

A Person-Centered Approach to Examining Heterogeneity and Subgroups Among Survivors of Sexual Assault

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This study identified subgroups of female sexual assault survivors based on characteristics of their victimization experiences, validated the subgroup structure in a second cohort of women recruited identically to the first, and examined subgroups' differential associations with sexual risk/safety behavior, heavy episodic drinking (HED), psychological distress symptomatology, incarceration, transactional sex, and experiences with controlling and violent partners. The community sample consisted of 667 female survivors of adolescent or adult sexual assault who were 21 to 30 years old ($M = 24.78$, $SD = 2.66$). Eligibility criteria included having unprotected sex within the past year, other HIV/STI risk factors, and some experience with HED, but without alcohol problems or dependence. Latent class analyses (LCA) were used to identify subgroups of women with similar victimization experiences. Three groups were identified and validated across 2 cohorts of women using multiple-group LCA: contact or attempted assault (17% of the sample), incapacitated assault (52%), and forceful severe assault (31%). Groups did not differ in their sexual risk/safety behavior. Women in the forceful severe category had higher levels of anxiety, depression, and trauma symptoms; higher proportions of incarceration and transactional sex; and more experiences with controlling and violent partners than did women in the other 2 groups. Women in the forceful severe category also reported a higher frequency of HED than women in the incapacitated category. Different types of assault experiences appear to be differentially associated with negative outcomes. Understanding heterogeneity and subgroups among sexual assault survivors has implications for improving clinical care and contributing to recovery.

General Scientific Summary

This study suggests that women's sexual assault experiences differ on many dimensions and that subgroups can be empirically identified: contact or attempted assault, incapacitated assault, and forceful severe assault. Overall, women in the forceful severe assault group experience more anxiety, depression, and trauma symptoms; higher proportions of incarceration and transactional sex; and more experiences with controlling and violent partners than women in the other 2 groups. Understanding different subgroups among sexual assault survivors has implications for improving clinical care and contributing to recovery.

Keywords: sexual assault, person-centered classification, subgroups, revictimization

Sexual assault is widespread. Estimates from large, nationally representative samples suggest that 11% to 22% of U.S. women experience sexual assault in their lifetimes (Basile, Chen, Black, & Saltzman, 2007; Black et al., 2011; Elliott, Mok, & Briere, 2004; Hedtke et al., 2008). In one such study, 13% of women reported

experiencing a completed, forcible sexual assault (Hedtke et al., 2008), and another estimated prevalence at 11% (Basile et al., 2007). A study whose definition of sexual assault included contact as well as penetration produced an estimate of 22% (Elliott et al., 2004). The National Intimate Partner and Sexual Violence survey,

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which included both attempted and completed rape, estimated that 18% of U.S. women had been assaulted in their lifetimes (Black et al., 2011). Higher rates are generally found among higher risk populations. For example, among community-recruited women with some history of heavy episodic drinking (HED) and sexual risk, lifetime rates of attempted or completed rape in adolescence and adulthood were 80% (Masters et al., 2014).

Over the past 30 years, research and activism have influenced social and legal definitions of rape in the United States (Roze & Koss, 2001). One outcome has been increased acknowledgment of victimizations not previously viewed as “real rape” (e.g., incapacitation or verbal coercion tactics). Emphasizing the common harmfulness of all types of sexual assault will continue to be important in rape prevention and victims’ recovery. At the same time, there is considerable heterogeneity in the experiences of sexual assault survivors. Research focused on these differences has the potential to increase understanding of what survivors need for recovery and to inform prevention efforts.

Sexual assault has been associated with myriad negative consequences. Among these are psychological distress, including symptoms of posttraumatic stress disorder (PTSD), anxiety, and depression (Campbell, Greeson, Bybee, & Raja, 2008; Messman-Moore, Long, & Siegfried, 2000; Pico-Alfonso, 2006); increased alcohol consumption and alcohol-related problems (Bedard-Gilligan, Kaysen, Desai, & Lee, 2011; Hughes, McCabe, Wilsnack, West, & Boyd, 2010; Reed, Amaro, Matsumoto, & Kaysen, 2009); and potentially risky sexual behavior such as higher partner numbers and earlier age of first intercourse (Senn, Carey, & Vanable, 2008). Furthermore, for some women, sexual assault may be part of a context of marginalization and vulnerability including incarceration, transactional sex, or experiences with controlling and violent partners (Campbell et al., 2008; Heath, Lynch, Fritch, McArthur, & Smith, 2011; Javdani, Sadeh, & Verona, 2011; Tripodi & Pettus-Davis, 2013), whereas for others, sexual assault may be a one-time traumatic event.

Although these associations provide important information about sexual assault sequelae, victimization experiences differ on many dimensions (e.g., severity, tactics used by the perpetrator). A thorough examination of different contextual factors associated with sexual assault may provide a guide for understanding how different assault experiences may be associated with negative outcomes. Knowledge about these differences could aid understanding of sexual victimization and help guide targeted prevention efforts (Testa et al., 2007), as well as potentially contributing to better clinical care for survivors.

Previous Categorizations of Sexual Assaults

Most research has approached the study of heterogeneity in sexual assault by examining the impact of a single or a few factors associated with the assault. Women’s experiences have been categorized based on characteristics such as perpetrator tactic, severity of assault outcome, frequency of victimization or revictimization, and impact of prior trauma history, including a history of childhood sexual abuse (CSA). Factors such as the presence of a weapon or the perception of a threat to life during an assault (Kilpatrick et al., 1989) have also been linked to differences in postvictimization well-being.

