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EMPIRICAL RESEARCH

The Native American Adolescent: Social Network Structure and Perceptions of Alcohol Induced Social Problems

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Abstract Race/ethnicity and the structure of an adolescent's social network are both important factors in the etiology of delinquent behavior. Yet, much of the minority-group delinquency literature overlooks the Native American youth population that traditionally exhibits high rates of alcohol use and abuse. Utilizing data from the National Longitudinal Study of Adolescent Health, we compare the structural characteristics of school-based friendship networks of American Indian youth and other racial/ethnic groups. Our core sample for the descriptive analysis consists of 70,841 youth (Caucasian = 42,096; Black = 13,554; Asian = 4,758; Hispanic = 4,464; American Indian = 3,426; Other = 2,543; Female = 50 %). We find that Native American youth generally occupy similar social positions within school hierarchies compared to other minority groups. However, American Indian youth have fewer ties at the school level than Caucasian youth, including reports of fewer reciprocated friendships, a smaller number of in-school friends, and membership in less cohesive personal networks. We also focus on the detrimental social and physical consequences of alcohol use during adolescence and offer an extended consequences model (n = 5,841) that includes the interactive effects of race/ethnicity, age, and drinking influences on relationships with friends (Caucasian = 59 %; Black = 19 %; Asian = 7 %; Hispanic = 7 %; American Indian = 5 %; Other = 3 %; Female = 54 %). American Indian youth are no more likely than other youth to report personal drinking as being detrimental to social relationships with parents, peers, and romantic partners. We address ties between our findings and criminal justice policies and practices, as well as the implications for similar network analyses involving other racial/ethnic groups.

Keywords Peer networks · American Indians · Delinquency · Alcohol

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Introduction: American Indian Youth and Alcohol Use

Nearly all young people at some point in their lives exhibit vulnerabilities and resiliencies to proximal and distal forces that threaten to move them into or promise to take them away from a delinquency trajectory. This observation has been borne out by generations of researchers who have studied why some children become delinquent and others do not (Akers and Sellers 2013; Mays and Winfree 2012; Winfree and Abadinsky 2010). As part of this body of work, researchers have invested much effort into looking at phenomena related to how and why certain groups have penetrated deeper into the criminal justice system than others. Another element in this investigation involves differentiating between those behaviors that are limited to adolescence and those that will continue into adulthood and thus will have a more significant impact on a youths' life across the life span (Moffitt 1993). In contemporary American society, individuals from some racial/ethnic groups are more likely than others to engage in self-reported delinquency, to become part of the official

statistics of crime and delinquency by negative contacts with the police, to go through juvenile (and adult) court for processing, and to end up in juvenile and eventually adult correctional facilities (Coalition for Juvenile Justice 2010). Race/ethnicity and crime are inextricably linked and questions remain as to why this continues to be the case.

The focus in much of the minority group-delinquency literature is on African American and Hispanic adolescents to the exclusion of other groups. If those same researchers wanted to understand in more detail the complex operation of an equally wide range of putative delinquency causal forces on contemporary youth, they need look no further than the 1.7 % of the U.S. population that call themselves Native Americans (Norris et al. 2011: 1, 2). Although they are often ignored within the context of the delinquency literature, this specific population has traditionally exhibited many social problems, including high rates of delinquency, victimization, drug use, and, of particular concern to this work, extremely high rates of alcohol use and abuse among adolescents. The nature and extent of the social problems faced by this small and vulnerable population warrant greater attention from the research community.

Alcohol consumption by Native American youth populations has been a consistent focus of research for decades (see Beauvais 1998 for review). The drinking patterns of Native American youth are well documented, indicating these youth are more likely to have consumed alcohol compared to White youth (Bachman et al. 1991; Friese et al. 2011; Spear et al. 2005) and have high rates of heavy episodic or binge drinking (Caetano et al. 1998), all of which lead to serious physical ailments such as liver disease and death by suicide or homicide (Beauvais 1998; Oetting and Beauvais 1989). The consistency of these findings has led social scientists to conclude that there is a "relatively complete picture of drinking among Indian youth since 1975" (Beauvais 1998: 254; see also Hawkins et al. 2004).

Although much is known about the alcohol consumption patterns of Native American youth, there is almost no information on the structure and nature of one of the strongest and most consistent predictors of alcohol use and abuse during adolescence: the adolescent friendship network. This missing element is in part due to the use of specialized data sets consisting of very small-scale studies of individual reservations, which tend to create overly homogeneous reservation-school samples, making any comparisons with other groups impossible (Pridemore 2004, 2005; Szlemko et al. 2006; see too Fisher et al. 1998; Frank and Lester 2002; Grossman et al. 1991). A few extant studies allow for cross-ethnic group comparisons between American Indians and other youth at the community (Yabiku et al. 2007) and state-level (Heavy-Runner-Rioux and Hollist 2010; Morris and Wood 2010). Even larger, nationally representative data sets, such as Monitoring the Future project or Tri-Ethnic Center for Prevention Research at Colorado State University, do not adequately capture the social world of the Native American adolescent. The rare studies that focus on race/ethnicity, friendship, and which have access to detailed social network data often relegate American Indian youth to the category of "other" (e.g. Quillian and Campbell 2003).

This is not to say that examinations of homophily, peer groups, minority group members, and friendship segregation do not exist. In particular, as Moody (2001; see too Moody and White 2003) indicates, extant studies of integrated schools suggest the mechanism of homophily increases student re-segregation in terms of friendship networks. "[W]hen people have the opportunity to choose relations within their own race, they will" (Moody 2001: 680). Even integrated schools tend to be segregated by racial groups internally, much in the same way as residents of prisons and other social institutions serving diverse populations re-segregate, even in the face of organizational opposition. And perhaps most interestingly, Moody (2001: 680) observes that race becomes most salient for friendship based on homophily when heterogeneity is "in the middle ranges, such that minorities could potentially threaten the dominant position of the majority." However, for the Moody analysis, which found that simple exposure to persons of other races does not reduce segregation, but that status equality and other interdependent actions do promote friendship integration, the variable of race and ethnicity clustered Native American youth in the "other" category. Generally, the social context of friends and friendship has yet to be integrated adequately into discussions of Native American youth and the range of social ills that disproportionately impact them.

Social network data and methods have significantly impacted the study of risky health behaviors during adolescence including alcohol consumption (see Valente 2010). Yet, there remains a need for a comprehensive description of the social structure that Native American youth and their friends create within U.S. schools. This is surprising given the importance of peers in the etiology of drinking during adolescence and the continued calls to understand ethnic and racial differences in the adolescent social world, which continue to be "grossly understudied" (Brechwald and Prinstein 2011: 175). Accurately quantifying the adolescent social world is important to our understanding of Native American youth problems since, with few exceptions, they represent a very small proportion of students within schools; this social and cultural isolation all but force them to make higher numbers of cross-racial/ethnic friendships (see Joyner and Kao 2000; Goodreau et al. 2009). Thus, our first goal is to provide a comprehensive description of the structural characteristics of

Native American youths' friendship networks and compare and contrast these with those of other racial/ethnic groups.

In a related vein, it is also important to gain a better understanding of Native American youths' perceptions of the detrimental impact their drinking behaviors may have on social relationships with parents, friends, and romantic partners. The more tangible economic, legal, and physical impacts of alcohol consumption stemming from drunk driving, car accidents, emergency room visits, violence, and subsequent alcohol abuse in adulthood are generally well understood for all youth populations (see DeWit et al. 2000; Farrow and Brissing 1990; Grant and Dawson 1997; Hingson et al. 2002; Lang et al. 1997; Meropol et al. 1995). However, as Native American youth engage in higher rates of heavy and binge type drinking, they may also be damaging important protective relationships with friends and family. Therefore, our second goal is to investigate Native American youth perceptions of how their drinking behavior leads to difficulties with friends, parents, and romantic partners. We also model how these perceptions are related to engaging in fighting, regretable sexual encounters, difficulties at school, and hang over symptoms.

These goals move our work beyond previous research on Native American youth and adolescent drinking behavior in two crucial respects. First, we quantify the adolescent social world of Native American youth and examine how it relates to or differs from the social networks of other racial/ethnic groups using nationally representative social network data. The data utilized in this study allow us to move beyond the focus of previous research on homogeneous populations and expands our knowledge to include American Indian youth in other environments beyond the reservation. This approach should provide a more accurate empirical representation of school-based friendship networks and also provide researchers theoretical language currently missing in explanations of Native American adolescents and their alcohol consumption. Second, we explicitly recognize that drinking behaviors of Native American youth can have a detrimental impact on social relationships. Doing so allows us to model their perceptions of the harmful effects of alcohol on potential protective factors such as family relationships. Combined, our analyses provide further insight into the social world in which American Indian youth function and whether these youth perceive alcohol consumption as damaging to relational ties.

Adolescent Social Networks

Adolescent peers have long been tied to various adolescent behaviors, including delinquency. The general consensus is in order to understand delinquency, we must consider the role of peers, as the relationship between peer delinquency and individual delinquency represents one of the strongest and most consistent finding in the literature (Elliott et al. 1985; Elliott and Menard 1996; Rees and Pogarsky 2011; Short 1957). The social network perspective as applied to the study of adolescent delinquency assumes that there is a systemic structure to relationships within these systems, and that individual actions are shaped by this structure (see Wasserman and Faust 1994). Network analysis is a structural approach to understanding the system of relationships between entities and how this structure can influence or guide behavior (Young and Rees 2013). Social network theory broadly assumes that resources such as information, goods, and support are passed along these connections (Kadushin 2012). People can be highly connected, occupy positions of prestige, or act as brokers of information between groups. Strongly connected network members are reachable in the sense that they can easily and readily access information from distant parts of a network. Conversely, some people are only loosely tied to others with few or no connections to larger social structures. Generally, these connections represent opportunities and constraints on behavior while also providing a measure of social capital (Lin 2002).

The core constructs of social network analysis are evident in some of the most influential theories of crime and delinquency such as the learning of crime through social interactions (Akers 2009; Sutherland 1947) and the importance of social ties within neighborhoods (Shaw and McKay 1942). Network data is rich in social detail, which allows researchers to measure structural characteristics of the group (e.g., size and cohesion), to investigate personal characteristics of group members (e.g., popularity and centrality), and to rule out selection effects (see Haynie 2001; Haynie and Osgood 2005). Methodologically, the study of the role of peers in the etiology of delinquency has been reinvigorated by the empirical precision that relational data and social network analysis brings to the study of human relationships (Young and Rees 2013).

An adolescent's delinquency is influenced by his or her friendship network, but this influence depends on the density or cohesion of the network (Haynie 2001). Network data also captures different types of adolescent friendships based dimensions of relationship quality. A singular best friend can be influential net of the rest of the friendship group (Hussong 2002; Jaccard et al. 2005; Weerman and Smeenk 2005), but this influence diminishes as group size increases (Rees and Pogarsky 2011). Less proximate peers also can be influential. Payne and Cornwell (2007) found that friends of friends can impact an adolescent's delinquency, indicative of a diffusion process of delinquent information being passed along relational ties. The behavioral repertoires of friends in an adolescent's social networks differ (Haynie 2002; Weerman and Smeenk

2005); indeed, reports of delinquency have not been found to be a consistent significant predictor of friendship selection (see Baerveldt et al. 2003, 2008; Weerman 2011). That is, adolescent friendship networks are a mix of delinquents and non-delinquents who are not only behaviorally different from each other, but are also potentially different from the focal adolescent. Generally, the majority of peer network research indicates a more complicated relationship regarding the influence of peers than previously thought.

