P < 0.01$	Risk	Garofalo 2010[39]	
	Comfort with (one's) homosexuality	Sexual risk composite	African American	Linear regression	β: 010; ns	Null	Garofalo 2010[39]	
	Comfort with (one's) homosexuality	Sexual risk composite	Latino	Linear regression	β: −0.08; ns	Null	Rosario 2001[23]	
	Comfort with (others knowing about one's) homosexuality	Unprotected oral sex	N/A	Path analysis	β: 0.32; $P < 0.05$	Risk	Rosario 2006[23]	
	Comfort with others knowing about one's homosexuality	URAI	N/A	Path analysis	OR: 9.77; $P < 0.05$	Risk	Rosario 2006[40]	
	Gay or bisexual self-acceptance	UAI	15–17 years of age	MANOVA	d = 0.43; one-tailed $P = 0.025$	Null[I]	Waldo 2000[38]	
	Gay or bisexual self-acceptance	UAI	18-22 years of age	MANOVA	d = 0.12; one-tailed $P = 0.064$	Null	Waldo 2000[38]	
	Sex-centred developmental sequence (same-sex activity occurring prior	Sexual risk scale	N/A	Path analysis	β: 0.19; $P < 0.05$	Protective (inverse)	Fisher 2012[36]	

Theoretical/ empirical protective factor	Individual-level factor[A]	Outcome[A]	Sub-population	Type of analysis[B]	Finding[C]	Type of effect[D]	First author, year	Summary
	to self-labelling as non-heterosexual)[J]							
Coping skills	Positive coping style	Sexual transmission risk behaviors[K]	N/A	SEM	β: −0.13 coping style to delinquency; $P < 0.05$ β: 0.29 delinquency to sexual transmission risk; $P < 0.001$	Protective	Stein 2005[29]	Protective: 2 associations, 2 studies Null: 1 association, 1 study Risk: 0 associations Total: 3 associations, 2 studies
	Proactive coping	UAI	N/A	Hierarchical logistic regression	OR = 0.97 (0.93–1.00), $P < 0.10$	Null	Wong 2010[41]	
	Proactive coping	UAI	N/A	Path analysis (indirect)	β: −0.03 coping to illicit drug use β: 0.23 drug use to UAI	Protective	Wong 2010[41]	
Intentions to use condoms	HIV prevention motivation[G,L]	Sexual risk scale	N/A	Path analysis	β: −0.17; $P < 0.05$ β: −0.15; $P < 0.05$ OR: 3.48; 95%	Protective	Fisher 2011[55] Fisher 2012[36]	Protective: 6 associations (2 longitudinal), 3 studies
	Not carrying a condom[M]	URAI	Those participating in RAI	Logistic regression	CI = 1.58, 7.66; $P < 0.01$ ns	Protective	Hart 2004[28]	Null: 2 null (1 ongitudinal), 2 studies
	Not carrying a condom[M]	UIAI	Those participating in IAI	Logistic regression (unadjusted)		Null		Risk: 0 associations Total: 8 associations (3 longitudinal), 3 studies
	Intentions to use protection	UAI	N/A	Path analysis	β: 0.48; $P < 0.05$	Protective (inverse)	Rosario 1999[22]	
	Intentions to use protection	Unprotected oral sex	N/A	Path analysis	β: 0.50; $P < 0.05$	Protective (inverse)	Rosario 2006[40]	
	Intentions for safer sex	Number of sexual encounters	N/A	Path analysis	β: 0.22; $P < 0.06$	Null	Rosario 2006[40]	
	Intentions for safer sex	URAI	N/A	Path analysis	OR: 29.63; $P < 0.05$	Protective (inverse)	Rosario 2006[40]	
	Intentions for safer sex	UIAI	N/A	Path analysis	OR: 4.94; $P < 0.05$	Protective (inverse)	Rosario 2006[40]	
Knowledge and skills	HIV prevention information[G]	Sexual risk scale	N/A	Path analysis	β: −0.24; $P < 0.05$ β: −0.25; $P < 0.05$ β: 0.35 $P < 0.05$	Protective	Fisher 2011[55] Fisher 2012[36]	Protective: 2 association, 2 studies