Assault Tactic

Studies have identified differences in the impact of sexual assault tactic—the method used by the perpetrator to obtain sex against the victim’s will—on psychological sequelae. These tactics include verbal coercion, incapacitation, and threatened force or use of force. Incapacitation refers to taking advantage of a woman when she is too intoxicated to stop what is happening due to either voluntary or involuntary use of alcohol or drugs. Although many studies do not differentiate between the two, there may be differences in psychological consequences. In a large national study of college women, drug/alcohol facilitated rape was associated with PTSD whereas rape that occurred after voluntary consumption of alcohol was not (Zinzow et al., 2010); however, forcible rape was associated with the highest risk of PTSD and depression. Similarly, among women who had been assaulted by force, incapacitation, or verbal coercion, PTSD symptoms varied across groups. Forcible rape victims reported the highest level of PTSD symptoms, followed by incapacitated rape victims, and then verbally coerced assault victims (Brown, Testa, & Messman-Moore, 2009).

Studies have also examined the impact of assault tactics on negative alcohol outcomes. Victims of alcohol-involved sexual assaults are associated with more frequent HED and higher alcohol-related negative consequences compared with women victimized by other tactics or with no trauma histories (Bedard-Gilligan et al., 2011; McCauley, Ruggiero, Resnick, Conoscenti, & Kilpatrick, 2009; McCauley, Ruggiero, Resnick, & Kilpatrick, 2010). However, assault tactic does not predict some indices of psychological distress (e.g., self-blame; Brown et al., 2009), which suggests that other factors also influence psychological consequences following assault.

Assault Outcome

Research has also focused on differences defined by severity of assault outcome. One such study categorized women’s experiences as no assault, unwanted sexual contact, attempted rape, and rape (Benson et al., 2007). Any exposure to sexual victimization was correlated with a greater number of lifetime sexual partners, which can increase women’s risk of STIs. Further, women with rape or attempted rape histories consumed more alcohol overall compared with women with lower severity outcomes or no victimization history. A recent review found that women who experience completed rape have more anxiety, depression, and suicide attempts compared with survivors of attempted rape (Ullman, 2007).

Revictimization

Revictimization, defined as sexual victimization (a) in childhood and again in adolescence/adulthood, (b) in adolescence followed by victimization in adulthood, or (c) during adolescence/adulthood by more than one perpetrator during separate events, is common (Classen, Palesh, & Aggarwal, 2005). A review of empirical literature suggests that approximately two thirds of women who experience victimization will be revictimized (Classen et al., 2005).

Women who have been revictimized appear to have more severe psychological sequelae than women who have not been revictimized, including more severe PTSD and more problematic drinking

outcomes (Najdowski & Ullman, 2009). Revictimization has been associated with a threefold increase in risk of depression or anxiety and a 12-fold increase in risk for PTSD as compared with women with no victimization history (Kimerling, Alvarez, Pavao, Kaminiski, & Baumrind, 2007). Casey and Nurius (2005) conducted a state-level random population survey and compared sexual assault survivors on trauma and depression symptoms and alcohol use. Survivors of multiple victimizations had greater lifetime symptoms of depression and PTSD and more frequent HED than all other women. The combination of CSA and adult sexual assault has also been linked to heightened psychological distress; 78% of women with both CSA and adult assault were considered depressed, compared with 59% of women with adult assault but not CSA (Cheasty et al., 2002). Taken together, repeated victimizations are associated with worse psychological functioning than a single sexual assault experience, especially when the multiple assaults occurred during both childhood and adulthood.

Although these approaches to examining differences in sexual assault experiences have yielded important findings, they are limited in that they have focused on how single aspects of assault experiences are related to psychological sequelae. In each case, there are other elements of a sexual assault history that are not considered and may affect results. To address this limitation and examine heterogeneity in assault experiences, researchers have begun to employ person-centered approaches.

Person-Centered Assessment of Sexual Assault Heterogeneity

Factors associated with women's sexual assault experiences co-occur and may relate to one another in complex ways. Statistical methods for considering multiple variables at the same time to characterize an assault experience, however, have previously been used very little. One way to characterize women's victimization experiences multidimensionally yet concisely is with person-centered empirical methods such as latent class analyses (LCA; Collins & Lanza, 2010). Such methods identify subgroups of people based on multiple factors simultaneously. Person-centered approaches have been used to examine patterns of violence exposure such as childhood maltreatment (Ford, Elhai, Connor, & Frueh, 2010; Walsh, Senn, & Carey, 2012). However, only two studies have used these methods with sexual assault.

Macy, Nurius, and Norris (2007) examined contextual factors in women's vulnerability to assault. They identified four latent classes among acquaintance sexual assault survivors based on prior adolescent/adult victimization, alcohol consumption at time of assault, relationship expectations of assailant, and precautionary habits, then tested for subgroup differences. Women with prior victimization and positive relationship expectations were significantly more likely to have a child abuse history (including sexual and physical abuse) than women in other groups. The other person-centered sexual assault study identified subgroups of young men and women based on assault tactic and outcome (French, Bi, Latimore, Klemp, & Butler, 2014). They found four classes, and the "poly victimized" group had a high likelihood of experiencing sexual assaults across all tactics. More of these youth (29%) had a history of CSA than youth in other classes (8% to 15%). They were also more likely to have greater psychological distress and more sexual risk behavior.

Both of these studies contribute to a multidimensional understanding of sexual assault. However, Macy et al. (2007) focused on profiles of vulnerability to assault rather than on characteristics of assault experiences themselves, did not test for group differences in psychological distress, did not model CSA's role, and focused exclusively on acquaintance sexual assault survivors. French et al. (2014) tested for differences in psychological distress, CSA history, and sexual risk behavior, but by including both men and nonvictims, took focus off the assault experiences of women victims. Lacking in this literature is a person-centered analysis characterizing women's assault experiences using (a) a broader set of assault characteristics, and (b) characteristics selected based on their importance in predicting outcomes of sexual assault in previous research. Also needed is a thorough examination of how group differences in psychological sequelae, as well other clinically relevant risks and vulnerabilities, are associated with different patterns of sexual victimization.

