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Profiles of Psychosocial Adversity and their Associations with Health Risk Behaviors and Mental Health Outcomes in Young Adults

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Abstract

Adverse psychosocial experiences operate simultaneously to affect mental health and behavior. The current study used mixture modeling to identify subgroups of young adults based on experiences of four types of psychosocial adversity and characterize their associations with depression, anxiety, world assumptions, substance use, and sexual risk behavior. Sexual assault, physical assault, and discrimination (interpersonal adversity) showed similar patterns within each group, but diverged from neighborhood disadvantage in two groups. Groups characterized by higher interpersonal adversity reported the most negative health outcomes. Findings highlight variations in the co-occurrence of adverse experiences and differential links to risky health behaviors and mental health.

Keywords

unsafe sex; alcohol; cannabis; anxiety; depression; stress

Introduction

Exposure to psychosocial adversity represents a pervasive threat to well-being (Felitti et al., 1998; Shonkoff & Garner, 2012; Toussaint et al., 2016). A range of mental health outcomes and health risk behaviors have been linked to various forms of psychosocial adversity (Jacob, 2013; Rutter, 2001). Specifically, sexual assault (Champion et al., 2004), physical assault (Coker et al., 2002; Duncan et al., 1996), discrimination (Earnshaw et al., 2016; Williams, Neighbors, & Jackson, 2003), and neighborhood disadvantage (Aneshensel & Sucoff, 1996; Repetti, Taylor, & Seeman, 2002) have been consistently associated with anxiety, depression, negative world assumptions, sexual risk behavior, and problematic substance use. These specific forms of adversity are often studied separately; however, research highlights how stressful experiences may operate simultaneously to affect mental

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health and behavior (Meyer, 2003; Pearlin et al., 2005; Thompson et al., 2004), which necessitates approaches that consider these constructs jointly. Although these forms of psychosocial adversity tend to co-occur (Dong et al., 2004; Rutter, 2001), this is not always the case, which raises questions about combinations of co-occurring adversity that may enhance risk. Therefore, the goals of the present study are 1) to identify subgroups of young adults based on experiences of sexual and physical assault, discrimination, and childhood neighborhood disadvantage; 2) to determine how the resulting profiles of psychosocial adversity risk are differentially associated with mental health, world assumptions, and health risk behaviors using a cross-sectional design.

Psychosocial adversity can lead to alterations in assumptions about the world, such as perceptions of vulnerability and meaningfulness (Janoff-Bulman, 1992). These world assumptions are associated with depression and anxiety, which have been consistently identified as outcomes of psychosocial adversity (Lilly, Veldez, & Graham-Bermann, 2011; Tian, 2016). Health risk behaviors, including sexual risk behavior and substance use, may best be understood within this broader context of mental health and world assumptions. These behaviors may reflect strategies to cope with stress, fulfill goals such as emotion regulation or interpersonal connection, or conform to perceived norms (Cooper, Agocha, & Sheldon, 2000; Kenney, Anderson, & Stein, 2018; Simons et al., 2005). It is important to understand these associations during young adulthood, a developmental period in which individuals are particularly vulnerable to mental health problems (Eisenberg et al., 2007) and health risk behaviors (Pearson et al., 2017; Schulenberg & Maggs, 2002; Staton et al., 1999).

Although understanding the independent effects of each risk factor is imperative, considering various forms of psychosocial adversity within the broader context of one's environment allows us to understand the cumulative effects that impact mental health (Jacob, 2013) and behavior (Rutter, 2001). Most research on exposure to psychosocial adversity and health has been variable-centered (Cooley-Quille et al., 2001; Copeland-Linder, Lambert, & Ialongo, 2010), which does not fully address how these risk factors work in tandem (Masten, 2001). Person-centered approaches, which are aimed at identifying meaningful subgroups of individuals and variation in outcomes across those subgroups (Copeland-Linder, Lambert, & Ialongo, 2010) have rarely been applied to this area of research; yet, research suggests that these types of classifications are effective in guiding prevention and intervention implementation (Bowen, Lee, & Weller, 2007). The use of this analytic technique, which considers multiple forms of adversity jointly, coupled with the distinction between interpersonal and non-interpersonal forms of adversity, will provide novel insight into the associations between psychosocial adversity and mental health and behavior.