Theoretical/ empirical protective factor	Individual-level factor[A]	Outcome[A]	Sub-population	Type of analysis[B]	Finding[C]	Type of effect[D]	First author, year	Summary
related to sex/ sexual health	Protection skills	UAI	N/A	Path analysis		Protective (inverse)	Rosario 1999[22]	Null: 0 associations Risk: 0 associations Total: 2 associations, 2 studies
Perceived susceptibility	Perceived risk of HIV infection	UAI	N/A	Logistic regression	OR: 1.5; 95% CI = 1.3, 1.8	Risk	Molitor 1999[37]	Protective: 0 associations
	Perceived threat (of HIV/AIDS)	Sexual risk composite	Caucasian	Linear regression	β: −0.17; ns	Null	Garofalo 2010[39]	Null: 3 associations, 1 study Risk: 1 association, 1 study
	Perceived threat (of HIV/AIDS)	Sexual risk composite	African American	Linear regression	β: −0.21; ns	Null	Garofalo 2010[39]	Total: 4 associations, 2 studies
	Perceived threat (of HIV/AIDS)	Sexual risk composite	Latino	Linear regression	β: −0.04; ns	Null	Garofalo 2010[39]	Protective: 0 associations
Religiosity	Religiosity	Risky sexual acts (sex acts w/o condom)	N/A	Ordinary least squares regression	ns	Null	Wright 2006[24]	Null: 2 associations, 1 study
	Religiosity	Number of sex partners	N/A	Ordinary least squares regression	ns	Null		Risk: 0 associations Total: 2 associations, 1 study
Self-efficacy	Self-efficacy (related to HIV/AIDS)	Sexual risk composite	Caucasian	Linear regression	β: 0.05; ns	Null	Garofalo 2010[39]	Protective: 5 associations, 3 studies Null: 5 associations, 3 studies 3 studies
	Self-efficacy (related to HIV/AIDS)	Sexual risk composite	African American	Linear regression	β: 0.06; ns	Null	Garofalo 2010[39]	Risk: 0 associations Total: 10 associations, 6 studies
	Self-efficacy (related to HIV/AIDS)	Sexual risk composite	Latino	Linear regression	β: −0.18; ns	Null	Garofalo 2010[39]	
	Self-efficacy	UAI	N/A	Path analysis (indirect)	β: 0.31 self-efficacy to intentions to use protection; $P < 0.05$	Protective (inverse)	Rosario 1999[22]	

Theoretical/ empirical protective factor	Individual-level factor[A]	Outcome[A]	Sub-population	Type of analysis[B]	Finding[C]	Type of effect[D]	First author, year	Summary
					β: 0.48 intentions to use protection to UAI; $P < 0.05$			
	Self-efficacy	Unprotected oral sex	N/A	Path analysis (indirect)	β: 0.31 self-efficacy to intentions to use protection; $P < 0.05$ β: 0.50 intentions to use protection to unprotected oral sex; $P < 0.05$	Protective (inverse)	Rosario 1999[22]	
	Safer sex communication skills (self-efficacy and behaviour)	UAI	N/A	Logistic regression	OR: 1.3; 95% CI: 1.1, 1.5	Protective (inverse)	Molitor 1999[37]	
	Skills self-efficacy[G]	Sexual risk scale	N/A	Path analysis	ns ns	Null	Fisher 2011[55] Fisher 2012[36]	
	Self-efficacy for reducing HIV risk behaviours	UAI	N/A	Logistic regression	OR: 1.12; 95% CI: 0.95, 1.33	Null	Torres 2013[33]	
	Safer sex self-efficacy	UAI	15–17 years of age	MANOVA	d = 0.73; $P = 0.002$	Protective	Waldo 2000[38]	
Self-esteem	Safer sex self-efficacy	UAI	18–22 years of age	MANOVA	d = 0.57; $P < 0.001$	Protective	Waldo 2000[38]	
	Self-esteem	Sexual risk composite	Caucasian	Linear regression	β: 0.12; ns	Null	Garofalo 2010[39]	Protective: 3 associations (1 longitudinal), 2 studies
	Self-esteem	Sexual risk composite	African American	Linear regression	β: −0.06; ns	Null	Garofalo 2010[39]	
	Self-esteem	Sexual risk composite	Latino	Linear regression	β: 0.15; ns	Null	Garofalo 2010[39]	
	Self-esteem	Sexual transmission risk behaviours	N/A	SEM	β: −0.17; $P < 0.05$	Protective (inverse)	Stein 2005[29]	Null: 3 associations, 1 study
	Self-esteem	UAI	N/A	Path analysis (indirect)	β: −0.28 self-esteem to anxiety; $P < 0.05$ β: 0.28 to UAI; $P < 0.05$	Protective (inverse)	Rosario 1999[23]	Risk: 0 associations Total: 6 associations (1 longitudinal), 3 studies
	Self-esteem	Number of sexual partners	N/A	Path analysis (indirect)	β: −0.37 self-esteem to anxious symptoms; $P < 0.05$; β: 0.50 anxious symptoms to number of sexual partners; $P < 0.05$	Protective (inverse)	Rosario 2006[40]	

