Utility of Respondent Driven Sampling to Reach Disadvantaged Emerging Adults for Assessment of Substance Use, Weight, and Sexual Behaviors


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Utility of Respondent Driven Sampling to Reach Disadvantaged Emerging Adults for Assessment of Substance Use, Weight, and Sexual Behaviors

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Abstract: Emerging adulthood often entails heightened risk-taking with potential life-long consequences, and research on risk behaviors is needed to guide prevention programming, particularly in under-served and difficult to reach populations. This study evaluated the utility of Respondent Driven Sampling (RDS), a peer-driven methodology that corrects limitations of snowball sampling, to reach at-risk African American emerging adults from disadvantaged urban communities. Initial "seed" participants from the target group recruited peers, who then recruited their peers in an iterative process (110 males, 234 females; M age = 18.86 years). Structured field interviews assessed common health risk factors, including substance use, overweight/obesity, and sexual behaviors. Established gender- and age-related associations with risk factors were replicated, and sample risk profiles and prevalence estimates compared favorably with matched samples from representative U.S. national surveys. Findings supported the use of RDS as a sampling method and grassroots platform for research and prevention with community-dwelling risk groups.

Key words: Respondent Driven Sampling, emerging adults, substance use, body mass index, sexual risk, African Americans.

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Emerging adulthood, spanning the mid- to late teens through the mid-20s, is a period of rapid change that offers opportunities for educational, physical, and psychological growth, but it is frequently characterized by heightened risk-taking related to substance use, obesity, and sexual practices. Emerging adulthood is considered a critical period for development of life-long healthy or unhealthy behavior patterns and therefore is a target for interventions aimed at risk reduction and health promotion.

Emerging adults who grow up in disadvantaged urban neighborhoods frequently face unique challenges known as the “urban health penalty.” Prevalence of substance abuse, unintended pregnancy, HIV and other sexually transmitted infections (STIs), obesity, academic failure, violence, and delinquency are often higher in such populations compared with more advantaged emerging adult groups. Research and prevention programs, however, have largely focused on college student populations, who tend to be disproportionately White and socioeconomically advantaged. Evidence is growing that emerging adults who do not attend college or come from less advantaged backgrounds may have distinct risk profiles and prevention needs. For example, although college student status is associated with elevated alcohol misuse, emerging adults not attending college who misuse alcohol are more likely to have persistent patterns of misuse. Furthermore, African American emerging adults as a group tend to drink less, but those who drink heavily tend to have relatively greater long-term negative outcomes.

These findings highlight the need to investigate risk behaviors and profiles among emerging adults from disadvantaged racial/ethnic groups and geographic areas who are not recruited from school or residing in institutional settings to inform targeted prevention programs. However, many are in transition (e.g., unstable jobs and residences, not in school), which makes their recruitment less likely when representative sampling methodologies based on landline phone and door-to-door recruitment are employed. Recruitment from traditionally pro-social sites (e.g., churches), a common practice in research with community-dwelling African Americans, may produce selection bias in favor of emerging adults engaged in relatively more pro-social activities and fewer risky behaviors.

In response to these recruitment challenges, investigators have used chain referral strategies such as snowball sampling, but the resulting samples may be biased due to non-random recruitment in ways that limit inferences about population dynamics. Respondent Driven Sampling (RDS) is a chain referral method that corrects limitations of snowball sampling through statistical weighting procedures while maintaining the benefits of peer-driven access to hard-to-reach groups. Respondent Driven Sampling has been used to obtain reasonable estimates of population-level prevalence for persons at very high risk for HIV/AIDS who are difficult to enroll, including injection drug users, men who have sex with men, and sex workers.

Respondent Driven Sampling has recently been extended to recruit subgroups defined by characteristics other than their engagement in high-risk, stigmatized behaviors. For example, a limited number of studies used RDS to recruit samples based on demographic characteristics (e.g., age), location, and Internet use, such as rural African American emerging adults not enrolled in school and young adults who participated in online communities. Respondent Driven Sampling appears promising for broader use in community-based research on addictive and other health behaviors, which offers oppor-
opportunities for expanded prevention efforts with at-risk groups. However, the utility and success of such applications of RDS have not been well investigated through evaluations of the resulting sample characteristics or through comparisons of findings obtained using RDS and probability sampling methods, which have yielded mixed results.

