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Risk and protective factors of social networks on alcohol, cannabis and opioid use among urban American Indian/Alaska Native emerging adults

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Abstract

Objectives.—Assess associations between social networks and urban American Indian/Alaska Native emerging adults' alcohol, cannabis, and opioid use and intentions.

Methods.—AI/AN participants ages 18-25 (N=150; 86% female) were recruited across the U.S. from 12/20 to 10/21 via social media. Participants named up to 15 people whom they talked with most over the past three months and reported who 1) used alcohol and cannabis heavily or used other drugs (e.g., opioid use), 2) engaged in traditional practices, and 3) provided support. They also reported past three-month alcohol, cannabis and opioid use and intentions to use.

Results.—Having a higher proportion of network members engaging in regular cannabis and heavy alcohol use (but not other drugs) was associated with more frequent cannabis use and stronger cannabis use intentions. Participants with higher proportions of members engaging in heavy alcohol use, regular cannabis use, or other drug use and who did not engage in traditional practices were more likely to report cannabis use and greater intentions to use cannabis and drink alcohol. In contrast, participants with higher proportions of network members engaging in traditional practices and who did not report heavy alcohol use, regular cannabis use or other drug use were less likely to report intentions to use cannabis or drink alcohol.

Conclusions.—Findings emphasize what many studies have shown among various racial/ethnic groups—having network members who use substances increases the chance of use. Findings also highlight that traditional practices may be an important part of the prevention approach for this population.

Keywords

Alaska Native; American Indian; Native American; social networks; alcohol use; cannabis/marijuana use

Introduction

Emerging adulthood, defined in this paper as ages 18-25, is an important developmental period of heightened vulnerability and critical social, neurological, and psychological development (Hanson et al., 2011) when people may be particularly influenced by their social networks (Marion et al., 2017; McMillan et al., 2018). Research with emerging adults has highlighted the importance of social networks in both generating risk (e.g., substance use) (Kennedy et al., 2018; Tucker et al., 2015) and providing protection (e.g., improve mental health) (Löwenstein & Frank, 2022; Mason et al., 2014; Parkhurst et al., 2022) for behavioral health. For example, emerging adults with social network members who use substances, such as cigarettes, alcohol, or cannabis, are more likely to use these substances as well (Bartel et al., 2022; De Bellis et al., 2021; de la Haye et al., 2013; Tucker et al., 2014), whereas those with supportive networks (e.g., feel close to their friends or get support to not use substances) report better mental health and less alcohol and other drug (AOD) use (Löwenstein & Frank, 2022; Schaefer et al., 2021; Tucker et al., 2022).

A few studies analyzing the role of peer networks in AOD use among urban AI/AN youth found that these youth are relatively socially isolated within school networks and tied to less cohesive school-based social groups, which can increase risk for AOD use (Rees, 2014; Tingey et al., 2017). To date, however, social network research on AI/AN young people AOD use is sparse, despite strong findings linking social networks and AOD use in other adolescent populations (Martinez et al., 2015; Rees, 2014). There are no studies that have examined the role of social networks on health behaviors (including AOD use) among urban American Indian/Alaska Native (AI/AN) emerging adults in the U.S. (Shelton et al., 2019). Given the unique culture of this population and the high value placed on family and relations, there is reason to believe that AI/AN emerging adults' social networks may be particularly important for health outcomes (Philip et al., 2016), especially in urban environments.

Despite significant strengths, AI/AN people experience numerous health disparities, including high rates of AOD use, suicide, and various physical health issues such as diabetes and obesity (Grant et al., 2017; Rasmus et al., 2019; Trout et al., 2018; Warne & Frizzell, 2014). These disparities are linked to historically based trauma, including forced relocation from tribal homelands and cultural genocide, that has persisted across generations (Brave Heart & DeBruyn, 1998; Dickerson et al., 2020). Over 87% of AI/AN individuals currently reside outside of reservations and tribal lands (U. S. Census Bureau, 2021) and the smaller size and fragmentation of the AI/AN population has left many urban AI/AN emerging adults feeling ostracized and socially disconnected (Brown et al., 2016). This fragmentation lies in stark contrast to AI/AN traditional ways of living, which emphasize the importance of relations with family and community for support and maintenance of culture and spirituality.

Recent studies highlight the many potential strengths of emerging adults in AI/AN urban communities, including their resilience, sense of cultural pride, and desire to connect to tribal traditions (Dickerson et al., 2020; Dillard et al., 2017; Ore et al., 2016).

Urban AI/AN emerging adults have been historically under-represented in research (Crump et al., 2020), and studies are needed to understand factors that may contribute to both health disparities and resilience within this population. Our work has shown, for example, that many urban AI/AN emerging adults who want to cut back or quit their use of substances experience difficulty because their social context may encourage AOD use through peer or family use (Brown et al., 2022), yet many also indicate that sharing AI/AN traditional teachings and stories (Dickerson et al., 2018) within their families and their community is protective against heavy AOD use (D'Amico et al., 2020; Palimaru et al., 2022). Furthermore, although some AI/AN emerging adults may use alcohol or cannabis without harmful consequences, due to the significant impact of substance use on this population historically (Beauvais, 1998; White Bison Inc., 2007), there is a need to develop alcohol and other drug use prevention programs for this population (Dickerson et al., 2018; Wendt et al., 2019).