Alcohol use is one element of delinquency that seems particularly influential during the adolescence years and thus largely impacted by the influence of peers (Ennett et al. 2006; Kobus and Henry 2010). Kreager et al. (2011) have found that the characteristics of traditional delinquent social networks differ from those of drinking groups, with drinking groups having "a higher status and [being] more internally cohesive than nondrinking groups" and delinquent groups being "smaller, less connected, more tenuous, and [having] lower status" (p. 96, 112). Greater status and prestige has also been found to increase alcohol use (Ennett et al. 2006). Hahm et al. (2012) reported that although prestige did not represent an immediate factor for binge drinking, that over time, the influence of this variable increased. Binge drinkers evidenced the opposite relationship between integration and associating (Hahm et al. 2012), as those with lower levels of integration and those whose peers were involved in binge drinking were more likely to also binge drink, but these tendencies decreased over time. Social network characteristics that influence alcohol use include embeddedness, with those that are less integrated into social networks more likely to use alcohol, as well as those that have more friends including best friends that use reporting higher rates of alcohol use (Ennett et al. 2006). Reciprocated friendships also increase the magnitude of influence of peers on personal drinking (Fujimoto and Valente 2012), indicating that a mutual understanding of the presence of the relationship has implications for peer influence.

The peer network literature has largely concentrated on the influence of social groups on delinquency, often to the exclusion of the characteristics of the groups themselves. Other peer network researchers have concentrated less on delinquency, but have also found some differences in social networks based on race or ethnicity. Among this latter group of researchers, Goza and Ryabov (2009) reported that having more integrated peer networks was "negatively related to high school graduation for Asians, Latinos, and non-Hispanic whites, and to GPA for Asians and Latinos, as only African American achievement increased in more racially/ethnically heterogeneous peer networks" (p. 1264). In their study of homeless youths' peer networks, Wenzel et al. (2012) also found that social network characteristics differed by race/ethnicity with "networks of Black youth included significantly more relatives and students who attend school regularly, whereas the networks of White youth were more likely to include homeless persons, relatives who drink to intoxication, and peers who drink to intoxication" (p. 885). A cursory examination of the literature could lead one to conclude that African Americans and Hispanics are *the* most overrepresented groups in terms of crime and victimization. However, when one pushes beyond the surface, the inaccuracy of such a conclusion becomes clear (Coleman 2013).

The Social Network Structure of Native American Youth

In terms of the adolescent social network literature, American Indian youth have largely been excluded and, thus, a paucity of information exists regarding the characteristics of their peer groups and theorizing how these might influence their behavior. However, the existing peer network literature might provide some insights. In their research on delinquency and gangs, a number of researchers (Anderson 1994, 1999; Vigil 1988, 2002) proposed that individuals from historically disadvantaged groups would be more greatly influenced by their peers as a way of gaining status. This would be particularly relevant for Native Americans considering their long history of discrimination and the resulting social consequences (Herman-Stahl et al. 2003; Morris et al. 2002; Pridemore 2004; Smokowski et al. 2009).

Research into Native American adolescence-based troublesome behavior has advanced appreciably over the course of the past 20 years. Public policy analysts have encouraged social scientists to examine the influence of a wide range of networks within the youth's sphere of influence, including peers, parents, and others (Jackson and Hodge 2010; Smokowski et al. 2009; Szlemko et al. 2006; Yabiku et al. 2007). In spite of these relatively recent theory-based studies of Native American delinquency, gaps in the literature abound (Herman-Stahl et al. 2003; Jackson and Hodge 2010; Pridemore 2005).

American Indians—often called First Peoples, Native Americans, or, depending on their location, Alaska Natives—constitutes a group that is often overlooked. This population subgroup is very small, roughly 2.9 million individuals in 2010, making up less than 1 % of the nation's population; another 2.3 million claim some Native heritage, increasing their total percentage of the national population to 1.7 % (Norris et al. 2011: 1, 2). Native Americans in the United States come from over 560 federally recognized tribal entities. Providing representative samples of such a small, but diverse population has proven difficult. Instead, most researchers of Native issues have resorted to state- or even city-level analyses, and, in most

cases, reservation studies (cf. Fisher et al. 1998; Mmari et al. 2010; Morris and Wood 2010; Morris et al. 2006, 2007; Winfree et al. 1981; Yabiku et al. 2007). Making generalizations about them is difficult if not incautious on the part of those doing the generalizing (Pavkov et al. 2010; Pridemore 2004, 2005; Szlemko et al. 2006).

Being few in number does not detract from the importance of the distinctive issues facing the Native American population. The level of economic deprivations under which a large segment of the aggregate American Indian population lives is extreme by any standard, with over 27 % living in poverty, a figure that is larger than for any other identified racial/ethnic group (McCartney et al. 2013). Equally troubling are the community-level indicators associated with this vulnerable subpopulation, such as their alarming physical and mental health indicators. These factors include high rates of alcohol and drug use, and the related rates of Fetal Alcohol Syndrome (Chavez et al. 1989; Herman-Stahl et al. 2003; Szlemko et al. 2006; Yabiku et al. 2007); suicide (Dorgan 2010; Potthoff et al. 1998); low educational attainment, particularly dropout and low college-degree award rates (Faircloth and Tippeconnic 2010); and disproportionate contacts across all parts of the criminal justice process (Pavkov et al. 2010).

Native Peoples in the United States, Canada and throughout the Americas have arguably been oppressed peoples since the earliest days of colonialism to the present. As a consequence, they have had to deal with unique cultural and physical challenges, including the dispossession of traditional lands, practices, and languages, and, in some cases, attempts at genocide (Herman-Stahl et al. 2003; Morris et al. 2002; Pridemore 2004; Smokowski et al. 2009; Szlemko et al. 2006). In short, if criminologists were to describe an adolescent group most likely to experience a wide range of social problems in contemporary society, that group would look a lot like American Indian youth.

The Current Study

Several practical limitations, then, are identifiable in the extant literature on social networks, delinquency, and Native American youth, ones that the present study must address. First, as previously noted, most of the published research tends to be based on rather small sample sizes, few of which are generalizable beyond the immediate study. Second, researchers rarely consider time as a variable; that is, most studies of Native American youth are cross-sectional in nature, severely restricting the researchers' ability to parse out the sequencing of events in the lives of the youths being studied. Third, where putative peer, parental or significant other relationships and networks exist, any meaningful exploration of their impact on youth, whether in a cross-sectional or longitudinal sense, is restricted by the available data, largely owing to the inability to connect the subjects in any meaningful way to their networks. To our knowledge, no study has provided a systematic empirical examination of the school based social world of American Indian youth.

There are exceptions to each of these limitations. For example, Kirchner and Higgins (2013) examine racial disparities using data from the National Longitudinal Survey of Youth, while Eitle et al. (2013) employed several waves of the National Study of Adolescent Health (Add Health) to study the efficacy of General Strain Theory as an explanation of substance use among American Indians. Haynie and Payne (2006) also used the Add Health study to explore the connections between friendship networks and differential rates of violence for White, Black, Hispanic, and Asian youth. To our knowledge, however, no one to date has overcome all three of the aforementioned limitations in a single study comparing Native American children to children in other racial and ethnic groups.

The current study, then, by employing two waves of the Add Health study, seeks to overcome these limitations as we address the following two research questions. First, to what extent are American Indian adolescent social networks different from those found among other racial/ethnic youth from similar school environments? Second, to what extent can we learn about how Native American youth perceive their own drinking levels as being detrimental in terms of social relationships (e.g., family, friends, and dating) and physical (e.g., fighting, vomiting, and sexual encounters) outcomes and how these perceptions compare to non-Indian youth?

Before seeking answers to these questions, we should issue a *caveat* of sorts. We recognize the wide cultural variability present within the tribal groups found in the United States. What is true for one tribe or even clan within a tribe may not be true for another such group, even between ones that share many of the same cultural practices (e.g., the Pueblos peoples of New Mexico, the Navajo Nation of New Mexico, Arizona, Colorado and Utah, the various Apache tribes across the Southwestern United States, the Coastal Indians of the Northwest region of North America, or the Plains Indian tribes of the North Central U.S. States and provinces of Canada). What we address in this article is the "Indian experience" in its broadest sense. That is, do those persons who see themselves as Native American express attitudes and orientations or engage in behavior that is fundamentally different from youth of other races or ethnicities? In essence, we are looking at whether being American Indian in contemporary society carries with it social costs (and benefits) that are not found within youth from other racial/ethnic groups. We

recognize that there are no universally accepted or accurate labels for the Indigenous Peoples of North America. Although individual tribal names are preferred, we have chosen to use the term American Indian or Native American to represent the collective population that is present within this study.

Method

Data

The National Longitudinal Study of Adolescent Health is a school-based, multi-wave panel study of how individual, family, peer, and school factors contribute to adolescent health, development, and transitions into adulthood. The initial sampling frame for the Add Health study was created in 1994–1995 from a list of 26,666 U.S. high schools maintained by Quality Education Data Inc. (QED) in Denver, Colorado. A stratified sample of 80 high schools was selected from this frame with a probability of selection proportional to school size. The sample includes public, private, and religious schools from rural, suburban, and urban areas, representing a 79 % response rate from the targeted schools. School populations ranged in size from less than 100 to greater than 3,000 students.

The first survey was conducted within schools and included questionnaires related to personal and family demographics, school achievement, risky health behaviors, mental health, and physical health. A total of 90,118 students were surveyed during this wave. An important aspect of the in-school Add Health survey is the comprehensive network component, which allows for the measurement of peer delinquency without assumed similarity bias. During the in-school interviews, respondents identified up to five best female friends and five best male friends from a name roster of all students enrolled in their schools. Each of the nominated friends (in attendance) provided answers to the in-school survey questions. These friendship ties sent and received by the survey respondents enable us to capture network characteristics and group-level behavioral measures related to risky health and delinquent activities.

Descriptive Analysis

A total of 84 % (n = 75,871) of the original 90,118 respondents in-school respondents met several Add Health criteria for inclusion in the network data. Respondents must have valid probability weights, come from a school with a survey response rate of greater than 50 %, and nominated friends who also participated in the survey. Our core sample for the descriptive analysis consists of 70,841 youth (Caucasian = 42,096; Black = 13,554; Asian = 4,758; Hispanic = 4,464; American Indian = 3,426; Other = 2,543). These adolescents provided valid responses when asked about their race/ethnicity on the in-school questionnaire. But, we note that the total sample size fluctuates in some cases due to missing data patterns in the focal network variables; this is noted in Table 1.

Table 1 Network descriptives

Variable	N	Mean	SD	Min	Max
Individual level connectedness					
Popularity (in-degree)	64,913	4.22	3.61	0	36
Out-degree	64,913	4.24	3.02	0	10
Reciprocated friendships	53,695	0.4	0.31	0	1
Out of school nominations	64,913	1.41	2.13	0	10
Send density	53,795	0.40	0.20	0.09	1
Power centrality	64,913	0.78	0.64	0	4.96
School level connectedness					
Influence domain	64,913	626.05	455.99	0	1.706
Proximity prestige	58,446	0.14	0.06	0	0.77
Closeness centrality	64,913	629.64	514.1	0	1.793
Closeness centrality 3	64,913	58.98	50.68	0	320
Average geodesic distance	53,795	5.69	1.71	1	22.85
Best friendship					
Has a best male friend	64,913	0.54	0.5	0	1
Best male friend reciprocates friendship	28,515	0.52	0.5	0	1
Best male friend reciprocates BF	28,515	0.29	0.45	0	1
Has a best female friend	64,913	0.58	0.49	0	1
Best female friend reciprocates friendship	32,213	0.63	0.48	0	1
Best female friend reciprocates BF	32,213	0.35	0.48	0	1
Heterogeneity: age and race					
Age heterogeneity in send network	53,795	0.43	0.2	0	0.83
Proportion of ages represented in send network	53,795	0.34	0.13	0.10	1
Race heterogeneity in send network	53,781	0.25	0.23	0	0.80
Proportion of races represented in send network	53,781	0.38	0.17	0.20	1

Measures

The Add Health data contains a host of measures of egocentric network structure. We broadly categorize them as individual level network measures of connectedness such

as prestige, centrality, and cohesion; school level measures of connectedness; best friendships and their level of reciprocity; and heterogeneity as it applies to age and race/ethnicity.

