Diversity of Psychosocial Syndemic Indicators and Associations with Sexual Behavior with Male and Female Partners Among Early Adolescent Sexual Minority Males

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Abstract

Purpose: Psychosocial syndemic indicators (e.g., internalizing symptoms, alcohol/substance use, and violence exposure) have been associated with increased risk for HIV among older adolescent sexual minority males and adult sexual minority men. No studies have examined these concerns among early adolescents (<16 years old). The purpose of this study was to examine syndemic indicators among early adolescent sexual minority males and their associations with sexual behavior.

Methods: Sexual minority males ($N=207$; ages 14–17; drawn from 40 U.S. states) completed a cross-sectional online survey. Descriptive statistics were used to document profiles of syndemic indicators. Firth logistic regressions tested the associations between count of syndemic indicators and sexual behavior with male and female partners.

Results: Psychosocial syndemic indicators were highly prevalent and co-occurring, with diverse psychosocial profiles. After controlling for age, race, and ethnicity, having more syndemic indicators was significantly positively associated with condomless anal sex with male partners (adjusted odds ratio [AOR]=1.37, 95% confidence interval [CI] 1.02–1.84) and vaginal and/or anal sex with females (AOR=1.75, 95% CI 1.25–2.47).

Conclusions: This study documents the psychosocial profiles of syndemic indicators with a sample of early adolescent sexual minority males and the association of syndemic indicators with sexual behavior. Among early adolescent sexual minority males, psychosocial concerns were prevalent, similar to rates seen among adult sexual minority males, and conferred vulnerability to HIV transmission. Behavioral and psychosocial interventions must reach sexual minority males in early adolescence to address mental health and substance use concerns and to help reduce the risk of HIV acquisition.

Keywords: adolescent, mental health, sexual minority, syndemics

Introduction

YOUNG SEXUAL MINORITY MALES are at increased risk for many adverse psychosocial outcomes, including depression,^{1,2} problematic alcohol and substance use,³ and exposure to violence.⁴ Research with sexual minority adults demonstrates that these psychosocial concerns are often interrelated and increase HIV risk in an additive way.⁵ Theorists have suggested that these psychosocial concerns (i.e., internalizing symptoms, alcohol and other substance use, and violence exposure) interact to elevate health risk through latent dynamics, and have coined the term “syndemics” to

describe these prevalent, comorbid, and potentially interactive conditions.⁶

Adolescent sexual minority males (i.e., gay, bisexual, and other males who are attracted to male partners) remain at disproportionate risk for acquiring HIV. Indeed, in 2016, 92% of new HIV diagnoses among 13–19-year-old males in the United States were specifically attributed to male–male sexual contact.⁷ While male–male sexual contact is the most common mechanism of HIV transmission in this age group, adolescent males who have sex with male partners are also likely to have sex with female partners. In the most recent national Youth Risk Behavior Survey, more

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youth identified as bisexual than gay and more youth reported having sex with both same-sex and different-sex (i.e., not male) partners than strictly same-sex partners.⁸ Youth who identified as sexual minority or reported both male and female partners were also less likely to report having used a condom the last time they had sex.⁸ Thus, although research on condom use among sexual minority male youth with female partners is limited, these national data suggest that sexual minority male youth may not be using condoms consistently with partners of any sex.

Psychosocial syndemics may influence sexual risk behaviors among sexual minority male adolescents. Youth who report same-sex sexual partners, attraction to their same sex, or label themselves as sexual minority also report greater psychosocial concerns, including depression and substance use.⁹ Condomless anal sex with male partners, which places sexual minority males at risk for HIV,¹⁰ has consistently been associated with drug use, alcohol use, and trauma among young sexual minority men.¹¹ Directly addressing these psychosocial problems could reduce risk for HIV for this vulnerable group. However, research has seldom investigated syndemic indicators among young sexual minority men.