Theoretical/ empirical protective factor	Individual-level factor[A]	Outcome[A]	Sub-population	Type of analysis[B]	Finding[C]	Type of effect[D]	First author, year	Summary
Self-regulation	Self-control	Sexual risk composite	Caucasian	Linear regression	β: 0.07; ns	Null	Garofalo 2010[39]	Protective: 0 associations
	Self-control	Sexual risk composite	African American	Linear regression	β: 0.03; ns	Null	Garofalo 2010[39]	Null: 3 associations, 1 study
	Self-control	Sexual risk composite	Latino	Linear regression	β: −0.15; ns	Null	Garofalo 2010[39]	
	Peer norms about condoms[N]	UAI	HIV negative	Logistic regression	OR: 1.12; 95% CI: 1.11,1.14; $P < 0.01$	Protective (inverse)	Forney 2012[32]	Risk: 0 associations Total: 3 associations, 1 study
Subjective peer norms	Peer norms about condoms[N]	UAI	HIV positive	Logistic regression	OR: 1.13; 95% CI: 1.00, 1.27; $P < 0.05$	Protective (inverse)	Forney 2012[32]	Protective: 12 associations, 6 studies
	Peer norms regarding condom use[N]	URAI	African American participating in RAI	Logistic regression	OR: 2.43; 95% CI: 1.41, 4.22; $P < 0.01$	Protective (inverse)	Hart 2004[28]	Null: 5 associations (1 longitudinal), 3 studies
	Peer norms regarding condom use[N]	UIAI	African American participating in IAI	Logistic regression (unadjusted)	OR: 1.90; 95% CI: 1.15, 3.14; $P < 0.05$	Protective (inverse)	Hart 2004[28]	Total: 17 associations (1 longitudinal), 7 studies
	Perceived peer norms about safer sex[N]	UAI	Asian / Pacific Islander	Logistic regression	AOR: 2.97; 95% CI: 1.60, 5.51; $P < 0.01$	Protective (inverse)	Choi 2002[26]	
	Peer norms	Sexual transmission risk behaviours	N/A	SEM (indirect)	β: 0.28 norms to delinquency; $P < 0.001$ β: 0.2 delinquency to sexual transmission risk; $P < 0.001$	Protective (inverse)	Stein 2005[29]	
	Peer norms	Sexual transmission risk behaviours	N/A	SEM (indirect)	β: 0.57 norms to hard drug use; $P < 0.001$ β: 0.23 drug use to sexual transmission risk; $P < 0.05$	Protective (inverse)	Stein 2005[29]	
	Peer norms for safe sex	UAI with a casual, non-monogamous or serodiscordant partner	N/A	SEM (cross-sectional)	Correlation: −0.12 (time 1), −0.12 (time 2); $P < 0.001$	Protective	Huebner 2011[31]	
	Peer norms for safe sex	UAI with a casual, non-monogamous or serodiscordant partner	N/A	SEM (longitudinal)	β: −0.03; ns	Null	Huebner 2011[31]	