Popularity Popularity or prominence (in-degree) is the number of friendship nominations a respondent receives. Individuals with high levels of popularity are placed in a position to potentially influence more people compared to those with low popularity.

Out-Degree Out-degree is the number of ties a respondent sends out to potential friends. That is, the number of people the adolescent nominates as a friend.

Power Centrality Power centrality is a method proposed by Bonacich (1987), which adjusts the centrality score of an adolescent based upon how central his or her friends are to him or her. Values larger than 0 reflect being linked to others who are more central; values closer to 0 reflect being tied to less central friends.

Influence Domain The influence domain of actors is measured by counting the number of adolescents who nominate (i.e. send a friendship tie) the respondent directly or indirectly through others.

Proximity Prestige Proximity prestige measures the prestige of an individual relative to the number of people who can reach that individual (Wasserman and Faust 1994: 203–205). Proximity prestige is at a maximum value if all other people in the school network nominate an adolescent directly as a friend.

Closeness Centrality Closeness centrality is a count of the number of other youth in the school an adolescent can reach in the entire school network either directly or indirectly; it starts from the focal adolescent and moves along the shortest path (i.e., geodesics). We also provide an alternative measure of closeness centrality, which is the maximum number of other adolescents a respondent can reach in three steps (e.g., a friend of a friend of a friend).

Average Geodesic Distance The average geodesic distance measures the average path (i.e., the shortest distance between two people) length between an adolescent and his or her complete set of reachable youth in the school.

Number of Respondent Nominated Friends Outside of School Out of school nominations is a count of the friendship nominations an adolescent makes to people who do not go to his or her school.

Respondent Nominated Best Friend A dichotomous measure of whether or not the respondent nominates a best friend in his or her school. Best is defined as a person occupying the position of first nominated friend on the friendship component of the survey. Values were set to missing if a respondent did not indicate having a best friend or if the nominated best friend did not fill out the survey.

Reciprocity of the Best Friend Nomination Best friend reciprocity is represented by two dichotomous measures. The first indicates whether or not the respondent nominated best friend reciprocates the best friend nomination at all. The second indicates if the nominated best friend reciprocates at the first position and therefore agrees with the "best" friend designation.

In Network Racial/Ethnic Heterogeneity The level of race/ethnic and age heterogeneity represented in respondents' friendship networks is measured in two ways. First, the proportion of races/ethnicities represented in the network is figured by dividing the total number of races/ethnicities represented in an adolescent's friendship network by the total number of race/ethnic categories represented in the adolescent's school. Second, a heterogeneity measure of race/ethnicity is calculated as

$$HETEROGENEITY_{iA} = 1 - \left[\sum_{1}^{n}\left(\frac{A_k}{en}\right)^2\right]$$

where A is a categorical attribute, A_k is the number of friends in the network with the trait k, en is the number of nodes in the respondents network with valid data on A, and n is the total number of traits of A represented in the respondent network. As values move toward zero, they represent a decline in heterogeneity such that a value of zero tells us that all members in the network share the same race/ethnicity (Bearman et al. 1997: 16). Similar measures were created using friends' age as the attribute of interest.

Longitudinal Analyses

Subsequent waves of data were collected via in-home surveys using automated computer-assisted interviewing (ASCI) technology. The 20,457 in-home respondents are a representative sample of the original 90,118 respondents in the in-school survey. In order to properly analyze the in-home sample, respondents must have a valid probability weight, which reduces the sample size to 14,396 prior to accounting for missing data on specific survey questions. The in-home surveys provide more in-depth data related to risky behaviors (e.g., alcohol use and criminal activity), decision-making, family and home structure, physical and health status, and personal attitudes and future aspirations.

In order to avoid problems due to missing data, such as biased estimates, distorted statistical power, and invalid conclusions (Acock 2005), we imputed data for all control variables with missing information. Up to 12 % of sample cases were missing data on any given control variable. Multiple imputation techniques in StataMP version 12 (StataCorp 2011) were used to produce parameter estimates and standard errors based on the combination of models from 20 imputed data sets. All independent and dependent variables, as well as auxiliary variables such as the Add Health survey design variables, were used in the imputation model (see Allison 2002; Enders 2010; Reiter et al. 2006; von Hippel 2007). These measures resulted in an imputed sample of 10,862 of which 5,841 identified themselves as having at minimum tried alcohol in the past 12 months. Our final sample consists of 5,841 (Caucasian = 3,458; Black = 1,082; Asian = 403; Hispanic = 401; American Indian = 316; Other = 181) students from 125 different schools.

Perceived Consequences of Alcohol Use The dependent variables capture eight social and physical consequences of alcohol use. At the Time 2 interview, respondents were asked about the physical consequences of alcohol use over the past 12 months including being: (1) hung over; and (2) sick to your stomach or threw up after drinking. Responses ranged from 0 (never) to 4 (5 or more times). Answers to these questions were summed and then dichotomized to reflect if either had happened at least once. Twenty-eight percent of respondents indicated having been hung over or vomited due to alcohol use in the past year. It is important to note here that representing the distributions of the dependent variables with dichotomies rather than ordinal or integer counts is well established in the Add Health literature (e.g., Hu et al. 2006; Maxwell 2002; Rees and Pogarsky 2011). In addition, dichotomies best represent the distributions of the outcomes as a whole, and this approach allows us to focus on the presence (unity) or absence (zero) of behavior, the most fundamental distinction in research on delinquency (see Osgood et al. 2002 for a more in-depth discussion of this issue).

Six dichotomous dependent variables were created to measure social consequences of alcohol use. Respondents were asked: Over the past 12 months, how many times has each of the following things happened? (1) You got into trouble with your parents because you had been drinking; (2) You had problems at school or with schoolwork because you had been drinking; (3) You had problems with your friends because you had been drinking; (4) You had problems with someone you were dating because you had been drinking; (5) Did you get into a sexual situation that you later regretted because you had been drinking; and (6) Did you get into a physical fight because you had been drinking? A total of 14 % reported parental troubles; 4 % school troubles; 10 % friend troubles; 14 % romance troubles; 13 % being in a regrettable sexual situation; and 9 % having been in a physical fight.

Respondent Alcohol Consumption Personal drinking is operationalized using respondent answers to how often in the past 12 months they drank beer, wine coolers, wine, or liquor, ranging from 0 ("never") to 6 ("nearly everyday").

Alcohol Consumption of Friends This variable is a count of drinking friends in an adolescent's friendship group. Specifically, we counted the number of each respondent's friends who reported having consumed alcohol at least once during the previous 12 months. This measure ranges from 0 to 10 and is comparable to those used in social psychological studies and consistent with prior studies of adolescent delinquency (see Haynie 2001).

Demographics The following demographic variables were measured: gender (1 = Male) that represents 46 % of our sample. Race/ethnicity reflects respondent reports of being Caucasian (59 %), Black (19 %), Asian (7 %), Hispanic (7 %), and American Indian (5 %). A final category of "Other" consists of respondents not in those previously mentioned (3 %). The average age of sample respondents at the Time 1 interview was 15.

Parental Attachment Parental attachment (Hirschi 1969) is constructed as the average of respondent responses (on a scale from 1 "not at all" to 5 "very much") to two questions measuring how much their mothers and fathers cared about them ("How much do you think he/she cares about you?").

Family Structure Family structure (Loeber and Stouthamer-Loeber 1986) is a dichotomous variable representing the presence of two parental figures in the home (biological mother/father or biological parent/stepparent) versus one parental figure in the home.

Parental Education This is a respondent-reported measure of whether the respondent's mother completed high school.

Public Assistance This measure represents the link between household socioeconomic status and deviance (Elliott et al. 1985) and reflects at least one form of household public assistance during the month preceding the Time 1 interview: social security or railroad retirement, supplemental security income (SSI), Aid to Families with Dependent Children (AFDC), food stamps, unemployment

or worker's compensation, or some form of housing subsidy.

School Attachment Respondent level of school attachment at time 1 is the average response to three questions on a five-point scale from 1 ("not at all") to 5 ("very much"): "I feel close to people at this school," "I feel like I am part of this school," and "I am happy to be at this school." Cronbach's reliability coefficient of these items is 0.79.

Grade Point Average GPA is the average of a respondent's self-reported English/Language Arts, Mathematics, Social Science/History, and Science grades from the most recent grading period at the Time 1 interview and ranges on a continuous and roughly normally distributed scale from 1 "D or lower" to 4 "A."

Friend Attachment Respondents were asked "How much do you feel your friends care about you?" with responses ranging from 1 "not at all" to 5 "very much".

Activities with Friends This variable is a variety score measure of the number of activities a respondent has done with each of his or her friends in the past 7 days. For each of the friends the respondent nominated, the respondent was asked a series of questions coded 0 ("no") or 1 ("yes") indicating if in the past 7 days he or she went to the friend's house, hung out after school, spent time together during the past weekend, talked about a problem, or talked on the phone.

Number of Respondent Nominated Friends This captures the size of the friendship network and represents the number of friends a respondent nominated as a friend.

Days Between Surveys The number of days between the initial in-school survey and the follow-up in-home survey varies across respondents. We control for this by taking the difference between the survey dates and converting the time metric to days.

Table 2 Variable descriptives

	N	Mean	SD	Min	Max
Dependent variables					
Parent trouble	5,841	0.14	0.35	0	1
School trouble	5,841	0.04	0.20	0	1
Friend trouble	5,841	0.10	0.30	0	1
Romance trouble	5,841	0.14	0.35	0	1
Sex trouble	5,841	0.13	0.33	0	1
Vomit/hang over trouble	5,841	0.30	0.46	0	1
Fight trouble	5,841	0.09	0.29	0	1
Independent variables					
White	5,841	0.59	0.49	0	1
African American	5,841	0.19	0.39	0	1
Asian	5,841	0.07	0.25	0	1
Native American	5,841	0.05	0.23	0	1
Hispanic	5,841	0.07	0.03	0	1
Other race	5,841	0.03	0.02	0	1
Friend attachment	5,841	4.30	0.74	1	5
Activities with friends	5,841	12.82	7.61	0	40
Male	5,841	0.46	0.50	0	1
GPA	5,841	2.71	0.78	1	4
Age	5,841	15.33	1.57	12	19
Number of drinking friends	5,841	3.39	2.22	0	10
Parental attachment	5,841	4.65	0.68	1	5
School Attachment	5,841	3.49	0.98	1	5
Network size	5,841	4.99	2.52	1	10
Parental education	5,841	0.86	0.35	0	1
Family structure	5,841	0.71	0.45	0	1
Public assistance	5,841	0.08	0.26	0	1
Lagged respondent drinking	5,841	2.11	1.34	1	6
Days between surveys	5,841	230.57	49.83	52	418

Results

We present the empirical findings in two parts. First, in order to describe the American Indian youths' networks and compare this structure to their other race/ethnic cohorts, we estimate survey-adjusted single factor AVOVA models of network structural variables to compare the equality of the network means across race/ethnicity. All of our analyses account for Add Health's stratified sampling design, which necessitates standard error adjustments to correct for correlated error structures resulting from students in one school network being more similar than students in a different school network and oversampling of racial, ethnic, disabled, and sibling students that result in a non-representative sample of American adolescents. This analytical approach relies on post-sampling weights and the hierarchical structure of the data to provide population estimates with unbiased standard errors. Second, to examine whether the effects of prior drinking involvement on social and physical consequences differ across race/ethnicity, we estimate survey-adjusted logit models. Tables 1 and 2 provide complete variable descriptive statistics for both analyses.