To address these issues, the present study used RDS to recruit African American emerging adults living in disadvantaged neighborhoods in a U.S. Deep South metropolitan area experiencing the urban health penalty for purposes of assessing their substance use, sexual risk behaviors, and obesity. The utility of this expanded RDS application based on geographic residence (disadvantaged urban neighborhoods) was evaluated in several ways: First, established RDS tests evaluated whether key demographic and risk behavior characteristics of the final sample became independent of the non-randomly selected seeds and achieved equilibrium over multiple recruitment waves. Evidence of fulfilling these essential requirements for data analysis would support broadening the application of RDS beyond sampling of very high-risk subgroups. Second, health risk behaviors in the RDS-generated sample were examined in relation to age and gender to evaluate the replicability of established relationships among demographic factors, substance use, overweight/obese body mass index (BMI), and sexual risk behaviors. If findings were comparable in the RDS sample, males would report more substance use and sexual risk-taking, females would have greater prevalence of overweight/obesity, and older participants would engage in more risky behaviors. However, because our target population was recruited from disadvantaged urban neighborhoods, to the extent that differences were observed, higher risk levels were predicted among the RDS sample relative to national general population samples. Third, the RDS-generated sample was compared with data from representative U.S. samples selected on age and response items to allow sample comparisons matched as closely as possible.

Methods

Sample recruitment and characteristics. The sample was recruited for the Community Influences Transitions of Youth (CITY) Health study, which received Institutional Review Board approval and a Certificate of Confidentiality from the U.S. Department of Health and Human Services. Using U.S. Census 2000 tract data, disadvantaged communities were identified in the Birmingham-Hoover, Alabama Metropolitan Statistical Area (MSA) with a high percentage of African American emerging adults at the time of recruitment (2010). Residents in the chosen area were 96% African American and had a median income below $15,000; 41% of households lived in poverty. Although emerging adulthood is often defined as ranging from 18 to 25 years, the 15–25 age range was selected because the target population is subject to economic pressures to transition quickly to adult roles. This population is exposed to numerous risks at much younger ages than their higher-SES counterparts.

Site selection for RDS implementation involved a three-phase formative research process summarized in Figure 1. Community locations frequented by emerging adults were selected through windshield tours (driving tours with community partners familiar with the neighborhoods) and informal community canvassing. Then, established
venue enumeration sampling procedures were implemented to verify the availability of the target population. First, research staff members counted African Americans who appeared to be ages 15–25 during a wide range of days and blocks of times at 20 potential community venues that were not exclusively pro-social or high-risk (e.g., gas stations, fast food restaurants, movie theaters). Seven venues were selected that had reasonably high counts across one to two-hour sampling frames and were not so crowded as to preclude screening interviews (e.g., football games). Second, in the seven selected venues, research staff members invited individuals who appeared eligible to participate in anonymous “brief intercept interviews” that included 12 short questions designed to verify target group membership and assess proxy indicators of risk behaviors (e.g., recent sexual activity or substance use, self-reported height/weight). Third, based on these data, venues, days, and times most likely to yield “seed” participants with desired characteristics were identified to start the peer recruitment process.

The RDS sample was recruited over a 20-month interval (July 2010 to February 2012). Potential seeds were screened to verify target characteristics, participated in a structured interview on study variables, and then received training to recruit their social network members for research participation. As is typical in RDS studies,
about half of the 49 seeds and 477 peer recruits recruited one or more enrolled network members (see Figure 1). The mean number of recruitment waves for productive seeds was approximately five ($M = 4.54$, $SD = 4.96$); the longest chain extended 19 waves.

Except for gender, seeds and recruits had similar demographic and health risk characteristics, suggesting successful recruitment of a sample with the desired target characteristics. Although more seeds (87%) than recruits (68%) were female ($\chi^2 (1) = 3.80, p = .052$), males and females did not differ in important demographic characteristics, including age ($M = 18.86$ years, $SD = 2.86$), education (93.60% had completed high school or were still enrolled), receipt of public assistance (79.65%), marital status (6.98% married), parent status (22.97%), and social network members who were like them ($M = 4.47$, $SD = 3.99$) and thus were potential peer recruits. Broader assessment of the total social network indicated that more than 90% of reported network members were either family members (64.82%) or friends (31.52%), suggesting sufficiently extensive network ties to support RDS implementation.

