

Identifying Resilience Resources for HIV Prevention Among Sexual Minority Men: A Systematic Review

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Abstract Most HIV prevention for sexual minority men and men who have sex with men targets risk behaviors (e.g., condom use) and helps <50% of participants. Bolstering resilience might increase HIV prevention's effectiveness. This systematic review identified resilience resources (protective factors) in high-risk, HIV-negative, sexual minority men. We reviewed PsycINFO, PsycARTICLES, MEDLINE, references, and Listservs for studies including sexual minority men with 1+ HIV risk factor (syndemics): childhood sexual abuse, partner abuse, substance abuse, or mental health symptoms. From 1356 articles screened, 20 articles met inclusion criteria. Across the articles, we identified and codified 31 resilience resources: socioeconomic (e.g., employment), behavioral coping strategies (e.g., mental health treatment),

cognitions/emotions (e.g., acceptance), and relationships. Resilience resources were generally associated with lower HIV risk; there were 18 low-risk associations, 4 high-risk associations, 8 non-significant associations). We generated a set of empirically based resilience variables and a hypothesis to be evaluated further to improve HIV prevention.

Resumen La mayoría de prevención del VIH para los hombres de las minorías sexuales y hombres que tienen relaciones sexuales con hombres se dirige a los comportamientos de riesgo (por ejemplo, el uso del condón) y ayuda a <50% de los participantes. Refuerzo de la resiliencia podría aumentar la efectividad de la prevención del VIH. Esta revisión sistemática identificó recursos de resiliencia (factores protectores) en alto riesgo, VIH-negativos, hombres de las minorías sexuales. Revisamos PsycINFO, PsycARTICLES, MEDLINE, referencias, y servidores de listas para los estudios incluidos hombres de las minorías sexuales con factor de riesgo del VIH 1+ (syndemics): el abuso sexual infantil, el abuso de pareja, abuso de sustancias, o síntomas de salud mental. A partir de 1.356 artículos revisados, 20 artículos cumplieron los criterios de inclusión. A través de los artículos, hemos identificado y codificado 31 recursos de resiliencia: socio-económico (por ejemplo, empleo), las estrategias de afrontamiento de comportamiento (por ejemplo, tratamiento de salud mental), cogniciones/emociones (por ejemplo, la aceptación), y relaciones. recursos de resiliencia en general se asocian con un menor riesgo de VIH (18 asociaciones riesgo bajo, 4 asociaciones alto riesgo, 8 asociaciones no significativas). Hemos generado un conjunto de variables de resiliencia de base empírica y una hipótesis para realizar evaluaciones adicionales para mejorar la prevención del VIH.

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Introduction

HIV/AIDS disproportionately affects sexual minority men [1], that is, men who identify with a sexual minority label (e.g., gay, bisexual) or who have sex with men regardless of sexual orientation. The new global UNAIDS strategy involves improving HIV prevention among this population [2]. Sexual minority men are at disproportionately high HIV risk for at least two reasons: *minority stress* [3] and psychosocial problems, such as childhood sexual abuse [4]. The aim of this systematic review was to identify a set of resilience resources among sexual minority men with minority stress and psychosocial problems, which, upon further study, may improve HIV prevention.

Explaining High HIV Risk Among Sexual Minority Men

Minority stress is a type of unique stress created by living as a sexual minority person in a heterosexist society [3]. Minority stress increases HIV risk among sexual minority men through indirect pathways [4]. Specifically, minority stress occurs by having to conceal one's sexual orientation, experience and anticipate identity-based discrimination, and internalize negative societal messages about sexual minority persons. Sexual minority persons experience minority stress in addition to everyday stressors and, as such, have worse health outcomes than heterosexual persons [5]. Minority stress is positively related to HIV risk behavior [7]. Another reason some sexual minority men are at high risk for HIV is because of specific psychosocial problems [6]. These psychosocial problems have an additive effect among sexual minority men, with more problems associated with a higher likelihood of HIV risk behavior and HIV seroconversion [8, 9]. Associations between psychosocial problems and HIV are consistent with a *syndemics* framework, in which two or more problems interact synergistically to increase the likelihood of a third problem [7]. In the literature, there are four HIV-related syndemic conditions for sexual minority men: childhood sexual abuse, partner abuse, substance abuse, and mental health symptoms [6]. These conditions also occur at higher levels compared to heterosexual men [8, 11, 12].

To prevent HIV transmission, policies focus on behavioral interventions to reduce condomless anal sex (CAS) among sexual minority men (8; HIV policy #18). Behavioral HIV interventions typically address deficits

through pragmatic skills to decrease CAS (e.g., 14). A systematic review of existing behavioral interventions found that CAS decreased among 27–43% of sexual minority men [9]. Although promising, the question remains: What would help the other two-thirds of sexual minority men to decrease CAS and, subsequently, their HIV risk?

One novel way to improve HIV prevention, especially among sexual minority men with syndemic conditions and minority stress [16], is to infuse existing interventions with strategies that enhance *resilience*, rather than only addressing deficits in pragmatic skills [10]. A resilience research paradigm is consistent with a larger scientific shift toward positive psychology [11], especially in sexual minority populations [18]. For example, Reed and colleagues [12] concluded the key difference between Black sexual minority men who did not meet criteria for syndemics and those who did, was the presence of positive interpersonal relationships that promoted resilience.

Shifting Toward and Defining Resilience in HIV Prevention

One next step to move the literature forward is to systematically identify other sources of resilience, and use them to increase innovation in HIV prevention interventions [13]. This step mirrors the so-called ‘first wave’ of resilience research, which focused on children's health, and identified variables that were thought to enhance resilience and warrant further study for interventions [14]. Although waves of resilience in children's health are not prescriptive, they emanate from a well-established body of resilience research with which HIV researchers may model, refer, and compare.

