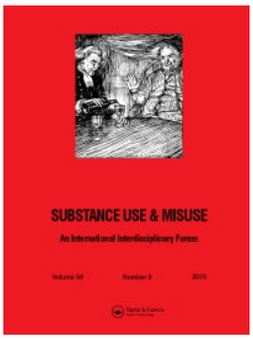

Substance Use & Misuse

ISSN: (Print) (Online) Journal homepage: www.tandfonline.com/journals/isum20

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To cite this article: Emily A. Hennessy, Jordan Jurinsky, Kiefer Cowie, Agata Z. Pietrzak, Sophia Blyth, Paige Krasnoff, David Best, Mark Litt, Blair T. Johnson & John F. Kelly (13 May 2024): Visualizing the Influence of Social Networks on Recovery: A Mixed-Methods Social Identity Mapping Study with Recovering Adolescents, Substance Use & Misuse, DOI: 10.1080/10826084.2024.2352618

To link to this article: https://doi.org/10.1080/10826084.2024.2352618

SUBSTANCE USE & MISUSE
https://doi.org/10.1080/10826084.2024.2352618

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ORIGINAL ARTICLE

Visualizing the Influence of Social Networks on Recovery: A Mixed-Methods Social Identity Mapping Study with Recovering Adolescents

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ABSTRACT

Background: Social recovery capital (SRC) refers to resources and supports gained through relationships and is vital to adolescent addiction recovery. Much is known about how substance use relates to social networks, but little is known about how other dimensions of social networks influence recovery (e.g., network size/exposure, degree of conflict). *Methods:* This mixed-methods study sampled 28 adolescents who received treatment for alcohol and other drug (AOD) use disorder (14–19 yrs.: 71% male; $M = 17.32$ yrs., SD = 1.33; White 82%): 20 were recovery high school (RHS) students. Adolescents completed a social identity map for addiction recovery (SIM-AR), survey, and interview. Qualitative data were content analyzed and the data from the SIM-AR were quantified. *Results:* On average, participants reported belonging to five distinct groups within their network (Range, 2–9; SD = 1.63; $M = 27.89$ people, SD = 20.09). Of their social network connections, 51% drank alcohol and 46% used other substances, on average. Larger networks involved more conflict ($r = 0.57$). Participants were more likely to spend more time with groups that had greater proportions of non-substance-using members. These linkages were stronger for RHS than for non-RHS students. Qualitative analyses revealed that youth reported their recovery-oriented groups as supportive, but some reported that their substance-using friends also supported their recovery. *Discussion:* SIM-AR was a useful measurement tool, and, through qualitative interviews, we identified unique aspects of youths' social networks important for further examination. Research with recovering youth should examine SRC-related elements within their networks including relationship quality, belonging, and conflict, alongside the substance use behaviors of network members.

KEYWORDS
Addiction; adolescent; recovery capital; social capital; social network

Introduction

Adolescent alcohol and other drug (AOD) use disorders present a major public health problem. In the United States, for example, approximately 72,000 12–20-year-olds received substance use treatment in 2020 and an additional 1.9 million 12–17-year-olds in 2021 needed specialized substance use disorder treatment but did not receive it (Behavioral Health & Statistics & Quality, 2022; Substance Abuse and Mental Health Services Administration (SAMHSA), 2021). Adolescents with AOD use disorders often require extensive treatment and post-treatment services for successful recovery (Buckheit et al., 2018). It is clear that *social recovery capital* (SRC)—resources and supports gained through sober and supportive friends, family, and peer groups—is vital to reducing substance use among recovering adolescents (e.g., Gonzales et al., 2012; Hennessy, 2017; Kelly et al., 2000; 2008; Nash et al., 2019; Ramo et al., 2012). Indeed, social contexts help shape one's social identity and behaviors resulting from that identity, as individuals interact with different social groups and experience group norms and values (Jetten et al., 2012, 2014). Experiences in different social contexts provide variable levels of direct and indirect exposure to AOD cues that can influence the risk of returning to substance use (Best et al., 2016; Haslam et al., 2018; Litt et al., 2021; Longabaugh et al., 2010). As a result, as youth engage in treatment services they are typically encouraged to join sober support groups, develop new sober friendships, and end relationships with friends who use drugs, with the hopes that these changes will support a sober identity and help maintain recovery-related behaviors.

Although it is recognized that social influences affect the AOD recovery process, there are still gaps in our understanding of the degree to which different *types* of social

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Supplemental data for this article can be accessed online at https://doi.org/10.1080/10826084.2024.2352618.

influences affect youth recovery, and *how* they might do so. In this mixed-methods study with recovering adolescents, we use an innovative, interactive form of data collection, social identity mapping (Cruwys et al., 2016), to examine adolescents' social network composition[1] and explore how the adolescents perceive social group influences on their own recovery process.

Background

Adolescence and Social influence

Social influence is a strong driver of health and risk behaviors and is especially salient for recovering adolescents (Cheng & Lo, 2015; Cin et al., 2009; Gerrard et al., 2008; Gibbons et al., 2012; Godley et al., 2005; Ramo et al., 2012). As adolescents mature, they develop a *social identity*, that is, they understand who they are in their social world, generating it from their social group memberships (Jetten et al., 2012). When an adolescent identifies with others in a social situation, they are motivated to act in ways that the group would expect based on perceived norms and values (Turner, 2010). For example, adolescents with heavy/frequent AOD use habits (or an AOD use disorder) may define themselves as "using" and engage in substance use when with friends they consider "users." Alternatively, these adolescents may define themselves as "non-users" or "in recovery" when around friends who identify as being in recovery and act accordingly, such as by avoiding substance use. Indeed, ample evidence supports the importance of social network behavior among friends, peers, and family members in predicting substance use among adolescents (Anderson et al., 2008; Dumas et al., 2012; Eddie & Kelly, 2017; Gonzales et al., 2012; Nash et al., 2019; Savolainen et al., 2018). Furthermore, the broader culture of substance use experimentation as 'normal' during adolescence may make it difficult for adolescents to perceive there is a need for changes to AOD use or to feel motivated to make changes. In addition, the positive experiences some youth report when using substances with others (e.g., deeper connection, shared meaning and experiences) may make it more difficult for youth to create new relationships while sober, especially when attempting to sustain recovery (Farrugia, 2015; Herold & Søgaard, 2019; Pennay & Measham, 2016).

