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Depression and alcohol use in American Indian adolescents: The influence of family factors

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Abstract

Background: Rates of both depression and alcohol use are disproportionately higher among American Indian (AI) adolescents than adolescents in the general population. The co-occurrence of depression and alcohol use is highly comorbid and clinically relevant given reciprocal negative influences on outcomes. Family factors may be especially relevant for conferring some buffering effect in this relationship due to the importance of kinship and community in AI communities. The purpose of the current study is to examine the roles of family warmth and parent monitoring in the association between depressive symptoms and alcohol use in a large, nationally representative sample of AI adolescents.

Methods: Data collected from 2009–2013 included 3,498 AI 7th-12th graders residing on or near a reservation (47.8% female). Participants reported on their depressive symptoms, family factors, and alcohol use.

Results: Depressive symptoms were statistically significantly positively associated with alcohol use ($r=.11$, $p<.001$). Greater depressive symptoms were associated with statistically significantly less perceived family warmth ($\beta=-.09$, 95% $CI[-.13, -.06]$), which was associated with statistically significantly greater alcohol use ($\beta=-.39$, 95% $CI[-.55, -.23]$). Family warmth was found to statistically significantly account for the association between depressive symptoms and alcohol use at high ($\beta=.04$, $SE=.02$, 95% $CI[.004, .09]$), but not low, levels of parent monitoring ($\beta=.02$, $SE=.02$, 95% $CI[-.002, .06]$).

Conclusions: Results of the present study suggest the importance of developing culturally sensitive prevention and treatment approaches focusing on increasing both family warmth and parent monitoring to address the co-occurrence of AI adolescent depression and alcohol misuse.

Keywords

American Indian; depression; alcohol use; family warmth; parent monitoring

Introduction

Alcohol use has been identified by American Indian (AI) communities as among their most pressing public health concerns (Hawkins et al., 2004, Spillane and Venner, 2018). There is a high degree of variability in rates of alcohol use across AI individuals, but it is well-established that AI individuals as a group experience disproportionate harm associated with alcohol use compared to other racial/ethnic groups (Spillane et al., 2020, Swaim and Stanley, 2018). One nationally representative sample of reservation-based AI adolescents found higher rates of lifetime alcohol use: 39.7%, 52.9%, and 72.5% for 8th, 10th, and 12th graders, respectively, compared to 22.8%, 43.4%, and 61.2% for 8th, 10th, and 12th graders, respectively, in a sample collected from Monitoring the Future representing the general population of U.S. adolescents (Swaim and Stanley, 2018). Simultaneously, other research finds higher rates of abstinence in AI communities compared to other racial/ethnic groups (US Department of Health and Human Services, 2010). These observed differences likely reflect the high degree of variability that exists across AI individuals. Previous work has found evidence for variability based on individuals' context and living situation; for example, reservation-based AI adolescents report significantly higher rates of alcohol use and initiate alcohol use earlier compared to urban AI adolescents (Yu & Stiffman, 2007). Yet, AI adolescents who do drink alcohol tend to initiate drinking alcohol early and experience high rates of binge and heavy drinking and consequences related to alcohol use (Spillane et al., 2015, Vaeth et al., 2017, Schick et al., 2021). These factors increase risk for greater negative alcohol-related outcomes in early adulthood among AI individuals (e.g., likelihood of a lifetime alcohol use disorder diagnosis; Henry et al., 2011).

One factor that has been found to contribute to risk for alcohol use among non-AI adolescents is depressive symptoms (Ganz and Sher, 2009, Kandel et al., 1999, Clark et al., 2003). In the U.S., AI adolescents have the highest prevalence rates of lifetime and past-year major depressive episodes compared to monoracial adolescents from other racial/ethnic groups (U.S. Department of Health and Human Services, 2019). The co-occurrence of depressive symptoms and alcohol use is clinically relevant given their reciprocal negative impact on outcomes. For example, alcohol use among non-AI individuals reporting depressive symptoms has been found to be associated with increased severity and duration of depressive episodes and likelihood of suicidal ideation (Hasin et al., 1996, Boschloo et al., 2011; Gadermann et al., 2012). Among AI youth, adolescents who report greater depressive symptoms tend to initiate alcohol use at younger ages (Cheadle and Whitbeck, 2011). Further, there is qualitative support for the role of alcohol in one's ability to manage depressive symptoms among AIs (i.e., 15 out of 19 adolescents in one study describing drinking as a means to avoid and regulate negative affective states, including depression; Tingey et al., 2017). Depressive symptoms, alcohol use, and their co-occurrence have been identified as important contributors to suicide (Gaynes et al., 2004; Hawton et al., 2013). This is of concern, as AIs have disproportionately high rates of suicidal ideation, suicide attempts, and death by suicide compared to all other racial groups in the U.S. (Centers for Disease Control and Prevention, 2020). Thus, to address these important health disparities, there is a need for research to identify factors that confer risk and protection for co-occurring

depressive symptoms and alcohol use and explain this connection among AI adolescents to inform targets for prevention and intervention strategies.