A scoping review of health research on resilience among sexual minority populations concluded “there is no clearly agreed-upon definition of resilience” (15, p. 6). In this paper, we provide an overarching definition of resilience that framed our inquiry, and provide conceptual and operational definitions of resilience resources. Our overarching definition of resilience, based on consensus across literature, is that resilience is a developmental process in response to adversity, not a static trait [16, 17], dynamic over time, and certain amalgams of factors may characterize resilience for one population but not another [18]. We conceptualized adversity as one of the two HIV risk constructs with an empirically based pathway to HIV infection for some sexual minority men—minority stress [19] and syndemics conditions [6]. Therefore, if in the context of experiencing minority stress or one syndemic condition, a variable were to be associated with a lower level of another syndemic condition or more frequent

condom use and thereby reduce HIV risk, that variable would be defined as a resilience resource. In this review, we systematically identified *resilience resources* [20]—variables indicative of the overarching process of resilience or protective factors that may prevent HIV. We believe resilience occurs by way of resilience resources (e.g., social support) among individuals with elevated risk for negative developmental outcomes across the lifespan (sexual minority men with syndemic conditions and/or minority stress) who do not actually develop a negative outcome (i.e., HIV; 17). By investigating resilience resources among individuals for whom risk for negative outcomes is higher than in the general population, we study an important scientific phenomenon to clarify its usefulness in assisting other individuals who experience adversity. We clarified conceptual definitions and theoretical rationale of resilience resources in Table 1 and operational definitions of them in the methods section.

Scholars have called for research on resilience and HIV, in general [21], and on sexual minority men, specifically, to identify and test resilience-based interventions (e.g., 9). This paradigm shift is driven by research indicating *most* sexual minority men do not have syndemic conditions, thus implying the presence of resilience resources [22], and also by data that behavioral HIV prevention interventions have plateaued in their ability to reduce new infections [10, 13]. One hypothesis is that existing behavioral interventions take too strongly a deficit-focused position, overlooking potential resilience resources among sexual minority men

and, by doing so, inadvertently invalidate their strengths, leading to treatment disengagement or dropout [10]. Indeed, across 19 studies examining efficacy of HIV prevention programs, the biggest barrier was participant retention—with some researchers stating their interventions were “not sufficiently motivating and captivating” (9, p. S50). One way to improve interest and engagement in HIV prevention may be to emphasize participants’ resources to mobilize behavior change. For example, a resilience perspective might explore other resources to increase condom use, such as an individual’s commitments to healthy living or behavior patterns in another area of life (e.g., exercising).

Little research on HIV and resilience among sexual minority men has been published. One study examined resilience related to HIV syndemics among sexual minority men [31], and only one empirical study has been published on resilience and HIV associations among sexual minority men [32]. Both prior studies quantitatively analyzed resilience variables identified by the authors a priori [31, 32]. The current review extends prior work by generating a broader set of resilience variables, informed by current literature, among sexual minority men at high risk for HIV, which may improve HIV prevention efforts. This bottom-up approach, with no resilience resources specified a priori, is a necessary foundation because it may reduce Type II error in future scientific inquiries and provides a stronger rationale for exploration of specific resilience variables among a high-risk subgroup.

Table 1 Conceptual definitions and rationale of resilience resources in a systematic review of HIV-negative sexual minority men with 1+ HIV risk factor

Conceptual criterion of a resilience resource	Rationale from resilience literature	Rationale from HIV literature
1. A variable that exists at any ecosystem level (e.g., individual, macrosystem)	Well-established research on child mental health concluded that resilience variables exist at many ecosystem levels [14, 21, 22]	HIV risk factors occur at several ecosystem levels [23, 24], thus, we hypothesize that HIV resilience resources also occur at several ecosystem levels
2. Variable must be present among individuals who have experienced adversity	Resilience is derived from unexpected positive characteristics and outcomes among people who experienced adversity [16]	Adversity resulting in higher HIV risk is defined as 1+ syndemic conditions [6] or minority stress [26]. Improving HIV prevention among people with adversity is needed [9, 25]
3. The presence of a variable, rather than the absence	Although some resilience researchers argue that absence of a problem (e.g., no drug use) confers resilience [20], most argue that resilience is promoted by the presence of adaptive variables [21, 27]	HIV researchers also argue that resilience involves the presence of adaptive variables [28]. From a translational research perspective [29], HIV research should identify factors that can be enhanced in HIV prevention because intervention developers cannot remove unmodifiable HIV risk factors (e.g., childhood sexual abuse) and also cannot target the absence of a problem in interventions

Resilience resources are variables systematically identified through this review and are conceptualized as indicative of the overarching process of resilience. For operational definitions of resilience resources in this review, see operational definition of resilience resources in the methods section

The Current Review

The literature lacks foundational data on what factors constitute resilience resources for HIV prevention, especially among individuals with increased HIV risk. In this review, we identified and categorized resilience resources from the extant literature across samples of sexual minority men at high risk for HIV. We defined our sample as sexual minority men who had some HIV risk but who had remained HIV-negative, suggesting positive adaptation on their parts. We captured a wide variety of men exposed to risk by (a) extracting data from samples who, by virtue of being sexual minority men, were exposed to minority stress, and also by (b) sampling men who self-reported one or more syndemic condition. Our goal was to generate a set of empirically based resilience variables to consider when adapting the next wave of HIV interventions for sexual minority men.