Prior studies provide evidence that the harmful effects of co-occurring psychosocial concerns (i.e., syndemics) occur among younger sexual minority males. Mustanski et al. initially reported that the increasing count of syndemic indicators (i.e., “syndemic burden”) was associated with greater odds of condomless anal sex among late adolescent and young adult sexual minority men (ages 16–24).¹² Halkitis et al. found evidence for stability of syndemic indicator symptoms over 18 months with young adult sexual minority men (ages 18–19) living in New York City.¹³ Mustanski et al. subsequently found a prospective association of syndemic indicators with condomless anal sex over 1 year with late adolescent (ages 16–20, $M=19$) sexual minority males in Chicago.¹⁴ Taken together, this research suggests that, similar to what has been established among adult sexual minority males,^{5,15,16} syndemic indicators and sexual behavior may also be associated among younger adolescent sexual minority males.

Nonetheless, there are several gaps in the literature that need to be addressed to guide intervention efforts. First, no study has assessed syndemic indicators and HIV risk among younger males (<16 years of age). Second, no study has assessed associations between syndemic indicators and sexual behavior with female partners; given that the onset of such psychosocial concerns and the development of sexual behavior occur early in adolescence,^{2,3,11,17} this is an especially important gap. Third, although previous studies have provided evidence of the deleterious effects of an increasing syndemic burden, no study has documented the possible combinations of syndemic indicators that are present among adolescent sexual minority males. A clearer understanding of which syndemic indicators are prevalent and co-occurring at a young age could clarify whether certain psychosocial “profiles” (i.e., combinations of syndemic indicators) are more common. This information would inform theories of change and guide the components that should be included in behavioral and psychological interventions for these youth.

To address these gaps, the current study (1) documents the combinations of syndemic indicators occurring among a

group of sexual minority males in early adolescence and (2) tests the association of syndemic burden with sexual behavior with both male and female partners. We hypothesized that the association of increasing syndemic burden with greater odds of sexual risk behavior—already established with adult sexual minority men—would be replicated with sexual minority male adolescents.

Methods

Procedures and participants

During June and July 2017, sexual minority male youth were recruited across the United States through online advertisements and social media posts (e.g., Instagram) for an online sexual health survey. Detailed recruitment and study procedures have been reported elsewhere.¹⁷ Briefly, participants were considered eligible for the online survey if they (1) were ages 14–17 years; (2) identified as a cisgender male (i.e., assigned male sex at birth and current male gender identity); (3) identified as gay or bisexual, reported sexual attraction to other males, or reported voluntary sexual contact with another male; (4) were a U.S. resident, and (5) had a personal e-mail address.

Interested youth completed a screener in REDCap¹⁸ and those who were eligible were presented with study information, followed by questions to determine capacity to consent. Specifically, potential participants were asked the following: (1) “If you agree to be in this study, what are we asking you to do?” (2) “What should you do if you no longer want to be in the study?” (3) “What can you do if you experience distress while taking part in this study?” (4) “What are the potential risks of being in this study?” Potential participants who were unable to answer all four questions accurately after three tries were ineligible. Those who answered correctly and assented were sent a unique electronic link to the online survey hosted in REDCap by e-mail. The final study sample comprised 207 sexual minority males ages 14–17. The average time to complete the online survey was 30 minutes (standard deviation [SD]=12). Participants received a \$15 electronic gift card.

Recommended practices to ensure valid responses were followed.^{19,20} Screening and survey entries were cross-validated using age (age vs. date of birth), location (zip code vs. state of residence), sexual activity (multiple questions across the screener and survey assessing sexual behavior), and e-mail address. All procedures, including a waiver of parental/guardian consent, were approved by The Miriam Hospital Institutional Review Board.

Measures

Demographics. Participants self-reported their age, racial identity (i.e., White, Black, Asian/Pacific Islander, American Indian/Alaskan Native, or mixed race), ethnicity (i.e., Latino or non-Latino), zip code, and state of residence. For analyses, racial identity and ethnicity were coded separately and dummy codes were constructed. Race dummy codes were constructed as follows: Black (1=Black, 0=Other) and Other (1=Other non-White race, 0=Other), such that White participants were the reference group for race. Ethnicity dummy codes were constructed as Latino (1=Latino, 0=Other), such that non-Latino participants

were the reference group for ethnicity. Participants also reported their self-identified sexual orientation (i.e., gay, bisexual, heterosexual, queer, or other sexual orientation) and whether or not they were open (i.e., “out”) about their sexual attraction to males (i.e., “definitely out,” “closeted some of the time and out some of the time,” or “definitely closeted”). The sexual orientation and outness variables were used in the current study to describe the sample.