Current Study

This study used LCA to identify subgroups of female sexual assault survivors based on multiple characteristics of their victimization experiences. These characteristics were selected, based on the research reviewed above, as potentially important in predicting outcomes associated with sexual assault. The subgroup structure was validated in a second cohort recruited in an identical manner. We examined subgroups' differential associations with clinically relevant vulnerabilities and risks: Sexual risk/safety behavior, HED, psychological distress symptomatology, incarceration, transactional sex, and experiences with controlling and violent partners. Although the examination of subgroups of women based on their history of sexual assault is by nature exploratory, we expected to observe both a subgroup of women characterized by multiple victimization experiences, based on revictimization's frequency (Classen et al., 2005), and one in which the predominant assault tactic was incapacitation, given the high prevalence of alcohol-involved assaults (Abbey, Zawacki, Buck, Clinton, & McAuslan, 2001). Further, we expected that members of a multiply victimized group would have higher levels of psychological distress and sexual risk behavior (French et al., 2014; Zweig, Sayer, Crockett, & Vicary, 2002).

Method

Participants and Procedures

Participants were 21- to 30-year-old women from a midsized urban community. Advertisements invited female social drinkers to participate in a paid study examining "male-female social interactions." We placed advertisements online on Facebook, Craigslist, and local community blogs; in local weekly and college newspapers; as flyers in bars, coffee shops, libraries, community health clinics, and college campuses; and in nontraditional outlets like streaming radio stations and a happy hour mobile app.

Data for the current study were collected as background in an alcohol administration experiment that included responding to one of two different sexual scenarios. The parent study investigated factors influencing women's unprotected sex intentions; its procedures are described elsewhere (Davis, Masters et al., 2014; George

et al., 2014; Masters et al., 2014). All data used in the current study were collected before alcohol administration and presentation of the sexual scenario. Although the cohorts were differentiated by which sexual scenario they read after alcohol administration, recruitment methods and eligibility criteria were identical across cohorts, and participants answered the same background questionnaires. Data were collected from the first cohort between September 2008 and January 2010 and from the second between September 2010 and April 2012.

All women were nonproblem drinkers (Pokorny, Miller, & Kaplan, 1972). They were eligible to participate if they were: interested in sexual activity with men, reported HED (4 or more drinks within 2 hr) at least once in the past year, engaged in unprotected sex at least once in the past year, and endorsed an HIV/STI risk factor. Additionally, women were ineligible if they had any medical contraindications to alcohol consumption (National Advisory Council on Alcohol Abuse and Alcoholism, 2005). Participants were phone screened and, if eligible, came into the laboratory, provided informed consent, and completed background questionnaires on a computer in a private room. After the experiment, all participants were debriefed and paid \$15/hr. The university's Human Subjects Division approved all research procedures.

Because this study sought to identify subgroups of survivors of adult/adolescent sexual assault (both those with and without CSA histories), only participants with adult/adolescent sexual assault histories ($n = 667$; 76%) were included in analyses (447 had a history of adult/adolescent sexual assault only, and 220 had experienced both CSA and adolescent/adult assault). Participants who (a) had no sexual victimization history in either childhood or adolescence/adulthood ($n = 166$), or (b) reported CSA but no victimization during adolescence or adulthood ($n = 43$), were excluded.

Participants' mean age was 25.0 ($SD = 2.66$). Seventy percent self-identified as White, 7% as African American/Black, 6% as Asian/Pacific Islander, 1% as Native American, and 16% as multiracial or "other." In addition, 7% self-identified as Latina/Hispanic. Most were employed (58%), had either some college education (38%) or a college degree (38%), reported yearly income at or below \$30,999 (69%), and were not students (64%) at time of enrollment. On average, participants drank 13.76 drinks per week ($SD = 8.77$).

Measures

Adult/adolescent sexual assault characteristics. We used the revised Sexual Experiences Survey (SES; Koss et al., 2007) to assess the outcomes and tactics of nonconsensual sexual experiences since age 14. Outcomes include sexual contact and attempted or completed oral, anal, and vaginal penetration by a penis or object. Tactics include verbal coercion, incapacitation, and threats of force or physical force. Participants were asked how often each outcome was obtained by each tactic ranging from 0 = never to 3 = three or more times. We quantified the most severe sexual assault outcome as 1 = contact, 2 = attempted rape, and 3 = completed rape. The most severe tactic used to obtain each outcome was quantified as 1 = verbal coercion, 2 = incapacitation by alcohol or drugs, and 3 = physical force or threat of force. We also computed a repeated victimization variable that categor-

ized the number of penetrative (oral, vaginal, anal) sex acts experienced during assault as 0 (in cases of attempted rape), 1 to 3, 4 to 6, or 7 or more. Although this categorization approach did not differentiate between one assault event that included multiple acts and multiple assault events, it was created to preserve distinctions among different levels of victimization (a potentially important difference in sexual assault experiences), while producing a distribution compatible with LCA.

We assessed physical injury by asking "What was the most severe physical injury you experienced during any of these events?" Response options were 1 = no physical injury, 2 = minor injury like bruises or scrapes, 3 = injury worse than bruises or scrapes not requiring medical treatment, 4 = severe injuries requiring medical treatment, and 5 = severe injuries requiring hospitalization. Because 70% of the sample reported no physical injury, we dichotomized this variable into 1 = no physical injury, 2 = mild to moderate physical injury. We also asked "How upsetting were these events for you at the time they occurred?" Response options ranged from 1 = not at all to 7 = extremely. We recoded answers into 3 categories (with 1 = not upsetting comprising 1 and 2 responses, 2 = moderately upsetting comprising 3, 4, and 5 responses, and 3 = extremely upsetting comprising 6 and 7 responses) to address distributional sparseness that might prevent convergence in the LCA model.