Within urban areas, addressing the role of social networks in AOD prevention is critical (Kennedy, D'Amico, et al., 2022). The urban context is complicated with respect to social networks. For example, urban AI/AN emerging adults' network influences often include several different social worlds, such as AI/AN peers and family in the urban areas where they live, non AI/AN urban network members, and AI/AN extended families living in rural, reservation areas (Kennedy, D'Amico, et al., 2022; Kulis et al., 2013). Many urban AI/AN emerging adults travel to their tribal communities during vacation and many remain connected to home communities through social media and other platforms (Reed et al., 2020). However, our knowledge of the influence of social networks on urban AI/AN emerging adults across the U.S. is quite limited.

The current study addresses this significant gap in the literature by examining the influence of social network characteristics, including heavy AOD use (defined in the social network survey as heavy drinking, such as regularly consuming 4-5 drinks in a short period of time (1-2 hours), regular use of marijuana/cannabis (every day or nearly every day), or use of other drugs to get high, such as opioids), participation in traditional practices (e.g., dancing, storytelling, and beading), and provision of support (e.g., emotional, financial), that may increase risk and confer protection for AOD intentions and use among urban AI/AN emerging adults. This work is an important first step in understanding these social network influences, which could help improve prevention and intervention services for this underserved population across the U.S.

Based on our formative work (Dickerson et al., 2022), we hypothesized that those AI/AN emerging adults with a high proportion of people in their network reporting heavy AOD use would report greater intentions and use of AOD, whereas those with a high proportion of people in their network engaging in traditional practices would have lower intentions to use and lower rates of use. Finally, we expected that greater support, specifically emotional

support, advice, money, transportation, food, or other things, would be associated with both lower intentions to use and reports of alcohol and cannabis use.

We also hypothesized that overlapping combinations of network relationship characteristics (“multiplexity”) would be associated with different AOD use outcomes, in particular relationships with network members who did or did not engage in traditional practices and/or engaged in heavy AOD use. Focus groups of urban AI/AN emerging adults, parents, and providers throughout California described the tension between prohibitions against alcohol and drug intoxication in certain ceremonies and the fact that participants in these ceremonies may still engage in AOD use either during or outside of these activities (Brown et al., 2022; Dickerson et al., 2022; Kennedy, D'Amico, et al., 2022). We therefore hypothesized that AI/AN emerging adults would experience different risk and protective influence effects from members of their network based on combinations of heavy AOD use and engagement in traditional practices. Specifically, we hypothesized that having more network members who engaged in traditional practices would predict lower AOD use among AI/AN emerging adults. However, we also expected that if these network members also engaged in heavy AOD use, this would be associated with greater AOD use among AI/AN emerging adults.

To test for these associations, we constructed measures of overlapping network heavy AOD use and participation in traditional practices to understand how these network characteristics (e.g., traditional practices with no heavy AOD use, traditional practices with heavy AOD use, and heavy AOD use with no traditional practices) intersected to confer risk and protection. We also explored whether these associations were different for individuals under or over 21, as we wanted to understand whether certain network characteristics might be more strongly associated with outcomes for those who were not able to legally use alcohol or cannabis.

Finally, our sample included a large percentage of sexual gender minority (SGM) individuals. Previous studies have shown that SGM individuals report greater consequences at the same levels of alcohol and cannabis use compared to their non-SGM peers (Dunbar et al., 2022a; Dunbar et al., 2022b). Furthermore, research with lesbian, gay, bisexual, and two-spirit Native American people has shown that these individuals tend to report higher rates of AOD use (Balsam et al., 2004) and also experience more health disparities compared to their non-SGM peers (Wilson et al., 2021). Therefore, we conducted a post-hoc analysis to understand whether there were differences in alcohol and cannabis use outcomes by SGM status.

Methods

Participants (N=150; 86% female; mean age 21.8) are part of a randomized controlled trial, TACUNA (Traditions and Connections for Urban Native Americans) that tests the effects of two culturally appropriate interventions on AOD use and cultural connectedness (D'Amico et al., 2021) (see Table 1 for demographic, AOD use, and network characteristics). This trial is specifically focused on prevention of opioid use disorder, and therefore focuses on emerging adults who are not in need of treatment. Eligibility criteria include: 1) age 18 to

25; 2) living in an urban area in any state in the United States that is not on a rancheria or a reservation); 3) self-identification as AI/AN; 4) no opioid use disorder; and 5) English speaking.

Participants completed an online screener, and those who were eligible were contacted by staff from our Survey Research Group and consented to be part of the study. They were then asked to complete a baseline survey and randomized to receive either one virtual workshop or three virtual workshops and a Wellness Circle (D'Amico et al., 2021). Data for this paper originate from an online baseline survey and address aims of a supplemental grant focused on understanding the influence of social networks on health behaviors. This study occurred during the COVID-19 pandemic from December 2020 to October 2021; therefore recruitment occurred online via social media across the United States, and participants completed surveys online. They received a \$40 Amazon gift card upon survey completion. Procedures were approved by the institution's IRB and the project's Urban Intertribal Native American Review Board. This study has been preregistered with Clinical Trials, registration [NCT04617938](#), and has published the study protocol (D'Amico et al., 2021).

Measures

Screener.—Participants were screened with the Rapid Opioid Dependence Screener. This is an 8-item measure of opioid dependence based on the *Diagnostic and Statistical Manual of Mental Disorders* (Fourth edition criteria), and designed for quick, targeted screening in clinical and research settings (e.g., use more opioids to get the same high as when first started using opioids, worry about use, find it difficult to stop use) (Wickersham et al., 2015).

Demographics.—We collected participant age, sex at birth, gender and transgender identification, sexual orientation, mother's education, and gender(s) of past sexual partners. Participants could choose from a variety of answers to identify themselves demographically. For example, for what best describes their gender identity, participants could choose: a) female, b) male, c) gender fluid, d) something else, or e) prefer not to say. Based on participant answers to various questions we defined SGM as any orientation other than "straight/heterosexual," sex at birth being "something else" gender identity as "gender fluid" or "something else," transgender identity, history of same-gender sex, or discordance between sex at birth and gender identity.