Internalizing symptoms. Internalizing mental health symptoms was assessed using the Patient Health Questionnaire (PHQ-2) for depression²¹ and the Generalized Anxiety Disorder Scale (GAD-2) for anxiety.²² Both measures are widely used.²³ The PHQ-2 has been validated with adolescents.²⁴ As scores on depression and anxiety items were highly correlated ($r=0.5-0.7$, $p<0.05$), the two scores were summed together to indicate general internalizing symptoms, which is consistent with prior literature.²⁵ The combined items demonstrated strong internal consistency in the current sample (Cronbach’s $\alpha=0.86$).

Alcohol use. Alcohol use was measured with the Alcohol Use Disorders Identification Test-Consumption (AUDIT-C), a widely used screening measure for hazardous drinking.²⁶ The AUDIT-C has been validated in adolescent samples, with a lower, adolescent-specific cut score indicative of problematic drinking (i.e., 3).²⁷ We used the AUDIT-C adolescent-specific cut score for hazardous drinking as the most clinically meaningful alcohol use measure available in our sample.

Substance use. Substance use was measured using a checklist of drugs used recreationally (e.g., marijuana, hallucinogens, heroin, opiates, and stimulants). Participants selected which, if any, drugs they had ever used. The large majority of participants endorsed minimal substance use, with the exception of marijuana (only 16 youth [8%] reported use of any substances other than marijuana and only 12 [6%] youth reported using more than one drug [including marijuana]). As such, we focused on marijuana use in analyses because it was the most common substance used. Marijuana was coded as 0 (“not endorsed”) or 1 (“endorsed”).

Childhood sexual abuse. Childhood sexual abuse was measured using the sexual abuse subscale of the Childhood Trauma Questionnaire (CTQ).²⁸ Each item uses the lead “when you were growing up” and participants answer using a five-point Likert scale (1 = “never” to 5 = “very often”) yielding scores ranging from 5 to 25. This subscale is scored such that 5 = “none”; 6–7 = “low”; 8–12 = “moderate”; and ≥ 13 = “severe.” The CTQ has been widely used and validated in adolescents.^{29,30} The subscale demonstrated excellent internal consistency in the sample (Cronbach’s $\alpha=0.92$).

Sexual behavior. Participants reported whether they had ever engaged in voluntary sexual behavior with female partners and with male partners. Participants who endorsed sexual contact with male or female partners were asked about specific behaviors with their partners (i.e., female partners: vaginal sex, anal sex; male partners: anal sex). Those reporting anal sex with males, specifically, also reported the num-

ber of total anal sex acts and condom-protected anal sex acts. We calculated a count of condomless anal sex acts from these data by subtracting the number of condom-protected episodes of anal sex from the total number of anal sex acts.

Data analyses

Internalizing symptoms, problematic alcohol use, and sexual abuse were dichotomized using appropriate clinical cutoffs, consistent with prior literature (i.e., PHQ-2 + GAD-2 ≥ 3 for the combined score²⁵; AUDIT-C ≥ 3 for adolescents²⁷; and CTQ sexual abuse subscale >5 ,²⁸ respectively). These scores, plus dichotomous marijuana use (i.e., 0 “no,” 1 “yes”), were summed to create a count of the total syndemic indicators. The dependent sexual behavior variables of any anal sex with a male partner, any condomless anal sex with a male partner, and any anal or vaginal sex with a female partner were also dichotomized (0 = never, 1 = ever) due to non-normal distributions.³¹ Having ever had anal or vaginal sex with a female partner was combined as both behaviors potentially confer HIV risk.