Recovery capital and social recovery capital

The Recovery Capital Model for Adolescents (RCAM: Hennessy et al., 2018) is based on an ecological model comprised of the resources one has for recovery from an AOD use disorder. It consists of the following domains: (a) human recovery capital (adaptive skills and characteristics), (b) financial recovery capital (material resources such as money and transportation), (c) social recovery capital (social supports, especially from sober family, friends, and peers), and (d) community recovery capital (recovery resources in the community like mutual help organizations). The more resources, or recovery capital, that one has for recovery, the higher the likelihood that an individual will achieve stable recovery, or the "fulfillment of basic needs, enhancements in social support and spirituality, and improvements in physical and mental health, quality of life, and other dimensions of well-being" (Cloud & Granfield, 2008; Granfield & Cloud, 1999, 2001; Hagman et al., 2022, p. 8). On the other hand, if youth lack these factors or experience barriers to securing resources, recovery will be more difficult.

Given the key role that peers play in the adolescent recovery process, the social recovery capital (SRC) domain is of central importance to understanding their recovery experience. SRC includes any social resources that support recovery, such as sober friends and other peer groups, abstinent family members who take an active role in supporting recovery, tangible resources gained through relationships, and activities that build positive social bonds (Hennessy et al., 2018). Improving one's SRC often also involves moving away from social groups whose behaviors are inconsistent with recovery goals. Often, SRC resources are dependent upon community-level recovery capital these youth can access. Thus, youth recovery is best supported when treatment and recovery support services are available in the community and provide opportunities for youth to engage in positive activities and build relationships with non-substance-using peers (Kelly & Urbanoski, 2012).

Social identity transitions and recovery capital development

The social identity model of recovery (Best et al., 2016) and the social identity model of transition (Kay & Monaghan, 2018) provide potential mechanisms by which social influences and recovery capital function for youth in recovery. The social identity model of recovery suggests that during the initiation of recovery, an individual's social network is still dominated by one or social groups that are actively using substances, and those groups' values exert a strong influence on substance use behavior (Best et al., 2016). Although an individual may have non-using social groups, their influence is minimal at this early stage. As recovery progresses, this balance shifts as the individual has access to more non-using and/or recovery-oriented groups. Subsequently, their social identity shifts to align with the norms and values of the social groups with which they have stronger bonds (Kay & Monaghan, 2018). Eventually, in stable recovery, social influence on substance use behavior has shifted primarily to non-substance using and recovery groups, and one's social identity, in turn, has transitioned to that of a dominant "sober" or "recovery" identity. The process is influenced by changes in recovery capital and recovery barriers, and it is often coupled with fluctuations in influence between the former and newer identities as the recovery identity solidifies.

Research has demonstrated the pivotal role that SRC can provide for youth with AOD use disorders and the results when youth lack SRC or are engaged in groups whose members actively use substances (Anderson et al., 2008; Gonzales et al., 2012; Nash et al., 2019; Savolainen et al.,

2018). For example, adolescents engaged in youth-specific recovery support groups, alternative peer groups, reflected that the peers they were friends with while they were using substances often encouraged high-risk behaviors and substance use (Nash et al., 2019). These same young people also reported that the persons they developed relationships with in the alternative peer groups were "real" friends. They also reflected on changes their parents experienced and the pivotal role their parents played as a source of social recovery capital in helping them to engage in treatment and recovery programming. Yet, despite attention to social networks in building recovery capital among older samples (Bathish et al., 2017; Dingle, Cruwys, & Frings, 2015), there is still a gap in this research among recovering adolescents. To address this gap, this study employed Social Identity Mapping in Addiction Recovery (SIM-AR: Beckwith et al., 2019; Cruwys et al., 2016) combined with semi-structured interviews. The aim was to examine to what extent the various social networks of youth in recovery provide social recovery capital.

The SIM-AR process involves providing participants with a set of materials (e.g., paper, sticky notes, and sticker dots) and asking a series of standardized questions to produce a visual map of the individual within their perceived social network (Figure 1 includes two exemplar SIM-ARs and a legend). The SIM-AR allows for the quantification of social network characteristics traditionally seen in egocentric social network analysis, in addition to enabling a more nuanced investigation of how an individual perceives their social network. The visual and hands-on aspects of the SIM-AR may also enable an individual to conceptualize numerous aspects of their social network (e.g., direct and indirect relationships, conflicts, group behaviors) simultaneously, which would be difficult to accomplish without a visual aid. The SIM-AR's visual component may be especially useful with this population, as youth tend to process information visually (Gerrard et al., 2008). Thus, in contrast to former approaches, which have used lengthy survey assessments, the SIM-AR is a novel and engaging approach that may also uncover youths' unique insights into the value, influence, and impact of social networks on their recovery journey.

Research questions

The chief research questions examined in this exploratory study were:

1. What is the nature of recovering adolescents' social networks in terms of network size, AOD use, and conflict, and the degree to which recovering adolescents spend time with and identify with various groups, or feel groups are important?
2. When viewing their social network (i.e., from a completed SIM-AR), what conclusions do these recovering adolescents reach about these different relationships and group characteristics in the context of their recovery journey?

