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Place-Based Social Network Quality and Correlates of Substance Use Among Urban Adolescents

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Adolescent substance use is a developmentally contingent social practice that is constituted within the routine social-environment of adolescents' lives, yet little research has examined the association between place-based social networks and substance use among adolescents. Substance use is sustained by complex transactional and reciprocal social-environmental forces that shape peer group selection and influence health behaviors. Influencing these forces is the fluid nature of peer contexts, which are continually shaped by adolescents' developmental stages and needs. The composition of adolescents' social networks is also influenced by important gender and age-based developmental tasks such as emotional regulation and peer socialization, which impact health behaviors (Bandura, 2005; Masten, et al., 1995; Zahn-Waxler, Crick, Shirlcliff & Woods, 2006). While research has demonstrated that adolescents develop social strategies through their social networks to regulate emotions (Berkman & Glass, 2000), a broader approach considers the role of place in producing environmental strategies to regulate emotions and promote identity development (Korpela, Kytta, & Hartig, 2002). Selected locations represent critical environments for adolescent social development, such as identity formation, by selecting and shaping appropriate outer contexts or settings to moderate internal states (Clark & Uzzell, 2006; Korpela, 2002; Silbereisen, Eyferth & Rudinger, 1986; Mason & Korpela, 2008). More specifically, the chosen locations can address developmental needs through processes of control, creativity, mastery, privacy, security, personal displays, and serenity (Korpela, Kytta, & Hartig, 2002; Low & Altman, 1992). These healthful outcomes are linked to appropriate self and emotional regulation, which in turn serve as protective factors against mental health problems (Cole, Michel, O'Donnell Teti, 1994; Eisenber, Smith, Sadovsky, & Spinrad, 2004; Gross & Munoz, 1995; Kring & Werner, 2004) and against substance use (Hull & Slone, 2004; Sayette, 2004). Unfortunately, social and contextual factors are often unexamined in typical adolescent research predicting substance use involvement (Krank, Wall, Stewart, Wiers, & Goldman, 2005; Weirs, et al., 2007).

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Grounding Social Networks in Place

Social network research on adolescent substance abuse has been largely approached through single settings to acquire full network data, such as within school systems. These studies have contributed to our understanding of network structure and size and the association with substance use, yet this approach limits the capability to capture the unique spatial variations that make up adolescents' activity space (routine locations). We propose a contextually specific research approach to ground social networks within the social-environment of adolescents' lives, their routine locations. Toward this end we are utilizing egocentric social network analysis through an "event-based" approach (Sampson, Morenoff, & Gannon-Rowley, 2002). Event-based research, used in criminology, examines the context where the index event occurs (substance use, peer interaction, etc.), rather than a generic spatial measure, such as a home residence of an individual victim or perpetrator. The event-based approach grounds the social networks to specific locations that are linked to a unique composition of individuals who are engaged in protective or risk exacerbating behaviors. Egocentric social network analysis fits well within a place-based network approach and has shown to be a reliable indicator of youth social network characteristics at the aggregate level (number of friends, test-retest reliability (Cronbach's .90) and behavioral level (drug use, sexual partners) test-retest reliability (Cronbach's .89 and .86 respectively) (Clair, Schensul, Raju, Stanek, & Pino, 2003).

The present research assumes that adolescents' social networks are not static across peer composition or across locations. That is, adolescents' social networks have different qualities (levels of risk) based upon the varied composition of a network and the level of risk at a particular location. The physical and social characteristics of adolescents' routine locations, whether measured by perceptions or independent measures, are known to interact with substance use and mental health (Ellaway, Macintyre, & Kearns, 2002; Fagg, Curtis, Clark, Congdon, & Stansfeld, 2008; Golledge & Stimson, 1997; Kawachi & Berkman, 2003; Lambert, et al., 2005; Latkin & Curry, 2003; Lynch & Cicchetti, 1998; Mason & Korpela, 2008). These findings suggest that different settings are important at different developmental periods for adolescents (Chipuer, Bramston, & Pretty 2003; Cicchetti & Blender, 2004; Clark & Uzzell, 2006). Place-based social network quality then, is dependent upon the alters who may or may not frequent a particular location, constituting an interaction between network composition and place. We propose that in order to understand the complexities of the relationship between social network quality and substance use, a place-based network approach is needed to address the psychosocial-environmental influences on health behaviors. Toward this end, we linked adolescent activity space data with social network quality data in order to produce estimates of substance use risk.