Descriptive statistics were used to document the prevalence of different psychosocial syndemic combinations. Logistic regression models were used to test associations of syndemic indicators with each other, consistent with prior literature.^{12,13,15} Firth (i.e., penalized likelihood) logistic regression models were used to account for small-sample bias given the small cell sizes of participants who had engaged in condomless anal sex with males and vaginal/anal sex with females.³² Firth regression models tested bivariate associations between the sexual behavior dependent variables and the count of syndemic indicators. Multivariable Firth logistic regression models tested associations between the count of syndemic indicators and the dependent variables adjusting for age, race, and ethnicity. Age, race, and ethnicity were not bivariate associated with the independent or dependent variables (all $ps>0.05$), indicating that none would act as confounders. However, we chose to control for age, race, and ethnicity, given their conceptual association with prevalence (minority race/ethnicity) and HIV risk behavior (age).^{7,11} Estimation of the adjusted odds ratios (AORs) at each level of the independent variable (the count of syndemic indicators) for each of the dependent variables was calculated using the regression equation, following suggested procedures.³³ All models were run in Stata v.14.³⁴

Results

Participants ($N=207$) were 16 years old on average ($SD=1.0$, range = 14–17). Approximately one-half (48%) identified as a racial and/or ethnic minority (i.e., 16% as mixed race, 11% as Black, 8% as Asian/Pacific Islander, and 7% as American Indian/Alaskan Native; 20% identified as Hispanic or Latino). Most (93%) lived at home with their parents/guardians. The majority (87%) lived in a metropolitan area. Participants came from 40 states, representing all major geographic areas of the United States: Northeast: 17%, Midwest: 20%, South: 29%, and West: 34%. Approximately two-thirds (65%) identified as gay, 24% identified as bisexual, 5% identified as heterosexual, and ~5% identified as queer. One-third (31%) were “definitely out” about their attraction to males.

TABLE 1. PROPORTIONS OF SYNDEMIC INDICATORS WITHIN THE SAMPLE OF ADOLESCENT SEXUAL MINORITY MALES ($N=207$)

<i>Profile</i>	<i>N 207 (total)</i>	<i>% of those in the syndemic class</i>	<i>% of the total sample</i>
One indicator ($N=63$)			
Internalizing mental health symptoms (IMH)	29	46	14
Childhood sexual abuse (CSA)	17	27	8
Marijuana (MJ)	10	16	5
Alcohol (AU)	7	11	3
Two indicators ($N=45$)			
CSA			
+ IMH	22	49	11
+ MJ	6	13	3
+ AU	1	2	0.5
MJ			
+ IMH	8	18	4
+ AU	5	11	2
AU			
+ IMH	3	7	1
Three indicators ($N=15$)			
AU			
+ MJ + IMH	7	47	3
+ MJ + CSA	3	20	1
+ CSA + IMH	1	7	0.5
MJ			
+ CSA + IMH	4	27	2
Four indicators ($N=11$)			
AU + MJ + CSA + IMH	11	—	5

Eighty-five (41%) participants scored above the clinical cutoff on internalizing symptoms, 65 (31%) reported having experienced childhood sexual abuse, 54 (26%) reported marijuana use, and 38 (18%) scored above the clinical cutoff for problematic alcohol use. Seventy-three (35%) youth endorsed no syndemic indicators. As shown in Table 1, 63 (30%) participants reported a single syndemic indicator, 45 (22%) reported two syndemic indicators, 15 (7%) reported three syndemic indicators, and 11 (5%) reported experiencing all four syndemic indicators.

As shown in Table 2, three of four syndemic indicators were significantly associated with each other, with the exception of childhood sexual abuse and problematic alcohol use.

The most common two-indicator combination of syndemics was childhood sexual abuse and internalizing symptoms, with 22 youth reporting that combination (49% of youth with two syndemic indicators; 11% of the total sample). The most common three-syndemic combination was problematic alcohol use, marijuana use, and internalizing symptoms, with seven youth (47% of the three-syndemic class; 3% of the total sample) endorsing that combination.

Forty-eight youth (23%) reported having both male and female sexual partners. Fifty-five participants (27%) reported having anal sex with a male partner, while 41 participants (20%) reported having condomless anal sex. Twenty-seven participants (13%) reported having either vaginal or anal sex with a female partner; 17 (8.2%) reported having only vaginal sex, 4 (1.9%) youth reported having only anal sex, and 6 (2.9%) reported having vaginal and anal sex with female partners.