CSA. Hulme's (2007) CSA questionnaire is a retrospective behaviorally specific measure of childhood sexual experiences. Participants were provided with a list of sexual acts and asked if any occurred when they were 13 years old or younger. Follow-up questions included information about the perpetrator. We added an additional question: How upsetting were these events for you at the time they occurred? (1 = not at all to 7 = extremely). The definition of CSA included childhood sexual experiences, occurring at 13 years old or younger, that involved a person 3 or more years older. When these experiences involved a perpetrator of similar age or only 1–2 years older, we classified them as CSA when the participant reported (a) the use of coercion, threats, or force; (b) being upset at the time of the experience; (c) having been molested or sexually abused as a child (assessed using the Childhood Trauma Questionnaire; Bernstein et al., 2003); or (d) vaginal or anal penetration at an age prior to that identified by the participant as age of first consensual sexual intercourse.

Sexual risk/safety. We measured participants' condom use in the past year by asking "Of all the times you had vaginal intercourse (in the past 12 months), what percentage of the time did you use a condom?" Response options ranged from 0 = 0% through 10 = 100%. We also assessed condom use at last sexual intercourse with "Did you use a condom the last time you had sex? (no/yes)." Finally we asked "Have you ever been diagnosed with a sexually transmitted infection (STI)? Check all that apply," followed by a list of STIs (e.g., Chlamydia, herpes). We recoded these answers into a dichotomous "STI diagnosis in lifetime (no/yes)" variable.

Heavy episodic drinking. We measured HED by asking "During the last 12 months, how often did you have 4 or more drinks containing any kind of alcohol within a 2-hr period?" (National Advisory Council on Alcohol Abuse and Alcoholism, 2005). Response options were 1 = 1 or 2 times in the past year, 2 = 3 to 11 times in the past year, 3 = once a month, 4 = 2 to 3

times a month, 5 = once a week, 6 = twice a week, 7 = 3 to 4 times a week, 8 = 5 to 6 times a week, 9 = every day.

Psychological distress symptomatology. We assessed anxiety and depression symptoms over the past week using subscales from the Brief Symptom Inventory (Asner-Self, Schreiber, & Marotta, 2006). Participants were asked to indicate how distressed or bothered they were by each item during the past 7 days. Response options were 1 = not at all, 2 = a little bit, 3 = moderately, 4 = quite a bit, and 5 = extremely. The anxiety scale included items such as “nervousness or shakiness inside.” The depression scale included items such as “feelings of worthlessness.” We computed scores as separate means of 6 anxiety and 6 depression items. Alpha for the anxiety items was .82, for depression, .91.

We measured trauma symptoms over the past 6 months with the Intrusive Thoughts and Defensive Avoidance subscales of the Trauma Symptom Inventory (Briere, 1995). Subscales, representative items, and alphas were: intrusive thoughts (“Sudden disturbing memories when you were not expecting them”), $\alpha = .85$; and defensive avoidance (“Trying to block out certain memories”), $\alpha = .88$. Response options ranged from 1 = never to 3 = often. Scores were computed as means of the 8 items for each subscale.

Incarceration and transactional sex. We assessed women’s histories of incarceration and transactional sex with one dichotomous item each, asking “Have you ever been incarcerated (jail, prison, lock-up, juvenile detention, etc.) for any length of time?” and “Have you ever had sexual intercourse because your partner helped you out financially (paid your rent or bills, bought things you needed, etc.).”

Controlling and violent partners. Experiences with controlling partners were measured with the 10-item Women’s Experience with Battering scale (Smith, Earp, & DeVellis, 1995). Participants indicate how much they agree with each item as a description of past or current relationships. Response options ranged from 1 = disagree strongly to 6 = agree strongly. Items include “My partner made me feel unsafe even in my own home.” Scores were computed as a mean; items’ alpha was .95. We assessed women’s lifetime experiences with violent partners with the 7-item Relationship Violence measure (Whitmire, Harlow, Quina, & Morokoff, 1999). This 7-item instrument asks “How often in your life has a sex partner done these things to you?” Items include “Kicked, bit, or hit you with a fist or with something else.” Response options ranged from 1 = never to 5 = very often. Scores were computed as a mean; these items’ alpha was .87.

Socioeconomic status. For descriptive purposes, we measured participants’ income, employment status, and education level. Response options to “What is your annual household income (include parental income if you are claimed as a dependent)?” ranged from “<\$10,999” to “\$61,000 or more” in categories incremented by \$10,000. Employment status was assessed with the dichotomous item “Are you employed?” We measured education level by asking “What is your highest grade completed?” Response categories were “less than high school,” “high school graduate or GED,” “trade or vocational school,” “some college,” “college graduate,” and “graduate degree.”

Analytic Approach

We had two analytic aims: To identify meaningful subgroups based on sexual assault history characteristics and to test whether and how outcomes empirically associated with sexual assault

victimization (e.g., psychological distress) differed across assault history profile groups. LCA is an analytic approach that identifies groups of individuals, referred to as “classes,” “profiles,” or “subgroups.” Each group has a unique profile based on responses to a set of indicator variables (Collins & Lanza, 2010), and includes people who are different from those in other classes and similar to those in their own group.

In order to validate identified subgroups, we conducted LCA on data from two cohorts of women recruited in an identical manner for two phases of the same study (cohort 1 $n = 351$, cohort 2 $n = 316$). There were no significant differences between cohorts in demographic (age, income, education level, and race-ethnicity), recruitment-related (STI risk and drinking behavior), or LCA indicator (sexual assault experience characteristics) variables. While no minimum sample size is required for LCA (Muthén & Muthén, 1998–2012), the size of each of these cohorts is within the range commonly employed in similar analyses (e.g., French et al., 2014; Macy et al., 2007). After identifying subgroups in each cohort separately, we examined whether differences in latent class structure between groups were merely quantitative (i.e., sexual assault history profiles identified were substantively the same across cohorts, but had different prevalences within cohorts) or were qualitative (i.e., profiles had substantively different interpretations across cohorts). We used Mplus 7.1 software (Muthén & Muthén, 1998–2012). Missing data were minimal and scattered; we employed full information maximum likelihood (FIML) to include cases with some missing data. We assessed the distribution of each model variable and found all to be within the acceptable range for LCA, given the flexibility with which this method accounts for non-normality of data (Muthén & Muthén, 1998–2012).