Alcohol, cannabis, and opioid use intentions.—Separate items assessed intentions to use alcohol, marijuana/cannabis, or opioids in the next six months (from 1 = definitely no to 4 = definitely yes).

Alcohol, cannabis, and opioid use.—Separate items assessed number of times in the past three months participants reported drinking a full drink, 5 or more drinks (defined as heavy drinking), and using marijuana/cannabis or opioids (none, 1 time, 2 times, 3-5 times, 6-9 times, 10-19 times, 20-30 times, and 31+times). For analysis, survey responses were recoded to estimate the actual number of times used (0, 1, 2, 4, 7, 14, 25, and 31, respectively). Note that we specifically assessed opioid misuse using language created as

part of the HEAL (Helping End Addiction Long-Term) prevention cooperative so that all prevention projects within this funding mechanism would measure opioid misuse in the same way. Instructions were as follows: Some items ask about using prescription opioids for pain relief or treatment (e.g., Vicodin, Norco, Fentanyl, Hydrocodone, Oxycontin, Percocet, Oxycodone, Tramadol, Tylenol with Codeine 3 or 4, Dilaudid, Methadone, Buprenorphine or Bupe, Suboxone) in any way a doctor or medical provider did not tell you to use them. This includes using without a prescription of your own (for example, someone else's medicine), using more or for longer than you were told to take it, and using for reasons other than pain (such as to get high, to sleep, or for anxiety).

Social network measure.—We measured respondents' social networks with a personal network (“egocentric”) survey instrument (Perry et al., 2018). We asked respondents (“egos”) to name up to 15 people whom they talked with the most over the past three months (“alters”). For each alter, respondents were asked a series of “name interpreter” questions. They were asked what their relationship was with each alter (“family”, “friend”, “romantic partner”, “co-worker”, “classmate”, etc.) and each alter's age (“older”, “around the same age”, “younger”). For each alter, respondents were asked if they “think of themselves as American Indian / Alaska Native” (yes/no). For those whom the respondent indicated that they do identify as AI/AN, they were asked if the alter “engages” or “does not engage in cultural/traditional activity.” In addition, they were asked three yes/no questions about the support they received from each alter. Specifically, they were asked if the alter had given them “emotional support or encouragement”, “advice”, or “money, transportation, food, or other things.”

Respondents also identified which alters were likely to engage in heavy levels of AOD use including: 1) heavy drinking, 2) regular cannabis use, or 3) taking other drugs such as opioids to get high. Substance use summary measures included proportions of alters who 1) only engaged in heavy drinking, 2) only used cannabis regularly, 3) only used other drugs to get high, and 4) engaged in both heavy drinking and regular cannabis use, and not other drugs. Respondents determined who in their network used substances in those ways based on the following question: “Now let's talk about alcohol and drug use and who you named is likely to do one or more of the following: Heavy drinking, such as regularly consuming 4-5 drinks in a short period of time (1-2 hours), regular use of marijuana/cannabis (every day or nearly every day), use of other drugs to get high, such as opioids.”

Finally, respondents were asked if each unique pair of alters they named knew each other. Respondents who were randomized into the intervention arm of the TACUNA study were immediately shown a series of visualizations of their egocentric networks, which were also discussed during the TACUNA workshops. More detail about the use of personal network visualizations in the TACUNA intervention study is available elsewhere (Kennedy, D'Amico, et al., 2022).

The social network data for the current study come from “name interpreter” questions. We calculated measures for respondents' overall networks based on summarizing their ratings of the alters in their network. For each network measure, we first counted the number of alters in the network with the characteristic and then divided by the total number of alters

mentioned by the respondent to produce a proportion. For each respondent, we calculated proportions of alters who engaged in traditional practices and the proportion of alters who provided the respondent with any type of support. We also produced proportions that combined traditional practice engagement and heavy AOD use, including proportions of those who engaged in 1) traditional practices and no heavy AOD use, 2) heavy AOD use and no traditional practices, 3) both traditional practices and heavy AOD use, and 4) no heavy AOD use and no traditional practices.

Analysis

We conducted bivariate linear regression analysis to examine how social network characteristics were correlated with alcohol and cannabis use outcomes: alcohol and cannabis use intentions, and frequency of alcohol use, cannabis use, and heavy drinking. Results are presented as standardized regression coefficients to facilitate comparisons of effects across outcomes. Note that we were unable to examine opioid intentions or opioid use given the low base rate of both outcomes (Table 1). Because this is the first paper to examine social network characteristics and their influence on different types of substance use and traditional practices, we chose to focus on how each characteristic was separately associated with the outcome; the objective was to provide a baseline understanding of associations that exist rather than a prediction model of unique contributions. In addition, some of the social network characteristics overlap, which would result in multicollinearity and thus model misspecification. Thus, this approach provides a relatively straightforward interpretation of these associations.

We also estimated all associations controlling for SGM status as we had a high proportion of the sample who endorsed SGM; these were estimated by repeating the regression models described above and adding an SGM indicator as a control. We further examined bivariate associations stratified by those under age 21 versus those 21 and older to better understand whether network characteristics might function differently at different ages. To test whether results for those under age 21 versus those over 21 were significant, we ran a set of models that included an indicator of being over 21, the social network predictor, and their interaction. All analyses were conducted using SAS Version 9.4 for Windows (SAS Institute 2016).