Family factors may be important to consider in the relation between depressive symptoms and alcohol use among AI adolescents. Family is recognized as the cornerstone of AI communities; it is the mechanism through which Indigenous beliefs, values, and practices are transmitted (Red Horse, 1980). Being close-knit is a central feature of healthy AI families (Martin and Yurkovich, 2014) and is inclusive of family warmth; or features of trust, support, emotional closeness, open and honest communication, caregiver responsiveness and attentiveness to children's needs, and mutual respect (Kopak and Hawley, 2012). Further, while the relative importance of parents and family in decision making regarding engagement in risk behaviors (such as substance use) tends to decline during adolescence in favor of peer influence, this decline is less pronounced for AI adolescents. Parents and families have been found to remain influential, even when controlling for peer influence, in this decision-making process throughout the adolescent years for AIs (Swaim et al., 1993; Swaim & Stanley, 2016). In particular, family warmth has been empirically linked to a number of positive outcomes, including greater well-being and lower risk for mental health concerns and for engagement in health-compromising behaviors (Huppert et al., 2010, Shakya et al., 2012, Yap et al., 2014). Parental Acceptance-Rejection Theory, which describes the causes and consequences of parental acceptance and rejection, states that a child's perception of experiencing warmth in their families is more impactful on outcomes than objective measures or parent reports of warmth (Rohner et al., 2012). Specifically, perceived family warmth has been found to be associated with significantly lower odds of endorsing depressive symptoms among AI adolescents (Barney, 2001, Henson et al., 2017). Further, a sense of family warmth has been found to be associated with lower rates of alcohol use in AI adolescents (King et al., 1992, Allen et al., 2006, Hurdle et al., 2003).

While there is a clear connection between depressive symptoms and alcohol use as well as between family warmth and both depressive symptoms and alcohol use separately, the relations among these three factors together remains underexplored. Nonetheless, there is good reason to suggest a relationship; it may be that depressive symptoms lead AI adolescents to believe that their family members care less about them as a result of common cognitive distortions associated with depression (e.g., feelings of worthlessness, discounting positive evidence; Orchard et al., 2019). Additionally, previous literature has found depressive symptoms to be negatively correlated with perceived family support (Tezel et al., 2011) and to be prospectively associated with decreased perceived emotional support from one's family (Slavin & Rainer, 1990); this same relationship may hold for depressive symptoms and family warmth. Low perceived family warmth may be particularly detrimental to AI adolescents given the traditionally strong reliance on familial bonding in AI communities (Garrett and Garrett, 1994). Subsequently, AI adolescents may turn to alcohol use to cope with negative mood (Yuan et al., 2010) stemming from these beliefs. Indeed, negative reinforcement (Baker et al., 2004) and self-medication (Khantzian, 1997) models suggest a central function of affect modulation for alcohol use broadly and specifically in the context of depression (Turner et al., 2018, Bolton et al., 2009), including among AI communities (Skewes and Blume, 2015, Stewart et al., 2011).

Another family-related factor that may play an important role in the relation of depressive symptoms to alcohol use in AI adolescents is parent monitoring, a set of parenting behaviors involving attention to a child's whereabouts and activities (Dishion and McMahon, 1998), including through parents' own efforts to find out what their children are doing (referred to as solicitation and control) and through children's choice to divulge information about what they are doing (referred to as child disclosure; Kerr & Stattin, 2000; Stattin & Kerr, 2000). Settler colonialism has led to the disruption of traditional parenting practices, family structures, and relationships in AI communities as a result of forced removal of children from their homes to be adopted into White families and institutionalization in residential schools, as well as criminalization of important cultural practices (Brave Heart, 1999). Indeed, qualitative studies examining the effects of residential boarding schools (i.e., the forced removal of AI children from their homes, whereby many children experienced significant trauma), report that AI individuals who were raised in boarding school settings feel unprepared in their roles as parents and a sense of confusion with respect to how to raise children in a healthy way (Brave Heart, 1999). These effects have been hypothesized as contributing to the stark health disparities seen among AI communities (Walters et al., 2011) and to alcohol-related health disparities in particular (Brave Heart, 1999). Lower parent monitoring has been found to be robustly associated with increased risk for adolescent substance use (Whitesell et al., 2014, Rodgers-Farmer, 2001), while greater parent monitoring is associated with increased communication and perceived support within child-parent relationships (Bacchini et al., 2011, Ceballo et al., 2003).