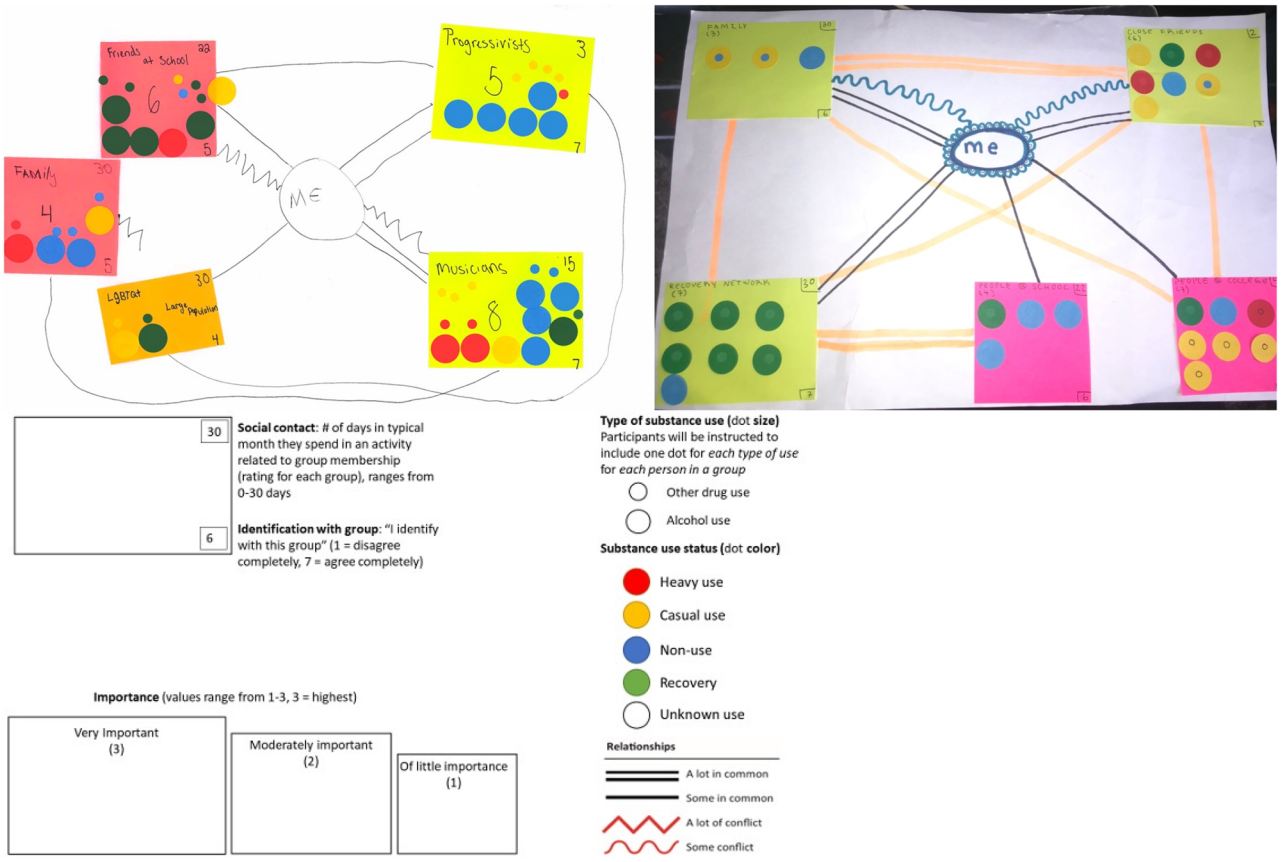

Figure 1. Exemplar SIMs from two participants (left: #2, Male, 18 yrs.) and (right: #9, Female, 18 yrs.) and the SIM key (bottom).

Methods

The MGH IRB approved the study protocol prior to recruitment. The protocol was pre-registered in the Open Science Framework (https://osf.io/8vdcp/?view_only=02544c530b0746dd812a78b9d8c008b3). The study used a mixed methods convergent parallel design in which the quantitative and qualitative data were collected at the same study visit, separately analyzed, and finally compared to identify where they converged or diverged (Creswell & Plano Clark, 2007). Our study team included not only faculty but also undergraduate and graduate students with varying degrees of research experiences. The faculty member leading the project and conducting the study visits had experience conducting mixed methods research with recovering adolescents and adolescent-serving organizations. Three of the authors were directly involved in the data collection, while the remaining authors only had access to the data.

Participants

We purposively sampled youth ages 12–19 for this study ($N = 28$; November 2020—December 2022) from treatment centers, recovery high schools (RHS), and the broader community via advertisements. Youth were eligible if they were currently attending a treatment or recovery support service for their AOD use (treatment center, recovery high school) or if they had recently seen a provider for their AOD use. Those under 18 years of age were consented with a parent. Participants received a $35 e-gift card for participation.

Of the 28 participants, most were male ($n = 20$) and White (82%), and they were on average 17.32 years of age (SD = 1.33; range = 14–19). Most participants ($n = 20$) were recruited from three different RHSs and the remaining 8 were recruited from treatment settings or from the community. Although our initial aim was not to compare participant results by their recruitment source, the cohorts were large enough that we provide a breakdown by recruitment source (RHS versus non-RHS) in the tables and present differences in exploratory analysis. RHSs meet state requirements to award a secondary school diploma and are exclusively for students in recovery, which may provide a unique context for social network influence and development among those attending them.