Network Descriptive Analysis

Table 3 provides adjusted means between American Indian youth and the other racial/ethnic categories for the network characteristics along with corresponding significance tests.

Table 3 Average levels of network structure and relationship measures by race/ethnicity

Network measure	White	African American	Asian	American Indian	Hispanic	Other
Individual level connectedness						
Popularity (in-degree)[a]	4.79***	3.76	3.74	3.92	3.66	3.77
Out-degree[a]	4.80***	3.64**	3.62**	4.20	3.68**	3.94
Reciprocated friendships[f]	0.43***	0.35	0.41*	0.37	0.38	0.37
Out of school nominations[a]	1.34	1.39	1.41	1.39	1.39	1.41
Send density[c]	0.41*	0.39	0.43***	0.40	0.42*	0.40
Power centrality[a]	0.84***	0.66**	0.70	0.74	0.71	0.72
School level connectedness						
Influence domain[a]	501.61**	402.33	546.51**	412.40	523.03†	440.03
Proximity Prestige[b]	0.17*	0.14†	0.13**	0.16	0.13*	0.14†
Closeness centrality[a]	509.40**	390.97	523.30†	422.18	510.45	433.26
Closeness centrality 3[a]	64.31***	44.76	40.96***	51.84	41.75**	50.40
Average geodesic distance[c]	5.16	5.30	6.03***	5.14	5.62*	5.31
Best friendship						
Has a best male friend[a]	0.60*	0.48**	0.46***	0.56	0.50*	0.53
Best male friend reciprocates friendship[d]	0.58***	0.41	0.54**	0.43	0.45	0.45
Best male friend reciprocates best friendship[d]	0.32***	0.22	0.29†	0.24	0.26	0.24
Has a best female friend[a]	0.64*	0.53**	0.48***	0.59	0.52***	0.52***
Best female friend reciprocates friendship[e]	0.66***	0.54	0.59	0.57	0.56	0.57
Best female friend reciprocates best friendship[e]	0.38***	0.29	0.33	0.30	0.29	0.31
Heterogeneity: age and race						
Send network age heterogeneity[c]	0.43†	0.46	0.41**	0.45	0.45	0.43*
Proportion of age represented send network[c]	0.36	0.38	0.31**	0.37	0.36	0.35
Send network race heterogeneity[c]	0.18***	0.24***	0.38	0.38	0.44***	0.43***
Proportion of races represented in send network[c]	0.36***	0.40***	0.45†	0.48	0.49	0.50†

[a] White (n = 39,019), African American (n = 12,154), Asian (n = 4,239), American Indian (n = 3,133), Hispanic (n = 4,021), Other (n = 2,347)

[b] White (n = 35,921), African American (n = 10,548), Asian (n = 3,693), American Indian (n = 2,780), Hispanic (n = 3,455) Other (n = 2,049)

[c] White (n = 33,969), African American (n = 9,023), Asian (n = 3,296), American Indian (n = 2,580), Hispanic (n = 3,053), Other (n = 1,874)

[d] White (n = 18,819), African American (n = 4,427), Asian (n = 1,526), American Indian (n = 1,281), Hispanic (n = 1,486), Other (n = 976)

[e] White (n = 20,820), African American (n = 5,422), Asian (n = 1,739), American Indian (n = 1,514), Hispanic (n = 1,689), Other (n = 1,020)

[f] White (n = 33,902), African American (n = 8,998), Asian (n = 3,295), American Indian (n = 2,578), Hispanic (n = 3,502), Other (n = 1,870)

† $p < .1$; * $p < .05$; ** $p < .01$; *** $p < .001$ (two-tailed tests)

Among the significant differences within the individual level connectedness category, we see that Caucasian youth are significantly more popular, receiving 4.79 friendship nominations compared to the 3.92 ties reported on average by American Indian youth ($t = 5.39$, $se = 0.16$). Caucasian youth also sent significantly more (4.80) friendship ties to other youth, compared to 4.20 by American Indian youth ($t = 4.22$, $se = 0.14$). However, American Indian youth sent significantly more ties to peers compared to African Americans (3.64, $t = -2.92$, $se = 0.19$), Asians (3.62, $t = -2.64$, $se = 0.21$), and Hispanics (3.68, $t = -2.69$, $se = 0.19$). Both Caucasian youth (43 %, $t = 6.78$, $se = 0.01$) and Asian youth (41 %, $t = 2.53$, $se = 0.02$) had significantly higher rates of friendship nominations reciprocated compared to American Indian youth (37 %). Compared to American Indian youth, a significantly greater proportion of all possible ties are present in Caucasian youths' networks (i.e., an adolescent's friends are also friends with each other), indicating a greater level of network cohesiveness (41 and 40 % respectively; $t = 2.56$, $se = 0.01$). The measure of power centrality indicates Caucasians are also more centrally located and tied to

central friends compared to American Indian youth (0.84 and 0.74, $t = 4.93$, $se = 0.02$). For their part, African American youth are less centrally located than American Indian youth (0.66, $t = -3.16$, $se = 0.03$). Asian youth also have a higher average network density (43 %, $t = 3.30$, $se = 0.01$), as do Hispanic youth (42 %, $t = 2.12$, $se = 0.01$). However, American Indian youth appear not to be significantly different than Asian, African American, and other race and ethnicities on the remaining measures of individual-level connectedness.

On average, American Indian youth also have significantly lower levels of school connectedness than Caucasians, along with consistently lower average levels than Asian students. Compared to Caucasians, American Indian youth have smaller influence domains ($t = 3.05$, $se = 44.15$), less proximity prestige ($t = 2.44$, $se = 0.01$), and can reach fewer people at a distance of three ($t = 5.75$, $se = 2.16$). Asian youth also have larger influence domains ($t = 2.74$, $se = 48.92$) and average geodesic distance ($t = 3.31$, $se = 0.26$), but lower levels of proximity prestige ($t = -3.04$, $se = 0.01$) and reachability at a distance of three ($t = -3.81$, $se = 2.85$). We also note that Hispanic youth have a significantly lower average level of proximity prestige ($t = -2.15$, $se = 0.01$) and reach ability at a distance of three ($t = -3.22$, $se = 3.13$) than American Indians, but a higher average geodesic distance ($t = 2.26$, $se = 0.22$). American Indian youth again appear to be roughly similar to Asian, African American, and other race and ethnicity youth on the remaining measures of school-level connectedness.

On average, American Indian youth indicate having a best male friend who attends their school (56 %) at lower levels than do Caucasian youth (60 %) ($t = 2.16$, $se = 0.02$). Among those American Indian youth who do indicate having a male best friend, these friendships are reciprocated at a lower rate compared to reciprocation levels of Caucasians both as a best friend (24 and 32 %; $t = 3.58$, $se = 0.02$) or as any sort of friend (43 and 58 %; $t = 5.31$, $se = 0.03$). Best friendships with females are generally similar, with American Indian youth when compared to Caucasians nominating fewer best female friendships (59 and 64 %, $t = 2.58$, $se = 0.02$) that have lower reciprocation rates at the best friend or other level (30 and 38 %, $t = 5.04$, $se = 0.01$; 57 and 66 %, $t = 5.04$, $se = 0.02$). However, American Indian youth do have higher levels of female best friend nominations compared to Asian (59 and 48 %, $t = -4.90$, $se = 0.02$), African American (53 %, $t = -2.78$, $se = 0.02$), Hispanic (52 %, $t = -4.13$, $se = 02$), and Other (52 %, $t = -3.28$, $se = 0.02$).

Lastly, American Indian youth display significantly higher levels of age heterogeneity within their networks when compared to Asian youth (heterogeneity measure, $t = -3.16$, $se = 0.01$; proportion measure, $t = -3.07$, $se = 0.02$). Furthermore, with the exception of Hispanic youth ($t = 4.65$; $se = 0.01$) and youth in the Other category ($t = 3.56$, $se = 0.01$), American Indian youth have higher average levels of in-network race/ethnicity heterogeneity compared to Caucasians (heterogeneity measure, $t = -12.33$, $se = 0.02$; proportion measure, $t = -20.15$, $se = 0.01$) and African American youth (heterogeneity measure, $t = -6.42$, $se = 0.02$; proportion measure, $t = -5.85$, $se = 0.01$).

Longitudinal Analyses

A series of logit models were fitted to the data (see Table 4) to test the research hypothesis regarding the relationship between the likelihood of difficulty with physical and/or social consequences related to drinking and the respondents' race/ethnicity adjusting for a host of control variables. In all analyses, American Indian youth serve as the reference category for the race/ethnicity variables. We first briefly summarize the findings related to our control variables.

In terms of race/ethnicity, we find very few initial differences in respondent reported social and physical trouble due to drinking. Compared to American Indian youth, African Americans have significantly lower odds ($e^{-0.779} = .46, p < .01$) of reporting their drinking behaviors as a cause of a regrettable sexual experience. However, the odds of Caucasian youth reporting drinking leading to being hung over and/or vomiting is 1.73 ($e^{0.549} = 1.73$, $p < .01$) times greater than the odds of American Indian youth. The total number of activities with friends significantly increases the odds of respondent reports of drinking leading to fighting, difficulties with friends, regrettable sexual encounters, difficulties in romantic relationships, hang over symptoms, and trouble with parents. The number of drinking friends in an adolescent's network, controlling for network size, also significantly increases the odds of respondent reports of drinking leading to all detrimental outcomes with the exception of school troubles. Higher levels of parental attachment significantly reduce the odds of reporting drinking as leading to school troubles, fighting, and difficulties in romantic relationships. However, attachment to peers had no significant impacts on any of the consequences. Increased network size reduces the odds of drinking leading to troubles with fighting, regrettable sexual encounters, hang over symptoms, and trouble with parents. Lastly, the level of respondent drinking increases the odds of having problems associated with drinking across all dependent variables.