In bivariate models, count of syndemic indicators was significantly associated with greater odds of anal sex with males (odds ratio [OR] = 1.33; 95% confidence interval [CI] 1.02–1.73), greater odds of condomless anal sex with males (OR = 1.39; 95% CI 1.05–1.85), and greater odds of vaginal or anal sex with females (OR = 1.87; 95% CI 1.34–2.63). In the adjusted models (Fig. 1), the count of syndemic indicators was significantly associated with greater odds of condomless anal sex with males (AOR = 1.37; 95% CI 1.02–1.84) and with greater odds of vaginal or anal sex with a female partner (AOR = 1.75; 95% CI 1.25–2.47). Although not statistically significant in the adjusted model, there was a trend for a positive association between the count of syndemic indicators and any anal sex with males (AOR = 1.27; 95% CI 0.96–1.67, $p=0.10$).

Discussion

This study yielded three primary findings. First, we found that co-occurring syndemic indicators are prevalent among early adolescent sexual minority males and generally associated with each other, corroborating prior research with a younger sample than has previously been studied.^{12,13} Second, the results documented the diverse “profiles” of psychosocial syndemics denoted by different combinations of syndemic indicators. Third, the results suggest that, even at an early age, the co-occurrence of these psychosocial problems confers risk for HIV by increasing the likelihood of engaging in condomless anal sex with male partners, as well as increasing the likelihood of sexual behavior with female partners. Given prior research on condom use among adolescents,⁸ it is likely that this behavior with females was also condomless.

TABLE 2. INTERRELATIONS AMONG SYNDEMIC INDICATORS ($N=207$)

	<i>Internalizing mental health symptoms (IMH) OR (95% CI)</i>	<i>Childhood sexual abuse (CSA) OR (95% CI)</i>	<i>Problematic alcohol use (AU) OR (95% CI)</i>	<i>Marijuana (MJ) OR (95% CI)</i>
IMH	—	—	—	—
CSA	2.8 (1.5–5.1)	—	—	—
AU	2.2 (1.1–4.5)	1.7 (0.80–3.4)	—	—
MJ	2.3 (1.2–4.2)	2.3 (1.2–4.3)	9.3 (4.2–20)	—

ORs where the 95% CI does not cross 0 are considered statistically significant at $p<0.05$.

OR, odds ratio; CI, confidence interval.

FIG. 1. Multivariable Firth logistic regression results of associations of syndemic indicators with sexual behavior with male and female partners ($N=207$ sexual minority adolescent males) Note: 0 syndemics is the reference group.

Previous research on syndemics has documented rates of psychosocial concerns among emerging adult and adult sexual minority men similar to those seen in this study. Mustanski et al. found that 23% of their sample of young adult sexual minority men (ages 16–24) reported problematic alcohol use (compared with 18% in our sample), 24% reported regular marijuana use (compared with 26% in our sample who reported any use), 32% reported psychological distress (compared with 41% in our sample who reported clinically significant internalizing symptoms), and 32% reported experiencing sexual assault (compared with 31% who reported childhood sexual abuse in our sample).¹² In one study of adult HIV-negative sexual minority men (M age = 34), syndemic indicators were approximately as common.¹⁵ Similar to these studies, results from this study found that syndemic indicators were generally significantly associated with each other. The relatively stable prevalence and interrelations among syndemic indicators in the current study and in samples of older adolescent and adult sexual minority men suggest that these concerns may coalesce early in sexual minority males, are associated with HIV risk at a young age, and remain problematic in adulthood.

Recommendations for HIV prevention interventions for adult sexual minority men place a premium on addressing mental health in an integrated³⁵ and cost-effective way.³⁶ Findings from the current study also offer other potentially valuable insights. We used clinically validated cutoffs on measures of syndemic indicators so that the results would be more likely to identify youth who are most at-risk for significant mental health issues. Furthermore, no prior study has clearly documented the diverse combinations of psychosocial syndemic concerns faced by sexual minority youth.