Overview of study and hypotheses

Hypotheses were generated based on extant literature regarding both group formation and associations between group membership and outcomes. In addition to one group characterized by high psychosocial adversity across domains and a second by low adversity across domains, we anticipated the emergence of at least one group in which forms of adversity diverged, i.e., qualitative distinctions. We expected that indicators of interpersonal adversity (i.e., both forms of assault, discrimination) would co-occur and diverge from non-

interpersonal adversity (i.e., neighborhood disadvantage). Given the elevated prevalence of socioeconomic disadvantage among African Americans compared to Whites (Turner & Avison, 2003; Williams, 1999), we hypothesized that African Americans would be overrepresented in groups characterized by high neighborhood disadvantage. We also expected African American and Asian individuals to be overrepresented in groups characterized by high discrimination. Because women are more likely to experience sexual assault compared to men (Elliot, Mok, & Briere, 2004), we expected women to be overrepresented in groups characterized by a higher probability of sexual assault, independent from physical assault.

Next, we generated hypotheses for distinctions in mental health, world assumptions, and health risk behaviors by group membership. Consistent with the literature on stressors and health, we expected that the group characterized by high adversity across all domains would report the most negative outcomes, and the low adversity group would report the fewest negative outcomes. We further hypothesized that groups characterized by higher interpersonal relative to non-interpersonal adversity would be associated with poorer outcomes. This is consistent with past research that suggests interpersonal forms of trauma have a more adverse effect on core world assumptions and mental health compared to non-interpersonal trauma (Janoff-Bulman, 1992; Lilly, Valdez, & Graham-Bermann, 2011).

Materials and Methods

Participants

The sample was drawn from a study that recruited 1422 students at a large university. After applying quality control standards (i.e., minimum survey completion time deemed acceptable, long strings of missing data), data were removed from 54 participants. Given our interests in identifying potential racial differences in patterns of psychosocial adversity experiences among young adults, the sample was limited to individuals between ages 18 and 25 years ($M = 19.50$, $SD = 1.69$) and to the three most highly represented racial categories. The final sample consisted of 1084 participants (74.1% female): 27.1% self-identified as Black/African American, 19.2% Asian and 53.7% White/Caucasian. Due to the low number of participants ($n = 43$) who identified their ethnicity as Hispanic (in a separate question), we could not meaningfully categorize individuals based on both race and ethnicity; thus, only participants' race was included in analyses ($n = 39$ White, $n = 3$ African American, $n = 1$). The majority of participants identified as heterosexual (88.3%), 2.7% as homosexual, and 6.9% as bisexual; further, 44.4% were not dating, 17.7% were casually dating, 34.2% were exclusively dating, and 2.7% were engaged, married, or had a life partner.

Procedures

Undergraduate students were recruited through SONA, a university-based research participation system that students can access after enrolling in a psychology course. Individuals were invited to participate in a web-based survey of stress, personality, and mental health. All students 18 years of age or older who were capable of providing informed consent were eligible to participate. Participants were provided with a description of the

study and procedures, and electronically provided informed consent. Participants were compensated with one research credit that could be applied toward an eligible course.

Measures

Demographics.—Participants' race, sex, age, relationship status, and sexual orientation were assessed.

Psychosocial Adversity

Physical and sexual assault.—Lifetime history of physical assault and lifetime history of sexual assault were assessed using the Life Events Checklist (LEC; Gray, Litz, Hsu, & Lombardo, 2004) and coded dichotomously as present or absent. Endorsement of experiencing either of the following events qualified for a history of physical assault: (1) physical assault or (2) assault with a weapon. Endorsement of experiencing (1) sexual assault or (2) any other unwanted or uncomfortable sexual experience qualified as a history of sexual assault.

Perceived discrimination.—Discrimination attributed to gender, race, ancestry, religion, sexual orientation, or education/income was assessed with the Everyday Discrimination Scale (EDS; Williams, Yu, Jackson, & Anderson, 1997). Participants reported how frequently 9 experiences occur in their lives, with response options ranging from 1 *almost everyday* to 5 *less than once a year*. For each item (e.g., "You are treated with less respect than other people are"), participants could select all that apply from a list of attributions. Scores were coded such that higher scores indicate higher perceived discrimination and summed to create a scale score ($\alpha = .89$). Participants who responded, "less than once a year" for all 9 items given a score of "0".

Childhood neighborhood disadvantage.—Neighborhood disadvantage was assessed with the Neighborhood Assessment (Jackson et al., 2004), a measure of perceived neighborhood safety and cohesion, in reference to their childhood neighborhood. Responses across 7 items (e.g., "I felt safe being out alone in my neighborhood at night") with response options ranging from 1 *very true* to 4 *not at all true* were summed such that higher scores indicate higher neighborhood disadvantage ($\alpha = .86$).