Results

Table 1 provides respondent demographics and network characteristics. The sample was mainly female, and nearly half of the sample identified as SGM. Participants were from 20 different states across the United States, and included the West Coast, Mid-West, and East Coast regions. The top five states that participants came from were California, Arizona, Washington, Oregon, and Minnesota.

Figure 1 illustrates the frequency distribution for two key social network variables as well as examples of personal network diagrams for selected frequencies. The histograms illustrate counts of respondent networks with a range of proportions of participant networks. The left-hand histogram in Figure 1 depicts the distribution of networks with heavy AOD use and the right-hand histogram in Figure 1 depicts the distribution of proportions of alters in

networks who engage in traditional practices. Below each of the histograms are diagrams for three example networks from respondent data (including the respondents' evaluation of which pairs of alters know each other) that represent the range of proportions (below average, close to average, and above average). Each personal network diagram under the left-hand histogram is labeled with the percentage of alters who engaged in at least one of the types of heavy AOD use. These examples were selected to illustrate a network with a low amount of alters who engaged in heavy AOD use (7%), a medium amount (27%), and a high amount (87%). The personal network diagrams under the right-hand histogram are also labeled with the percentage of alters who engage in traditional practices and these examples also illustrate networks with a low (0%), medium (40%), and high (73%) percentage of alters who engage in traditional practices.

Figure 2 presents similar histograms for the 3 social network variables that measure combinations of heavy AOD use and engagement in traditional practices (traditional practices only, heavy AOD use only, and both heavy AOD use and traditional practice engagement). Below these histograms are example personal network diagrams that illustrate participant networks with above average proportions of network members for the three histogram variables.

The three network diagrams highlight the networks of individual participants who have varying proportions of these variables. Network members who participants reported engaged in heavy AOD use and did not engage in traditional practices are depicted with large red circles, members reporting no heavy AOD use and who engaged in traditional practices are represented with large green circles, and those who engaged in both heavy AOD use and traditional practices are represented by large brown circles. Those members who participants reported did not engage in either are depicted with small gray circles. The personal network example on the left-hand side demonstrates a network with a relatively large percentage of alters who engaged in traditional practices, but not heavy AOD use (60%). The personal network in the middle is an example of a network with a relatively high percentage of alters who engage in heavy AOD use, but not traditional practices (80%). The personal network diagram on the right hand side is an example of a network with a relatively high percentage of alters who engage in both traditional practices and heavy AOD use (40%).

Table 2 provides descriptive statistics (mean, standard deviation) of the egocentric networks (counts and proportions of types of alters). The average number of alters named by respondents was 14.2. On average, 25% of people named in respondent networks engaged in traditional practices and 8% engaged in both traditional practices and heavy AOD use. Around 26% of people named in respondent networks engaged in heavy AOD use but not traditional practices, and conversely about 17% engaged in traditional practices but not heavy AOD use. On average, the remaining 51% of people named in respondent networks did not engage in heavy AOD use nor traditional practices. Roughly 7% of network members engaged in heavy alcohol use only, 11% engaged in regular cannabis use only, 9% engaged in heavy drinking and regular cannabis use, and less than 1% engaged in some other type of drug use only. Respondents' networks on average had 84% of alters who provided them with emotional support, advice, or tangible support (money, transportation, food, or other things).

Table 3 provides bivariate tests between network characteristics and each dependent variable. Having a higher proportion of network members who engaged in regular cannabis and heavy alcohol use (but not other drugs) was associated with frequency of cannabis use in the past 3 months and intentions to use cannabis in the next 6 months. Having a higher proportion of network members who engaged in heavy alcohol use only was associated with frequency of alcohol use in the past 3 months. Networks with higher proportions of alters who engaged in regular cannabis use only were associated with participants' frequency of cannabis use in the past 3 months and intentions to use cannabis in the next 6 months.

Respondents with a higher proportion of network members engaging in traditional practices were more likely to report lower alcohol use intentions. Respondent networks with higher proportions of members who engaged in heavy AOD use and not traditional practices were more likely to report cannabis use in the past 3 months and greater intentions to use cannabis and drink alcohol in the next 6 months. Having a higher proportion of network members who engaged in both traditional practices and heavy AOD use was associated with cannabis use in the past three months. In contrast, participants with a higher proportion of network members who engaged in traditional practices and no heavy AOD use were less likely to report intentions to use cannabis or drink alcohol. Finally, having a higher proportion of network members who did not engage in heavy AOD use nor traditional practices was associated with less frequent cannabis use and lower intentions to use cannabis in the next 6 months. We did not find significant associations for proportion of network members providing support with any outcome measures.

Given the high proportion of the sample who endorsed SGM, we ran a second set of regression models controlling for SGM status. Overall, results were largely similar (see Supplemental Table 1). Only three correlations that were significant at the $p < 0.05$ level were no longer significant at that level. The proportions of network members who “engage in traditional practices and do not use AOD heavily” or “do not engage in traditional practices nor use AOD heavily” were still associated with lower cannabis use intentions but each at $p = .08$, and the “drink but do not use other drugs” was still associated with greater alcohol use frequency, but at $p = .08$. We also examined interaction tests for those under 21 versus those 21 and older. There were no instances where the effect of the predictor on an outcome was significantly different for those under 21 versus those 21 and older.