Procedures

Study visits were conducted in person (e.g., in a private space at an RHS) or remotely. Most participants were met individually ($n = 16$) and three separate group visits were also conducted ($n = 12$)[2]. The lead author developed a structured guide for this study to facilitate participants' creation of the SIM-AR. For example, participants were asked to use the materials to create a diagram depicting their social network by considering the different groups that comprised their overall network, the importance of each group, the time spent with each group, the level of conflict between groups (between each group and other groups on the SIM-AR and between each group and the participant), and the alcohol and drug use of group members (see "Quantitative Data" for all items collected and Figure 1 for exemplar SIM-ARs). Following the SIM-AR exercise, participants were interviewed about their SIM-AR (see Supplement for the Interview Guide) and completed a short demographic survey using questions from the NIH's All of Us Research Program (gender, race/ethnicity, age) and two questions on length of time at their school (if an RHS student) or in treatment (if currently in treatment). The SIM-AR portion of the visit lasted 19–63 min ($M = 32.52$, SD = 11.07), and the interview lasted 10–45 min ($M = 25.75$, SD = 7.46).

Quantitative data derived from the SIM-AR

The following nine characteristics from the SIM-ARs were entered into a REDCap database created to manage project data (Harris et al., 2009): (1) number of social groups, (2) group importance (least [0], somewhat [1], most important [2]), (3) number of days/month spent with the group [0–30], (4) level of identification with group [1–7: 7 as the highest level of identification], (5) level of conflict as indicated by the presence of squiggly or orange lines (low conflict, 1) or jagged or red lines (high conflict, 2) or the absence of lines (no conflict, 0), (6) level of commonality between self/groups as indicated by the absence or presence of single (little in common) or double (a lot in common) straight lines [0–2], (7) alcohol use level among group members [heavy/red, casual/yellow, none/blue, none and in recovery/green, unknown/blank], (8) non-tobacco substance use level among group members [heavy/red, casual/yellow, none/blue, none and in recovery/green, unknown/blank], and (9) group label/name provided by participant. One research assistant checked the data entry of each variable. We used these data to calculate ratios of the level of AOD use of group members across each adolescent's network (e.g., for each group: $\frac{Number\ of\ group\ members\ heavily\ using\ alcohol}{Total\ number\ of\ group\ members}$ and overall: $\frac{Number\ of\ network\ members\ heavily\ using\ alcohol}{Total\ number\ of\ network\ members}$). We calculated descriptive statistics and correlations across all variables. To examine the relationships between the group-level SIM-AR data, variables were first standardized, and then bivariate regressions of the variables were conducted, including the participant ID to account for participants having multiple groups across their networks. The resulting regression coefficient represents the correlation between the two variables.

Qualitative data

Study visit recordings were professionally transcribed and checked or transcribed by a study team member and stored in an NVivo qualitative management software database for review and analysis (QSR International Pty Ltd., 2020). One

coauthor who had not engaged in the study visits reviewed the transcripts and drafted the initial codebook based on the domains of recovery capital (human, financial, social, and community recovery capital). To increase the trustworthiness of the results (Lincoln & Guba, 1985), the codebook was discussed by three members of the study team, refined, and used for coding the interviews using the constant comparative method (Corbin & Strauss, 2008). The coding team engaged in regular coding meetings throughout the process to discuss coding discrepancies and come to consensus. We engaged in descriptive qualitative analysis (Sandelowski, 2000) for this paper as we focused on how participants used the SIM-AR for reflection to answer questions about their recovery journey in the context of their social groups. Thus, our presentation of results focuses on two broad recovery experience themes as they relate to social network shifts and the development of recovery capital: recovery barriers and recovery supports.

Data integration

The quantitative data from the maps were summarized to produce a general overview of the youths' current social network composition. The results from the quantitative data analysis were reviewed alongside youths' maps and reflections on these maps to highlight how youth viewed their own recovery journey as it related to their social network influences. This process was initiated by the lead author followed by several rounds of discussion and feedback with the study team. To aid in the integration, qualitative responses were organized by summaries of key variables (conflict, AOD use among members, time spent with groups, and identification with a group by majority use/recovery groups) using the median value and/or the top and bottom percentiles (10% and 90%, respectively). Although we considered using the top/bottom 25%, the initial exploration of quartiles indicated this cutoff did not identify divergent perspectives. For example, qualitative responses coded as related to the theme of social "conflict" from participants with a high number of conflict lines (9 or more; 90%) were compared to participants with a low number of conflict lines (1 or none; 10%).

Results

Nature of recovering adolescents' social networks

Participants reported having on average 5.14 groups (SD = 1.63; Range = 2–9) and 27.89 people (SD = 20.09; Range = 2–103) in their social networks for a total of 781 network members across the 28 participants. All participants reported at least one friend group and all but one reported having a family group. Over half reported having a group based on treatment/recovery services or a group centered around work. Some youths labeled groups who bought drugs from them ($n=1$) or groups characterized by persons they knew who used substances (e.g., "drug friends", $n=9$). Four youths depicted very large groups that they felt connected to, i.e.: "recovering people", "social media" and the "LGBTQ+ community".[3] See Table 1 for a summary of participant and SIM-AR characteristics. (See Figure 1 for two exemplar SIM-AR maps and the supplement for a summary table of SIM-AR characteristics for individual participants).

AOD use and conflict

On average, across all group members depicted by all study participants, approximately 51% drank alcohol, 16% were in recovery from alcohol use, and 18% did not drink but were not in recovery (Figure 2). On average, across all group members, approximately 46% used drugs, 13% were in

Table 1. Overall summary of participants and their social network characteristics.