We used the multiple-group LCA approach recommended by Collins and Lanza (2010). First, to identify sexual assault history profiles and explore whether their general latent structure was similar across cohorts, we treated each as a separate data set. We fit a series of models in each cohort, each specifying an increased number of classes, and identified the best solution using the G^2 likelihood ratio statistic, fit to the data as calculated by Akaike and Bayesian Information Criteria values (AIC and BIC); Vuong-Lo-Mendel-Rubin and parametric bootstrapped likelihood ratio tests (VLMR and BLRT); classification quality (entropy); and interpretability and meaningfulness (Collins & Lanza, 2010; Muthén & Muthén, 2000).

Next, to test differences in latent class structure across cohorts, we combined data from both cohorts, then fit and compared three multiple-group LCA models, plus one single-group model combining the two cohorts. Each model used the number of classes identified as the best fit in step one. The first model was unconstrained, meaning that item-response probabilities within each latent class were free to vary across cohort groups. The second was constrained to complete measurement invariance across groups. The third was partially measurement invariant, but where unconstrained item-response probabilities within a latent class differed considerably between cohorts, we left these parameters free to vary. We used the likelihood ratio difference statistic (G^2_{Δ}) to test whether difference in fit among these three nested models was significant, as well as comparing AIC and BIC values. We assessed the fit of the final single-group model combining the two cohorts using AIC, BIC, entropy, and classes’ interpretability.

Table 1
Fit Indices for Separate 2- to 5-Class Models of Sexual Victimization Profiles by Study Cohort Group

Classes	Cohort group 1 (n = 351)						Cohort group 2 (n = 316)					
	G ² (df)	AIC	BIC _{ssa}	VLMR	BLRT	Entropy	G ² (df)	AIC	BIC _{ssa}	VLMR	BLRT	Entropy
2	284 (408)	3,423	3,439	-1,805***	-1,805***	.70	238 (408)	2,841	2,854	-1,609***	-1,609***	.99
3	211 (396)	3,372	3,396	-1,689**	-1,689***	.74	134 (396)	2,761	2,782	-1,397***	-1,397***	.86
4	174 (384)	3,359	3,391	-1,651	-1,651***	.72	112 (384)	2,763	2,790	-1,346	-1,345*	.88
5	158 (372)	3,366	3,407	-1,633	-1,633	.73	99 (372)	2,774	2,808	-1,334	-1,334	.81

Note. Optimal solutions are denoted in **bold**. AIC = Akaike information criterion; BIC_{ssa} = Sample size-adjusted Bayesian information criterion; VLMR = Vuong-Lo-Mendel-Rubin likelihood ratio test; BLRT = bootstrapped likelihood ratio test.

* $p < .05$. ** $p < .01$. *** $p < .001$.

Finally, with the full sample, we compared distal outcomes (sexual risk/safety behavior, HED, psychological distress symptomatology, incarceration, transactional sex, and experiences with controlling and violent partners) across latent classes. We used the stepwise method (Lanza, Tan, & Bray, 2013), employing the Mplus AUXILIARY (DCON) and (DCAT) commands. Although these class comparisons were descriptive, we employed the Holm-Bonferroni method for each set of pairwise tests to correct for multiple comparisons.

Results

Initial LCA Model Fitting

Table 1 shows fit statistics for two, three, four, and five class LCA solutions for each cohort group modeled separately. Overall, fit statistics supported a 3-class model for both cohort groups, and the 3-class model offered good separation, interpretability, and theoretical meaningfulness. The 3-class model's G² test was nonsignificant (indicating good fit to the data) in both groups. In Cohort 1, the AIC and BIC decreased only slightly between the 3- and 4-class solutions, and increased between the 4- and 5-class solutions. In Cohort 2, both AIC and BIC increased between the 3- and 4-class solutions. These information criteria values suggest that as the number of classes increased, parsimony was being lost without fit improvement. The VLMR was significant for the three (vs. two) class models for both cohorts, suggesting that 3 classes improved fit over two classes, but became nonsignificant for the 4- (vs. 3-) class model. The BLRT, being significant for 2-, 3-, and 4-class models in both cohorts, was uninformative. Entropy for the 3-class model was acceptable in both cohorts. Taking these criteria together, we chose the 3-class model as superior.

Similarity of Latent Structure Across Cohort Groups

We fit and compared four 3-class LCA models—three nested multiple groups models and one single group model—to the full data set to test differences in latent class structure across cohorts (see Table 2). The unconstrained model fit acceptably. The G_Δ² of the measurement invariance model was significant, indicating that constraining item-response probabilities to equality within classes across cohorts decreased fit to the data compared with the unconstrained model. This model also resulted in increased AIC and BIC values indicating poorer fit. The third model, partial measurement invariance, left item-response probabilities within a latent class free to vary when they differed considerably across cohorts. The G_Δ² and AIC and BIC values indicated that this model was no worse a fit than the unconstrained model.

Because fit indices supported the unconstrained and partial measurement invariance models equally, and substantive differences in latent class structure between cohorts were minor, we fit a final model that combined data from both cohorts into one group. This model's G², AIC, BIC, and entropy all indicated acceptable fit; it had good within-class homogeneity and across-class separation; and it produced theoretically meaningful classes. For all these reasons, we selected it as our final model.

Victimization Profiles

Our final LCA model identified three substantively different subgroups among the complete 667-person sample of sexual assault survivors. Table 3 depicts the item-response patterns that defined them, contrasting these patterns with those of the sample as a whole.

Table 2
Fit Indices for Test of Measurement Invariance Across Cohort Groups and for 3-Class Model With Full Data Set

	G ² (df)	G _Δ ² (df Δ)	AIC	BIC _{ssa}	Entropy
Unconstrained multiple groups model	345 (792)	—	7,057	7,152	.88
Measurement invariance multiple groups model	508 (825)	163 (33)***	7,154	7,204	—
Partial measurement invariance multiple groups model	367 (808)	22 (16)	7,048	7,121	—
Full data set single group model	257 (396)	—	6,239	6,286	.79

* $p < .05$. ** $p < .01$. *** $p < .001$.