Social Networks and Substance Use

Research on social networks has suggested that peer context is a very robust predictor of adolescent substance use (Alexander, Piazza, Mekos, & Valente, 2001; Bauman & Ennett, 1994; Hawkins, Catalano, & Miller, 1992; Mason, 2009; Mayes & Suchman, 2006; Uberg, Degirmencioglu, & Pilgrim, 1997; Unger, & Chen, 1999; Valente, Unger, & Johnson, 2005). Earlier approaches toward understanding the processes of substance use uptake focused on two distinct mechanisms: (a) social influence, indicating that adolescents' substance use uptake occurs due to influence within the peer context, and (b), peer selection, where similar adolescents associate based on prior behaviors such as substance use (Hussong, 2002). However, recent research, has blurred the lines between these mechanisms with prospective studies providing support for both mechanisms (Cotterell, 2007; Curran, Stice, & Chassin, 1997; Kirke, 2006; Wills & Cleary, 1999). It now appears likely that social networks cannot be completely understood through an single linear, cause-effect model, but rather, like the interactive nature of social development, social networks have to be understood through bi-

directional influences on actors, the network quality, and the context in which the social development processes are experienced (Cotterell, 2007; Bronfenbrenner, 1979; Hussong, 2002; Kirke, 2006). In trying to disentangle the interpersonal dynamics of adolescent social networks and substance use, our research was framed by the following assumption: Adolescent risk behavior such as substance use, is a co-created act that cannot be fully understood outside the social contextual reality (social network quality and setting) that constitutes these actors, provides meaning, addresses developmental needs, and sustains the relationships. This approach acknowledges selection and influence as important psychological variables, yet incorporates a socially interactive contextual framework as well, one that fits with an ecological developmental model (Clark & Uzzell, 2006; Bronfenbrenner, 1979).

Specifying Social Network Characteristics

In critically examining the limitations of much of the current social network research, Berkman and Glass (2000) state that relative risk of morbidity or mortality are reduced about 20 percent when social networks are introduced into multivariate models because researchers are measuring the wrong characteristics of the networks. Studies have primarily focused on network size and social support, which may be less predictive of health behaviors. Instead, Berkman and Glass advocate for strengthening the explanatory analytical power by adding details regarding social engagement, level of influence, social support, and person to person contact. Berkman and Glass claim that these detailed mechanisms are likely to be most predictive of health promoting and compromising behaviors. Research that addresses these mechanisms of adolescents' social networks will also need to account for the influence of gender as an explanation for varying network qualities and substance use.

Substance Use, Gender & Social Networks

Studies have explained substance use uptake for females through disturbances in social relationships that may influence self-medication (Wills, Sandy & Yaeger, 2002; Windle, 1992; Zahn-Waxler, Crick, Shirliff & Woods, 2006). This line of research maintains that as females are more likely to derive psychologically relevant information about themselves and others through interpersonal relationships, they are more vulnerable when they encounter interpersonal distress and therefore often experience increased disturbance when their relational ties are threatened, particularly with friends (Cross & Madson, 1997; Geary, 1998; Leadbeater, Blatt, & Quinlan, 1995; Maccoby, 1990; Crick & Zahn-Waxler, 2003). These findings point to the appropriateness of social network research for understanding female adolescent substance use. Toward this end, as we apply an ecological model to peer relationships, the construct of activity space is particularly useful in addressing place-based social networks and health behaviors.

Activity Space of Adolescents

Activity space can be defined as all the locations that an individual has direct contact with as a result of his or her daily activities (Miller, 1991). More broadly, activity spaces are the manifestation of one's spatial life, serving as an index representing their routine locations and all the accompanying psychological, social, and health related experiences of these places (Golledge & Stimson, 1997; Sherman, Spencer, Preisser, Gesler, & Arcury, 2005). Related to the present study, research with urban youth informs us that the type of locations in which youth spend their time are varied and geographically dispersed, and are not delimited by traditional geographical boundaries such as census tracts, neighborhoods, block groups, or political wards (Mason & Korpela, 2008; Mason, Cheung, & Walker, 2004). It is due to this unique spatial behavior of urban youth that traditional geographic boundaries are not effective in capturing teens' spatial signatures and associated health outcomes, that activity space is a

more appropriate metric to address social-environmental processes that influence social network quality.