Mental health.

Depression.—Depression was assessed with the 9-item Patient Health Questionnaire (PHQ-9; Kroenke, Spitzer, & Williams, 2001) that queries the frequency respondents have been bothered by depressive symptoms (e.g., Little interest or pleasure in doing things) in the past 2 weeks. Response options range from 1 *not at all* to 4 *nearly every day*. Responses were summed such that higher scores represent greater depression severity ($\alpha = .90$).

Anxiety.—Anxiety was assessed with the 7-item Generalized Anxiety Disorder Scale (GAD-7; Spitzer, Kroenke, Williams, & Löwe, 2006). Participants reported the frequency of anxiety symptoms (e.g., Feeling nervous, anxious or on edge) over the past 2 weeks with response options ranging from 1 *not at all* to 4 *nearly every day*. Responses were summed such that higher scores represent greater anxiety severity ($\alpha = .91$).

World assumptions.—World assumptions were assessed with the 22-item World Assumption Questionnaire (WAQ; Kaler, 2009) which consists of four subscales. Controllability of events (CE) consists of 5 items (e.g., “I have a great deal of control over what will happen to me in my life”; $\alpha = .69$). Comprehensibility and predictability of people (CPP) consists of 5 items (e.g., “People often behave in unpredictable ways”; $\alpha = .76$). Trustworthiness and goodness of people (TGP) consists of 6 items, (e.g., “Other people are usually trustworthy”; $\alpha = .73$). Safety and vulnerability (SV) consists of 6 items (e.g., “Terrible things might happen to me”; $\alpha = .62$). Participants rated their agreement with each statement on a scale from 1 *strongly agree* to 6 *strongly disagree*. Separate scores were created for each subscale, with higher values indicating more positive world assumptions.

Health risk behaviors.

Sexual risk behavior.—Sexual risk behavior was assessed with four items. The first item, “How many people have you had sex with (oral, anal, or vaginal)?” over the previous three months was rated on a scale from 1 *1 person* to 8 *more than 20 people*. The remaining three items: frequency over the past three months of (2) unprotected sex, (3) sex while drunk, and (4) sex while under the influence of drugs besides alcohol were rated on a scale from 1 to 10, (1=*never*; 10=*more than 30 times*). Individuals who had never had sex were given a score of 0. Because the first item used a different response scale, items were standardized then averaged to create a composite score, with higher values indicating greater risk ($\alpha = .79$). These items have been used in another study assessing sexual risk behavior among college students (Moore et al., 2017) with items derived from the Youth Risk Behavior Survey (Centers for Disease Control and Prevention, 2013).

Problematic alcohol use.—The 10-item Alcohol Use Disorders Identification Test (AUDIT; Saunders, Aasland, Babor, De la Fuente, & Grant, 1993) was used to assess problematic alcohol use over the past year. Participants reported drinking frequency on a scale from 1 *never* to 5 *four or more times a week*, drinking quantity on typical days drinking on a scale from 1 *0 to 2* to 5 *10 or more*, and frequency of 8 problems (e.g., “How often during the last year have you found that you were not able to stop drinking once you had started?”) on a scale from 1 *never* to 5 *daily or almost daily*. Scores were summed such that higher scores indicate greater severity ($\alpha = .86$). A score of 8 or higher indicates problematic alcohol use (Saunders, Aasland, Babor, De la Fuente, & Grant, 1993).

Problematic cannabis use.—The 10-item Cannabis Use Disorders Identification Test (CUDIT; Adamson & Sellman, 2003) was used to assess problematic cannabis use. Participants reported cannabis use frequency on a scale from 1 *never* to 5 *four or more times a week*, hours “stoned” on typical days using on a scale from 1 *0 to 2* to 5 *10 or more*, and frequency of 8 problems (e.g., “How often have you had a problem with your memory or concentration after using cannabis?”) on a scale from 1 *never* to 5 *daily or almost daily*. Scores were summed such that higher scores indicate greater severity ($\alpha = .88$). A score of 8 or higher indicates problematic cannabis use (Adamson & Sellman, 2003).