Table 4 also indicates being male increases the odds of reporting personal drinking leading to physical fight by

Table 4 Logit regression analysis of social and physical consequences of alcohol consumption

Independent variables	(1) School trouble β/(s.e.)	(2) Fight trouble β/(s.e.)	(3) Friend trouble β/(s.e.)	(4) Sex trouble β/(s.e.)	(5) Romance trouble β/(s.e.)	(6) Hang over or vomit trouble β/(s.e.)	(7) Parent trouble β/(s.e.)
Caucasian	−0.125	−0.042	0.084	−0.281	−0.027	0.549**	0.225
	−0.320	−0.280	−0.270	−0.260	−0.230	−0.200	−0.230
African American	−0.449	−0.695	−0.330†	−0.779**	−0.322	−0.141	−0.376
	−0.410	−0.370	−0.350	−0.260	−0.270	−0.210	−0.290
Asian	−0.175	0.317	−0.110	−0.475	−0.616	0.348	−0.197
	−0.560	−0.440	−0.420	−0.480	−0.400	−0.300	−0.360
Hispanic	−0.307	−0.377	−0.169	−0.507	0.008	−0.091	−0.147
	−0.430	−0.400	−0.350	−0.410	−0.330	−0.250	−0.330
Other	0.142	−0.085	0.167	−0.205	0.250	0.060	0.173
	−0.470	−0.430	−0.350	−0.340	−0.450	−0.300	−0.390
Male	0.254	0.444**	−0.247†	−0.248*	−0.171	−0.138†	0.097
	−0.190	−0.150	−0.130	−0.100	−0.110	−0.080	−0.120
GPA	−0.131	−0.288**	−0.055	−0.007	−0.042	0.066	0.047
	−0.150	−0.100	−0.080	−0.070	−0.070	−0.060	−0.070
Age	0.020	−0.001	0.043	0.164***	0.219***	0.171***	0.041
	−0.060	−0.050	−0.040	−0.040	−0.04	−0.030	−0.040
Total activities with friends	0.014	0.040***	0.023**	0.029***	0.025**	0.035***	0.016*
	−0.010	−0.010	−0.010	−0.010	−0.010	−0.010	−0.010
Number of drinking friends	0.077	0.116*	0.133*	0.247***	0.130**	0.214***	0.236***
	−0.070	−0.050	−0.050	−0.060	−0.040	−0.040	−0.040
Friend attachment	−0.042	−0.038	−0.037	−0.054	−0.015	0.018	−0.098
	−0.140	−0.09	−0.090	−0.090	−0.060	−0.070	−0.070
Parental attachment	−0.327**	−0.279***	−0.098	−0.094	−0.277***	−0.048	0.049
	−0.100	−0.070	−0.070	−0.080	−0.070	−0.060	−0.080
School attachment	−0.094	0.010	−0.085	−0.058	0.031	−0.084*	−0.082
	−0.100	−0.070	−0.070	−0.060	−0.060	−0.040	−0.060
Network size	−0.024	−0.152**	−0.037	−0.166**	−0.034	−0.157***	−0.146***
	−0.070	−0.050	−0.050	−0.060	−0.030	−0.030	−0.040
Parental education	−0.277	−0.143	0.255	0.162	0.171	−0.103	−0.091
	−0.260	−0.180	−0.200	−0.220	−0.160	−0.130	−0.180
Two parents in home	0.149	−0.054	0.061	−0.322**	−0.068	−0.097	0.015
	−0.170	−0.130	−0.140	−0.110	−0.120	−0.100	−0.120
Public assistance	0.021	0.296	0.261	0.156	0.453†	−0.081	0.600**
	−0.410	−0.260	−0.280	−0.220	−0.240	−0.190	−0.210
Lagged respondent drinking	0.428***	0.411***	0.324***	0.357***	0.341***	0.350***	0.329***
	−0.060	−0.040	−0.040	−0.040	−0.030	−0.030	−0.040
Days between surveys	0.000	0.002	−0.001	0.001	0.002†	0.001	0.000
	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Constant	−2.246	−1.76†	−3.216**	−4.549***	−5.732***	−4.813***	−3.304***
	−1.400	−0.990	−0.980	−1.030	−0.870	−0.670	−0.870
Observations							
N	5,841	5,841	5,841	5,841	5,841	5,841	5,841

Reference category for race and ethnicity variables is "American Indian"

† $p < .1$; * $p < .05$; ** $p < .01$; *** $p < .001$ (two-tailed tests)

Table 5 Logit regression analysis of social and physical consequences of alcohol consumption race/ethnicity by gender interaction

Independent variables	1 School trouble β/(s.e.)	2 Fight trouble β/(s.e.)	3 Friend trouble β/(s.e.)	4 Sex trouble β/(s.e.)	5 Romance trouble β/(s.e.)	6 Hang over or vomit trouble β/(s.e.)	7 Parent trouble β/(s.e.)
Caucasian	0.039	−0.305	0.099	0.055	0.324	0.450†	−0.028
	0.565	0.351	0.396	0.313	0.329	0.270	0.280
African American	−0.969	−0.699	−0.310	−0.478	0.020	−0.328	−1.037**
	0.676	0.437	0.447	0.334	0.382	0.300	0.360
Asian	−0.167	−0.012	0.237	−0.027	−0.188	0.104	−0.634
	0.905	0.812	0.532	0.710	0.511	0.475	0.526
Hispanic	0.261	−0.374	0.441	0.153	0.679	−0.227	0.074
	0.742	0.599	0.453	0.440	0.646	0.425	0.487
Other	0.456	0.039	0.236	−0.111	0.600	0.074	−0.496
	0.646	0.474	0.463	0.530	0.415	0.345	0.432
Male	0.464	0.090	−0.152	0.367	0.475	−0.386	−0.509
	0.631	0.510	0.541	0.411	0.473	0.348	0.404
Caucasian by male	−0.270	0.473	−0.023	−0.658	−0.657	0.237	0.567
	0.682	0.484	0.576	0.421	0.499	0.363	0.408
African American by male	0.841	−0.034	−0.024	−0.572	−0.635	0.453	1.379**
	0.844	0.689	0.666	0.548	0.576	0.421	0.470
Asian by male	−0.026	0.574	−0.764	−0.879	−0.808	0.504	0.884
	1.094	0.902	0.820	0.845	0.657	0.584	0.730
Hispanic by male	−0.193†	0.523	−0.696	−0.703	−0.820	0.644	0.219
	1.107	0.793	0.766	0.678	0.882	0.654	0.764
Other by male	−1.822	−0.856	−1.049	−0.786	−1.191*	−0.330	0.737
	0.940	0.630	0.749	0.679	0.483	0.479	0.601
Constant	−2.342	−1.428	−3.278**	−4.990***	−6.280***	−4.839***	−2.958**
	1.568	1.024	1.083	1.075	0.922	0.742	0.931
Observations							
N	5,841	5,841	5,841	5,841	5,841	5,841	5,841

Reference category for race and ethnicity variables is "American Indian"; models control for gender, GPA, total activities with friends, number of drinking friends, friend attachment, parental attachment, school attachment, network size, parental education, two parents in home, public assistance, lagged respondent drinking, days between surveys

† $p < .1$; * $p < .05$; ** $p < .01$; *** $p < .001$ (two-tailed tests)

$e^{0.444} = 1.56, (p < .001)$ times compared to females. However, being male significantly decreases the odds of reporting regrettable sexual encounters ($e^{-0.248} = .78$, $p < .01$). Table 5 includes an interaction term to test if perceived physical or social troubles due to alcohol consumption differ by race/ethnicity as a function of gender. These results show that gender generally does not moderate perceived troubles across racial/ethnic groups except in the case of romantic troubles and parental troubles. African American males have increased odds of reporting parental troubles compared to Native American males ($e^{1.379} = 3.97$, $p < .001$). Males in the racial category of "other" have lower odds of reporting romantic troubles compared to Native American males ($e^{-1.191} = 0.30$, $p < .001$).

Lastly, results in Table 4 indicate increases in respondent age leads to significant increases in the odds of a regrettable sexual encounter due to drinking ($e^{0.164} = 1.18$, $p < .001$), difficulties in a romantic relationship ($e^{0.219} = 1.24$, $p < .001$), and symptoms of being hung over ($e^{0.171} = 1.18$, $p < .001$). Table 6 includes a race/ethnicity by respondent age interaction term. We are interested in comparing the effects of age across racial/ethnic categories. Age has been centered at 15 years old. We again see results consistent with those presented in Table 4 with the exception being respondent reports of parental trouble. Increases in the age of Hispanic youth lower the odds ($e^{-1.051} = 0.35$, $p < .001$) of reporting parental troubles due to alcohol consumption compared to Native American youth. There is evidence of a similar

Table 6 Logit regression analysis of social and physical consequences of alcohol consumption race/ethnicity by age interaction

Independent variables	1 School trouble β/(s.e.)	2 Fight trouble β/(s.e.)	3 Friend trouble β/(s.e.)	4 Sex trouble β/(s.e.)	5 Romance trouble β/(s.e.)	6 Hang over or vomit trouble β/(s.e.)	7 Parent trouble β/(s.e.)
Caucasian	−0.138	−0.040	0.090	−0.223	−0.054	0.555**	0.290
	0.319	0.299	0.284	0.280	0.250	0.207	0.246
African American	−0.597	−0.669†	−0.350	−0.738*	−0.249	−0.205	−0.479
	0.435	0.373	0.348	0.309	0.293	0.232	0.301
Asian	−0.087	0.407	−0.159	−0.278	−0.976†	0.441	−0.047
	0.559	0.450	0.496	0.487	0.495	0.320	0.373
Hispanic	0.128	−0.076	0.163	−0.172	0.245	0.070	−0.260
	0.464	0.437	0.372	0.369	0.439	0.306	0.411
Other	−0.350	−0.348	−0.160	−0.384	−0.053	−0.079	−0.084
	0.458	0.397	0.354	0.431	0.354	0.261	0.347
Age	−0.080	0.051	0.034	0.297†	0.183	0.161	0.235*
	0.207	0.205	0.157	0.156	0.155	0.126	0.114
Caucasian by age	0.113	−0.043	−0.003	−0.135	0.073	0.013	−0.210†
	0.225	0.211	0.160	0.165	0.160	0.130	0.122
African American by age	0.315	−0.111	0.059	−0.103	−0.095	0.126	0.053
	0.297	0.255	0.186	0.192	0.183	0.157	0.139
Asian by age	−0.224	−0.288	0.085	−0.357†	0.361	−0.142	−0.435*
	0.414	0.271	0.324	0.208	0.223	0.166	0.211
Hispanic by age	0.045	0.013	0.181	0.025	−0.155	0.006	−1.051***
	0.300	0.314	0.262	0.253	0.227	0.231	0.221
Other by age	−0.215	−0.221	−0.119	−0.329	0.139	−0.008	−0.245
	0.263	0.297	0.212	0.255	0.223	0.155	0.179
Constant	−1.964	−1.792**	−2.573***	−2.162**	−2.400***	−2.269***	−2.782***
	1.017	0.682	0.628	0.734	0.703	0.515	0.624
Observations							
N	5,841	5,841	5,841	5,841	5,841	5,841	5,841

Reference category for race and ethnicity variables is "American Indian"; models control for gender, GPA, total activities with friends, number of drinking friends, friend attachment, parental attachment, school attachment, network size, parental education, two parents in home, public assistance, lagged respondent drinking, days between surveys

† $p < .1$; * $p < .05$; ** $p < .01$; *** $p < .001$ (two-tailed tests)

effect for Asian youth ($e^{-0.435} = 0.65$, $p < .001$). However, note the baseline likelihood of a 15 year old Native American youth reporting parental trouble due to his or her own alcohol consumption is 6.2 % ($100 \times e^{-2.782} = 6.19$, $p < .001$).

Discussion

Peers clearly represent one of the most significant influences on an individual's delinquency level (Elliott et al. 1985; Elliott and Menard 1996; Rees and Pogarsky 2011; Short 1957). However, until recently with the use of social network analysis, we have not been able to understand fully many relevant social structural variables by which peers influence individuals' behavior. Additionally, although minority-group membership is often tied empirically to increased levels of deviance, minority group-inclusive analyses of social networks, especially ones including American Indians, are largely missing in the extant literature (Haynie and Payne 2006). Furthermore, participation in various delinquent and criminal activities by minority-group youth often results in a number of negative consequences, including at a minimum deeper penetration into the criminal justice system. This study addressed some of these shortcomings in the literature. In this regard, we sought to describe any significant differences between the characteristics of peer social networks for various racial/

ethnic groups, particularly how they compared and contrasted with those of American Indians, a group who has been largely ignored within the delinquency literature. Moreover, to understand more fully the consequences of delinquency, we specifically examined the negative consequences of drinking; an activity often participated in by adolescents and whether this varied by racial/ethnic group.