Based upon Berkman and Glass (2000) and Sampson et al., (2002) recommendations, we sought to add detail regarding network characteristics and to examine these networks through an event-based model to better estimate substance use by social network quality. Social network quality is anchored in specific locations identified by subjects' weekly routine locations, adding a unique place-based dimension to our study. Based on this approach, we hypothesized (a), that mental health disturbance (PTSD) and behavioral problems (School Problems) and place-based social network quality would be associated with substance use classification (use and non-use) and these associations would vary by gender and age, and (b), that protective place-based social networks would reduce the likelihood of substance use and that this protection would vary by gender and age. Specifically, we hypothesized that younger females (13-16) would experience more protective salience from their networks compared to older females and both younger and older males.

Methods

Participants

The sample comprised 301 adolescent primary care patients at a Philadelphia Department of Public Health, health care center. Table 1 presents demographic data for this sample. As indicated in the table, the sample was 87% African American and 13% self-identified as mixed or other race/ethnicity, with the majority (60%) female which corresponds with other primary care gender distributions (Mason, et al, 2004). The high African American rate is representative of the urban area served by the health care center. Nearly one third- 30% - of subjects were living below the poverty line and 14 percent were on public assistance. Substance use involvement was predetermined by the study design to have one-half of the sample be non-substance users (n=151) and the other half be substance users (n=150). Of the users, 16.3% qualified as at-risk for either substance abuse or dependency. Participants were eligible for the study if they met the requirements of age (13-20 years), Philadelphia residence, free from major mental health disturbance (active psychosis would exclude a patient from completing the interviews), literate or fluent in English, and for minor patients be accompanied with parents or legal guardians capable of providing informed consent.

Procedure

Parents or guardians of all adolescent patients were approached in the clinic waiting area, the study was explained, and eligibility screening questions were asked. Families who met eligibility requirements were recruited to participate in the study. Adolescents over 18 were approached directly while they waited for their appointments. Written informed consent was obtained from all parents and/or adolescent participants. Gift card incentives for \$25.00 were used to acknowledge participants' time and effort and the study's consent rate was 90%. Measures were administered in private (i.e., in a separate room from parents to protect patient confidentiality and obtain more valid data) and the procedure generally lasted 45 minutes or less. The first author's university and the city of Philadelphia Health Department's institutional review boards approved the research protocol and the study received a federal certificate of confidentiality.

Measures

All assessments were conducted by graduate student interviewers who completed a training protocol that included role-play training and ongoing weekly supervision to ensure the collection of high-quality data. Individual background characteristics such as age, sex, race/ethnicity, and social economic status of all participants were assessed.

Substance Involvement Measure—Substance involvement was measured with the Adolescent Alcohol and Drug Involvement Scale (AADIS) (Moberg, 2005). The AADIS is a brief measure of the level of alcohol and drug involvement in adolescents for use as a research tool and is highly accurate in differentiating between those who do not have any substance use disorders and those that have at least one (Winters, 2001). The AADIS has favorable internal consistency reliability (Cronbach's alpha .94) and correlates highly with self-report measures of substance use ($r = .72$) and with clinical assessments ($r = .75$), and with subjects' perceptions of the severity of their own drug use problem ($r = .79$).

Social Network Measure—Social network data was gathered using the Adolescent Social Network Assessment (ASNA) (Mason, Cheung, & Walker, 2004). The ASNA captures information on each person's close personal contacts, their strong ties which constitute their social networks. Adolescents are asked to name the people with whom they have contact at *least once per month* and with whom they have a "meaningful relationship." Respondents provide information about each alters' substance use, influence on behavior, and types of activities. Subjects are asked whether they know if each alter uses substances, if the alter is a daily user, and whether the subject has been directly or indirectly influenced to use or not to use substances by each alter. This item has been shown in past research to be an important influence on behavior (Valente, et al., 1997). Subjects are also asked about positive activities such as receiving help with school or transportation, as well as negative activities such as engaging in illegal or dangerous behaviors. These procedures follow those widely used and accepted in the social network field (Burt, 1984, 1992; Brewer, 2000; Cotterell, 2007; Liebow, et al, 1995; Marsden, 1990; Valente, 2003; Vehovar, et al., 2008). The ASNA has favorable internal consistency reliability (Cronbach's alpha .84) and correlates significantly in the expected direction with self-report measures of substance use ($r = -.66$).