We clarified parameters of this systematic review according to the following six taxonomies from current guidelines [23]. Our *focus* was on identifying empirical findings, rather than methods or theory. There were three main *goals*: (a) identify and categorize (into themes) resilience resources from the literature on HIV-negative sexual minority men with some HIV risk; (b) extract data on associations between resilience resources and HIV risk; (c) assess whether associations between resilience resources and HIV risk differed by theme. We espoused a *position* that there would be resilience resources among sexual minority men at high risk for HIV and such resources would be associated with lower HIV risk. The *coverage* was not exhaustive. We reported from published literature within our search strategy and did not draw from all possible literature (e.g., unpublished). We *organized* results conceptually by ecosystems level themes determined by our coding scheme. Our *audience* is scientists, especially treatment developers, studying resilience and/or HIV prevention among disproportionately affected groups.

Methods

Search for Evidence

Literature Search

Data collection and analysis followed PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) guidelines [24] [see checklist in supplementary files]. We retrieved articles from three sources: (a) electronic databases (PsycINFO, PsycARTICLES, MEDLINE),

(b) reference lists of screened articles, and (c) online professional venues, including Listservs and Research Gate. We searched keywords, titles, and abstracts through December 2014 using this Boolean statement: (men who have sex with men *OR* gay men *OR* bisexual men) *AND* (HIV) *AND* [(protective factors *OR* strengths *OR* resilience) *OR* (syndemic *OR* polydrug use *OR* polysubstance use *OR* child sexual abuse *OR* CSA *OR* mental health *OR* depression *OR* suicide *OR* anxiety *OR* partner abuse *OR* domestic violence *OR* intimate partner violence)]. See Fig. 1 for flowchart of the systematic search procedures.

The coding team consisted of a primary coder (first author) who screened all articles, and two secondary coders—one coded syndemics and the other coded resilience resources. A primary-secondary coding pair independently screened the same sample of 10% of abstracts for inclusion/exclusion criteria. Syndemics coding inter-rater reliability was high ($k = .90$); thus, coders divided and screened the remaining 90% of abstracts independently. The primary coder cross-examined titles of references from articles included at this step to identify other prospective articles. Resilience coding commenced; inter-rater reliability for resilience was high ($k = .80$). We contacted authors to obtain additional information when needed. Disagreements were resolved by consensus or consultation with the last author.

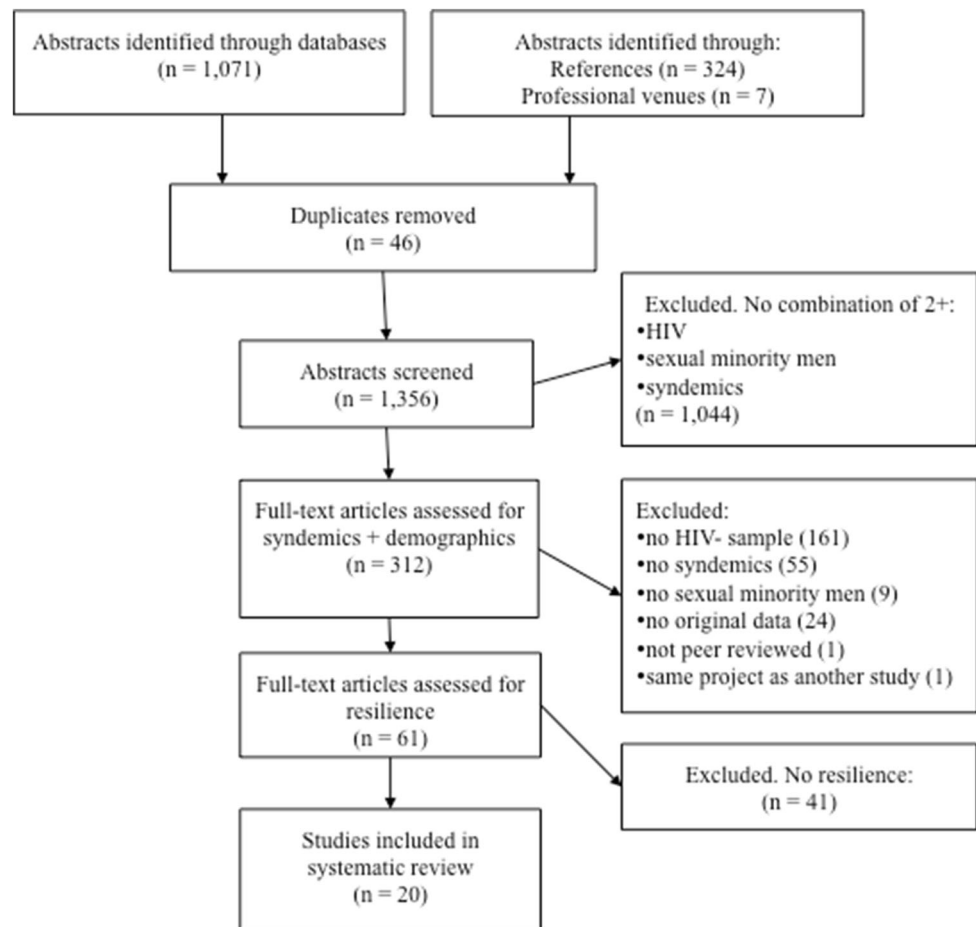
Study Inclusion/Exclusion Criteria

Inclusion criteria included: (1) a sample of self-identified sexual minority men (e.g., bisexual) or men who had sex with men (MSM), (2) an identifiable HIV-negative sample or subsample, (3) participants met criteria for at least one syndemic condition, and (4) authors reported on any resilience resources. Articles contained peer-reviewed quantitative or qualitative data. We excluded case studies, dissertations, and chapters summarizing primary sources (vs. presenting new empirical evidence). To limit variability, we excluded samples entirely of transgender men because of the higher prevalence of HIV risk behaviors and different sexual development in that subgroup compared to cisgender men (e.g., 25).