Analytic Approach

Mixture model analyses were conducted 1) to identify subgroups of participants based on experiences of psychosocial adversity; and 2) to determine how patterns of adversity are differentially associated with health risk behaviors, world assumptions, and indicators of mental health. Analyses were conducted using Asparouhov and Muthén's (2014) three-step approach, in which the number of distinct latent classes are identified and modeled to predict distal outcomes while accounting for the uncertainty in profile membership. Mixture modeling is a person-centered analytic technique utilized to detect unobserved heterogeneity and identify meaningful subgroups based upon similarity of responses to measured variables (Nylund, Asparouhov, & Muthén, 2007). This approach allows for profiles to be identified based on a combination of both continuous and dichotomous indicators. Analyses were conducted with the default number of random starts, and were subsequently increased to ensure that the global maxima were reproduced (Hipp & Bauer, 2006). Models were estimated with an increasing number of profiles and model fit was evaluated to determine the appropriate number of profiles to retain based on indices of model fit and conceptual considerations, including interpretability of groups and group sample sizes (Berlin et al., 2014). Lower values for BIC and AIC, and higher values for log-likelihood and entropy indicate better model fit. Following the identification of latent classes, associations between group membership and outcomes (i.e., mental health, world assumptions, health risk behavior) were assessed using a weighting procedure to account for classification error with parameter comparisons using the Wald chi-square test (Asparouhov & Muthén, 2007). Analyses were conducted with Mplus version 7.11 software and model parameters were estimated via maximum likelihood procedures (Muthén & Muthén, 2012). Descriptive and correlational information is provided in Supplemental Table 1.

Results

Group identification

We evaluated model fit for 2 through 6 groups (see Table 1). The 4-group solution was determined to have satisfactory fit based on BIC, AIC, and entropy (Asparouhov & Muthén, 2014; Tein et al., 2013). Although the Vuong-Lo-Mendell-Rubin likelihood ratio test suggests that 3 groups are sufficient, the parametric bootstrapped likelihood ratio test was significant for the 4-group solution, indicating that 4 groups fit better than 3. BIC and AIC decreased and entropy increased with the addition of each group, suggesting improved fit. Fit indices thus did not clearly converge on an optimal solution, which suggests that additional groups may result in overfitting data (Nylund et al., 2007). Both the 5 and 6-group solutions included groups that comprised less than 5% of the total sample, leading to interpretability issues and difficulty drawing meaningful conclusions about group differences. Thus, we selected the 4-group solution based on adequate fit, signs of data overfitting with increasing the number of groups, model parsimony, and interpretability (Nylund et al., 2007).

In line with expectations, variations in patterns of psychosocial adversity were observed. As shown in Table 2, the largest group (Group 1; 57.1%) was characterized by low adversity across all four domains. Patterns for the other three groups were as follows: Group 2) high

interpersonal adversity (both categories of assault and discrimination; 8.1%), low neighborhood disadvantage; Group 3) low interpersonal adversity, high neighborhood disadvantage (28.7%); Group 4) average/high interpersonal adversity, very high neighborhood disadvantage (6.1%). White participants and men were underrepresented in Group 3, and African Americans and women were overrepresented in Group 3 (see Table 3).

Associations with health behaviors and mental health

Omnibus equality tests of means across groups showed a significant effect ($p < .001$) for all indicators of health risk behaviors (sexual risk behavior, AUDIT, CUDIT) and mental health symptoms (depression, anxiety). There were significant group differences for three of the four world assumptions scales (controllability of events, trustworthiness and goodness of people, and safety/vulnerability). Results of post hoc tests for group differences are reported in Table 3. In summary, Groups 2 and 4 were characterized by higher mental health symptom severity and health risk behaviors than both Groups 1 and 3. Although many of these outcomes were comparable across Groups 2 and 4, membership in Group 4 was associated with significantly higher anxiety symptoms, yet lower problem alcohol use and higher feelings of safety/vulnerability. Group 3 was characterized by significantly higher anxiety and depression symptoms, sexual risk behavior and problem alcohol use compared to Group 1, as well as lower assumptions about the controllability of events and trustworthiness/goodness of people – yet more positive feelings about safety/vulnerability.

Discussion

Patterns of exposure to psychosocial adversity

We identified four distinct profiles of exposure to psychosocial adversity, which, supporting hypotheses, reflected qualitative differences in experiences of adversity in addition to adversity load. We observed divergence in indicators of psychosocial adversity across groups, and neighborhood disadvantage was the primary distinguishing factor. Whereas the probability of experiencing the three forms of interpersonal adversity (i.e., sexual assault, physical assault, discrimination) were similar within a given group, neighborhood disadvantage co-occurred with interpersonal adversity only in certain groups. Adversity load was low across domains in Group 1 and high across domains in Group 4, whereas divergence was observed in Groups 2 (high interpersonal, low neighborhood) and 3 (low interpersonal, high neighborhood). Although neighborhood disadvantage has been linked to other forms of adversity in past research (Baglivio, Wolff, Epps, & Nelson, 2017; Coulton et al., 2007), its divergence from other forms of adversity in two of the groups may partially reflect that childhood neighborhood disadvantage is a comparatively distal factor and thus not as closely tied to events that occurred in a later developmental period.