Discussion

Urban AI/AN emerging adults have been historically underrepresented in research. This is the first study to date addressing the influence of social networks on urban AI/AN emerging adults' alcohol and cannabis intentions and use. Participants were from urban areas across 20 different states in the U.S. Results highlight the potential importance of social networks in both increasing risk and conferring protection for this population. Urban AI/AN emerging adults who reported having a higher proportion of people in their network who used alcohol or cannabis regularly had greater intentions to use both alcohol and cannabis in the next six months, and reported more frequent use of these substances in the past three months. In contrast, urban AI/AN emerging adults who had a higher proportion of people in their network who participated in traditional practices reported lower intentions to drink alcohol

in the next six months (albeit no association with drinking behavior). Furthermore, when we examined the combination of network characteristics for AOD use and traditional practices, we found some indication that having a high proportion of network members who engaged in traditional practices may be protective. Emerging adults with higher proportions of network members who used AOD heavily but did not engage in traditional practices reported greater alcohol and cannabis use intentions and cannabis use frequency. In contrast, when participants reported high proportions of network members who used AOD heavily *and also* engaged in traditional practices, the association with intentions was nonsignificant, although a significant association remained with cannabis use frequency. However, the standardized coefficient for cannabis use frequency decreased from .30 to .23, suggesting a possible weakening of the social influence on cannabis use when participants' network members also engaged in traditional practices. Longitudinal work is needed to better understand these associations over time.

Our sample had a large proportion of SGM individuals; thus, we also explored whether controlling for SGM status might affect alcohol and cannabis outcomes. Overall, results were similar to the main findings with only three effects changing from a significance level of .05 to .08. In addition, we examined whether findings differed depending upon whether the participant was under age 21 or 21 and older, and did not find any significant interactions. Overall, findings emphasize what many studies have shown among various racial/ethnic groups—having individuals in your life who use substances increases the chances that you will use substances (Woods et al., 2022).

Our current results suggest that having network members who engage in traditional practices may reduce the strength of social influence on both intentions to engage in alcohol and cannabis use and cannabis use frequency. Of note, motivational interviewing interventions have shown that changing beliefs about substances can lead to decreased substance use (D'Amico et al., 2018). However, current results only provide a preliminary understanding of these associations, and further exploration is needed. Other research has shown that socially connecting with AI/AN people who engage in traditional practices is associated with less AOD use over time (D'Amico et al., 2020; Dickerson et al., 2021; Woods et al., 2022) and that a stronger sense of cultural identity is protective against AOD use (Brockie et al., 2022; Brown et al., 2016). However, many urban AI/AN emerging adults have difficulty accessing cultural resources (D'Amico et al., 2021; Dickerson et al., 2022) and often feel isolated from their traditional ways (Johnson et al., 2021) due to being geographically fragmented in urban areas and also often far from their reservation or tribal lands. One way to connect urban AI/AN emerging adults with their culture is by focusing on helping them develop supportive social networks with whom they can share traditions (Kennedy, D'Amico, et al., 2022; Philip et al., 2016; Woods et al., 2022).

Current results can help inform the development of social network based interventions, which target social network dynamics to enhance behavior change interventions (Shelton et al., 2019). Interventions that combine network visualizations similar to Figures 1 and 2 with motivational interviewing have shown promise, and have been found to be acceptable and feasible to include in interventions with emerging adults (Kennedy, Osilla, et al., 2022). Addressing social networks could help urban AI/AN emerging adults better understand the

people in their lives who influence them and help them determine who in their network can support them in making healthy choices, or even focus on ways to decrease the effects of peers who use AOD on their own behaviors (Kennedy, D'Amico, et al., 2022). This is especially important given the geographical fragmentation that often occurs in urban areas and the disconnection from culture that many urban AI/AN emerging adults experience (Brown et al., 2022). Opportunities for this population to openly discuss these topics are rare within urban areas. Allowing urban AI/AN emerging adults to comfortably discuss their social networks can help them discover new ways of connecting with AI/AN people who may be participating in traditional practices and who emphasize living a healthy life.

Although this study is an important first step in understanding social network influences among urban AI/AN emerging adults, there are limitations. First, we used cross-sectional data to assess associations, and our sample size was small, which limited power and the number of control variables we could include in models. Future studies need to examine social networks among this population longitudinally, and how network changes may relate to increased risk or protection. Second, our project is focused on prevention and early intervention, thus we excluded individuals who were in need of treatment for an OUD, therefore purposively screening out those with higher use. Third, our sample was mostly female; however, prevention research with this age group and population typically has higher participation from females (Reed et al., 2022). Of note, 48% of the sample identified as SGM; other recent work with urban AI/AN emerging adults has also found that many endorse SGM identity (Reed et al., 2022). To date, few studies address Two-Spirit and AI/AN SGM individuals (Cassels et al., 2010), and they are often underrepresented in health research (Thomas et al., 2021). Overall, further engagement is needed in this area with this population with larger and more generalizable samples as the current sample was heavily weighted towards females and also had a large percentage of SGM individuals.

In addition, this study, like many, also occurred during the COVID-19 pandemic (December 2020 to October 2021), and in person recruitment was not allowed at any organizations. The entire sample was recruited online; thus, we may have missed those AI/AN emerging adults who did not have access to social media. Furthermore, the pandemic may have affected participants' social contacts. For example, in another study with AI/AN teens, we found that some teens reported increased closeness with family members and that they were still connecting with peers virtually, whereas others felt more disconnected (D'Amico et al., 2021). Finally, many participants may have already been engaging in traditional practices; although anecdotal data from our workshops indicate that many AI/AN emerging adults are looking for more ways to engage in culture due to transportation barriers and fewer opportunities within urban areas to participate in traditional practices.