Overall, the results of this study indicate that the characteristics of American Indian peer social networks differ significantly when contrasted with the networks of White youth. Compared to Native American youth, school-based friendships of Whites are much more conducive to network flows of information, friendship support, and influence. White youth hold more socially prestigious positions within schools and are considered more often as friendship targets. The social networks of Caucasian youth and their friends consistently show higher levels of agreement on the gold standard of friendship, reciprocity (see Bagwell and Schmidt 2011). Compared to American Indian youth, White youth appear to have a greater understanding of who their friends are as indicated by higher levels of reciprocated friendship nominations. Hartup and Stevens (1997) refer to this as indicative of the deep structure or essence of friendship. This is contrasted with the surface structure of friendships or actual exchanges that take place between friends. The former type of mutual affection is an important developmental aspect of friendship during adolescence. Self-esteem, developmental transitions, social support, and a better understanding of self-concept can all stem from such higher quality and affectively deeper relationships (see Bagwell and Schmidt 2011). If peer influence is conceived of as a reciprocal and transactional process, Native American youth on average may be expected to receive less of these transactions given that their school-based friendship nominations are reciprocated at lower rates than other races/ethnicities.

Additionally, American Indian youth had significantly lower levels of school connectedness, smaller influence domains, less proximity prestige, and could reach fewer people at a reach of three than Whites. Generally, relationship dynamics influence the capacity of particular peers to influence an adolescent (Brown et al. 2008). Viewing drinking or other forms of delinquency from an opportunity perspective, Native American youth may not have many opportunities stemming from their school networks given the overall lack of connectedness within these institutions. From a learning perspective, Native American youth may be less influenced by socially distal or even proximal behavioral displays of drinking. The connection of drinking and popularity may not operate similarly when Native American youth are compared to their Caucasian counterparts. Our findings suggest that Native American youth would have less opportunity for reinforcement of drinking behaviors from their proximal friendship network or adolescents who are socially distal. On average, Native American youth are less connected within their schools, and this may well serve as a protective factor at least in the sense of school friendships advocating delinquent behavior. Their higher levels of social seclusion may shield them from the normative influence of alcohol use and abuse. In sum, popularity and drinking may go hand in hand, but there is no guarantee that this works for all races/ethnicities equally. However, this conclusion needs to be balanced with the detrimental effects of social rejection, exclusion, or even explicit ostracism (see Williams et al. 2005). Indeed, the levels of alcohol use observed in this study and others for Native American youth may be in part a response to a negative social-psychological state derived from being essentially a cultural and social isolate in a community–in this case a school–that values and rewards homogeneity and, in many cases, being Caucasian.

Comparing Native American youth to other minority groups leads to a mix of findings in terms of the structure of adolescent friendship networks. Native American youth nominated more friends than African Americans, Asians, and Hispanics, a finding that implies that American Indian students at least feel they have more friends in their schools compared to non-Indian minority youth, regardless of reciprocity. Importantly in terms of overall structural characteristics, American Indian youth are most similar to their African American counterparts. We found very few significant differences between these two groups, which may indicate that their in-school social experience may be similar, cultural differences aside. Furthermore, American Indian youth have higher average levels of in-network race/ethnic heterogeneity compared to Whites and African Americans indicating that their peer networks are more likely to consist of peers of various racial/ethnic groups. This finding is not surprising on one level: Simply put, with few exceptions (e.g., reservation schools and schools serving urban areas with dense Native American populations), American Indian children are unlikely to have access to many same-race peers and, consequently, report that their in-network friends come from a greater range of other ethnic and racial groups than is the case for non-Native American children.

Social network characteristics also revealed much about the negative consequences experienced by individuals, especially as it related to alcohol use. The total number of activities with friends, as well as the number of drinking friends in an adolescent's network, controlling for network size, significantly increased the odds of reports of drinking leading to fighting, difficulties with friends, regrettable sexual encounters, difficulties in romantic relationships, hang over symptoms, and trouble with parents. On the other hand, increased network size reduced the odds of

drinking leading to troubles with fighting, regrettable sexual encounters, hang over symptoms, and trouble with parents.

Individual characteristics also influenced the impact of drinking. Being male increased the odds of reporting personal drinking leading to physical fighting, but significantly decreased the odds of reporting a regrettable sexual encounter, the latter finding supportive of research findings showing cross-gender differences in sexual encounter-linked regret (Campbell 2008; Coats et al. 2012; Esbaugh and Gute 2008). Increases in respondent age led to significant increases in the odds of a regrettable sexual encounter due to drinking, difficulties in a romantic relationship, and symptoms of being hung over. Higher levels of parental attachment significantly reduced the odds of reporting drinking as leading to school troubles, fighting, and difficulties in romantic relationships. The level of respondent drinking increased the odds of having problems associated with drinking across all dependent variables. However, these negative consequences of drinking did not vary significantly by race/ethnicity other than African Americans reported significantly lower odds of their drinking behaviors as a cause of a regrettable sexual experience and White youth had increased odds of drinking leading to being hung over and/or vomiting compared to American Indian individuals. We did not find consistent evidence that the effect of age or gender varied across racial/ethnic categories. These findings did not present themselves as a consistent pattern of effects that could be linked to extant research or theory on the problems of alcohol consumption for Native American youth. We suggest that these interactions, especially as they pertain to parental problems, could constitute an area of future research, particularly given the fact that in some cases the results were worse for Native American youth and in others the outcomes were less problematic. In sum, however, it is worth reiterating that the probability of perceiving alcohol use being related to the selected social and physical difficulties does not appear to differ greatly across race/ethnicity.

The implications of these findings are far reaching in terms of how we think about the influence of peers, especially for American Indian youth. Clearly peer networks do not develop within a vacuum and, as a result, the social context of family and school must also be considered (Friese et al. 2011). Parents can and do shape the social world of the adolescent which reduces their probability of engaging in delinquency. This is done by developing quality relationships, neighborhood and school selection, and proactive parental supervision (Knoester et al. 2006). As nearly all children age, they experience increased levels of conflict with their parents, and American Indian children are no exception to this generalization (Frank and Lester 2002). That Native American youth are introduced to alcohol at an earlier age than Caucasians has also been reported in previous studies, onset which is often facilitated by family members rather than peers or non-related adults (Szlemko et al. 2006; Waller et al. 2003). Earlier problem onset can lead to later problem and binge drinking (Henry et al. 2011). In mid-adolescence, especially when the alcohol consumption begins to create problems between the youth and general society, school, friends, and parents, child-parent conflicts over alcohol may emerge, especially as the parents start to realize that such patterns pose long-term negative consequences for their children (Frank and Lester 2002; Heavy-Runner-Rioux and Hollist 2010). These conflicts with parents have been used in a variety of explanations to provide a reason for why many youth join the most problematic peer group—the gang. These justifications often revolve around the idea that the family no longer meets the needs of the individual and thus they seek out those within the peer group. However, the research does not bear this out and in fact supports the findings in this research that the influences leading to gang membership or peer involvement are very similar between minorities, but different for White youth (Curry and Spergel 1992; Freng and Esbensen 2007). Identifying risk factors linked to conflicts with one's parents and the expansion of emotional and behavioral ties to one's peer groups, then, has the potential to inform those who design intervention and prevention programs; however, what is important about our findings is that one size does not fit all, that significant differences exist by race/ethnicity that must be taken into account by efforts to reduce drug and alcohol use or general delinquency (see too Jackson and Hodge 2010; Potthoff et al. 1998; Rutman et al. 2008).

School level characteristics are also important factors that should be considered. Schools serve as a major organizing institution for adolescent friendships. Nearly all children spend significant portions of their adolescence in school, even those who eventually leave for a variety of reasons; hence, the schools are a natural point of intervention and prevention for the kinds of problem behavior (e.g., alcohol and drug use, bullying, general delinquency, authority-figure conflicts) that cause children to leave school and may be linked to later failures in life. As such, the level of racial/ethnic heterogeneity within a school is likely related to heterogeneity in friendship networks (Moody 2001). School level distributions of race/ethnicity may drive patterns of homophily or selective-mixing (see Lazarsfeld and Merton 1954; McPherson et al. 2001) within personal networks, but also aid in the development of racially/ethnically segregated networks (Moody 2001) within the school. In addition, school levels of drinking and other forms of delinquency are also important factors in the explanation of adolescent delinquency (Botticello 2009;

Cleveland and Wiebe 2003; Kuntsche and Jordan 2006; Zimmerman and Vásquez 2011). Understanding how school level characteristics, such as racial/ethnic heterogeneity impact not only friendship development, but the behavior of those peers, is imperative in being able to address adolescent problem behavior regardless of race/ethnicity.

Conclusions

Several findings should be highlighted based on their possible policy implications. Although the analyses only completed group comparisons with American Indians, the fact that Native American peer social networks characteristics differed significantly from Whites, but not other minority groups, might support the contention that something about those peer groups contributes to higher levels of delinquency and deviance among minority individuals. This is supported in part by Haynie and Payne's (2006) research, but, it needs to be explored more copiously in future research. Based on this research, American Indian peer groups seem very similar to other racial/ethnic minority peer groups, especially African Americans. This might change the focus of current prevention efforts. Typically, when addressing delinquency among American Indian populations, especially alcohol use, prevention efforts often include a significant cultural component (Donnermeyer et al. 2000; Grant and Feimer 2007; Pridemore 2004; Theriot and Parker 2007). However, this research would indicate that minority peer group structures are in fact very similar, other than with Whites, and thus specific programming targeting American Indian culture might not be needed, but perhaps some racial/ethnic specific programming would be beneficial.

The finding that Whites actually experienced more perceived negative consequences in terms of being hung over and vomiting when compared to American Indian youth is somewhat contradictory to previous research which indicates that American Indian youth often are at a significantly greater risk for negative consequences based on alcohol use compared to other groups (Pridemore 2004). However, other research (Ennett et al. 2006; Hahm et al. 2012) indicates that those that experience greater popularity in their social networks report higher levels of alcohol use. Our findings support this notion as well in that Whites report more popularity than American Indians within their peer networks. Perhaps, since White youth tend to be more popular, resulting in higher rates of alcohol use, they are more likely to experience negative consequences related to that use. Another possibility might be related to social perceptions of drinking in each of these communities. Although these results run counter to the "drunken Indian" stereotype, for American Indian youth, perhaps as previous research has indicated, alcohol use is so prevalent and accepted in their social environments, that it is not perceived to cause problems within the youths' relationships. Since this could influence programming efforts in terms of who to target and how to address specific peer influences, future research needs to further decipher this connection between popularity, community perceptions, alcohol use, and the resulting negative consequences.

Finally, the most significant finding in this research indicated that American Indian peer social networks are more likely to consist of racial/ethnic heterogeneity compared to Whites, African Americans, but less than Hispanics and Others. In other words, Native American youth are more likely to have friends who are of another racial/ethnic group compared to other groups. Based on Haynie and Payne's (2006) finding that those individuals with higher rates of racial/ethnic heterogeneity in their peer groups were at greater risk for participation in violence, this result is extremely concerning in terms of policy and prevention implications. The fact that Native American youth often represent a very small proportion of students within schools results in them having to make higher numbers of cross-racial/ethnic friendships, thus perhaps contributing to their higher rates of violence, calling possibly for increased prevention efforts targeting peer influences (Haynie and Payne 2006; Joyner and Kao 2000).