**Procedures.** Respondent Driven Sampling was implemented using established procedures. Seeds were asked to distribute up to three recruitment coupons to peers that included the project name and phone number. Recruits thus could contact research staff directly, which helped protect confidentiality. Unique coupon numbers were used to track network development and key sample characteristics using RDS Coupon Manager software (RDSCM, http://www.respondentdrivensampling.org/). Peer recruit callers were screened by phone, and eligible callers participated in face-to-face interviews (described next). Recruits were then trained to recruit three peer network members, restricted to non-relatives who were “like them,” ages 15 to 25, living in the MSA, unlikely to move within six months, and with daily phone access. The process continued iteratively until the desired sample of about 350 recruits was obtained.

Research staff similar to the target population in age, race, or both conducted individual 1.5-hour interviews concerning risk and protective behaviors at safe, private community locations (e.g., libraries, recreation centers). The interviewer described the study procedures and protections; answered questions; and obtained written informed consent. Information from phone screenings was verified and expanded to collect socio-demographic characteristics, school and work history, parent status and ages of children, living arrangements, and household finances. For use in the sample weighting procedures, participants were asked, “About how many people do you usually hang around with? These are people who are not your family or relatives.”

Seeds and recruits received $30 for their interviews and $15 for each enrolled network member (up to 3, $45 maximum for recruiting). A phone-accessible “electronic bank” account, programmed using Voxco Command Center IVR Solution (Montreal, Quebec, www.voxco.com), allowed participants to track recruitment payments. Payments were made using Visa™ gift cards distributed weekly at community sites.

**Measures.** The Alcohol, Smoking and Substance Involvement Screening Test [ASSIST V3.0] was used to assess substance use and yields a Global Continuum of Risk score (range = 0 to 280). Higher scores indicate greater substance involvement. A dichotomized variable also was created for data analysis, with substance use defined as any tobacco, alcohol, or illegal drug use or non-medical use of prescription drugs in the past 90 days.

Questions from the Youth Risk Behavior Survey [YRBS] assessed sexual behav-
ior, including multiple partnering, condom use, and other birth control methods. A dichotomous sex risk variable was created for analysis. Those endorsing any risky behaviors (i.e., sex before age 16, no condom use during last sex, substance use before/during last sex, multiple partners in the past 90 days, any STI in the past six months, transactional sex, sex with a known/suspected injection drug user were considered risky (versus no reported risk behaviors).

Height (cm) was measured with a SECA Model 213 portable stadiometer, and weight (kg) was measured with a Health-o-meter Professional Model 349KLX portable digital scale. Height and weight were measured twice. BMI was calculated using the standard formula (kg/m²) from the average of the repeated measures. A dichotomous overweight status variable was created for analysis. Overweight was defined as BMI > 25 for ages 20–25 or BMI > the 85th percentile for age and gender per the 2000 CDC Growth Chart for ages 15–19.32,33

Data analysis. Data analysis proceeded as follows. First, the RDS Analysis Tool [RDSAT 7.1]21 examined gender, age, and the three dichotomous risk variables for bias due to potential non-random recruitment (homophily) and assessed whether each variable became independent of the non-randomly selected seeds and achieved equilibrium over multiple recruitment waves.22 Homophily can range from –1.0 to 1.0; 1.0 indicates that members of a group exclusively recruited from their own group (e.g., males only recruited males), –1.0 indicates that group members did not recruit any of their members (e.g., males only recruited females); and 0 indicates that recruits were recruited randomly on a given grouping variable. Equilibrium is demonstrated when sample distributions on key variables remain stable within the 95% confidence intervals of their respective equilibrium distributions as more participants enter the sample across successive recruitment waves.34

Second, associations among gender, age, and health risk behaviors were examined to confirm established associations in the literature using SAS® software, version 9.2 of the SAS System. Logistic regression analyses were conducted for dichotomous outcome variables (substance use, overweight status, sexual risk) and ordinary least squares (OLS) regression analysis for the continuous ASSIST Global Continuum of Risk score. As recommended,34 a weighting variable (M = .32; SD = .22) was created using the reciprocal of reported peer social network size to adjust for variations in participant networks and applied in the regression analyses. Models with and without the age by gender interaction term were estimated for each risk behavior. Age was centered prior to creating the product of age and gender for the interaction term to remove potential multicollinearity.35

Third, the RDS-generated sample was compared with data from representative U.S. samples selected on age and response items to allow sample comparisons matched as closely as possible. To compare substance use prevalence, the percentages of the study sample endorsing lifetime use of tobacco, alcohol, and any illicit drugs were compared with African American respondents aged 15 to 25 years from the 2010 National Survey of Drug Use and Health [NSDUH].36 For measured BMI, the prevalence of overweight was compared with matched African Americans aged 15–18+ years in the National Youth Physical Activity and Nutrition Study [NYPANS]37 and matched African Americans aged 20–25 in the National Health and Nutrition Examination Survey [NHANES].38
Z-tests comparing two proportions examined potential prevalence differences. For risky sexual behaviors, local sample reports were compared with African Americans aged 18–25 in Wave III of the National Longitudinal Study of Adolescent Health (Add Health), who reported lifetime intercourse, early initiation of intercourse (defined as occurring before age 13 in Add Health), and condom use at last intercourse.