Responses are given weighted values of 1-6 forming a possible range of -14 to 14, with higher scores indicating more protection and lower scores indicating more risk. Weights were based upon previous research that has shown, for example, that risk for substance use increases with one substance user in a network, and risk for mental health problems is elevated with one daily substance user in a network (e.g., 3 fold increase) (Mason, 2009; Mason, et al., 2004). Given these data, we developed the following weighted scoring procedures: Risk quality: substance user = -1, daily user = -3, negative activity = -4, influence to use = -6 and Protective Quality: non-substance user = 4, absence of negative activities = 4, influence not to use = 6.

Activity Space Measure—Activity space data were captured from the Ecological Interview (Mason, Cheung, & Walker, 2004) which produces a location-specific listing of the teen's weekly routine locations, as well as participant evaluations of these various locations. The Ecological Interview is a structured interview that uses a method known as "Free Listing" where participants are asked to list and describe all the elements that are part of a particular domain of interest, in this case weekly locations (Weller & Romney, 1988) and "Recall Method" (Verma & Saraswathi, 1992) where respondents report on their activities in sequential order for a given reference period, in this case one week. The Ecological Interview produces accurate and valid geographic data with previous studies successfully identifying and geocoding 90% of the collected geographic data (Mason, et al., 2004). Teens are asked to identify specific geographical information of their locations in a priority order such as (a) complete addresses if known, if not then (b) cross streets, and lastly, (c) names of known landmarks such as parks, subway stations, and the like that are close to the participants' activity space location. Participants are asked which place from their list of locations is the (a) *safest* (safe from harm, danger, or the likelihood of engaging in risky, illegal, or dangerous activities), (b) *riskiest* (most likely to engage in risky or dangerous activities, cause trouble, or do illegal activities), and (d) *favorite* (most valued, important, meaningful place). Finally, participants are asked which social network alter they interact with at each (safe, risky, and favorite)

location. By connecting alters to activity space, we linked social network data to environmental data. Knowing the risk and protective behaviors of each alter, and knowing where these alters interact with the participant, allows for a specific place-based social network quality value to be derived.

Table 2 shows the steps in creating the Place-based Social Network Quality scores and how the ASNA and the Ecological Interview data are linked and specifies the scoring formulas for the ASNA.

Analytic Plan

We initially conducted a series of preliminary analyses to examine sample demographics by gender and descriptive statistics for our key variables. To aid with interpretation of values for our key variables, we created a “% at-risk” variable. The “% at-risk” variable used pre-established clinical cut-points for the PTSD, School Problems, and Substance Use Involvement measures, where scores at or above the established cut-point were coded as 1= at-risk for development of the disorder and 0= not at-risk. The Social Network Quality variables were coded as 1= at-risk (0 to -70) and 0= protective (1-70). In order to control for adolescent-family relations influencing substance use and social network quality, we examined the Adolescent-Parental Relations scale within the BASC measure. We found no significant correlations among these variables ($p > .05$) and therefore removed the adolescent-parental relations variable from our analysis. To test our first hypothesis, that PTSD, School Problems and Social Network variables would be associated with substance use and those associations would be moderated by age and gender, we conducted a series of bivariate Mann-Whitney U tests. The Mann-Whitney test was used due to the non-normal distribution of the predictor variables. In this analysis, all predictor variables were used in their original, continuous form. Age groups were established based on the sample mean of 17, with the younger group being aged 13-16 and the older group 17-20. The dichotomized dependent variable substance use classification (non-substance user =0 and substance user =1) followed our original exploratory research design and sampling framework of examining the influence of individual, place-based social network, and geographic variables on substance use classification. We examined all substance use by gender, age, and Network Quality as well as by type of substance. Specifically, we examined alcohol and marijuana separately as these were the most commonly used substances. We found no significant differences between type of substances and gender, age, or Network Quality, and therefore we only examined substance use as general variable, inclusive of both alcohol and other drug use. We tested our second hypothesis, that protective-place based social networks would reduce the likelihood of substance use and the associations would vary by gender and age, using four multivariate logistic regression analyses (one each for young females, older females, younger males and older males) to estimate the likelihood of substance use classification based on our predictor variables. In these regression analyses, School Problems and Network Quality variables, were also used in their continuous forms.