Operational Definition of Syndemic Condition

To meet the syndemic condition criterion, a majority of the sample (50%) had to (1) endorse the presence of at least one of the four conditions (i.e., substance abuse, childhood sexual abuse, partner abuse, or mental health problems) or (2) report elevated scores on continuous measures of a condition (e.g., depression symptom severity over an established cutoff).

Fig. 1 Flowchart of search procedures for final articles



Operational Definition of Resilience Resources

We did not measure resilience as an outcome; rather, we identified resources we believe may indicate an overarching process of resilience [26]. See Table 1 for our conceptual definitions of resilience resources. The following a priori inclusion criteria functioned as operational definitions of resilience resources. We systematically identified a variable as a resilience resource if it met one or more of the following criteria:

1. Statistically associated ($p < .05$) with lower HIV risk via: (a) lower prevalence of HIV, (b) decreased likelihood of HIV risk behaviors (e.g., condomless anal sex; 27) or (c) HIV-related syndemic conditions;
2. Inherently protective against HIV risk (e.g., condom use);
3. Positive adaptation that (a) significantly differed from HIV-positive men, (b) occurred in greater than 75% of the sample, or (c) ranked in the 75th percentile of possible scores for the construct (i.e., Z score ≥ 2)—

even if it was not significantly associated with lower HIV risk.

4. Have potential clinical significance; that is, be malleable and able to be intervened upon, otherwise they were not meaningful for future intervention development (e.g., race and age are not malleable resources)

We modeled the third criterion (>75th percentile) after the procedures employed by Kurtz et al. [32], one of few published studies on sexual minority men, HIV, and resilience resources. If participants scored above the 75th percentile on a measure of positive adaptation, our rationale posits that achieving a positive milestone two standard deviations above average demonstrates a resilience resource.

Data Extraction and Coding

Each coding pair extracted data displayed in Supplementary files Tables 1 and 2 from articles, and the primary coder re-checked all data. We did not assess risk of bias of

Table 2 Resilience resources of HIV-Negative sexual minority men at high risk for HIV coded into ecosystem level themes

Citation	Resilience Resource	Operational Definition / Data Source	Coded Theme
Berg et al. [30]	Mental health treatment: 17% inpatient, 72% outpatient	Clinical interview	Behavior, in general
Brooks et al. [31]	1. 71% condom use 2. 80% acceptance of PrEP ^a	1. Theme of HIV prevention, qualitative interviews 2. M scores on Likert scale statements about PrEP	1. Behavior, about sex 2. Cognitions or emotions
Buchbinder et al. [32]	Willingness to be in HIV vaccine trials: 37% “definitely”, 57% “might be” or “probably”	4-point Likert scale range = “definitely” to “not at all”	Cognitions or emotions
Folkman et al. [33]	1. Positive meaning of caregiving ($M = 20, 2.38, Range 0-24, 75th \% = 18$). 2. Dyadic adjustment between partners ($M = 85.40, 9.40, Range 0-110, 75th \% = 82.5$). ^b	1. Investigator-created Likert scale (e.g., “caregiving shows love for my partner”). 2. Dyadic Adjustment Scale [34]	1. Cognitions or emotions 2. Relationships
Gray and Hedge [35]	1. Satisfaction with social support: ($M = 29, 6.5, Range = 6-36, 75th \% cutoff = 28.5$). 2. Adequate instrumental and emotional social support 3. Acceptance of situation: 94% 4. Positive reinterpretation: 79%	1. Social Support Questionnaire [36] and 4 investigator-created questions for caregivers 2. COPE Scale [37]	1. Relationships 2. Cognitions or emotions 3. Cognitions or emotions 4. Relationships
Halkitis et al. [38]	Seroconcordant with main partner: 87.6%	Main sex partner also HIV-negative, sexual activity primary partner scale	Behavior, about HIV, about sex
Hays et al. [39]	Sought help for HIV/AIDS concerns: 77%	Investigator-created questions	Behavior, about HIV
Kurtz et al. [22]	Greater than HIV+ on: 1. Coping self-efficacy: 31% in 75th % 2. Social engagement: 30% in 75th %	1. Coping self-efficacy scale [40] 2. Social Engagement Scale (# of social events last 90 days)	1. Cognitions or emotions 2. Relationships
Liu et al. [41]	1. Reported health care coverage: 72–89% 2. Doctor visit last 12 mos.: >80% 3. >\$100,000/year 4. Willing to use PrEP if proven effective: 67%	Investigator-created questions	1. Socioeconomic 2. Behavior, general 3. Socioeconomic 4. Cognitions or emotions
Lyons et al. [42]	1. Some or a lot of social support: 81% 2. Part- or full-time job: 89% 3. Approx. \$50,000/year: 64% 4. More likely than HIV+ to have >5 close friends	Investigator-created questions	1. Relationships 2. Socioeconomic 3. Socioeconomic 4. Relationships
Mansergh et al. [43]	More likely than HIV+ men: 1. \geq college degree	Demographics questions	1. Socioeconomic