**Results**

Table 1 shows the unweighted prevalence of substance use, overweight/obesity, and select sexual risk behaviors for the CITY Health sample and the matched probability samples in the NSDUH, NYPANS, NHANES, and Add Health data sets. For the RDS sample, equilibrium tests showed that the distributions of gender, age, and the three dichotomous risk variables became independent of the non-randomly selected seeds by four or fewer recruitment waves, and the distributions remained stable until recruitment ended. Homophily scores for all variables indicated no substantial non-random recruitment bias (< 0.50). Thus, per Aim 1, the sample satisfied key assumptions for analysis without weighting on these demographic and risk behavior variables.

Table 2 presents the regression analysis results that address Aim 2 using the recommended weighted sample based on the reciprocal of reported peer network size. Gender main effects were observed for all health risk domains in the predicted direction. Significantly more males (47.3%) than females (20.9%) reported recent substance use, and more males (81.8%) than females (56.4%) reported one or more lifetime sexual risk behaviors. Males also had significantly higher ASSIST global risk scores ($M = 21.83$, $SD = 10.8$) than females ($M = 13.07$, $SD = 10.7$), and females had significantly higher BMIs ($M = 29.03$, $SD = 5.0$) than males ($M = 25.20$, $SD = 30.9$). Age main effects in the predicted direction were observed for substance use and ASSIST risk scores, with use and risk increasing with age. The age main effect for overweight status approached significance ($p = .055$), but was not significant for sexual risk behaviors. No interaction effect between age and gender was found in any risk domain.

Finally, per Aim 3, the unweighted CITY Health sample was found to be at similar or greater risk than the corresponding probability samples (see Table 1). Prevalence of lifetime substance use was significantly higher in the CITY Health sample than in the NSDUH sample for all drug classes (illicit drugs, alcoholic beverages, tobacco). Although overweight/obesity was slightly higher among CITY Health participants than the comparison samples, the differences were not significant. Prevalence of ever having sexual intercourse was higher in the CITY Health sample compared with the Add Health sample, but intercourse before age 13 and condom use during last intercourse did not differ significantly between samples.

**Discussion**

The findings add to evidence that RDS can be extended beyond original applications with high-risk individuals to sample hard-to-reach emerging adults who experience health risks based on geographic location, age, and race. As in earlier RDS studies, peer recruitment started slowly and then accelerated rapidly, and a sizeable percentage
### Table 1.

**PREVALENCE OF SUBSTANCE USE, OBESITY, AND SEXUAL BEHAVIORS IN THE CITY HEALTH AND NATIONALLY REPRESENTATIVE U.S. SAMPLES**

<table>
<thead>
<tr>
<th>Risk factor</th>
<th>CITY Health sample (%)</th>
<th>Population survey sample (%)</th>
<th>z-test comparing total samples (95% CI)</th>
<th>p ≤</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Males</td>
<td>Females</td>
<td>Total</td>
<td>Males</td>
</tr>
<tr>
<td>Lifetime substance use</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Illicit substances(^a)</td>
<td>74.5</td>
<td>52.1</td>
<td>59.3</td>
<td>51.2</td>
</tr>
<tr>
<td>Alcoholic beverages(^a)</td>
<td>84.5</td>
<td>75.6</td>
<td>78.5</td>
<td>67.6</td>
</tr>
<tr>
<td>Tobacco products(^b)</td>
<td>71.8</td>
<td>48.7</td>
<td>56.1</td>
<td>43.9</td>
</tr>
<tr>
<td>Overweight/obese</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ages 15–19 years(^c)</td>
<td>38.6</td>
<td>50.0</td>
<td>46.4</td>
<td>35.1</td>
</tr>
<tr>
<td>Ages 20–25 years(^c)</td>
<td>40.5</td>
<td>70.1</td>
<td>60.5</td>
<td>41.4</td>
</tr>
<tr>
<td>Sexual behaviors</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Intercourse ever(^d)</td>
<td>94.7</td>
<td>94.6</td>
<td>94.6</td>
<td>88.5</td>
</tr>
<tr>
<td>Intercourse before age 13(^d)</td>
<td>18.7</td>
<td>3.9</td>
<td>9.3</td>
<td>10.1</td>
</tr>
<tr>
<td>Condom use last intercourse(^d)</td>
<td>73.6</td>
<td>50.0</td>
<td>58.8</td>
<td>61.4</td>
</tr>
</tbody>
</table>