Table 3
Victimization Profiles Among Heterosexually Active Young Women Who Are Sexual Assault Survivors

LCA indicators	Latent class groups			Full sample (<i>n</i> = 667)
	Contact or attempted (<i>n</i> = 110)	Incapacitated (<i>n</i> = 348)	Forceful severe (<i>n</i> = 209)	
Adult/adolescent assault characteristics				
Outcome				
Contact	.45	.00	.00	.07
Attempted rape	.54	.13	.03	.16
Rape	.01	.87	.97	.77
Tactic				
Coercion	.30	.10	.00	.10
Incapacitation (drugs or alcohol)	.51	.72	.10	.49
Force	.19	.18	.90	.41
Repeated victimization [†]				
0 sex acts	1.00	.11	.06	.24
1 to 3 sex acts	.00	.59	.39	.44
4 to 6 sex acts	.00	.25	.34	.24
7 or more sex acts	.00	.04	.21	.09
Injury beyond the assault itself				
No additional injury	.92	.88	.29	.70
Mild to moderate injury	.08	.12	.71	.30
Level of upset at the time				
1 not at all upset	.49	.15	.05	.17
2	.33	.57	.26	.44
3 extremely upset	.18	.28	.69	.40
CSA history				
No	.76	.74	.51	.67
Yes	.24	.26	.49	.33

[†] Combines reports of oral, vaginal, and anal penetration. Not possible to differentiate among multiple different assaults, one assault involving multiple acts, or both.

The first subgroup, contact or attempted assault, was the smallest at 110 women (17% of the total sample). Women in this group were most likely to have been victims of contact sexual assault or attempted rape, with zero acts of victimization by penetration. Incapacitation was the most common assault tactic. Very few members of this group experienced injury as a result of the assault, and they described being less upset at the time of the assault than women in the other 2 subgroups. The proportion of contact or attempted assault women who had a CSA history (24%) was lower than that of the sample as a whole (33%) and similar to that of the next subgroup.

The second subgroup, incapacitated assault, was the largest at 348 women (52% of the total sample), and included mostly completed rapes with a high likelihood of reporting incapacitation as the tactic. Incapacitated assault women were more likely to cite fewer acts of penetrative victimization than were women in the third subgroup (described below). Women in this subgroup were unlikely to report injury beyond the assault itself, and for the most part were moderately upset at the time of the assault. The proportion of incapacitated assault women who were CSA survivors (26%) was lower than that of the sample as a whole.

The third subgroup, forceful severe assault, included 209 women (31% of the total sample), who were more likely to report completed rapes than the other two groups. These women reported force as the predominant tactic and more acts of victimization than those in the other groups, and they were more likely to have a CSA

history (49%) than women in any other group or the sample as a whole. Members of this group were also likely to report some injury beyond the assault itself and for the most part described the event as extremely upsetting at the time.

Between-Class Comparisons

Table 4 compares victimization classes on sexual risk/safety and psychological distress, as well as their experiences with HED, incarceration, transactional sex, and having a violent or controlling partner. There were no significant differences in sexual risk/safety (past year condom use, condom use at last sex, or lifetime STI diagnosis) among women with different sexual victimization profiles.

In terms of psychological distress, women in the forceful severe assault subgroup had significantly higher levels of anxiety, depression, and trauma symptoms than women in the other two groups. Forceful severe assault women also reported more episodes of HED in the past year than did incapacitated assault women. Women in this group differed significantly from women in the other two groups in terms of incarceration experiences and having traded sex for basic needs. They had a 1 in 4 chance of having been incarcerated compared with other participants' approximately 1 in 8 likelihood of this history. Their likelihood of having had transactional sex was 41%, whereas among contacted or attempted and incapacitated assault women it was 7% to 8%, respectively. In terms of experience with controlling or violent partners, the three

Table 4

Between-Class Comparisons (Means or Probabilities) Among Sexual Assault Survivors (n = 667) on Sexual Risk-Safety, Heavy Episodic Drinking, Psychological Distress Symptomatology, and Other Factors

	Latent class groups			Omnibus χ^2 (df 2)	Full sample (n = 667)
	Contact or attempted (n = 110)	Incapacitated (n = 348)	Forceful severe (n = 209)		
Condom use past year (mean, 0 to 10)	4.68	4.48	4.31	.85	4.46
Condom use last sex (probability)	.45	.37	.33	3.88	.37
STI diagnosis in lifetime (probability)	.32	.33	.44	4.40	.36
HED past year (mean, 1 to 9)	4.03	3.80 _a	4.24 _a	7.30*	3.98
Anxiety symptoms (mean, 1 to 5)	.43 _a	.48 _b	.70 _{a,b}	16.41***	.54
Depression symptoms (mean, 1 to 5)	.73 _a	.81 _b	1.01 _{a,b}	11.16**	.86
Trauma symptoms (mean, 1 to 3):					
Intrusive thoughts	1.60 _a	1.53 _b	1.94 _{a,b}	101.10***	1.68
Defensive avoidance	1.81 _a	1.80 _b	2.21 _{a,b}	81.86***	1.93
Incarceration history (probability)	.12 _a	.12 _b	.25 _{a,b}	9.44**	.16
Transactional sex history (probability)	.07 _a	.08 _b	.41 _{a,b}	55.65***	.19
Controlling partner (mean, 1 to 6)	1.48 _{a,c}	1.68 _{b,c}	2.91 _{a,b}	116.58***	2.02
Violent partner (mean, 1 to 5)	1.25 _{a,c}	1.32 _{b,c}	1.96 _{a,b}	106.24***	1.49

Note. Where the omnibus test is significant, values in the same row that share the same subscript are significantly different between class groups based on sequential Holm-Bonferroni-corrected pairwise tests (corrected $p < .05$).