	Mean/%	SD/N	n	Mean/%	SD/N	n	Mean/%	SD/N	n
	Recruited from RHS ($n=20$)			Recruited from other ($n=8$)			Total Sample ($N=28$)		
Male	85.00	17	20	37.50	3	8	71.43	20	28
White, Hispanic	61.00	4	18	12.50	1	8	17.86	5	28
White, Non-Hispanic	22.00	11	18	87.50	7	8	64.29	18	28
Age in years (14–19)	17.10	1.33	20	17.88	1.25	8	17.32	1.33	28
Time at school (days)[a]	354.68	516.53	19	651.00	424.52	6	425.80	504.31	25
Time in treatment (days)[a]	185.71	242.68	7	485.00	416.84	5	310.42	345.05	12
Network total members (2–103)	24.50	15.46	20	36.38	28.16	8	27.89	20.09	28
Number of groups (2–9)	4.85	1.53	20	5.88	1.73	8	5.14	1.63	28
Importance rating (1–3)	2.15	0.31	20	2.09	0.23	8	2.13	0.29	28
Time with group in days (0–30)	18.37	5.47	20	14.81	4.96	8	17.35	5.48	28
Group identify rating (1–7)	4.84	1.01	20	4.35	1.04	8	4.70	1.03	28
Degree of Conflict (AN)	5.26	3.72	19	5.50	3.78	8	5.33	3.67	27
Degree of Commonality (AN)	4.32	2.58	19	5.75	4.17	8	4.74	3.12	27
Alcohol and Drug Use Ratios[b]									
Heavy AU (ratio, AN)	0.20	0.33	20	0.18	0.10	8	0.19	0.29	28
Casual AU (ratio, AN)	0.28	0.19	20	0.47	0.17	8	0.33	0.20	28
No AU (ratio, AN)	0.21	0.17	20	0.09	0.13	8	0.18	0.17	28
Recovering AU (ratio, AN)	0.19	0.18	20	0.07	0.08	8	0.16	0.16	28
Heavy DU (ratio, AN)	0.30	0.35	20	0.24	0.16	8	0.28	0.30	28
Casual DU (ratio, AN)	0.19	0.17	20	0.23	0.14	8	0.20	0.16	28
No DU (ratio, AN)	0.19	0.15	20	0.26	0.14	8	0.21	0.15	28
Recovering DU (ratio, AN)	0.17	0.17	19	0.03	0.07	8	0.13	0.16	27

Note. AN: Across Network; AU: Alcohol users; RHS: Recovery High School; DU: Substance users.
[a]Only answered if participant was enrolled in school/treatment during the study.
[b]Missing data due to unknown substance use for some group members.

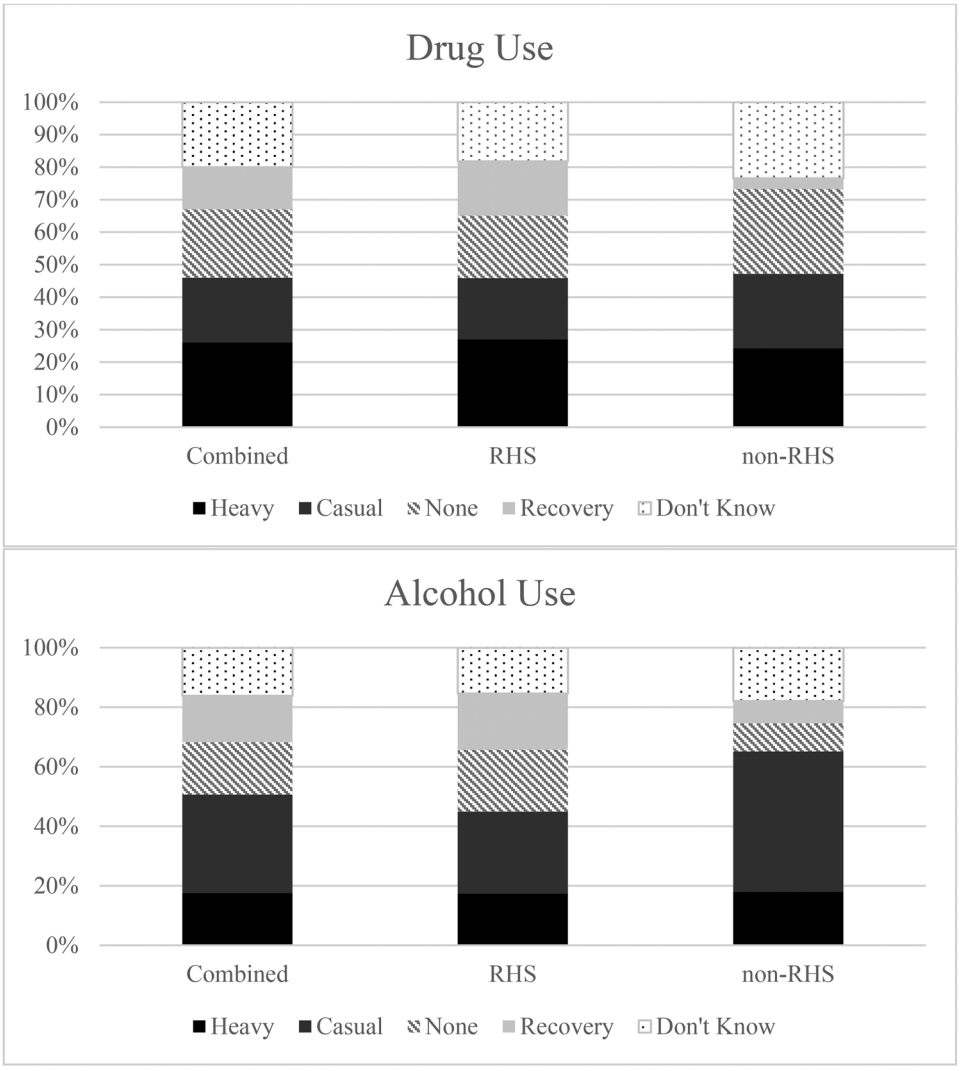

Figure 2. Drug use (top) and alcohol use (bottom) among group members, by recruitment source.