Theoretical/ empirical protective factor	Individual-level factor[A]	Outcome[A]	Sub-population	Type of analysis[B]	Finding[C]	Type of effect[D]	First author, year	Summary
	Perceived (peer) condom norms	Low risk group vs high risk group	N/A	ANOVA	ns	Null	Peterson 2009[30]	
	Perceived peer condom norms	Low risk group vs no risk group	N/A	ANOVA	ns	Null	Peterson 2009[30]	
	Perceived (peer) condom norms	High risk group vs no risk group	N/A	ANOVA	F = 5.30, df: 2; $P = 0.0006$	Protective	Peterson 2009[30]	
	Peer norms about condoms	Being high during last sexual encounter with main partner	Sexual contact with main or non-main partner in last 3 months	Logistic regression	OR: 0.77; 95% CI: 0.67, 0.88; $P < 0.001$	Protective	Stueve 2002[27]	
	Peer norms about condoms	Being high during last sexual encounter with non-main partner	Sexual contact with main or non-main partner in last 3 months	Logistic regression	OR: 0.78; 95% CI: 0.70, 0.87; $P < 0.001$	Protective	Stueve 2002[27]	
	Peer norms about condoms	Relationship between being high and UAI with non-main partner	N/A	Logistic regression (moderation)	OR: 0.57; 95% CI: 0.48, 0.66; $P < 0.001$	Protective	Stueve 2002[27]	
	Partner norms	UAI	N/A	Path analysis	β: 0.28; $P < 0.05$	Protective (inverse)	Rosario 1999[22]	
	Partner norms	Unprotected oral sex	N/A	Path analysis	β: 0.25; $P < 0.05$	Protective (inverse)	Rosario 1999[22]	
	Safer sex peer norms	UAI	15–17 years of age	MANOVA	d = 0.37; one-tailed $P = 0.050$	Null	Waldo 2000[38]	
	Safer sex peer norms	UAI	18–22 years of age	MANOVA	One-tailed $P = 0.19$	Null	Waldo 2000[38]	
	Peer sexual norms	UAI	N/A	Logistic regression	OR: 1.85; 95% CI: 1.08, 3.15; $P < 0.03$	Protective (inverse)	Torres 2013[33]	

[A] The authors' language is used to describe individual-level factors and outcomes; relevant clarifications are noted in parentheses.

[B] Unless otherwise indicated, multivariate statistics are used and direct effects are examined.

[C] Point estimates/*P* values are not provided if the authors did not report them.

[D] Inverse indicates that an absence and/or low score of an individual-level construct (e.g. poor partner norms) was associated with an adverse sexual health outcome or that the individual-level construct was operationalised as a risk factor (e.g. decisional balance to forgo condoms, not carrying a condom) in which case the presence and/or high score was associated with an adverse sexual health outcome.

[E] Based on ever having had vaginal/anal sex and frequency of condom use for vaginal/anal sex.

[F] This factor was included because Bauermeister *et al.*[34] conceptualised it as protective (i.e. decisional balance to use condoms) even though it was operationalised in analyses as a risk factor. Yeagley *et al.*[35] examined the same factor using the same data source and also operationalised it in analyses as a risk factor.

[G] This association was examined in two articles that use the same data source. Per our analytic strategy, this association is only counted in the summary column once.

[H] Includes UAI, anal intercourse while intoxicated, insertive and receptive anal intercourse with multiple partners, and receptive anal intercourse with a high-risk partner.

[I] Significance is based on a two-tailed $P < 0.05$.

[J] This factor was included because it is a dichotomous measure of identity development, although it was operationalised in analyses as a risk factor.

[K] Latent variable based on sexual activity without condom use, percentage of partners they did not tell they were HIV positive, number of sex partners in prior 3 months.

[L] Composite measure of attitudes, norms, and intentions; because intentions are most proximal to behaviour, it has been classified as relevant to intentions.

[M] This factor was included because it is a dichotomous behavioural measure of intention to use condoms, although it was operationalised in analyses as a risk factor.

[N] This association is examined by multiple authors using the same data source for different but overlapping analytic samples. Only the findings for Forney *et al.*[32] are included in the count.