* $p < .05$. ** $p < .01$. *** $p < .001$.

subgroup profiles differed significantly from one another. Contact or attempted assault women had the lowest rates of these histories, followed by incapacitated assault, and forceful severe assault women had the highest rates.

In terms of socioeconomic status, tests indicated that the incapacitated assault and forceful severe assault subtypes had significantly different distributions on the categorical income variable (Omnibus $\chi^2(df 12) = 29.18$, $p < .01$), with the forceful severe assault group's distribution representing lower income overall. There were no significant differences between subtypes in proportion employed. The forceful severe assault subgroup's distribution on the categorical education variable was significantly different than those of the other two groups (Omnibus $\chi^2(df 12) = 27.53$, $p < .01$). These women were less educated overall: More likely to be high school graduates or below (20%, compared with 8% in the contact or attempted assault group and 13% in incapacitated assault), or to have "some college" (45%, compared with 37% in the contact or attempted assault group and 34% incapacitated assault) versus being college graduates (24%, compared with 46% in the contact or attempted assault group and 45% incapacitated assault), than the other two groups.

Discussion

The goals of this study were to (a) identify subgroups of female sexual assault survivors based on multiple characteristics of their victimization experiences, and (b) examine whether and how women grouped according to victimization experiences differed in terms of psychological distress symptomatology, sexual risk/safety, HED, incarceration, transactional sex, and experiences with controlling and violent partners. It extends prior work by employing an underutilized method, LCA, to characterize victimization experience subgroups based on a broader set of factors than have been previously used to do so. These factors co-occur and may relate to one another in complex ways, and this method allows sexual assault experiences to be multidimensionally categorized

according to outcome, tactic, frequency, and other factors simultaneously, rather than considering these important factors one by one. The study also makes a novel contribution by examining how differences in psychological sequelae, and other clinically relevant risks and vulnerabilities, are associated with different multidimensional patterns of sexual victimization.

We empirically identified three distinct patterns of assault characteristics. About one fifth of the survivors in this sample fell into a group characterized by contact assault or attempted rape, generally with incapacitation as the tactic, and by relatively low likelihood of CSA. The sexual assault histories of approximately half the sample were characterized by completed rape with incapacitation (whether through their own alcohol/drug consumption or an assailant's actions) as the tactic. The third subgroup, nearly one third of the sample, was made up of survivors of completed rape with force as the predominant assault tactic, who were also considerably more likely to have been sexually abused as children (49%) than women in either other group (24–26%).

These three distinct subgroups of sexual assault experiences should be understood in context. They emerged from a sample of women who were at higher risk of assault, or of more severe assault, than the general population. They were recruited based on alcohol consumption and STI risk factors that are associated with victimization. However, comparisons with recent findings suggest that this study's overall sample had only slightly higher rates of sexual assault and CSA than the women of the state in which it was carried out (Berliner, Fine, & Moore, 2001). Thus, it seems likely that differences in findings between this study and one done with a general population sample would appear in terms of group size rather than group definition. LCA with a different sample may have produced a distribution with fewer women in the forceful severe assault group and more in the incapacitated assault or the contact or attempted assault group, but conceptually similar groups would have been likely to emerge.

The most substantial between-groups differences were between women in the forceful severe group and the contact or attempted and incapacitated assault groups in levels of psychological distress symptomatology. Forceful severe assault women had significantly higher levels of anxiety, depression, and trauma symptoms than women in the other two groups. Because our measures assessed anxiety and depression symptoms over the past week, and trauma symptoms over the past 6 months, findings must be interpreted cautiously. However, this finding is consistent with other studies that found that multiple types of traumatic events, a bigger dose of trauma exposure, or forcible sexual assaults, bring higher risk for psychological distress (Classen et al., 2005; Ford et al., 2010; French et al., 2014; Green et al., 2000; Kimerling et al., 2007). Multiple trauma exposures may lead to more intransigent negative beliefs about self and the world that heighten risk for posttrauma psychopathology (Ali, Dunmore, Clark, & Ehlers, 2002; Filipas & Ullman, 2006). Part of what may also distinguish the other two groups from the forceful severe assault group is each group's degree of upset at the time of the event. Peritraumatic cognitive appraisals are consistent predictors of recovery, with lower perceptions of possible injury, threat, or death—likely leading to feeling less upset at the time of the event—being associated with lower risk of PTSD (Brewin, Andrews, & Valentine, 2000; Halligan, Michael, Clark, & Ehlers, 2003; Rizvi, Kaysen, Gutner, Griffin, & Resick, 2008).

The forceful severe assault group had a nexus of vulnerabilities that may have increased their risk of revictimization. They had a 1 in 4 chance of having been incarcerated compared with other participants' approximately 1 in 8 likelihood of this history. Their likelihood of having had transactional sex was 41%, whereas for women in the contacted or attempted and incapacitated assault groups it was 7% to 8%. In addition, these women reported significantly more HED than women in the incapacitated assault group. All of these behaviors and situations could be contributors to multiple victimization vulnerability, consequences of victimization experiences, or both. Our results align with current literature suggesting that there are strong links between multiple victimization experiences and contexts that may then increase risk of future revictimization (Begle et al., 2011; Coid et al., 2001; Swanston et al., 2003). These risky contexts include elevated rates of delinquency, life chaos, and substance use among individuals who have been exposed to multiple traumatic events (Begle et al., 2011; Ford et al., 2010; Tyler & Johnson, 2006).

Groups identified also differed in terms of their exposure to controlling or violent partners; women classified in the forceful severe assault group had the highest rates. Our methodology cannot determine whether these partners perpetrated the sexual aggression analyzed here, only demonstrate the correlation of more severe and repeated victimization with more contact with violent and controlling partners. However, these results indicate that women with a history of forceful or multiple victimization experiences may be especially likely to have a history of violent and/or controlling partners, consistent with other research indicating co-occurrence among CSA, adult sexual assault, and physical intimate partner violence (Campbell et al., 2008). In addition to interventions that focus on preventing future assaults, clinicians should assess for intimate partner violence or abuse and work to address the larger pattern of victimization women may be experiencing.