**Note.** Respondents with missing data were excluded in percentage calculations; unweighted percentages are presented. \(^a\)CITY Health sample prevalence of lifetime substance use for 15–25 year old African Americans from ASSIST V3.0 reports (N = 344, 32% male, 68% female); prevalence for matched 15–25 year old African Americans from 2010 National Survey on Drug Use and Health (NSDUH) (N = 3,878, 48% male, 52% female). \(^b\)CITY Health ASSIST reports of all tobacco products; NSDUH reports of cigarette use only. \(^c\)Computed as BMI ≥ 25 kg/m\(^2\) for participants aged 20–25 years (N = 117, 32.5% male, 67.5% female) or as age/gender BMI percentile > 85% for participants aged 15–19 years (N = 227, 31.7% male, 68.3% female); population prevalence from matched 20–25 year old African Americans from the 2009–2010 National Health and Nutrition Examination Survey (NHANES; N = 124, 46.8% male, 53.2%) and matched 15–18+ year old African Americans from 2010 National Youth Physical Activity and Nutrition Survey (NYPANS; N = 2,880, 49.5% female, 50.5% male). \(^d\)CITY Health reports of sexual behaviors for 18–25 year old African Americans from 2009 National Youth Risk Behavior Survey (YRBS) Standard High School Survey (N = 205, 37% male, 63% female); prevalence for matched 18–25 year old African Americans from 2010 National Longitudinal Study of Adolescent Health (Add Health) reports (N = 1,188, 43% male, 57% female). CITY Health reports included all types of intercourse; Add Health reports included vaginal intercourse only. \(^e\)CI = 95% Confidence Intervals.
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of seeds and peer recruiters were unproductive recruiters. Despite this seemingly fitful recruitment process, the final RDS sample was uncorrelated with the initial sample of seeds on key demographic and risk behavior characteristics and showed no evidence of significant bias due to non-random recruitment. Furthermore, the sample characteristics were in line with well-established gender- and age-related associations with substance use, BMI, and sexual risk behaviors. Overall, these results support expanded use of RDS to recruit community-dwelling risk groups for intervention and research on addictive and related health risk behaviors.

Nevertheless, when compared with age-, gender-, and race-matched national probability samples, the present sample evinced similar or greater prevalence of risk factors, as would be expected given their disadvantaged socio-economic status. The observed higher prevalence of lifetime substance use and sexual intercourse is a reminder that national surveys typically include respondents with a wide range of socio-economic and risk profiles that may obscure heightened risks among disadvantaged subgroups, even when comparisons are matched on race, age, and gender, as they were in the present analyses.

An important added value of RDS compared with representative sampling lies in revealing social networks and providing peer-driven network access as a channel for preventive and risk reduction interventions. Preventive interventions vary in intensity