Public Health Implications

Overall, findings highlight the importance of helping urban AI/AN emerging adults obtain support from their social networks in order to mitigate alcohol and cannabis use, and reinforce the potential of traditional practices as part of the prevention toolbox for this population (Walters et al., 2020; Woods et al., 2022). As noted in many other studies, traditional practices and cultural teachings/presentations may confer protection for

several reasons. These practices and teachings often reinforce Native American community connectedness, and underscore relationships with self, others and the land (Johnson et al., 2021). For example, based on community needs, a Los Angeles Native American organization began providing the Native American Drum, Dance, and Regalia Program (NADDAR) in 2007 as part of their services. Participants noted that building social AI/AN connections through this type of programming is crucial in the complex urban environment of Los Angeles. Additionally, families noted that learning how to drum, dance, and make regalia helped enhance their connection to their culture, tribe, and community, which increased overall well-being (Johnson et al., 2021). Furthermore, our qualitative work with urban AI/AN emerging adults has shown the importance they place on the protective role that traditional practices may play in decreasing substance use (Brown et al., 2022; Kennedy, D'Amico, et al., 2022). Addressing this relational perspective and sense of belonging may be protective by helping urban AI/AN emerging adults find support systems that can help them learn more about their cultural identity and ways that they can connect with the Native American community. Furthermore, if studies can demonstrate that traditional practices are an effective way to address health behaviors, including AOD use, this could lead to policy change, allowing for provision and reimbursement for these types of services for AI/AN people (Crump et al., 2020; Johnson et al., 2021; Kaholokula et al., 2017).

Our current intervention, TACUNA, is being virtually implemented with these participants, and specifically focuses on helping them visualize who in their network engages in risk and protective behaviors so that they can determine whether they need to change their social networks in order to make healthy choices for their future (D'Amico et al., 2021; Dickerson et al., 2022). TACUNA also focuses on tradition and culture and ways that they can connect with others in the AI/AN community. From a clinical perspective, social network diagrams can be used to help address many different factors that may affect urban AI/AN emerging adults' alcohol and cannabis use, and help them better understand key social connections that may support them in not using substances, provide them with cultural knowledge, and help them engage in traditional practices. For example, utilizing social network diagrams with cognitive behavior therapy and MI in culturally based programs may help to optimize substance use treatment and prevention approaches. Of note, participants in this study were from urban areas in 20 different states across the U.S., emphasizing the potential reach of this type of program. Given the challenging nature of the urban environment, it is crucial to provide urban AI/AN emerging adults with an understanding of who in their social network can support them as they navigate their AI/AN identity and the complex social challenges that come with this developmental period.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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Public Health significance:

- There are no prior studies that have examined the role of social networks on health behaviors (including substance use) among urban American Indian/Alaska Native (AI/AN) emerging adults in the U.S.
- Participants with a higher proportion of network members engaging in traditional practices but not heavy substance use were less likely to report intentions to use cannabis or drink alcohol.
- This study highlights that traditional practices (e.g., beading, storytelling, dancing) may be an important part of the prevention approach for this population.

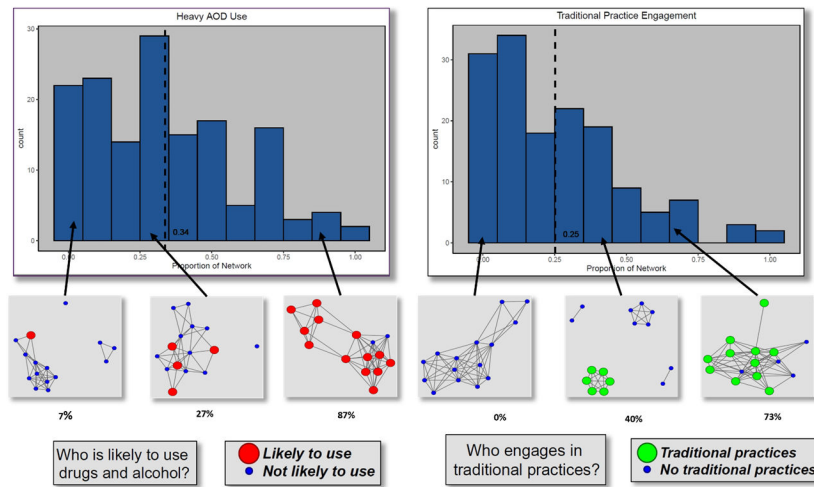


Figure 1.

Histograms and example personal network diagrams illustrating frequency distribution of proportions of network members engaging in heavy AOD use (left panel) and traditional practices (right panel). Each histogram depicts the count of egocentric networks across all interviews (y-axis) within a range of proportion of network members with that characteristic (x-axis). Three egocentric diagrams appear below each histogram to provide illustration of egocentric networks with different proportions of alters with the highlighted characteristic. Each circle or “node” in each egocentric diagram depict an “alter” named by a respondent and lines/“edges” between each node represent alters who the respondent indicated know each other. Each egocentric network is labeled with the percentage of network members with the alter characteristic illustrated by the histogram. Each histogram also includes a dashed, vertical bar indicating the overall mean proportion across all networks. On average, those reporting heavy AOD use represent 34% of network members named by participants and network members engaged in traditional practices represent 25% of networks, on average. Network diagrams represent the networks of individual participants who have varying proportions of the different types of network members. Network members who participants reported engaged in heavy AOD use are depicted with larger red circles; Members who participants reported did not use alcohol or drugs are depicted with small blue circles. Network members who participants reported engaged in traditional practices are depicted with large green circles and those who did not are depicted with small blue circles.