Hypotheses about demographic representation were partially supported. African Americans were highly represented in the groups characterized by high neighborhood disadvantage (3 and 4). Group 2 had the highest discrimination rates, but contrary to the hypothesis, African American and Asian individuals were not overrepresented in this group (Supplemental Table 2). However, African Americans were overrepresented in the groups (3 and 4) characterized by both high neighborhood disadvantage and above average discrimination. We expected

that women would be overrepresented in groups characterized by high sexual assault, independent of physical assault. However, within each group, the probability of experiencing sexual assault was comparable with the probability of physical assault so sex differences specific to sexual assault cannot be interpreted meaningfully.

Associations with health outcomes and behaviors

Consistent with our hypothesis and past research (Jacob, 2013; Major et al., 2007; Rutter, 2001), individuals in the group characterized by low psychosocial adversity across all four domains (Group 1) reported the lowest levels of anxiety and depression, most positive world assumptions, fewest alcohol and cannabis problems, and lowest engagement in sexual risk behavior. Results also support the hypothesis that groups characterized by higher interpersonal relative to non-interpersonal adversity would be associated with poorer outcomes; these groups (2 and 4) reported the highest mental health symptoms, regardless of neighborhood context. The high interpersonal/low neighborhood adversity group (2) reported the most problematic substance use, consistent with past research linking (e.g., Ullman et al., 2013). This group, as well as the group characterized by average/high interpersonal in combination with very high neighborhood adversity (Group 4) reported the highest depression and anxiety symptoms. Together, this suggests that extreme exposure to psychosocial adversity in general has a meaningful influence on health and behavior – yet, this influence may manifest in slightly different ways (e.g., substance use vs. depression) depending on the form.

More positive world assumptions and lower sexual risk behavior were observed in the low adversity group (Group 1) compared to the other groups. However, there were not consistent differences between these three higher risk groups, suggesting a lack of specificity, i.e., any form of adversity contributes to these outcomes. This may be because these factors are complex and multidetermined. For sexual risk behavior, for example, adversity may result in interpersonal difficulties and thus fewer opportunities for sexual interaction (Johnson et al., 2002; Mullen et al., 1994), whereas for others, adversity may lead to sexual risk behavior as an attempt to fulfill interpersonal or emotion regulation goals (Cooper, Agocha, & Sheldon, 2000; Moore et al., 2017).

Strengths, limitations, and future directions

There are several notable strengths and limitations of this study. In addition to the person-centered analytic technique that filled a gap in the literature regarding patterns of psychosocial adversity, the sample was large and diverse, which allowed us to assess distributions of race and sex across groups. However, future investigations in which Hispanic individuals are more highly represented should also aim to understand potential ethnic differences in patterns of adversity. Furthermore, we investigated associations between patterns of adversity and world assumptions – which have rarely been examined in past research.

Although we captured a wide range of indicators of adversity and health, future research should extend this by evaluating protective factors that promote resilience. This work can be enhanced by obtaining information about the severity, duration, and appraisals of adversity

to facilitate a more nuanced understanding of the circumstances under which these stressors exert their influence. Although we cannot draw causal inferences due to the cross-sectional design, this study lays the groundwork for longitudinal research that better address directions of effects.

Conclusions

The culmination of results provides additional support for the link between psychosocial adversity and negative health outcomes among young adults, and extends past research by demonstrating that these effects are largely driven by interpersonal adversity. These results highlight variation in the association of childhood neighborhood disadvantage with other forms of adversity and broadly supports the importance of considering multiple types of adversity and how they may act together to influence health and behavior. Lastly, these results may help inform the development of tailored prevention and intervention strategies for college students based on psychosocial adversity history.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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Figure 1.
Associations between group membership and mental health, world assumptions, and mental health symptoms

Table 1.