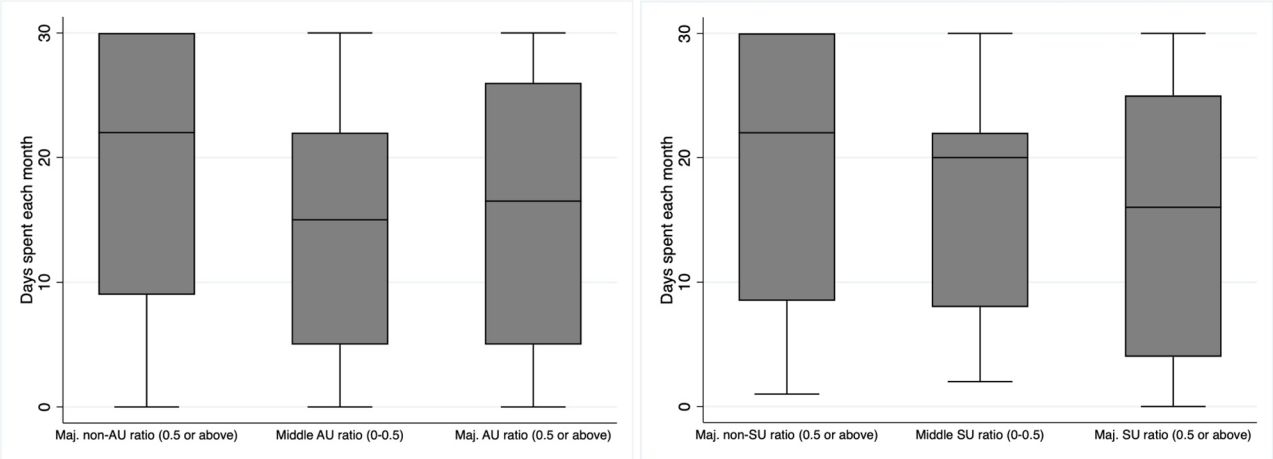

Figure 3. Amount of time spent with groups by the alcohol (**left panel**) and drug (**right panel**) use levels of group members.

recovery from drug use, and 21% did not use drugs but were not in recovery. Participants indicated 102 conflict lines overall ($M = 3.78$, SD = 2.53, Range = 0–10) with an average degree of conflict of 5.33 (SD = 3.67, Range = 0–14). Approximately 67% ($n = 68$) of the lines of conflict were directly between the participant and their groups.

Table 2. Spearman rank correlations between participant network composition factors: entire network.

	Groups (n)	Members (n)	Conflict	Heavy DU (ratio)	Casual DU (ratio)	No DU (ratio)	Rec. DU (ratio)	Heavy AU (ratio)	Casual AU (ratio)	No AU (ratio)	Rec. AU (ratio)
Groups (n)	1.00										
Members (n)	**0.63**	1.00									
Conflict	**0.57**	0.30	1.00								
Heavy DU (ratio)	0.02	0.15	0.16	1.00							
Casual DU (ratio)	0.07	−0.07	0.08	−0.28	1.00						
No DU (ratio)	0.21	0.05	−0.05	**−0.53**	0.06	1.00					
Rec. DU (ratio)	0.01	0.00	0.12	−0.31	−0.35	0.05	1.00				
Heavy AU (ratio)	−0.18	0.08	−0.22	0.13	0.04	0.07	0.00	1.00			
Casual AU (ratio)	0.23	0.13	0.13	−0.01	0.26	0.05	**−0.53**	−0.33	1.00		
No AU (ratio)	−0.01	−0.26	0.03	−0.17	0.11	0.33	**0.40**	0.08	**−0.53**	1.00	
Rec. AU (ratio)	0.12	0.04	0.32	−0.13	−0.35	0.04	**0.55**	−0.26	−0.21	0.07	1.00

Note. Bolded values indicate $p < 0.05$.
AU: Alcohol use members; Rec.: In recovery; DU: Substance use members.

Table 3. Correlations between time spent and group composition factors by recruitment source.

	Time Spent in Days Per Month (0–30)		
	Recruited from RHS ($n = 20$)	Recruited from other ($n = 8$)	Total Sample ($N = 28$)
Importance rating	**0.33**	**0.36**	**0.34**
Group identify rating	**0.40**	**0.40**	**0.42**
Conflict between self/group	0.18	0.03	0.13
AU ratio of group	−0.11	0.13	−0.08
Non-AU ratio of group	0.13	0.11	**0.16**
DU ratio of group	−0.26	0.07	−0.17
Non-DU ratio of group	**0.23**	0.06	**0.20**

Note. Bolded values reach statistical significance ($p < 0.05$). AU: Alcohol use members; DU: Substance use members.

Relationships between group size, AOD use, and conflict across networks

The size of the network, measured by the number of groups, indicated that participants with more social groups tended to have more people in their overall network ($r = 0.63$, $p < 0.05$) and more lines of conflict between themselves and their groups, as well as between groups ($r = 0.57$, $p < 0.05$; Table 2). Participants with higher ratios of network members in recovery from drug use were less likely to have group members with casual alcohol use (r=-0.53, $p < 0.05$) and more likely to have higher ratios of network members who did not drink alcohol ($r = 0.40$, $p < 0.05$) or were in recovery from alcohol use ($r = 0.55$, $p < 0.05$); these relationships were not significant for other drugs.

Relationships between time spent, level of identification and importance, and AOD use across groups

Participants were likely to spend more time with groups in their networks that they labeled as more important or with whom they identified more (Table 3). Youth were more likely to spend more time with groups that had greater proportions of non-alcohol users and non-drug use members (Figure 3), although these relationships were stronger for RHS than for non-RHS students. Because some of the groups listed are part of a formal structure in which time spent with others in that setting is determined by the setting—for example, school—this relationship is confounded. Indeed, seven youth who attended RHS distinguished between "close friends" and "school friends" on their SIM-AR, with higher levels of identification for their close friends ($M = 6.71$, SD = 0.76) than their RHS friends ($M = 3.86$, SD = 1.35), yet reported similar levels of time spent (20 versus 21 days together). There is a similar pattern for the three youths who did not attend RHSs but distinguished between "close friends" and "school friends" on their SIM-AR.