Results

Table 3 presents descriptive data, % at-risk, means, standard deviations, and the minimum and maximum values by gender, for each of the study variables. As anticipated, females reported elevated levels of PTSD symptoms, while males reported more School Problems and substance abuse or dependency. Males also had more at-risk social networks across all locations (home, important, safe, risky, and favorite places) compared to females. Chi-square analyses showed males were significantly more at-risk for substance abuse or dependency, and at Important, Safe, and Favorite places.

Table 4 shows the results of four Mann-Whitney *U* tests by gender, age group, substance use classification, mental health, and social network quality that tested the first hypothesis.

Significant differences were found between non-substance users and substance users' behavioral problems, with young male users having significantly more School Problems than non-users. Regarding place-based Social Network Quality, non-using young females had significantly more protective networks at four out of five places analyzed compared to substance using young females. In contrast, non-using older females who had more protective Networks only at their Risky place compared to substance using older females. Non-substance using younger and older males had more protective networks at their Risky and Favorite places compared to substance users.

Results from the four multivariate logistic regression analyses testing our second hypothesis are presented in Table 5 as Odds Ratios (OR) and 95% Confidence Intervals (CI). The results indicate that younger females with protective social networks at their risky and favorite places are less likely to use substances compared to females with less-protective networks at these locations (OR=0.94, CI=0.89-0.99, $p<.05$). In contrast, younger males did not appear to reap any protective effects from their social networks. Both older females (OR=0.96, CI=0.93-0.99, $p<.005$) and older males (OR=0.86, CI=0.74-0.99, $p<.05$) reduced their likelihood of substance use if they had protective networks at their risky places compared to those with non-protective networks at these locations.

Discussion

In the present study we analyzed whether the likelihood of urban adolescents' substance use involvement was dependent on place-based social networks (based upon their routine locations) and whether that was moderated by gender and age. Results indicated that differences existed primarily in Risky and Favorite place locations although this varied by age and gender. These findings provide support for place-based social network approach as a useful methodology in determining adolescent substance use by gender and age. More broadly, this research supports our basic premise that adolescents' social networks have differing levels of protection that are dependent upon composition of the network, which is constituted by these unique locations (activity spaces). These findings also suggest that contextual features of social networks matter for youth development and point to significant interactions among place, network composition, gender, and age.

The analysis that show young females' social networks are protective is an important finding and underscores the need to further investigate the social processes of substance use and non-use for early adolescent females. Related socially-based research has demonstrated that substance use for females can be attributed to their relational disturbance sensitivity in which they cope with social stress through substance use (Cross & Madson, 1997; Geary, 1998; Leadbeater, Blatt, & Quinlan, 1995; Maccoby, 1990; Crick & Zahn-Waxler, 2003). Our findings are consistent with this socially-based literature. We speculate that females with protective social networks, are less likely to experience relational disturbance (e.g., they would engage in less negative and more positive activities, less influence to use substances, and less daily users), and thus their networks would provide protection against substance use. This appears plausible, but more detailed and longitudinal research is needed to further address this issue. However, given the risk of early substance use on later substance dependence (Kosterman, Hawkins, Guo, Catalano, & Abbott (2000) and psychiatric disorders (Brook, Brook, Zhang, Cohen, & Whiteman, (2002) these data are important in strategizing ways to address substance use with young females. Recent gender focused research has shown that females' involvement with substances increases at a faster rate than males during early adolescence (Andrews & Tildesley, 2003) with some studies showing that by middle school females' use of cigarettes, alcohol, and marijuana exceeds that of males (Andrews, 2005), highlighting the need to understand the timing and course of this disorder for young females and to test developmentally and gender appropriate preventive interventions.

The findings that young males' social networks offer no protection against substance use is informative and could be interpreted in two ways. First, it could be attributed a less relationally sensitive mechanism for substance use uptake among young males. That is, younger males' decisions about using substances are less dependent upon the social network quality compared to younger females. A second interpretation is that the substance using younger males are experiencing more School Problems (attitudes toward school, teachers, and sensation seeking), as is evident in Table 4, and that these educationally based experiences in schools have more salience on their substance use than their peer networks (Mayes & Suchman, 2006). More research on the interactive qualities of networks, activity spaces and substance use with young adolescents is needed.