### Table 2.

**SUMMARY OF WEIGHTED REGRESSION ANALYSES TO PREDICT RISK FACTORS**

<table>
<thead>
<tr>
<th>Risk factor</th>
<th>Predictors</th>
<th>B (SE)</th>
<th>OR</th>
<th>95% CI</th>
<th>p</th>
<th>R²</th>
</tr>
</thead>
<tbody>
<tr>
<td>ASSIST Global continuum of risk</td>
<td>Gender</td>
<td>8.99 (2.11)</td>
<td>—</td>
<td>—</td>
<td>.001</td>
<td>0.18</td>
</tr>
<tr>
<td></td>
<td>Age</td>
<td>2.46 (0.33)</td>
<td>—</td>
<td>—</td>
<td>.001</td>
<td>—</td>
</tr>
<tr>
<td>Substance use</td>
<td>Gender</td>
<td>1.40 (0.49)</td>
<td>4.07</td>
<td>1.57, 10.55</td>
<td>.01</td>
<td>0.13d</td>
</tr>
<tr>
<td></td>
<td>Age</td>
<td>0.21 (0.08)</td>
<td>1.24</td>
<td>1.05, 1.45</td>
<td>.01</td>
<td>—</td>
</tr>
<tr>
<td>Overweight/obese</td>
<td>Gender</td>
<td>–0.92 (0.45)</td>
<td>0.40</td>
<td>0.17, 0.97</td>
<td>.05</td>
<td>0.07d</td>
</tr>
<tr>
<td></td>
<td>Age</td>
<td>0.14 (0.07)</td>
<td>1.15</td>
<td>0.99, 1.32</td>
<td>n.s.</td>
<td>—</td>
</tr>
<tr>
<td>Sexual risk behaviors</td>
<td>Gender</td>
<td>1.24 (0.53)</td>
<td>3.47</td>
<td>1.22, 9.85</td>
<td>.05</td>
<td>0.07d</td>
</tr>
<tr>
<td></td>
<td>Age</td>
<td>0.09 (0.07)</td>
<td>1.10</td>
<td>0.95, 1.27</td>
<td>n.s.</td>
<td>—</td>
</tr>
</tbody>
</table>

**Note.** Results based on weighted data set. Models presented show estimated age and gender main effects only; no significant interaction effects found. B = Unstandardized Estimate; SE = Standard Error of Estimate; n.s. = p > .05. aWeighted least squares regression analysis with age centered and females as reference group. ASSIST = Alcohol, Smoking and Substance Involvement Screening Test (score range = 0 to 280, higher scores indicate greater substance involvement). bWeighted logistic regression analyses with age centered and females as reference group. OR = Odds Ratio adjusted for other model predictors; CI = 95% Confidence Interval. cOverweight/obese defined as BMI ≥ 25 kg/m² for ages 20–25 and > 85th percentile in 2000 CDC Growth Charts by age and gender for ages 15–19. dNagelkerke R².
and the extent to which they target the general population, at-risk groups, or individuals with known risk factors, referred to as universal, selective, and indicated prevention strategies, respectively.\textsuperscript{19} Whereas most prior RDS applications could support indicated prevention with small groups of high-risk individuals, the present study suggests that RDS may also support selective prevention with larger population subgroups with above average risk factors at the group level. This is particularly valuable because peer social networks are known to influence substance misuse, obesity, and related risk behaviors such as risky sex.\textsuperscript{40} There is growing evidence for the effectiveness of peer-driven interventions for addictive behaviors, which have potential for greater impact on population health because they can reach more persons at risk compared with individual-focused interventions suitable for the minority with established disorders.\textsuperscript{40,41}

Targeting moderate-risk groups is important because they may serve as a bridge between sub-populations at very high individual risk (e.g., injection drug users, men who have sex with men), and the general population.\textsuperscript{15} Small subgroups engaged in very high risk behaviors often are embedded within and overlap with larger groups that have risk factors that are not uniformly distributed across individual members. It is through these social pathways that risky health practices and problems can be transmitted from higher- to lower-risk individuals and subgroups, and these same pathways can be used to promote network-wide protective health practices and positive behaviors.\textsuperscript{41–44}

Limitations. Some study limitations are worth noting. First, except for measured BMI, the risk assessment was based on verbal reports of sensitive behaviors in face-to-face interviews. To facilitate accurate reporting, strong confidentiality protections were put in place, validated instruments were used to obtain reports of risk behaviors and events, and interviewers and participants were similar in age and race. Second, the unequal gender proportions in the sample held after multiple recruitment waves, even after equilibrium was reached. This is consistent with the disproportionately higher survey response rates for women noted throughout the literature.\textsuperscript{45} Furthermore, it appears that women are the more accessible social network entry channel for peer-driven interventions.\textsuperscript{42}

Conclusions and recommendations/practice implications. The study broadened the application of RDS beyond sampling of very high-risk subgroups. The method reached the emerging adult target group and offers a grassroots platform for community-based prevention generally and for social network-based interventions specifically. Compared with other sampling methods, RDS can offer advantages such as easier and less costly implementation based on peer recruitment; the method also typically yields moderate to large size samples in a reasonable timeframe.\textsuperscript{15,46} Respondent Driven Sampling thus has promise for extending evidence-based health promotion and risk reduction interventions to at-risk community groups that are often hard to reach for research and interventions. This is particularly important for substance misuse, which is broadly distributed throughout the general population and is heavily influenced by social networks that can be made accessible using RDS.

Declaration of interests

None.
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