Parent monitoring may also modify the relation between depressive symptoms and family warmth by influencing the degree to which depression affects an adolescent's perception that their family cares about them. Youth whose parents engage in greater monitoring may experience protection against the negative effects of depressive symptoms because their parents are more likely to communicate their support, which may then indirectly reduce those youth's risk for alcohol use. Parent monitoring may also modify the relation between family warmth and alcohol use. Parenting styles characterized by a high degree of warmth and a low degree of monitoring (i.e., permissive parenting) have been found to be associated with deleterious adolescent outcomes, including increased risk of substance use (Berge et al., 2016; Cohen & Rice, 1997). It is likely that family warmth is protective against alcohol use, such as in the context of depressive symptoms, only when parents are also effectively monitoring their behavior. Further, parent monitoring may serve to limit the availability of alcohol (which is among the strongest predictors of adolescent alcohol use; Kuntsche et al., 2008, Ryan et al., 2010), thereby limiting the opportunity for adolescents to use alcohol in response to higher depressive symptoms. Yet, no work to date has examined the role of parent monitoring in these associations.

The present study aims to extend previous literature by examining the relations among depressive symptoms, perceived family warmth, parent monitoring, and alcohol use in AI adolescents. First, we examined the direct association between depressive symptoms and alcohol use; we hypothesized that AI adolescents with greater depressive symptoms would report more alcohol use. Next, we examined family warmth as a potential explanatory variable; we hypothesized that greater depressive symptoms would be associated with lower levels of perceived family warmth, which, in turn, would relate to more alcohol use. Finally,

we explored parent monitoring as a potential moderator of the indirect effect of depressive symptoms on alcohol use through perceived family warmth; we expected that perceived family warmth would account for the association between depressive symptoms and alcohol use at high but not low levels of parent monitoring.

Materials and Methods

Participants and Procedures

Data used in the current study were collected as part of a larger study examining levels of substance use as well as risk and protective factors associated with substance use among AI adolescents. Following data collection, data used for the current study were made publicly available through the National HIV and Addiction Data Archive, with all potentially identifying information regarding specific participating tribal groups or communities removed to protect their privacy and confidentiality. Schools were invited to participate if they were on or near an AI reservation and if at least 20% of their student body were AI. They were stratified into six geographic regions in which reservation-based AIs live (Snipp, 2005). Within those regions, tribal and/or school board authority approvals were obtained, as appropriate, and surveys were administered during classes by staff at 33 identified schools. Parents were able to opt their children out of participation by contacting the school, and students could decline to participate by leaving their surveys blank. However, less than 1% of children either declined to participate or were opted out by their parents (Stanley et al., 2014a). Participants for the present study were a subsample of 7–12th graders who identified as AI ($n = 3,498$, 47.7% female) drawn from a larger sample of adolescents ($N = 5,744$, 47.0% female). More than half of participants in the present study reported that they had ever drunk alcohol ($n = 2,082$, 59.7%). Of those reporting lifetime alcohol use, 71.9% reported that they had ever drunk alcohol until they were intoxicated ($n = 1,492$). Demographic characteristics of the sample are presented in Table 1.

Measures

Participants were administered the adolescent form of the American Drug and Alcohol Survey (ADAS; Oetting et al., 1985). This measure was listed in the 2007 SAMHSA Measures and Instruments Resource Guide and has been used in the national Our Youth our Future Project conducted by the Colorado State University Tri-Ethnic Center for Prevention Research since 1974 to assess rates and correlates of substance use among AI adolescents living on or near reservations (Oetting et al., 1985; Stanley et al., 2014a; Swaim & Stanley, 2018). ADAS domains/items evaluated in the present study are described below.

Depressive symptoms—Depressive symptoms were measured with seven items assessing depressive affect (e.g., one question asks students how depressed they feel). Participants rate each item based on how much they believe it describes them using a 4-point scale (0 = *not at all*, 3 = *a lot*). Item scores are summed to create a total scale score ranging from 0 to 21, with higher scores reflecting greater depressive symptoms. Reliability in the current sample was excellent (Cronbach's $\alpha = .92$). This scale has been previously used in research focusing on substance use among AI adolescents (Swaim, 2015).