Thus, these findings have implications for both screening and intervention. For example, many youth in the current study reported childhood sexual abuse, which often goes undetected.³⁷ Childhood sexual abuse commonly co-occurred

with internalizing symptoms and with alcohol/marijuana use. This suggests a means of detecting underlying trauma for these youth (i.e., via screening for mental health and substance use), as well as potential avenues for clinical intervention (e.g., internalizing vs. externalizing pathways from trauma to other mental health issues).³⁸

These findings can also inform existing theories of HIV risk behavior change among adolescents. The Information–Motivation–Behavioral (IMB) skills theory is widely used in the field of HIV prevention, including among adolescents,^{39,40} but it does not explicitly incorporate mental health concerns as a target.⁴¹ However, data among adult sexual minority males show that the proposed mechanisms of change in the IMB model are moderated by depression, such that IMB processes may not predict risk behavior among sexual minority males facing mental health concerns.⁴² In addition, HIV prevention interventions for youth are often attentive to their social/ecological context,⁴³ given its considerable impact on developmentally shaped antecedents to risk behavior among adolescents (e.g., autonomy, social norms, and perceived risk).¹¹ Examining the current results in the context of these theories suggests that prevention efforts should address how syndemic indicators affect adolescents' sexual behaviors as well as their connections to healthy social institutions (e.g., peers, school, and family). In addition, these results suggest the need for HIV prevention efforts for adolescent sexual minority males that are adaptable or modular so they can flexibly address these multiple psychosocial concerns of sexual minority youth while simultaneously enhancing HIV prevention skills.

Additional research is needed to understand how these syndemic indicators operate across the range of HIV-related risks for sexual minority adolescents. The current study was the first to document an association between syndemic indicators and sex with different-sex (i.e., not male) partners, which is especially important during adolescence when

youth often experiment with a range of sexual behaviors.^{8,11,17} One important limitation of the current study is that we did not assess condom use with female partners; thus, we cannot determine if syndemic burden is associated with sexual risk with female partners. However, because many adolescents do not use condoms with different-sex partners,⁸ we hypothesize that condomless sex may comprise much of the statistical association between syndemic burden and vaginal/anal sex with female partners among this sample. However, more studies are needed to confirm this hypothesis.

Limitations

The current study has other limitations, which will be important to address in future research. These data are cross-sectional, which limits inferences about causality. Future longitudinal research can more precisely explore when and how these concerns emerge among sexual minority youth. Although the current study assessed key syndemic indicators, it did not assess all that have been documented in the literature. Intimate partner violence was not assessed, although it is commonly considered a syndemic indicator. Furthermore, research on syndemics among adults has often focused on polysubstance use. The current study focused only on marijuana as the most commonly used drug in the sample. In addition, criticism of the syndemic literature has noted that many studies have not directly tested the potential interactive effects of psychosocial problems to demonstrate a putative synergistic effect.^{16,44} The current study was not powered to test this number of interactions nor alternative analytic strategies (e.g., latent class analysis, which would test for an underlying syndemic variable linking the indicators) and, thus, was only able to document the effect of increased syndemic burden on sexual behavior among youth.

Conclusion

Despite these limitations, the current study indicates that syndemic indicators emerge early for many sexual minority males, with some youth facing multiple psychosocial risks. Furthermore, these syndemic indicators were associated with early sexual behavior, which increases adolescent sexual minority males' vulnerability for HIV and other sexually transmitted infections. These findings underscore the critical need for timely identification of psychosocial concerns and targeted intervention with sexual minority men. Screening and intervention must begin early for adolescent sexual minority males to reduce the long-term effects of untreated mental health issues for these vulnerable youth.

Acknowledgments

We thank the participants and our research assistant, Jaime Ramirez, for their time and efforts in the study.

Disclaimer

The content of this publication is solely the responsibility of the authors and does not represent the official views of the National Institutes of Health.

Author Disclosure Statement

No competing financial interests exist.

Funding Information

Support for this study came from a grant from the National Institute of Mental Health awarded to Dr. K.M.N. (K23MH109346).

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