Table 2 continued

Citation	Resilience Resource	Operational Definition / Data Source	Coded Theme
Mimiaga et al. [44]	1. Willing to use PrEP: 86% daily if effective; 85% before “hot” date and for 28 days after a risky encounter; 89% for all CAS ^c ; 88% if >1 pill; 86% if > 1×/day 2. >\$60,000/year 3. Meeting sex partners via internet past 12 months 4. ≥ College degree	Investigator-created questions	1. Cognitions or emotions 2. Socioeconomic 3. Behavior, about sex 4. Socioeconomic
Pakenham et al. [45]	Compared to HIV+ men: > proportion close friends: 7.2 friends out of 10	Listed up to 10 persons who provided ongoing support to cope with AIDS epidemic	Relationships
Philip et al. [46]	Serosorting: 48%	Frequency of condom use with HIV+ / unknown status partners than with HIV- partners	Behavior, about sex, about HIV
Rosengard et al. [47]	1. Subjective social integration 75th % for: no SI group ($M = 17.66, 3.37$); lifetime SI group ($M = 16.01, 2.87$); low SI group ($M = 16, 3.62$). 2. Optimism 3. Social support 4. Confrontive coping 5. Accepting responsibility	1. 4 items Social Support Questionnaire [48] perceived integration and connectedness to others 2. Life Orientation Test [49] 3. 23 items Social Support Questionnaire [48] 4. Ways of Coping Questionnaire [50] 5. Ways of Coping Questionnaire [50]	1. Relationships 2. Cognitions or emotions 3. Relationships 4. Behavior, general 5. Cognitions or emotions
Schneider et al. [51]	Confidant support ($M = 2.8, 0.5$; $Range = 1-3$; 75th % = 2.5). ^b	# Current and past people counted on for “understanding or support”. 3 groups: 1 (isolated), 2 (single confidant), 3 (multiple confidants).	Relationships
Shoptaw et al. [52]	More likely than HIV+ to have ≥ high school education: 80.8%	Demographics question	Socioeconomic
Strathdee et al. [53]	1. Discussed HIV w/ anyone ever: 91% 2. Social support ($Mdn = 48$, $Range 26 -130$, higher scores = lower support; 25th % = 52). ^b	1. Dichotomous question (yes/no) 2. Instrumental-Expressive Scale [54]	1. Behavior, about HIV 2. Relationships
Theodore and Koegel [55]	Commitment to safer sex ($M = 4.59$, $Range = 1-5$; 75th % = 4). ^b	“How committed do you feel right now to maintaining safer sex practices?”	Cognitions or emotions
Viney et al. [56]	Greater than HIV+ men: 1. Competence ($M = 2.8, 0.73$; $Z = 5.52$). 75th %. 2. Good feelings ($M = 1.36, 0.56$).	1. Origins scale 2. Positive affect scale	1. Cognitions or emotions 2. Cognitions or emotions

Mean values followed by standard deviation values unless otherwise noted. 75th % = 75th percentile cutoff; calculated Z scores unless population estimates were unavailable. If 75th % not listed, then resource met other resilience criteria (i.e., > HIV+ men; sig. associated with lower HIV risk; occurred at >75% in sample; inherently lower risk such as condom use)

^a PrEP pre-exposure prophylaxis to prevent HIV

^b No population estimates available to calculate Z score, so used sample estimates to determine eligibility

^c CAS condomless anal sex

individual studies [24] because majority of articles were not intervention studies. Based on a methods consultation (L. Scott-Sheldon, personal correspondence, May 26, 2015), we did not run meta-analytic statistics because our inquiry was to identify resilience resources rather than test effects, and wide variability among resilience resources would prevent meta-analytic statistics from making reliable inferences.

A second coding team generated themes and categorized resilience resources identified across included articles into themes. This coding team consisted of six faculty, doctoral students, and research assistants. We compared the primary coder's (first author) results to other coders' results [28] with adequate to excellent inter-rater reliability: ($k = 0.828$ [Coder A], 0.656 [Coder B], 0.785 [Coder C], 0.806 [Coder D], 0.914 [Coder E], 0.914 [Coder F]).

Results

The final sample included 20 articles published between 1991 and 2012 (1990–1999 $n = 8$; 2000–2009 $n = 7$; 2010–2014 $n = 5$). Three included articles reported adult and childhood abuse; other articles reported on either substance abuse or mental health problems. See Supplementary files Table 1 for study samples (supplementary file). Samples included MSM—men who reported sexual behavior with another man (5 studies)—and also men who identified with a sexual minority label (e.g., gay or bisexual; 15 studies). We refer to both groups as sexual minority men, since studies suggest most MSM typically identify with a sexual minority label (e.g., 29).

Categorizing Resilience Resources

To achieve the first aim, we identified 41 resilience resources across all 20 articles. After accounting for duplicate resources (e.g., social support measured in two separate studies), we categorized 31 distinct resilience resources into four ecosystem level themes. See Table 2 for an elaboration of all resources and themes. Themes included (1) *socioeconomic*, (2) *behavioral coping strategies*, (3) *cognitions or emotions*, and (4) *relationships*. Socioeconomic resources included financial or economic factors that implied social context. Two examples were having a full-time job and at least a college degree. Four distinct socioeconomic resources were identified.

Behavioral coping strategies were adaptive coping skills that may be the result of cognitions. Specifiers included *about sex*, *about HIV*, or *general*. Behavioral coping strategies included, for example, engaging in mental health treatment. We identified six behavioral strategies as distinct resilience resources that represented behavioral

coping strategies about HIV or sex (e.g., meeting sex partners online), and three that represented general behavioral coping strategies (e.g., doctor visits).

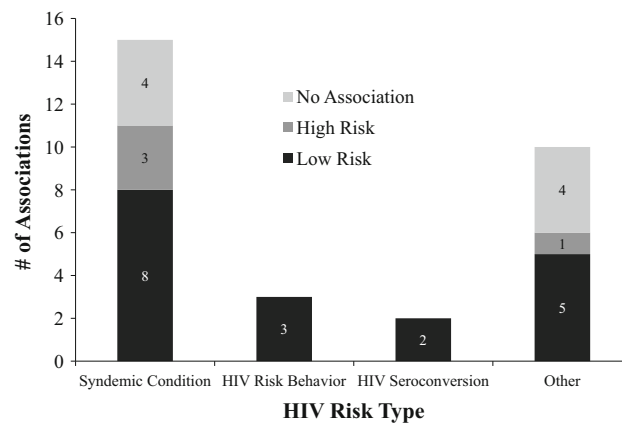
Cognitions or emotions were internal processes, affective states, feelings, or attitudes representing participants' perspectives about themselves, others, or the world. Two examples of cognitive or emotional resources were positive meaning of caregiving and acceptance of a situation; both imply participants' perspectives on a situation. We identified 12 distinct cognitive or affective resources (e.g., optimism).