Parent monitoring—Parent monitoring was measured with four items assessing participants' beliefs of how much their parents monitored their actions (e.g., one question asks whether student's parents allow them to stay out late). Participants rate each item on a 4-point scale (0 = *very true*, 3 = *not at all true*). Item scores are summed to create a total scale score ranging from 0 to 12, with higher scores reflecting greater parent monitoring. Reliability in the current sample was good (Cronbach's $\alpha = .84$). This scale has been previously used in research focusing on substance use among AI adolescents (Spillane et al., 2017; Swaim & Stanley, 2016).

Perceived family warmth—Perceived family warmth was measured with three items assessing participants' perceptions of their family's attitudes towards them, the participants' perceptions of their family's attitudes towards their actions, as well as the participants' attitudes towards their family (e.g., one question asks how much a student's family cares about them). Participants rate each item on a 4-point scale (0 = *not at all*, 3 = *a lot*). Item scores are summed to create a total scale score ranging from 0 to 9, with higher scores reflecting a greater sense of family warmth. Reliability in the current sample was good (Cronbach's $\alpha = .84$). This scale has been previously used in research focusing on substance use among AI adolescents (Nalven et al., 2020).

Alcohol Use—Alcohol Use was measured with five items assessing the frequency of various drinking behaviors. Two questions ask about frequency of drinking alcohol and being intoxicated in the past year on a 6-point scale (0 = *none*, 5 = *50 or more times*). Two questions ask about frequency of drinking alcohol and being intoxicated in the past month on a 5-point scale (0 = *none*, 4 = *20 or more times*). One item asks about frequency of heavy drinking in the past two weeks (i.e., having four or more drinks on one occasion) on an 11-point scale (0 = *none*, 10 = *10 or more times*). Items are summed to create a total scale score ranging from 0 to 28, with higher scores reflecting greater alcohol use. Reliability in the current sample was good (Cronbach's $\alpha = .88$). This scale has been previously used in research focusing on alcohol use among AI adolescents (Schick et al., 2020).

Demographic characteristics—Demographic characteristics including age, sex (coded such that 0 = male and 1 = female), grade, and race/ethnicity were collected.

Analytic Plan

As recommended by Tabachnick et al. (2007), all study variables were assessed for adherence to generalized linear model assumptions. Then, Pearson product-moment and point-biserial correlations were calculated between relevant study variables to explore their bivariate associations. Next, moderated mediation analyses were conducted to examine whether parent monitoring moderated the associations among depressive symptoms, perceived family warmth, and alcohol use using the PROCESS SPSS macro (Model 59) as recommended by Hayes (2018). The PROCESS procedures use ordinary least squares regression and bootstrapping methodology, which confers more statistical power than do standard approaches to statistical inference and does not rely on distributional assumptions. The model examined whether parent monitoring moderated each of the paths in the mediation model (i.e., the paths between depressive symptoms and family warmth [*a* path],

between family warmth and alcohol use [*b* path], and between depressive symptoms and alcohol use [*c* path]) and the indirect effect ($a \times b$). The indirect effect is considered statistically significant if the 95% confidence interval does not contain zero (Preacher and Hayes, 2004). Predictor variables were Z-standardized and models were re-run with these standardized variables to attain standardized regression outputs to serve as a measure of effect size and allow for comparison of the magnitude of effects. Bootstrapping was done with 10,000 random samples generated from the observed covariance matrix to estimate the standard errors of parameter estimates and the bias-corrected 95% confidence intervals (CIs) of the indirect effects (Preacher and Hayes, 2004, MacKinnon et al., 2002).

Results

Bivariate Correlations

Pearson product-moment correlations revealed small negative associations between depressive symptoms and perceived family warmth ($r = -.11, p < .001$) and parent monitoring ($r = -.09, p < .001$) and a small positive association between depressive symptoms and alcohol use ($r = .11, p < .001$). Perceived family warmth demonstrated a small positive association with parent monitoring ($r = .14, p < .001$). Alcohol use demonstrated a small negative association with perceived family warmth ($r = -.11, p < .001$) and a medium negative association with parent monitoring ($r = -.22, p < .001$).