As we look to the future, it is important to remember that peer influence is a situational process, one that needs opportunity and the social cache to enact the behavior. Being somewhat socially disconnected may well serve as a protective factor for Native American youth, but contextual factors such as family and neighborhood must also be considered. Differences in how the structure of adolescent friendship networks affects behavior in urban versus rural settings, school level factors, and the role of parents in monitoring behavior and shaping the adolescent social world needs further examination (Morris and Wood 2010; Yabiku et al. 2007). This research has just begun to scratch the surface of understanding the nature of these peer group structures for American Indian youth, as well as other youth. Continuing in the vein of social network research will shed more light not only on the extent of the influence of peer groups, but also on how to best address those participating in delinquent behavior.

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References

Acock, A. (2005). Working with missing values. *Journal of Marriage and Family, 67*, 1012–1028.

Akers, R. L. (2009). *Social learning and social structure: A general theory of crime and deviance*. Piscataway, NJ: Transaction Publishers.

Akers, R. L., & Sellers, C. (2013). *Criminological theories: Introduction, evaluation, and application*. New York: Oxford University Press.

Allison, P. D. (2002). Missing data: Quantitative applications in the social sciences. *British Journal of Mathematical and Statistical Psychology, 55*(1), 193–196.

Anderson, E. (1994). The code of the street. *The Atlantic Monthly, 273*, 80–94.

Anderson, E. (1999). *Code of the street: Decency, violence, and the moral life of the inner city*. New York: W. W. Norton.

Bachman, J. G., Wallace, J. M., O'Malley, P. M., Johnston, L. D., Kurth, C. L., & Neighbors, H. W. (1991). Racial/ethnic differences in smoking, drinking, and illicit drug use among American high school seniors, 1976–89. *American Journal of Public Health, 81*, 372–377.

Baerveldt, C., Van Rossem, R., & Vermande, M. (2003). Pupils' delinquency and their social networks: A test of some network assumptions of the ability and inability models of delinquency. *Netherlands' Journal of Social Sciences, 39*(2), 107–125.

Baerveldt, C., Völker, B., & Van Rossem, R. (2008). Revisiting selection and influence: An inquiry into the friendship networks of high school students and their association with delinquency. *Canadian Journal of Criminology and Criminal Justice/La Revue canadienne de criminologie et de justice pénale, 50*(5), 559–587.

Bagwell, C. L., & Schmidt, M. E. (2011). *Friendships in childhood and adolescence*. New York: Guilford Press.

Bearman, P., Moody, J., & Stovel, K. (1997). *The add health network variable codebook*. Available at: http://www.cpc.unc.edu/projects/addhealth/codebooks/wave1. Accessed March 31, 2013.

Beauvais, F. (1998). American Indians and alcohol. *Alcohol Health & Research World, 22*(4), 253–259.

Bonacich, P. (1987). Power and centrality: A family of measures. *American Journal of Sociology, 92*(5), 1170–1182.

Botticello, A. L. (2009). School contextual influences on the risk for adolescent alcohol misuse. *American Journal of Community Psychology, 43*(1–2), 85–97.

Brechwald, W. A., & Prinstein, M. J. (2011). Beyond homophily: A decade of advances in understanding peer influence processes. *Journal of Research on Adolescence, 21*(1), 166–179.

Brown, B. B., Bakken, J. P., Ameringer, S. W., & Mahon, S. D. (2008). A comprehensive conceptualization of peer influence process in adolescence. In M. J. Prinstein & K. A. Dodge (Eds.), *Understanding peer influence in children and adolescence* (pp. 17–44). New York: Guilford Press.

Caetano, R., Clark, C. L., & Tam, T. (1998). Alcohol consumption among racial/ethnic minorities. *Alcohol Health and Research World, 22*(4), 233–242.

Campbell, A. (2008). The morning after the night before: Affective reactions to one-night stands among mated and unmated women and men. *Human Nature, 19*, 157–173.

Chavez, G. F., Cordero, J. F., & Becarra, J. E. (1989). Leading major congenital malformations among minority groups in the United States, 1981–1986. *Journal of the American Medical Association, 261*(2), 205–209.

Cleveland, H. H., & Wiebe, R. P. (2003). The moderation of adolescent-to-peer similarity in tobacco and alcohol use by school levels of substance use. *Child Development, 74*(1), 279–291.

Coalition for Juvenile Justice. (2010). *Disproportionate minority contact (DMC): Facts and resources*. Washington, DC: Coalition for Juvenile Justice.

Coats, S., Harrington, J. T., Beaubouef, M., & Locke, H. (2012). Sex differences in relationship regret: The role of perceived mate characteristics. *Evolutionary Psychology, 10*, 422–442.

Coleman, A. (2013). *A disproportionate minority confinement (DMC) chronology: 1988 to date*. Washington, DC: OJJDP. Retrieved on 29 April 2013 at http://www.ojjdp.gov/dmc/chronology.html.

Curry, D., & Spergel, I. (1992). Gang involvement and delinquency among Hispanic and African-American adolescent males. *Journal of Research in Crime and Delinquency, 29*, 273–291.

DeWit, D. J., Adlaf, E. M., Offord, D. R., & Ogborne, A. C. (2000). Age at first alcohol use: A risk factor for the development of alcohol disorders. *American Journal of Psychiatry, 157*(5), 745–750.

Donnermeyer, J. R., Edwards, R. W., Chavez, E. L., & Beauvais, F. (2000). Involvement of American Indian youth in gangs. *Free Inquiry Special Issue: Gangs, Drugs, and Violence, 28*, 73–80.

Dorgan, S. B. L. (2010). The tragedy of Native American youth suicide. *Psychological Services, 7*(3), 213–218.

Eitle, T. M., Eitle, D., & Johnson-Jennings, M. (2013). General strain theory and substance use among American Indian adolescents. *Race and Justice, 3*(1), 3–30.

Elliott, D., Huizinga, D., & Ageton, S. (1985). *Explaining delinquency and drug use*. Beverly Hills, CA: Sage Publications.

Elliott, D., & Menard, S. (1996). Delinquent friends and delinquency behavior: Temporal and developmental patterns. In J. D. Hawkins (Ed.), *Delinquency and crime: Current theories* (pp. 28–67). New York: Cambridge University Press.

Enders, C. K. (2010). *Applied missing data analysis*. New York: The Guildford Press.

Ennett, S., Bauman, K., Hussong, A., Faris, R., Foshee, V., Cai, L., et al. (2006). The peer context of adolescent substance use: Findings from social network analysis. *Journal of Research on Adolescence, 16*, 159–186.

Esbaugh, E., & Gute, G. (2008). Hookups and sexual regret among college women. *The Journal of Social Psychology, 148*, 77–89.

Faircloth, S. C., & Tippeconnic, J. W, I. I. I. (2010). *The dropout/graduation crisis among Native American and Native Alaska students: Failure to respond places the future of Native Peoples at risk*. Los Angeles: Civil Rights Project.

Farrow, J. A., & Brissing, P. (1990). Risk for DWI: A new look at gender differences in drinking and driving influences, experiences, and attitudes among new adolescent drivers. *Health Education & Behavior, 17*(2), 213–221.

Fisher, P. A., Bacon, J., & Storck, M. (1998). Teacher, parent, and youth report of problem behaviors among rural American Indian and Caucasian youth. *American Indian and Alaska Native Mental Health Research, 10*(3), 24–32.

Frank, M. L., & Lester, D. (2002). Self destructive behaviors in American Indian and Alaska Native high school youth. *American Indian and Alaska Native Mental Health Research, 10*(3), 24–32.

Freng, A., & Esbensen, F.-A. (2007). Race and gang affiliation: An examination of multiple marginality. *Justice Quarterly, 24*(4), 600–628.

Friese, B., Grube, J. W., Seninger, S., Paschall, M. J., & Moore, R. S. (2011). Drinking behavior and sources of alcohol: Differences between Native American and White youths. *Journal of Studies on Alcohol and Drugs, 72*(1), 53–60.

Fujimoto, K., & Valente, T. W. (2012). Decomposing the components of friendship and friends' influence on adolescent drinking and smoking. *The Journal of Adolescent Health: Official Publication of the Society for Adolescent Medicine, 51*(2), 136–143.

Goodreau, S. M., Kitts, J. A., & Morris, M. (2009). Birds of a feather, or friend of a friend? Using statistical network analysis to investigate adolescent social networks. *Demography, 46*(1), 103–125.

Goza, F., & Ryabov, I. (2009). Adolescents' educational outcomes: Racial and ethnic variations in peer network importance. *Journal of Youth and Adolescence, 38*, 1264–1279.

Grant, B. F., & Dawson, D. A. (1997). Age at onset of alcohol use and its association with DSM-IV alcohol abuse and dependence: Results from the National Longitudinal Alcohol Epidemiologic Survey. *Journal of Substance Abuse, 9*(1), 103–110.

Grant, C. M., & Feimer, S. (2007). Street gangs in Indian Country: A clash of cultures. *Journal of Gang Research, 14*, 27–66.

Grossman, D. C., Milligan, B. C., & Deyo, R. A. (1991). Risk factors of suicide attempts among Navajo adolescents. *American Journal of Public Health, 81*, 870–874.

Hahm, H., Kolaczyk, E., Jang, J., Swenson, T., & Bhindarwala, A. (2012). Binge drinking trajectories from adolescence to young adulthood: The effects of peer social network. *Substance Use and Misuse, 47*, 745–756.

Hartup, W. W., & Stevens, N. (1997). Friendships and adaptation in the life course. *Psychological Bulletin, 121*(3), 355–370.

Hawkins, E. H., Cummins, L. H., & Marlatt, G. A. (2004). Preventing substance abuse in American Indian and Alaska native youth: Promising strategies for healthier communities. *Psychological Bulletin, 130*(2), 304–323.

Haynie, D. L. (2001). Delinquent peers revisited: Does network structure matter? *American Journal of Sociology, 106*, 1013–1057.

Haynie, D. L. (2002). Friendship networks and delinquency: The relative nature of peer delinquency. *Journal of Quantitative Criminology, 18*, 99–134.

Haynie, D. L., & Osgood, D. W. (2005). Reconsidering peers and delinquency: How do peers matter? *Social Forces, 84*, 1109–1130.

Haynie, D. L., & Payne, D. C. (2006). Race, friendship networks, and violent delinquency. *Criminology, 44*(4), 775–805.

Heavy-Runner-Rioux, A., & Hollist, D. R. (2010). Community, family, and peer influences on alcohol, marijuana, and illicit drug use among a sample of Native American youth: An analysis of predictive factors. *Journal of Ethnicity in Substance Abuse, 9*, 260–283.

Henry, K. L., McDonald, J. N., Oetting, E. R., Silk Walker, P., Walker, R. D., & Beauvais, F. (2011). Age of onset of first alcohol intoxication and subsequent alcohol use among urban American Indian adolescents. *Psychology of Addictive Behaviors, 25*(1), 48.

Herman-Stahl, M., Spencer, D. L., & Duncan, J. E. (2003). The implications of cultural orientation for substance use among American Indians. *American Indian and Alaska Native Mental Health Research, 11*(1), 46–66.

Hingson, R., Heeren, T., Levenson, S., Jamanka, A., & Voas, R. (2002). Age of drinking onset, driving after drinking, and involvement in alcohol related motor-vehicle crashes. *Accident Analysis and Prevention, 34*(1), 85–92.

Hirschi, T. (1969). *Causes of delinquency*. Transaction publishers.

Hu, M., Davies, M., & Kandel, D. B. (2006). Epidemiology and correlates of daily smoking and nicotine dependence among young adults in the United States. *American Journal of Public Health, 96*(2), 1–10.

Hussong, A. (2002). Differentiating peer contexts and risk for adolescent substance abuse. *Journal of Youth and Adolescence, 31*(3), 207–220.