Contrary to our expectations and some prior literature, we found no differences between groups in degree of engagement in sexual risk behaviors. Women in all three victimization profiles had similar rates of past year condom use, condom use at last sex, and lifetime likelihood of an STI diagnosis. In contrast, other researchers have found that sexual victimization in childhood, adulthood, or both is associated with more STI risk behavior compared with nonvictimized women (Brener, McMahon, Warren, & Douglas, 1999; Campbell, Sefl, & Ahrens, 2004; Lalor & McElvaney, 2010; Malow, Devieux, & Lucenko, 2006; Molitor, Ruiz, Klausner, & McFarland, 2000). There are several possible reasons for these findings. Women were selected for the parent study from which these data were drawn because of some engagement in sexual risk behavior, thus we may have had ceiling effects. We did not assess relationship status; some monogamous participants may have eschewed condom use but still had low STI risk. Moreover, because research questions focused on differences among assault survivors, participants had all been exposed to sexual trauma, though of differing types and degrees; previous studies generally have compared the STI risk behavior of women with sexual assault histories to that of nonvictimized women.

This study's implications for future research on the experiences of sexual assault survivors emphasize the importance of measurement. Future research should attempt to differentiate between incapacitated assaults involving self-administered alcohol/drugs versus substances provided by a perpetrator to facilitate sexual assault. Additionally, future research should examine whether multiple sex acts reported in typical measures of assault represent part of a single assault experience or multiple assault experiences over time. Measuring and modeling other characteristics, such as time since the assault occurred, could also contribute to a fuller understanding of differences among assault survivors and their associations with psychosocial functioning. The three profiles identified in the LCA highlight the importance of examining both outcome and tactic of sexual assault experiences as well as their frequency and whether there was a history of CSA. As we can observe from profile characteristics, knowing that a woman has a history of completed rape without knowing which tactic was used is less informative regarding negative sequelae such as psychological distress. Rather, the combination of sexual assault characteristics appears to provide the clearest distinctions. However, it may not be always necessary for researchers to use person-centered approaches to analyze sexual assault data. Several ways to score the SES—the most widely used measure of adolescent/adult sexual assault experiences—have been described that take into account outcome, tactic, and frequency of sexual assault experiences (Davis, Gilmore et al., 2014). Although these scoring methods do not include history of CSA, they represent a significant improvement over traditional methods of summarizing sexual assault experiences.

Despite the study's strengths, including a large sample size and a multidimensional approach, it also has limitations, including measurement issues, its cross-sectional nature, and specific sample characteristics. Because we did not measure exposure to other traumatic events, we were not able to examine whether findings are specific to sexual trauma or reflect trauma exposure more broadly. Similarly, although a number of other factors might have contributed to characterizing assault victimization subgroups, we were not able to include length of time since assault. Our repeated

victimization measure did not differentiate between one assault event that included multiple acts and multiple assault events. Because more in-depth measures of depression, anxiety, or PTSD were not available, we instead relied on self-report of symptomatology. In addition, the study's cross-sectional design precluded examination of causality or directionality. It is possible that psychological distress symptoms precede sexual victimization; all we can demonstrate is the association between group membership and levels of distress. Although our community sample avoided problems associated with college samples of convenience (e.g., underrepresentation of racial and ethnic minority and lower income participants), its characteristics limit the generalizability of our findings. Because the parent study involved alcohol administration, only nonproblem drinkers with fairly recent HED were included, and all participants were of legal drinking age. Similarly, the requirement that participants have some sexual risk factors limits generalizability.

It remains socially important to emphasize that all sexual assault is illegal and harmful to victims, but clinically, recognizing the heterogeneity in women's experiences of sexual assault may inform work toward survivors' recovery. Different types of assault experiences appear to be differentially associated with negative outcomes. These findings indicate that women victimized by force, multiple times, or in both childhood and adulthood may be more psychologically distressed than women who have been the victims of contact or attempted assault or of assault with incapacitation by alcohol/drugs as the tactic. Findings support the importance of early interventions to help prevent future trauma exposure and the accumulation of downstream problems, both with regards to higher psychological distress and more problems with risk behaviors. Some promising research indicates that treatment of PTSD may be helpful in reducing future interpersonal victimization (Iverson et al., 2011). These severely victimized women may be in greater need of clinical services and less likely to experience natural recovery following trauma exposure. To be maximally effective, trauma-focused interventions need to reach some of these women in jails or prisons, where they may be more likely to be found than other assault survivors (Javdani et al., 2011). Because women with a history of forceful, severe victimization may also be especially likely to have a history of involvement with violent and controlling partners, assessing them for intimate partner abuse and working to address any ongoing victimization is indicated. Finally, the differentially high prevalence of CSA among forcefully and repeatedly victimized women suggests that revictimization prevention efforts for child victims may be essential in stemming a potential cascade of future negative effects.

Accurate multidimensional classification of victimization experiences has the potential to make important contributions to the clinical treatment of women who have survived sexual assault. For some of these women, sexual victimization may be part of a context of marginalization and vulnerability; they may require intensive trauma-focused treatment and potentially case management services to address co-occurring difficulties with education, HED, violent partners, or criminal justice system involvement. For others, assault may be a one-time traumatic event, and clinicians may focus on enhancing natural recovery. Person-centered approaches like the one used here may be particularly useful to practitioners (Burstein et al., 2012), given that "findings from person-centered analyses often need little interpretation to be pre-

sented within frameworks which many clinicians . . . currently operate" (Swartout & Swartout, 2012, p. 311). Information about women's differing sexual assault experiences and the negative outcomes associated with each pattern could be used to tailor treatment to groups' particular recovery needs.

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