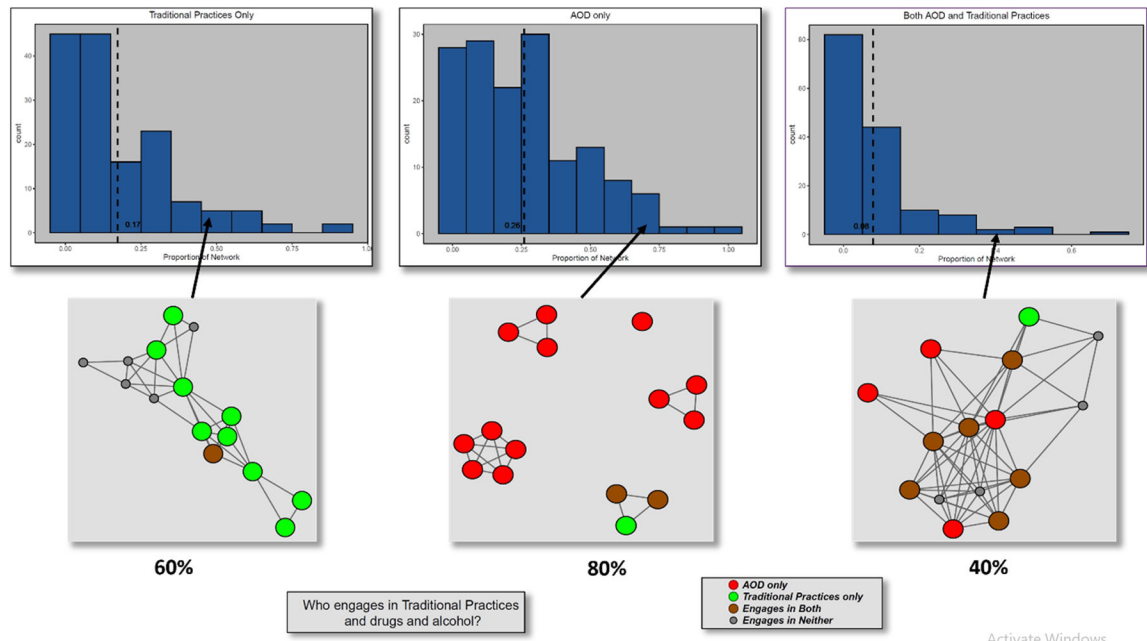


Figure 2.

Histograms and example personal network diagrams illustrating frequency distributions of multiplex social network variables that combine AOD use and traditional practices. Each histogram depicts the count of egocentric networks across all interviews (y-axis) within a range of proportion of network members with that characteristic (x-axis). Three egocentric diagrams appear below each histogram to provide illustration of egocentric networks with different proportions of alters with the highlighted characteristic. Each circle or “node” in each egocentric diagram depict an “alter” named by a respondent and lines/”edges” between each node represent alters who the respondent indicated know each other. Each egocentric network is labeled with the percentage of network members with the alter characteristic illustrated by the histogram. Each histogram also includes a dashed, vertical bar indicating the overall mean proportion across all networks. On average, networks had 17% of network members who engaged in traditional practices but not AOD use, 26% of network members who engaged in AOD use but not traditional practices, and 8% of those who engaged in both. The three network diagrams below the histogram represent the networks of individual participants who have varying proportions of these variables. Network members who participants reported engaged in heavy AOD use and did not engage in traditional practices are depicted with large red circles, members reporting no AOD use and who engaged in traditional practices are represented with large green circles, and those who engaged in both AOD use and traditional practices are represented by large brown circles. Those who participants reported did not engage in either are depicted with small gray circles.

Table 1.

Participant demographic and social network characteristics

Participant Characteristics	Participants (n = 150) (%)
Age	
18	8.0
19	11.3
20	13.3
21	8.0
22	14.7
23	16.0
24	16.7
25	12.0
Sex at birth	
Male	14.0
Female	86.0
Intersex/Other	0.0
Gender	
Man	12.0
Woman	72.7
Gender fluid	10.0
Something else	4.7
Prefer not to say	0.7
Sexual Orientation	
Straight/heterosexual	48.7
Gay	2.0
Lesbian	4.7
Bisexual	30.7
Questioning	4.7
Asexual	2.0
Something else	5.3
Prefer not to say	2.0
SGM status	48.0
Mother's education	
Less than high school	8.7
High school	21.3
Some college/AA	30.7
Bachelor's degree	36.7
Don't know	2.7
Heavy drinking in the past 3 months	51.3
Cannabis use in the past 3 months	59.3
Alcohol and cannabis use in the past 3 months	54.0

Prescription opioid use in the past 3 months	0.7
Alcohol use intentions	
Definitely yes	31.3
Probably yes	26.0
Probably no	12.7
Definitely no	20.0
Cannabis use intentions	
Definitely yes	35.3
Probably yes	19.3
Probably no	10.7
Definitely no	34.7
Opioid use intentions	
Definitely yes	0.0
Probably yes	0.7
Probably no	4.7
Definitely no	94.7
Social Network Characteristics	M(SD) of percentage
% of alters who engage in traditional practices	25.1 (23.3)
% of alters who engage in traditional practices and do not use any AOD	17.3 (19.2)
% of alters with heavy AOD use and no engagement in traditional practices	25.9 (21.8)
% of alters who engage in traditional practices and report heavy AOD use	7.8 (12.2)
% of alters who drink alcohol heavily but do not use cannabis or other drugs	6.9 (9.6)
% of alters who use cannabis regularly but do not drink alcohol or use other drugs	10.9 (14.7)
% of alters who drink alcohol heavily and use cannabis regularly but do not use other drugs	9.0 (13.2)
% of alters who use other drugs but do not use cannabis or drink alcohol	0.2 (1.4)
% of alters who provide the participant with support (i.e., emotional, advice, financial)	83.7 (20.1)

Note: AOD = alcohol and other drugs; SGM= sexual and gender minority. We defined SGM status as any orientation other than “straight/heterosexual,” sex at birth being “something else,” gender identity as “gender fluid” or “something else,” transgender identity, history of same-gender sex, or discordance between sex at birth and gender identity.