Participant reflections on relationships, group characteristics, and recovery journey

Participants reported different reflections when viewing their completed map and were able to see the barriers and supports spread across their networks. Recovery barriers involved time spent with substance-using members of their social networks, as well as interpersonal conflict. Recovery supports included persons identified as supporting their recovery efforts (close friends, family members, staff at recovery programs) and time spent with network members who were in recovery or not using substances.

Recovery barriers

Conflict

Most participants indicated some level of interpersonal conflict in their networks. Overall, youth tended to accept that in relationships with others, there is likely to be some disagreement leading to conflict. Youth who reflected on this often distinguished between the conflict they had with family and that with their friends. Family conflict was common and fell into two major categories: (1) general (unspecified) family conflict; and (2) conflict due to parent disagreement with youth actions or choice of friends related to substance use. For example, P103, who had a higher level of conflict than the sample average reflected, "My family has a hard

time with recovery, especially me being in recovery. They don't really understand it to the full extent. So, like, they kind of look at everything and everyone as being bad." From his perspective, this misunderstanding led to conflict between him and his family, who did not want him to spend time with friends who were in recovery and by whom he felt supported. P140 similarly reflected that his family and "drug friends" did not get along because his family sees them as "unproductive". P123, who had high amounts of conflict across his network, commented that he still had some conflict with his family because of his struggles related to engaging in treatment.

Conflict with friends ranged from small disagreements around what movie to watch to fighting or "beef" between groups (P105; P145). This included conflict between drug-using and non-drug using friends (P140), drama at school due to cliques (P127), and conflict on social media (P123). Many participants also discussed having taken steps to reduce conflict or wanting to take steps to reduce that conflict in the future. For example, P121, who had reported little conflict, was getting ready to graduate from an RHS and attend college in the future. She linked the reduced conflict in her life to changes she made in her social network to remove relationships with friends using substances.

Substance use among network members

Youth with high proportions of alcohol and substance-using members in their social networks often concluded that these persons constituted a potential barrier to their recovery, but also that those persons were friends they cared about or were loyal to. For example, P127 commented that her recovery process "would probably be a lot more linear if there weren't so many reds [heavy use]" on her SIM-AR. Yet, she reflected, "The group that uses more happens to be the group that I like more and that I hang out with more. But not because they use more. That just happens to be." Similarly, P113 recorded a lot of casual alcohol use across her network, and even within her family: "I feel like I knew it, but, like, seeing it… there's such easy access to me continuing to use." Others who noticed a lot of alcohol and drug use in their network pointed out specific groups that were a potential barrier to their recovery. For example, P123 reflected that his work in the hospitality industry was "dangerous" for his recovery because "substance use is really normalized." Yet, some youth with high amounts of substance-using network members had larger networks that also had some non-substance-using group members who supported their recovery: "I may have some bad apples, but… the good support that I have completely outweighs the bad support… I have a good support group, is what I learned."

Alternatively, youths with fewer substance-using members often reflected positively on this aspect of their lives and referenced the changes they had made to stop seeing those friends and develop new relationships. P103 reflected on these social changes: "And, like, my drug addicts… I had to cut a lot of people out, because I can't keep asking you to get help if you don't want help… I don't have that many problems with anyone anymore." P142 also considered previous relationships that were no longer part of her life: "I was friends with people who would put me in pretty bad situations and stuff… they probably would have been a person on this thing and they are red on red [heavy alcohol, heavy drug use]… I'm happy that I stopped hanging out with them."

Recovery supports

Relationships with group members who did not use substances or were in recovery themselves were noted as recovery supports. Having family members engaged in the recovery process was another important source of recovery support. Youths with high proportions of recovering members and high proportions of non-substance-using members discussed these relationships in similar ways. P144 suggested that her relationships were a result of learning "how to kind of like choose the right people to be close friends with," a sentiment echoed by P121, who felt that she had undergone radical social group change during her recovery journey. P121 indicated that her newer college friends were positive supports for her in that they had similar values, and not just related to substance use: "They all care about learning a lot and high-achieving. They hold themselves to high standards." Similarly, P123 indicated that his close relationships supported him in that they genuinely cared about his best interests, "whatever that is to me, not what they think my best interest is." P103 reflected that his recovery friends were easier to connect with because they had shared experiences, but also that his church friends were safer for him in that they were likely not going to offer him substances. In sum, participants emphasized the many different ways recovering and non-using members of their social groups brought support to their lives.

Discussion

To gain a better understanding of the addiction recovery process and provide timely support for adolescents, a comprehensive and nuanced picture of social networks and how these social elements can hinder or facilitate the recovery process to build recovery capital is needed (Buckheit et al., 2018; Meisel et al., 2023). Adolescents in this study reported a variety of social network influences. These were characterized as potential barriers to their recovery (having group members who actively used substances or were associated with high conflict), or potential supports to their recovery (having groups or group members who were themselves in recovery or were not actively using substances).

The quantitative findings from the SIM-AR indicate that youth who reported more groups in their network were more likely to report higher network conflict (Table 2), which could interfere with their recovery process. Not surprisingly, youth reported spending more time with groups that they rated as more important and with whom they more strongly identified. Yet, youth also reported spending

more time with groups that had higher ratios of members that did not use alcohol or drugs, a factor supporting their recovery process (Table 3 and Figure 2). These findings were more marked for youth attending RHS, highlighting the importance of having youth-specific recovery support services that are easily accessible to youth seeking recovery. Indeed, given that time spent with substance-using peers is a strong predictor of return to use (Eddie & Kelly, 2017), every effort should be made to link and engage youth with recovery services in their communities immediately following treatment.