The finding that older males are less likely to use substances with protective social networks at their riskiest location is revealing. In contrast to younger males, older males experience the most protective effects from their networks at their risky locations, indicating that social networks could be influential in their substance use. Thus every incremental increase in their risky place network score, produces a 14% decrease in the odds of their using substances. While older male adolescents are at greatest risk for substance abuse and dependency, they also stand to benefit the most from protective networks at their riskiest locations.

Several limitations should be considered when interpreting the findings from this study. First, the cross-sectional nature of our design limits our understanding of the causal processes behind many of the associations revealed in this research. In particular, when examining adolescent substance use and social networks, being able to examine the duration of these findings across developmental periods would be very beneficial. Second, our assessment, while extensive in many regards, did not capture family history of substance use or parenting practices which could have added another important dimension to these data. We were limited to one scale within a measure that focused on parent-teen relations from the adolescents' perspective, and as noted, we found no relationship with this variable and our predictor and dependent variables. Third, our sample was drawn from a low-resource, urban primary care setting and may not generalize beyond this type of population.

Despite these limitations, the results provide new insights into a unique methodology that contextualizes adolescent social networks and substance use and provides a framework for investigating the social lives of adolescents in a specific and meaningful manner. Place-based network research may provide a useful ecological approach toward addressing adolescent substance use and can provide guidance for network interventions. Our attempt to specify social networks' influence on substance use through the formulation of a place-based measurement procedure, that is grounded in adolescent activity space and peer behaviors, is unique and provides a contribution to the study of the social-ecological lives of adolescents.

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Table 1
Participant Characteristics (N = 301)

	Count	%	Mean	(SD)
Age			17	(2)
13-16	136	45		
17-20	165	55		
Gender				
Male	118	39		
Female	183	61		
Race				
African American	262	87		
Mixed Race	24	8		
Other	15	5		
Resident Neighborhood Characteristics				
Below Poverty Line		30%		
Receiving Public Assistance		14%		
Substance Use Involvement				
No Substance Use	151	50		
Substance Use	150	50		
At-Risk for Abuse/Dependency	24	16.3		

Table 2
Steps in Creating Place-Based Social Network Quality Scores

1. Adolescent Social Network Assessment	
a. Generate list of each adolescents' close personal contacts, their strong ties which constitute their social networks (up to five network members)	
b. Collect behavioral information on each person in their social network	
c. Create a social network quality score for each person based upon:	
<u>Risk Values</u>	<u>Protective Values</u>
• Substance user = -1	Non-user = 4
• Daily user = -3	No risk activities =4
• Risky Activities = -4	Influence not to use =6
• Influence to use = -6	
<u>Total network quality scores range -14 to 14</u>	
2. Ecological Interview	
a. Free listing of routine locations	
b. Subjective ratings of places as: Important, Safe, Risky, or Favorite	
c. Linking Social Network members to places:	
• "Who in your network typically is with you at your Important, Safe, Risky, Favorite, and Home place?"	
3. Place-Based Social Network Quality	
a. Each subject has a social network quality score calculated on the members' risk and protective values who are typically at each identified place with the subject	
b. Total Place-based network scores range from -70 to 70 (5*-14, 5*14)	

Table 3

Sample Descriptive Statistics by Gender (n =301)

	Female				Male			
	% At-Risk	Mean	(SD)	Min-Max	% At-Risk	Mean	(SD)	Min-Max
PTSD	52.5	1.5	(1.4)	0-4	47.5	1.4	(1.4)	0-4
School Problems	8.0	49.0	(8.2)	31-77	12.0	51.3	(8.1)	31-75
Substance Abuse/Dependency	11.0	16.6	(17.4)	0-63	24.6**	21.5	(19.2)	0-67
Home Place Network	47.5	10.5	(17.6)	-23-70	55.1	9.4	(16.9)	-29-70
Important Place Network	22.4	10.5	(17.8)	-28-70	34.7**	9.9	(19.6)	-70-70
Safe Place Network	19.7	16.0	(18.9)	-23-70	28.0*	11.8	(18.4)	-56-62
Risky Place Network	20.2	14.0	(19.0)	-28-70	22.9	10.4	(20.2)	-70-70
Favorite Place Network	20.8	13.7	(18.2)	-27-70	29.7*	14.7	(21.5)	-32-70

 χ^2 :

*

p≤0.05

**

p<0.005

Table 4
Bivariate Analyses of the Association of Mental Health Disturbance and Place based Social Network Quality to Substance Use by Gender and Age (n=301)