Table 2.

Egocentric Network Characteristics (N=150)

Alter Characteristics	Alter Counts Mean (SD)	Alter Proportion Mean (SD)
Total Alters Named	14.2 (2.36)	---
Relationship with Respondent		
Family	5.01 (3.35)	0.35 (0.22)
Friend	6.43 (3.49)	0.45 (0.23)
Romantic Relationship	0.75 (0.61)	0.06 (0.06)
Co-worker	0.96 (1.73)	0.07 (0.11)
Classmate	0.18 (0.65)	0.02 (0.04)
Age		
Younger	0.59 (1.04)	0.04 (0.07)
Same Age	8.32 (3.35)	0.60 (0.22)
Older	5.06 (3.04)	0.35 (0.20)
AI / AN Identity		
Identifies as AI / AN	5.73 (3.98)	0.40 (0.26)
Engages in traditional practices	3.59 (3.43)	0.25 (0.23)
Support Provided		
Emotional Support	10.40 (3.98)	0.74 (0.25)
Informational Support	10.10 (4.07)	0.71 (0.26)
Tangible Support	6.38 (4.41)	0.44 (0.29)
Heavy AOD Use		
Any heavy AOD use	4.75 (3.75)	0.33 (0.25)
Heavy alcohol use	2.60 (2.87)	0.18 (0.19)
Regular cannabis use	3.10 (2.96)	0.22 (0.21)
Other drugs	0.46 (1.03)	0.03 (0.07)
Heavy alcohol use only	1.00 (1.41)	0.07 (0.10)
Regular cannabis only	1.49 (2.02)	0.11 (0.15)
Heavy alcohol or regular cannabis only	1.25 (1.88)	0.09 (0.13)
Other drugs only	0.03 (0.21)	0.00 (0.01)
Multiplexity		
Traditional practice and heavy AOD use	1.11 (1.74)	0.08 (0.12)
Traditional practice, no heavy AOD use	2.49 (2.82)	0.17 (0.19)
Heavy AOD use, no traditional practices	3.64 (3.12)	0.26 (0.21)
Neither traditional practices nor heavy AOD use	6.95 (4.06)	0.49 (0.27)

Table 3.

Results from bivariate linear regression for all participants (N=150)

Proportion of alters who...	Coefficient (standard error), p-value Standardized coefficient				
	Alcohol intentions	Cannabis intentions	Alcohol use frequency	Heavy drinking frequency	Cannabis use frequency
Engage in traditional practices	-0.80 (0.38), p=.04 -0.18	-0.40 (0.45), p=.38 -0.08	-3.54 (3.80), p=.08 -0.08	0.25 (2.61), p=.92 0.01	3.15 (4.45), p=.48 0.06
Engage in traditional practices and do not use AOD heavily	-1.05 (0.46), p=.02 -0.19	-1.14 (0.54), p=.04 -0.18	-6.55 (4.60), p=.16 -0.12	-0.68 (3.17), p=.83 -0.02	-4.88 (5.41), p=.37 -0.07
Use AOD heavily and do not engage in traditional practices	1.07 (0.40), p=.009 0.23	1.74 (0.46), p<.001 0.31	7.66 (4.04), p=.06 0.16	2.71 (2.79), p=.33 0.08	17.38 (4.56), p<.001 0.30
Use AOD heavily and engage in traditional practices	-0.30 (0.74), p=.68 -0.04	1.37 (0.86), p=.11 0.14	3.10 (7.26), p=.67 0.04	2.61 (4.97), p=.60 0.04	23.70 (8.28), p=.005 0.23
Do not engage in traditional practices nor use AOD heavily	-0.09 (0.34), p=.78 -0.02	-0.84 (0.39), p=.03 -0.18	-2.36 (3.31), p=.48 -0.06	-2.04 (2.27), p=.37 -0.07	-13.87 (3.71), p<.001 -0.30
Drink heavily but do not use cannabis or other drugs	1.07 (0.94), p=.25 0.10	-0.78 (1.10), p=.48 -0.06	18.60 (9.14), p=.04 0.17	9.69 (6.30), p=.13 0.12	-9.34 (10.82), p=.39 -0.07
Use cannabis regularly but do not drink or use other drugs	0.46 (0.61), p=.45 0.07	3.22 (0.67), p<.001 0.39	-0.53 (6.03), p=.93 -0.01	-1.40 (4.13), p=.73 -0.03	25.78 (6.73), p<.001 0.30
Drink heavily and use cannabis regularly but do not use other drugs	0.87 (0.68), p=.21 0.11	1.62 (0.79), p=.04 0.17	11.56 (6.69), p=.09 0.15	7.03 (4.59), p=.13 0.12	22.89 (7.68), p=.003 0.24
Use other drugs but do not drink or use cannabis	-8.35 (6.23), p=.18 -0.12	-5.78 (7.34), p=.43 -0.07	-67.26 (61.56), p=.28 -0.09	-24.04 (42.29), p=.57 -0.05	-29.56 (72.31), p=.68 -0.03
Provide support to participant	0.25 (0.45), p=.58 0.05	0.37 (0.53), p=.48 0.06	0.10 (4.42), p=.98 0.00	0.97 (3.03), p=.75 0.03	3.33 (5.17), p=.52 0.05