Relationships included states or descriptions of one's interaction with others, rather than a coping strategy involving other people (e.g., negotiating condom use with a partner was categorized as a behavior and not a relationship per se). One example of relationship resources was sufficient social support. Sufficient social support revealed one's perceived support from others, consistent with the relational aspect of this theme. We identified six distinct relationship resources (e.g., social engagement).

Are Resilience Resources Associated with Lower HIV Risk?

To fulfill the second aim, we extracted data from each article on statistically significant associations ($p < .05$) between each resource and four types of HIV risk: (1) syndemic conditions, (2) HIV transmission risk behaviors (e.g., CAS), (3) HIV seroconversion, and (4) *other variables* that would indirectly impact any/all three types (e.g., willingness to use PrEP). PrEP is pre-exposure prophylaxis, which could reduce HIV risk if taken consistently before a high-risk exposure to the virus. According to the theory of reasoned action [57], influencing willingness to use PrEP may impact actual use and indirectly reduce HIV transmission risk. We separated HIV risk into four types (rather than one HIV risk factor composite) because, although there are many HIV risk types—e.g., syndemic conditions, HIV risk behavior—prior research by Millett and colleagues [58] indicates that higher HIV risk among certain subgroups (e.g., Black sexual minority men) is attributed mostly to one type of HIV risk (e.g., syndemics) and not another (e.g., risk behavior). We attempted to show the most nuanced analysis of our findings, as they may be different for subgroups of sexual minority men. See Fig. 2 for more detail.

We categorized resources as lower risk if they were negatively associated with any of four HIV risk types. Four resilience resources were also inherently protective from HIV (one was identified in two different studies, for a total of five). We considered these protective resources as inherently implying lower HIV risk: main sex partner is



Note. Depicts associations extracted from each study between resilience resources and any of four HIV risk types. No association = no statistically significant ($p > .05$) association between resilience resource and HIV risk type. High Risk = positive association ($p < .05$) between resilience resource and HIV risk type. Low Risk = negative association ($p < .05$) between resilience resource and HIV risk type. Other type = Awareness, acceptance, or willingness to use PEP or PrEP, or willingness to enroll in HIV vaccine trial. Inherently protective resources are not included (e.g., condom use) because we could not say with statistical certainty which HIV risk type would be most impacted by each inherently protective resource. Numbers represent number of resilience resources in each risk group (e.g., 8 associations between resilience resources and lower levels of syndemic conditions). The number of risk-resource associations does not equal 31 resilience resources identified in this review because some original study authors' reported on 2+ associations for one resource and other study authors' did not report enough data on which to evaluate risk-resource associations.

Fig. 2 Associations between resilience resources and HIV risk among sexual minority men

also HIV-negative [38], willingness to use PrEP [41, 44], PrEP acceptance [31], and condom use [31]. Among 31 distinct resilience resources, five were inherently protective (lower risk) and 18 had other lower risk associations: eight with fewer syndemic conditions, three with fewer risk behaviors, two with low HIV seroconversion, and five with other variables (see Table 2 in Supplementary files).

We found four associations between resilience resources and higher HIV risk. Some resources were associated with both lower and higher risk. So, we specified each risk-resource association in Supplementary files Table 2 since some associations for the same resource were in different directions. For example, doctor visits were associated with higher awareness of post-exposure prophylaxis (PEP) but not PrEP [41]. Thus, results included two separate associations for doctor visits. There were also eight findings with no risk-resource associations because the association was not statistically significant (e.g., 41). Also, some studies did not report enough data to evaluate associations (e.g., 43).

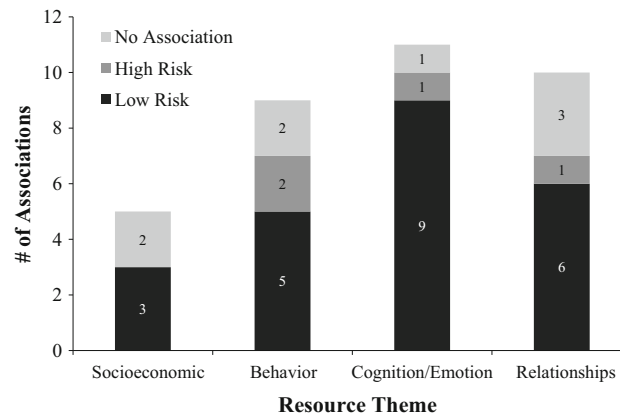
Do Associations Between Resilience Resources and HIV Risk Differ By Theme?

We analyzed each risk-resource association within the context of our higher-order, ecosystems level themes (see Fig. 3), providing four inferences for analysis. First, most research on resilience and HIV among sexual minority men at higher HIV risk reported on cognitive or emotional resources. Second, relationship and behavioral resources

were the most variable in their association with HIV risk, such that relationship and behavior resources were helpful, harmful, and neutral for HIV prevention. Third, no socioeconomic resources identified in the extant literature were associated with higher HIV risk. Fourth, most resources, across themes, were associated with lower HIV risk, although this finding could be inflated due to publication bias.