Fit indices for groups

	2 Groups	3 Groups	4 Groups	5 Groups	6 Groups
BIC	8344.61	8271.59	8248.78	8210.33	8203.91
Sample size adjusted BIC	8309.68	8220.77	8182.08	8127.75	8105.45
AIC	8289.81	8191.88	8144.16	8080.80	8049.47
Log Likelihood	-4133.91	-4079.94	-4051.08	-4014.50	-3993.74
Entropy	.719	.682	.743	.793	.789
Group sample sizes	822,255	717,133,227	309,87,615,66	560,153,137,207,20	153,182,39,530,20,153
VLMR LRT	$p < .001$	$p < .001$	$p = .639$	$p < .001$	$p = .003$
BLRT	$p < .001$	$p < .001$	$p < .001$	$p < .001$	$p < .001$

BIC = Bayesian Information Criterion. AIC = Akaike's Information Criterion. VLMR LRT = Vuong-Lo-Mendell-Rubin Likelihood Ratio Test. BLRT = Bootstrapped LRT.

Table 2.

Pattern of Groups

Probabilities		Means (Standardized)		Description
Physical Assault	Sexual Assault	Discrimination	Neighborhood	
Group 1 (<i>n</i> = 615)	.206	.147	-.380	Low adversity across domains
Group 2 (<i>n</i> = 87)	.805	.717	.982	High interpersonal adversity; low neighborhood adversity
Group 3 (<i>n</i> = 309)	.195	.326	.309	Low interpersonal adversity; high neighborhood adversity
Group 4 (<i>n</i> = 66)	.478	.399	.436	Average/high interpersonal adversity; very high neighborhood adversity

Note. Means less than zero indicate lower adversity than full sample average. Means greater than zero indicate higher adversity than full sample average.

Table 3.

Group differences for mental health outcomes, world assumptions, health behaviors, and demographics

	Group 1	Group 2	Group 3	Group 4	Omnibus Wald χ^2 Test	
	M (SE)				χ^2	p
Mental Health						
Depression	5.65 (.21) ^{2,4}	10.34 (.41) ^{1,3,4}	6.59 (.43) ^{1,4}	14.90 (.60) ^{1,2,3}	278.27	<.001 [*]
Anxiety	5.16 (.19) ^{2,3,4}	9.93 (.45) ^{1,3}	6.54 (.34) ^{1,4}	10.66 (.55) ^{1,3}	162.89	<.001 [*]
World Assumptions						
Controllability of Events	19.83 (.15) ^{2,3,4}	18.52 (.37) ¹	18.63 (.22) ¹	17.99 (.47) ¹	34.56	<.001 [*]
Comp./Predict. of People	14.81 (.17)	14.30 (.41)	14.79 (.24)	15.23 (.50)	2.29	.514
Trustworthiness/ Goodness People	21.88 (.17) ^{2,3,4}	19.06 (.39) ^{1,3}	20.96 (.27) ^{1,2,4}	18.43 (.44) ^{1,3}	85.34	<.001 [*]
Safety/Vulnerability	15.01 (.15) ²	13.40 (.30) ^{1,3}	15.73 (.25) ⁴	14.56 (.38) ³	36.79	<.001 [*]
Health Behavior						
Sexual Risk Behavior	-.16 (.03) ^{2,3,4}	.31 (.08) ¹	.15 (.05) ¹	.28 (.17) ¹	55.51	<.001 [*]
AUDIT	3.94 (.18) ^{2,3}	7.55 (.60) ^{1,3,4}	5.34 (.31) ^{1,2}	4.05 (.78)	43.92	<.001 [*]
CUDIT	2.57 (.19) ^{1,4}	6.20 (.72) ^{1,3}	2.42 (.27) ^{2,4}	4.95 (.70) ^{1,3}	35.18	<.001 [*]
% (n)					Chi-Square Test	
					χ^2	P
Sex						
Male	27.7% (169) ^a	24.1% (21)	19.2% (59) ^a	32.3% (21)	9.54	.002 [*]
Female	72.3% (442) ^a	75.9% (66)	80.8% (248) ^a	67.7% (44)		
Race						
White/Caucasian	57.6% (354) ^a	59.8% (52)	45.6% (141) ^a	50.0% (33)	6.56	.010 [*]
Black/African American	24.2% (149) ^a	25.3% (22)	32.4% (100) ^a	31.8% (21)		
Asian	18.2% (112)	14.9% (13)	22.0% (68)	18.2% (12)		

* $p < .01$. Comparisons shown are significant at $p < .01$.

^aSignificantly differs from expected count at $p < .05$ level.

AUDIT = Alcohol Use Disorders Identification Test. CUDIT = Cannabis Use Disorders Identification Test.