In line with the social identity model of recovery (Best et al., 2016), many youths in this study noted that they changed during their recovery, and they reflected that their social networks had changed to incorporate more non-using and recovery-oriented groups and members. As would be expected from this age group, the changes they described were primarily in external sources of support in terms of friends, peers, and recovery support groups. Because many were students in an RHS, the RCAM would suggest that this was a source of community recovery capital. That is, the RHS provided an adolescent-specific community-based setting focused on recovery support, which in turn fostered these social recovery capital changes (Hennessy et al., 2018). However, other aspects of the broader cultural context around substance use and the settings in which youth engaged in substance use were not examined in this study and should be considered in future work that integrates individual experiences and an understanding of their daily environments (O'Gorman, 2016).

Many youths also noted reductions in conflict as a highlight of their recovery journey, specifically regarding their family during their treatment and recovery experiences. Yet, several youths also mentioned family as a potential barrier to their recovery process, a finding that lends support for the integration of interventions that either incorporate the family in youth recovery or, alternatively, to emancipate youth from high-risk situations (Nash et al., 2019; Tanner-Smith et al., 2013; Winters et al., 2014). Given the different roles that friends, family members, and others play in a youth's recovery journey, future work should attend to the relative weight each of these groups play in influencing recovery trajectories as this study indicates they offer different sources of support and stressors.

As adolescents and emerging adults, participants in this study were also likely still in a transitional phase of social identity and network development (Kay & Monaghan, 2018). Indeed, these participants were undergoing life transitions, for example, as many were coming to the end of high school and planning for what would come next. As a result, many participants envisioned changes to their network in the near future and even welcomed some changes, such as developing new relationships through new experiences in college or the workforce.

Overall, the social identity mapping approach was well-received by the participants. The reflection interviews conducted after the mapping provided further nuances to the map data and will help to contribute to the evolution of this innovative method. Findings from these mixed methods provide preliminary areas for future research to explore with a larger sample. That is, in addition to the presence of alcohol and other substance use among group members as reflected on the SIM-ARs, greater conflict was present in larger networks and was also discussed by youth as being an important area of stress or change for them. Conflict between family and friends, and how it is managed, is a key area for researchers to address when examining youth recovery and their social interactions, as it may play a role in decisions to return to use. Also, although all youth noted their recovery-oriented groups were supportive, some felt their non-recovery friends and even substance-using friends supported their recovery process. Future social network research with recovering youth should address not only the substance-use aspects of network members, but other elements related to relationship quality, belonging, stress, and conflict.

Limitations

Because the current sample drew a majority of youth from RHS, results likely represent youth with more severe AOD use, or those with enough resources to attend treatment and recovery support services (Hennessy & Finch, 2019; Tanner-Smith et al., 2018). This study was not planned or powered to examine differences between RHS and non-RHS students, and thus comparisons between the groups are exploratory and included as an area for future research to examine. Because RHS often facilitate linkage to additional recovery supports, it is possible that these participants had more recovery groups in their networks compared to youth who only attended treatment; thus, the findings may not generalize to other recovering youth. Additionally, we did not ask questions about one's own substance use behaviors (e.g., drugs of choice) and as a result, do not have data collected on specific drug combinations or where substance use was occurring, factors that can be important to understanding the social context of specific drug use habits and recovery (O'Gorman, 2016; Pennay & Measham, 2016). The majority of the sample were male (71%) and Non-Hispanic White (64%), and although we aimed to recruit youth ages 12–19, the recruited sample was on average older (i.e., 16 years), so the findings may not generalize across youth. Future studies would profit from larger, more diverse samples. Finally, as this study was approved as a cross-sectional and single-visit study to reduce participant burden, we did not engage in member-checking with adolescent participants after the study team had completed their interpretations of the data (Lincoln & Guba, 1985). Future work should incorporate this important qualitative design element to increase the trustworthiness of the findings.

This study also supports the idea that the SIM-AR could be used as the basis for a component of an intervention program. After developing their SIM-ARs, the participating youth arrived at conclusions about the supportive and non-supportive social influences in their social networks. These conclusions can form the basis for discussions about behavior change needed to achieve goals such as recovery. Because many youth may process information visually

(Gerrard et al., 2008), the SIM-AR may be particularly useful in facilitating youth insights in to the factors that may be important in reaching recovery goals.

Conclusions

This study demonstrates that youth in the recovery process have complex social networks to navigate and that their social groups likely change throughout their treatment and aftercare experience. Future research with recovering adolescents should examine the supports and barriers from different kinds of relationships and different aspects of those relationships, as well as how these social aspects change over time. This work should include the primary barrier of AOD use among group members but also examine key factors related to relapse, such as interpersonal conflict. The SIM-AR is a unique interview method of collecting data from participants who may struggle with completing traditional self-report survey measures. Interview data suggest that the resulting visual map provided by the SIM may be a tool for critical reflection on the recovery process. Consequently, future research also should explore the potential of a facilitated SIM tool as an intervention method for those in recovery.

Notes

1. Note, we use the term *social networks* throughout the manuscript to broadly refer to the composition of social groups among recovering youth in this study and not to indicate we are conducting the traditional quantitative form of "social network analysis".
2. Originally, the study planned to use group study visits, but procedures for most participants moved online and/or to a one-on-one format to accommodate the COVID pandemic. Remote study visits were conducted over Zoom and recorded.
3. Because these groups were large social groups with no finite bounds (i.e., "recovering people") and not necessarily connected directly to youths' immediate social networks, participants could not identify how many people were group members or the level of substance use among these groups. These groups were excluded from the summary statistics of group size and AOD use ratios.

Acknowledgments

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

Disclosure statement

No potential conflict of interest was reported by the author(s).

Funding

Research reported in this publication was supported by the National Institute On Alcohol Abuse And Alcoholism of the National Institutes of Health under Award Number K01AA028536 to Emily A. Hennessy.

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