Discussion

Using a systematic search of published literature through December 2014, we identified 20 unique studies that reported quantitative or qualitative data from HIV-negative sexual minority men at higher risk for HIV than heterosexual men because, as sexual minority men, many were undoubtedly exposed to minority stress, which can indirectly increase HIV risk. Majority of each sample also met criteria for a syndemic condition known to increase HIV risk (i.e., substance abuse, childhood sexual abuse, partner abuse, or mental health problems). Thus, the men represented in this review were exposed to a variety of HIV risk factors and yet, they remained HIV negative. We used a systematic protocol to identify 31 distinct resilience resources among these samples. We believe these resources represent the broader process of resilience because they are positive resources among samples of men who, statistically, were at higher risk for HIV, and yet, defied odds and



Note. Depicts associations between resilience resources and HIV risk extracted from original studies, grouped by ecosystems level theme created by the coding team. No association = no statistically significant ($p > .05$) association between resilience resource and HIV risk type. High Risk = positive association ($p < .05$) between resilience resource and HIV risk type. Low Risk = negative association ($p < .05$) between resilience resource and HIV risk type. Inherently protective resources included as low risk (e.g., condom use). Numbers represent number of a type of risk-resource association in each theme (e.g., 3 socioeconomic resilience resources that were associated with lower HIV risk). The number of risk-resource associations does not equal 31 resilience resources identified in this review because some original study authors' reported on 2+ associations for one resource and other study authors' did not report enough data on which to evaluate risk-resource associations.

Fig. 3 Associations between resilience resources and HIV risk by theme

remained HIV-negative. Social support was the most frequently reported resilience resource across studies ($n = 7$), followed by higher income ($n = 3$). Next, we situate the results within relevant literature and discuss a hypothesis explaining resilience resources and HIV prevention informed by our data.

No resources directly reflected responses to minority stress (e.g., discrimination), which is not representative of current literature. Literature on minority stress and HIV risk is burgeoning (e.g., 7), as well as minority stress and resilience [59]. One study indicated minority stress lessened over time among many sexual minority men who were adolescents during the AIDS epidemic in the 1980s [31], although no data explained why minority stress lessened over time. Other possible resources to ameliorate minority stress include friendships [60] and psychological hardiness [61]. Because we also identified resilience resources in samples of men who undoubtedly experienced minority stress, we believe positive adaptation despite minority stress is possible. Considerably more research is needed on mechanisms for alleviating minority stress [59], syndemic conditions, and HIV risk.

Most associations between resilience resources and syndemic conditions were related to levels of syndemic conditions (e.g., lower suicidal ideation). We identified only one resource related to alleviating syndemic conditions—mental health treatment [30]. Results from another study in this review indicated after receiving mental health treatment, men reported a greater commitment to safe sex and more condom use [55]. There is little published research on resilience resources among sexual minority

men who meet criteria for syndemics and, thus, we are unable to make comparisons between our work and other published reports. Qualitative and ethnographic approaches would be one logical next step to enhance specificity of resources identified in this review, and also to assess how participant self-reports and observations of resilience resources compare with our review results.

Overall, most resilience resources identified in this review were associated with lower HIV risk, regardless of the operational definition of HIV risk. There were some conflicting findings for the same resource (e.g., social support), although relatively few; this may be because operational definitions of a resource varied across studies (e.g., social support vs. number of close friends vs. frequency of interaction). Future research should strongly consider bottom-up approaches to establish more specific definitions of resilience. Then, large epidemiologic studies would be helpful to ascertain the prevalence of resources and assess how context (e.g., substance abuse vs. sexual abuse) may alter a resource's effectiveness in HIV prevention.

No socioeconomic resources were associated with higher HIV risk. Higher annual incomes were associated with lower risk (e.g., 41, 42) consistent with the overall trend of the HIV epidemic that has disproportionately affected economically disadvantaged individuals [62]. Our findings support the argument that higher incomes appear to protect people from HIV transmission, likely through several mediators [63]. Future research on HIV prevention among sexual minority men might examine unique social contexts of economically disadvantaged individuals to

assess resilience resources among those specific subpopulations. This would warrant a person-centered analytic approach.

Some resilience resources were associated with higher HIV risk. Still, we considered them to be resilience resources because they met other inclusion criteria, such as being a possibly adaptive resource occurring at levels greater than 75% of the population. Certain variables may be risk factors for some populations and resilience resources for others [18]. Although some resources may be associated with higher HIV risk in a linear model, they may still be vital to HIV prevention as moderators between risk and HIV transmission. For example, the positive association between syndemics and HIV transmission may be weakened at moderate levels of acceptance of responsibility (resilience) and strengthened at high levels of acceptance of responsibility (risk; 47). We opted to be as inclusive of resources as scientifically sound to prevent Type II error in the generative phase of this research.

In addition to noting many types of resilience resources, we generated a primary hypothesis from this systematic review of published literature: resilience resources are associated with lower HIV infection via indirect associations with HIV risk factors. We came to this hypothesis because each of the observed resilience resources were not themselves part of sexual or other behavior related to HIV transmission. For example, coping self-efficacy, which was not directly related to HIV transmission behaviors, was nevertheless correlated with lower HIV risk [22]. Even though some resources may appear unrelated to HIV in bivariate associations—mental health treatment, social integration, education, for example—they may mitigate the negative impact of minority stress/syndemic conditions on HIV transmission via condomless anal sex. Indeed, two interventions targeting minority stress and syndemic conditions also increased condom use [55, 64]. Thus, interventions that address minority stress and syndemic conditions may also address HIV risk behavior. This possibility warrants continued scientific study, through qualitative research on the experience of resilience and HIV risk factors among sexual minority men and then, perhaps through a test of moderation mediation of resilience resources on the indirect effect of minority stress/syndemic conditions on HIV transmission via condomless anal sex.