	Female				Male			
	13-16 (n=78)		17-20 (n=105)		13-16 (n=58)		17-20 (n=60)	
	Non Users (n=57)	Users (n=21)	Non Users (n=44)	Users (n=61)	Non Users (n=38)	Users (n=20)	Non Users (n=12)	Users (n=48)
PTSD	37.0 <i>U</i> = 460	46.1 <i>U</i> = 1255	51.0 <i>U</i> = 1255	54.4 <i>U</i> = 1255	26.9 <i>U</i> = 281	34.4 <i>U</i> = 273	29.2 <i>U</i> = 273	30.8 <i>U</i> = 273
School Problems	37.3 <i>U</i> = 494	43.4 <i>U</i> = 633	37.1 <i>U</i> = 633	38.5 <i>U</i> = 633	25.6 <i>U</i> = 233*	35.7 <i>U</i> = 233*	25.1 <i>U</i> = 139	24.3 <i>U</i> = 139
Home Place Network	41.9 <i>U</i> = 461	32.9 <i>U</i> = 1152	57.3 <i>U</i> = 1152	49.8 <i>U</i> = 1152	30.6 <i>U</i> = 338	27.4 <i>U</i> = 338	33.3 <i>U</i> = 254	29.7 <i>U</i> = 254
Important Place Network	42.8 <i>U</i> = 406*	30.3 <i>U</i> = 1015*	60.48 <i>U</i> = 1015*	47.6 <i>U</i> = 1015*	32.3 <i>U</i> = 273	24.1 <i>U</i> = 273	38.4 <i>U</i> = 192	28.5 <i>U</i> = 192
Safe Place Network	44.0 <i>U</i> = 338**	27.1 <i>U</i> = 1068	59.2 <i>U</i> = 1068	48.5 <i>U</i> = 1068	29.5 <i>U</i> = 378	29.4 <i>U</i> = 378	36.9 <i>U</i> = 210	28.8 <i>U</i> = 210
Risky Place Network	44.3 <i>U</i> = 320**	26.2 <i>U</i> = 915**	62.7 <i>U</i> = 915**	46.0 <i>U</i> = 915**	32.9 <i>U</i> = 249*	22.9 <i>U</i> = 249*	45.1 <i>U</i> = 112***	26.8 <i>U</i> = 112***
Favorite Place Network	44.6 <i>U</i> = 304***	25.5 <i>U</i> = 1068	59.2 <i>U</i> = 1068	48.5 <i>U</i> = 1068	32.6 <i>U</i> = 260*	23.5 <i>U</i> = 260*	39.6 <i>U</i> = 178*	28.2 <i>U</i> = 178*

Mann-Whitney *U* analyses: Mean ranks and *U* values

*
p<.05

**
p<.005

p<.001

Table 5
Odds Ratios (ORs) and Confidence Intervals (95% CI) from Multivariate Logistic Regression Analyses Testing for Association Between Mental Health Disturbance, Behavioral Problems, and Place-based Social Network Quality and Substance Use by Gender and Age (n=301)

	Female		Male	
	13-16 (n=78) OR, (95% CI)	17-20 (n=105) OR, (95% CI)	13-16 (n=58) OR, (95% CI)	17-20 (n=60) OR, (95% CI)
PTSD	1.37 (0.85-2.21)	1.27 (0.89-1.82)	1.25 (0.74-2.10)	1.06 (0.48-2.33)
School Problems	0.98 (0.92-1.04)	1.01 (0.95-1.08)	1.06 (0.98-1.14)	1.04 (0.90-1.20)
Home Network Quality	0.94 (0.87-1.02)	1.02 (0.97-1.06)	0.98 (0.935)	1.08 (0.96-1.20)
Important Network Quality	0.97 (0.90-1.04)	0.94 (0.89-1.00)	0.96 (0.92-1.01)	0.98 (0.90-1.06)
Safe Network Quality	0.99 (0.93-1.04)	1.02 (0.96-1.09)	1.02 (0.92-1.01)	1.02 (0.91-1.14)
Risk Network Quality	0.94 [*] (0.89-0.99)	0.96 ^{**} (0.93-0.99)	0.99 (0.95-1.03)	0.86 [*] (0.74-0.99)
Favorite Network Quality	0.94 [*] (0.89-0.99)	1.00 (0.96-1.05)	0.98 (0.94-1.02)	0.95 (0.85-1.07)

*
p<.05

**
P<.005