Jaccard, J., Blanton, H., & Dodge, T. (2005). Peer influences on risk behavior: An analysis of the effects of a close friend. *Developmental Psychology, 41*(1), 135–147.

Jackson, K. F., & Hodge, D. R. (2010). Native American youth and cultural sensitive interventions: A systematic review. *Research on Social Work Practice, 29*(3), 260–270.

Joyner, K., & Kao, G. (2000). School racial composition and adolescent racial homophily. *Social Science Quarterly, 81*(3), 810–825.

Kadushin, C. (2012). *Understanding social networks: Theories, concepts, and findings*. New York: Oxford University Press.

Kirchner, E. E., & Higgins, G. E. (2013). Self-control and racial disparities in delinquency: A structural equation modeling approach. *American Journal of Criminal Justice*. doi:10.1007/s12103-013-9205-7.

Knoester, C., Haynie, D. L., & Stephens, C. M. (2006). Parenting practices and adolescents' friendship networks. *Journal of Marriage and Family, 68*(5), 1247–1260.

Kobus, K., & Henry, D. (2010). Interplay of network position and peer substance use in early adolescent cigarette, alcohol, and marijuana use. *The Journal of Early Adolescence, 30*, 225–244.

Kreager, D., Rulison, K., & Moody, J. (2011). Delinquency and the structure of adolescent peer groups. *Criminology, 49*, 95–127.

Kuntsche, E., & Jordan, M. D. (2006). Adolescent alcohol and cannabis use in relation to peer and school factors. Results of multilevel analyses. *Drug and Alcohol Dependence, 84*(2), 167–174.

Lang, S. W., Waller, P. F., & Shope, J. T. (1997). Adolescent driving: Characteristics associated with single-vehicle and injury crashes. *Journal of Safety Research, 27*(4), 241–257.

Lazarsfeld, P. F., & Merton, R. K. (1954). Friendship as a social process: A substantive and methodological analysis. *Freedom and Control in Modern Society, 18*(1), 18–66.

Lin, N. (2002). *Social capital: A theory of social structure and action,* Vol. 19. New York: Cambridge University Press.

Loeber, R., & Stouthamer-Loeber, M. (1986). Family factors as correlates and predictors of juvenile conduct problems and delinquency. *Crime & Justice, 7*, 29–149.

Maxwell, K. A. (2002). Friends: The role of peer influence across adolescent risk behaviors. *Journal of Youth and Adolescence, 31*(4), 267–277.

Mays, G. L., & Winfree, L. T, Jr. (2012). *Juvenile justice*. Frederick, MD: Wolters Kluwer Law and Business.

McCartney, S., Bishaw, A., & Fontenot, K. (2013). *Poverty rates for selected detailed race and Hispanic groups by state and place: 2007–2013*. Washington, DC: U.S. Bureau of the Census.

McPherson, M., Smith-Lovin, L., & Cook, J. M. (2001). Birds of a feather: Homophily in social networks. *Annual Review of Sociology, 27*(1), 415–444.

Meropol, S. B., Moscati, R. M., Lillis, K. A., Ballow, S., & Janicke, D. M. (1995). Alcohol-related injuries among adolescents in the emergency department. *Annals of Emergency Medicine, 26*(2), 180–186.

Mmari, K. N., Blum, R., & Teufel-Shone, N. (2010). What increases risk and protection for delinquent behaviors among American Indian youth? Findings from three tribal communities. *Youth and Society, 41*(3), 382–413.

Moffitt, T. (1993). Adolescence-limited and life course persistent antisocial behavior: A developmental taxonomy. *Psychological Review, 100*, 674–701.

Moody, J. (2001). Race, school integration, and friendship segregation in America. *American Journal of Sociology, 107*, 679–716.

Moody, J., & White, D. R. (2003). Structural cohesion and embeddedness: A hierarchical concept of social groups. *American Sociological Review, 68*, 103–127.

Morris, C. H., Crowley, S. L., & Morris, C. (2002). A measure of traditionalism for American Indian children: Psychometric properties and factor structure. *American Indian and Alaska Native Mental Health Research, 10*(3), 33–55.

Morris, G. D., & Wood, P. B. (2010). Delinquency and non-reservation American Indians: The role of unique and general predictors of interpersonal and property offending. *Journal of Ethnicity in Criminal Justice, 8*(4), 248–265.

Morris, G. D., Wood, P. B., & Dunaway, R. G. (2006). Self-control, native traditionalism, and Native American substance use: Testing the cultural invariance of a general theory of crime. *Crime and Delinquency, 52*(4), 572–598.

Morris, G. D., Wood, P. B., & Dunaway, R. G. (2007). Testing the cultural invariance of parenting and self-control as predictors of American Indian delinquency. *Western Criminology Review, 8*(1), 32–47.

Norris, T., Vines, P. L., & Hoeffel, E. M. (2011). *American Indian and Alaska Native populations: 2010*. Washington, DC: U.S. Bureau of the Census.

Oetting, E. R., & Beauvais, F. (1989). Epidemiology and correlates of alcohol use among Indian adolescents living on reservations. In D.L. Spiegler, D.A. Tate, S.S. Aitken, C.M. Christian (Eds.), *Alcohol use among U.S. ethnic minorities. National Institute on Alcohol Abuse and Alcoholism Research Monograph No. 18* (pp. 239–267). DHHS Pub. No. (ADM) 89–1435. Rockville, MD: The Institute.

Osgood, D. W., McMorris, B. J., & Potenza, M. T. (2002). Analyzing multiple-item measures of crime and deviance I: Item response theory scaling. *Journal of Quantitative Criminology, 18*(3), 267–296.

Pavkov, T. W., Travis, L., Fox, K., Bear King, C., & Cross, T. L. (2010). Tribal youth victimization and delinquency: Analysis of Youth Risk Behavior Surveillance Survey data. *Cultural Diversity and Ethnic Minority Psychology, 16*(2), 123–134.

Payne, D. C., & Cornwell, B. (2007). Reconsidering peer influences on delinquency: Do less proximate contacts matter? *Journal of Quantitative Criminology, 23*(2), 127–149.

Potthoff, S. J., Bearinger, L. H., Skay, C., Cassuto, N., Blum, R. W., & Resnick, M. D. (1998). Dimensions of risk behavior among American Indian youth. *Archives of Pediatrics and Adolescent Medicine, 152*(February), 157–163.

Pridemore, W. A. (2004). Review of the literature on risk and protective factors of offending among Native Americans. *Journal of Ethnicity in Criminal Justice, 2*(4), 45–63.

Pridemore, W. A. (2005). A culturally informed developmental approach to understanding risk and resiliency among Native American youth. *Journal of Ethnicity in Criminal Justice, 3*(1–2), 111–129.

Quillian, L., & Campbell, M. E. (2003). Beyond black and white: The present and future of multiracial friendship segregation. *American Sociological Review, 68*(4), 540–566.

Rees, C., & Pogarsky, G. (2011). One bad apple may not spoil the whole bunch: Best friends and adolescent delinquency. *Journal of Quantitative Criminology, 27*, 197–223.

Reiter, J. P., Raghunathan, T., & Kinney, S. (2006). The importance of modeling the sampling design in multiple imputation for missing data. *Survey Methodology, 32*, 143–149.

Rutman, S., Park, A., Castor, M., Taualii, M., & Forquera, R. (2008). Urban American Indian and Alaska Native youth: Youth Risk Behavior Survey 1997–2003. *Maternal and Child Health Journal, 12*, S76–S81.

Shaw, C. R., & McKay, H. D. (1942). *Juvenile delinquency and urban areas: A study of rates of delinquents in relation to differential characteristics of local communities in American cities*. Chicago: University of Chicago Press.

Short, J. F. (1957). Differential association and delinquency. *Social Problems, 4*, 233–239.

Smokowski, P. R., David-Ferdon, C., & Stroupe, N. (2009). Acculturation and violence in minority adolescents: A review of the empirical literature. *Journal of Primary Prevention, 30*, 215–263.

Spear, S., Longshore, D., McCaffrey, D., & Ellickson, P. (2005). Prevalence of substance use among White and American Indian young adolescents in a Northern Plains State. *Journal of Psychoactive Drugs, 37*, 1–6.

StataCorp. (2011). *Stata Statistical Software: Release 12*. College Station, TX: StataCorp LP.

Sutherland, E. H. (1947). *Principles of criminology* (4th ed.). Philadelphia, PA: J.B. Lippincott.

Szlemko, W. J., Wood, J. W., & Thurman, P. J. (2006). Native Americans and alcohol: Past, present and future. *The Journal of General Psychology, 133*(4), 435–451.

Theriot, M. T., & Parker, B. (2007). Native American youth gangs: Linking culture, history, and theory for improved understanding prevention and intervention. *Journal of Ethnicity in Criminal Justice, 5*, 83–97.

Valente, T. W. (2010). *Social networks and health: Models, methods, and applications*. New York: Oxford University Press.

Vigil, J. D. (1988). *Barrio gangs*. Austin, TX: University of Texas Press.

Vigil, J. D. (2002). *A rainbow of gangs: Street culture in the mega-city*. Austin, TX: University of Texas Press.

von Hippel, P. (2007). Regression with missing Ys: An improved strategy for analyzing multiply imputed data. *Sociological Methodology, 37*, 87–113.

Waller, M. A., Okamoto, S. K., Miles, B. W., & Hurdle, D. E. (2003). Resiliency factors related to substance use/resistance: Perceptions of native adolescents of the Southwest. *Journal of Sociology and Social Welfare, 30*(4), 79–94.

Wasserman, S., & Faust, K. (1994). *Social network analysis*. Cambridge, MA: Cambridge University Press.

Weerman, F. (2011). Delinquent peers in context: A longitudinal network analysis of selection and influence effects. *Criminology, 49*(1), 253–286.

Weerman, F., & Smeenk, W. H. (2005). Peer similarity in delinquency for different types of friends: A comparison using two measurement methods. *Criminology, 43*(2), 499–524.

Wenzel, S., Hsun, T., Zhou, A., & Tucker, J. (2012). Are social network correlates of heavy drinking similar among Black homeless youth and White homeless youth? *Journal of Studies on Alcohol and Drugs, 73*, 885–889.

Williams, K. D., Forgas, J. P., Von Hippel, W., & Zadro, L. (2005). The social outcast: An overview. In K. D. Williams, J. P. Forgas, & W. von Hippel (Eds.), *The social outcast: Ostracism, social exclusion, rejection, and bullying*. New York: Psychology Press.

Winfree, L. T, Jr, & Abadinsky, H. (2010). *Understanding crime: Essentials of criminological theory*. Belmont, CA: Wadsworth.

Winfree, L. T, Jr, Theis, H. E., & Griffiths, C. T. (1981). Drug use in rural America: A cross-cultural examination of complementary social deviance theories. *Youth and Society, 12*(4), 465–489.

Yabiku, S. T., Rayle, A. D., Okamoto, S. K., Marsiglia, F. F., & Kulis, S. (2007). The effect of neighborhood context on the drug use of

American Indian youth of the Southwest. *Journal of Ethnic Substance Abuse, 6*(2), 181–204.

Young, J. T. N., & Rees, C. (2013). Social networks and delinquency in adolescence: Implications for life-course criminology. In C. Gibson & M. D. Krohn (Eds.), *Handbook of life-course criminology* (pp. 159–182). New York: Springer.

Zimmerman, G. M., & Vásquez, B. E. (2011). Decomposing the peer effect on adolescent substance use: Mediation, nonlinearity, and differential nonlinearity. *Criminology, 49*(4), 1235–1273.

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