We categorized resilience resources into one of four themes: socioeconomic, behavioral coping strategies, cognitions or emotions, and relationships. These themes are consistent with much research confirming resilience can be cultivated by behavioral and social experiences that enhance emotional and cognitive regulation in response to adversity [65]. Our categorization created a preliminary ecosystems framework for resilience and HIV prevention.

Our themes included mostly individual-level resources and some resources of an individual's broader ecosystem. Most studies only assessed individual-level variables. This limited representation may be skewed by our methods, since we did not search databases of system-level disciplines, such as economics or health policy. Despite this, nine of our findings represented socioeconomic resources that are impacted by systems-level factors, such as policies, education opportunities, fair employment, and insurance coverage. Otherwise, we identified several interpersonal-level variables. By attending to interpersonal factors, we can more holistically address the needs of men at highest risk for HIV [16]. By searching across medicine, psychology, and public health—the disciplines predominantly charged with developing and implementing efficacious HIV prevention programs—and finding few resources beyond the interpersonal level, our results reinforced a prior criticism that HIV prevention has neglected ecosystem factors [13]. We advocate for the study of resources in more distal ecosystems and environments, such as social climate in one's neighborhood, work, religious communities, and policies impacting sexual minority men (e.g., 66). Especially because ecosystems frameworks can estimate the impact of the environment on behavior [67], they deserve special consideration for explaining HIV risk behavior of sexual minority and other marginalized individuals who experience unique ecological circumstances [29]. Indeed, among HIV-negative sexual minority men (syndemic conditions unknown), a 2015 study reported associations between less stigmatizing environments and less CAS, increased awareness of PEP, and increases in taking PEP or PrEP [68]. Thus, ecosystems frameworks are likely essential to effective HIV prevention [13] and were helpful in situating our findings.

Recent scholarly work emphasizes HIV risk exists at many ecosystem levels [16], and resilience resources may offset risk at those levels—individual, structural (e.g., access to information, safe housing), and biological [69, 70]. The ecosystems framework developed from this review enhances the specificity of current ecosystems research for HIV prevention. For example, Halkitis et al. [70] collapsed psychosocial and structural influences of HIV together, such as beliefs about HIV and having social capital to prevent HIV. Beliefs and social capital are important influences to consider, although to improve on either one requires different levels of intervention. Changing beliefs would require individual interventions; to increase social capital would likely require policy-level interventions (in addition to individual ones). We extended current work by identifying HIV prevention resources at very specific levels of experience—thoughts, emotions, relationships—which allow for more precise intervention development.

Implications

Future researchers might utilize the resilience resources identified in this review as a set of potential moderators that mitigate the impact of HIV risk factors, like mental health problems, on HIV infection via condom use. In addition, the next wave of research should investigate resilience resources at more distal levels of one's ecosystem (e.g., policies). Researchers would capture more variance in HIV risk behavior by developing a theory of resilience and HIV prevention for sexual minority men situated in an ecosystems framework [71]. Another suggestion is to use several methods and data sources beyond linear models to explain interactions between risk, resilience, biology, and environment on HIV risk behavior, because human development is not linear [26, 51]. Based on our review, we also concluded there were no qualitative differences between resilience resources and HIV risk associations by ecosystem level. Based on our cross-sectional, bivariate data, we were unable to identify which resilience resources are most effective in preventing HIV; although, that would be a next step in this line of research. Our broad interpretation is that individual-level variables appeared to be of primary importance; most of the socioeconomic, behavioral, cognitive, and emotional resources were associated with lower HIV risk. This is consistent with existing HIV prevention interventions targeting behaviors or cognitions [72]. Although existing interventions primarily attempt to resolve deficits (e.g., not using condoms), they may utilize existing resilience resources to reduce HIV risk.

Limitations

Any systematic review is limited by an inability to draw causal conclusions. Therefore, we believe the resilience resources identified in this inquiry would benefit from further qualitative and quantitative evaluation in their role preventing HIV among sexual minority men. Although we piloted several systematic search strategies, and worked with a librarian to ensure our search procedures were sensitive enough to identify pertinent articles, it is possible that pertinent articles were unintentionally excluded due to overly specific strategies. We had little data from men who were asked about abuse experiences, indicating a dearth of research on abuse, HIV risk, and resilience resources. Our findings may also be representative only of English-language speakers. Although we screened articles in all languages, all included articles were published in English, limiting our ability to generalize to non-English speaking populations, some of which have higher HIV prevalence. A final limitation is the inability to control for the

methodological rigor of each study, thus, we increased validity of our findings by using stringent inclusion criteria for resilience resources.

Conclusions

Resilience resources for HIV prevention are a sparse area of study, with promise for interventions reaching the most marginalized populations. This novel inquiry generated a set of empirically based resilience variables upon which to conduct further research and eventually improve existing HIV prevention interventions. Only one of the studies we extracted data from examined resilience resources and HIV prevention as the primary aim [22]. Sexual minority men have multiple resilience resources that should be evaluated further in relation to HIV risk behavior and seroconversion. We also present a central hypothesis for future study: resilience resources may indirectly decrease HIV transmission by mitigating the negative impact of minority stress and syndemic conditions on condom use.

Our findings, coupled with prior theoretical work, suggest ecosystems frameworks are important to HIV prevention because both risk and resilience for HIV occur at various levels of human experience. Indeed, research on sexual minority men is more comprehensive when it draws on ecosystems frameworks because it accounts for their unique experience as marginalized members of society, rather than overlooking them [3]. Thus, efforts should be made to utilize an ecosystems framework when studying resilience and HIV prevention among sexual minority men [13].

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Compliance with Ethical Standards

Conflict of interest The authors do not have any conflicts of interest to report, financial or otherwise.

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