Primary Analyses¹

A moderated mediation model was examined to further explore the relations among depressive symptoms, parent monitoring, perceived family warmth, and alcohol use, controlling for the effects of age and sex; this model is depicted in Figure 1. The model predicting family warmth (*a* path) was statistically significant ($F[5, 2938] = 21.47, p < .001, R^2 = .04$), as was the overall model predicting alcohol use ($F[7, 4936] = 48.95, p < .001, R^2 = .11$). Depressive symptoms were statistically significantly associated with less perceived family warmth ($b = -.03, SE = .01, \beta = -.09, t = -5.21, p < .001, 95\% CI[-.04, -.02]$), which in turn was statistically significantly associated with greater alcohol use ($b = -.22, SE = .05, \beta = -.39, t = -4.87, p < .001, 95\% CI[-.30, -.13]$). Greater parent monitoring was statistically significantly associated with both more perceived family warmth ($b = .07, SE = .01, \beta = .13, t = 7.01, p < .001, 95\% CI[.05, .09]$) and with less alcohol use ($b = -.29, SE = .03, \beta = -.94, t = -11.72, p < .001, 95\% CI[-.34, -.24]$). Further, parent monitoring was found to statistically significantly interact with perceived family warmth to predict alcohol use (path *b*; $b = -.03, SE = .01, \beta = -.19, t = -3.22, p = .001, 95\% CI[-.05, -.01]$). Parent monitoring did not statistically significantly interact with depressive symptoms to predict perceived family warmth (path *a*; $b = .002, SE = .002, \beta = .03, t = 1.49, p = .14, 95\% CI[-.001, .01]$) nor with depressive symptoms to predict alcohol use (path *c*²; $b = .01, SE = .004, \beta = .08, t = 1.16, p = .25, 95\% CI[-.003, .01]$).

¹An additional model was examined with a dichotomously scored lifetime alcohol use variable (coded such that 0 = no lifetime alcohol use and 1 = any lifetime alcohol use) as the outcome to examine whether this model may be more relevant in considering presence (versus absence) of alcohol use versus alcohol use severity. In this model, depressive symptoms remained significantly associated with family monitoring ($\beta = -.09, p < .001$) and with lifetime alcohol use ($\beta = .27, p < .001$). However, family caring was no longer significantly related to lifetime alcohol use ($\beta = -.02, p = .59$), and the indirect effect of depressive symptoms on lifetime alcohol use through the pathway of family warmth was not significant at any level of parent monitoring.

Analysis of the statistically significant moderation effect indicated that the path between perceived family warmth and alcohol use was stronger at high levels (1 *SD* above the mean; $b = -.32$, $SE = .06$, $\beta = -.58$, $t = -5.56$, $p < .001$, 95% *CI*[-.44, -.21]) of parent monitoring than at low levels (1 *SD* below the mean; $b = -.11$, $SE = .05$, $\beta = -.20$, $t = -2.14$, $p = .03$, 95% *CI*[-.22, -.01]). Further, the indirect effect of depressive symptoms on alcohol use through the pathway of perceived family warmth was found to be statistically significant at high (1 *SD* above the mean; $b = .01$, $SE = .004$, $\beta = .04$, 95% *CI* [.00, .02]) but not low levels of parent monitoring (1 *SD* below the mean; $b = .004$, $SE = .003$, $\beta = .02$, 95% *CI* [.00, .01]).

Discussion

The goal of the present study was to examine the roles of perceived family warmth and parent monitoring in the association between depressive symptoms and alcohol use among AI adolescents. First, as expected, we found that depressive symptoms were positively associated with alcohol use at zero-order. This finding extends a large body of literature focusing on non-AI individuals that finds depression and alcohol use to be robustly related (Boden and Fergusson, 2011, Brière et al., 2014) by finding a similar association in a sample of AI adolescents. There is a notable lack of literature focusing on the association between depressive symptoms and alcohol use among AI adolescents; thus, this paper represents a novel and important contribution. Our findings suggest that, when working with AI adolescents presenting for treatment reporting alcohol use, clinicians should assess for depressive symptoms, as they may represent an important risk factor. Conversely, AI adolescents presenting for treatment as a result of depressive symptoms should be screened for alcohol use given that depressive symptoms may increase risk for drinking alcohol. Further, these findings provide support for future research to investigate whether interventions targeting depressive symptoms may have a subsequent positive impact on adolescent alcohol use and vice versa.

As expected, greater perceived family warmth was negatively associated with both depressive symptoms and alcohol at the bivariate level. These results support previous literature finding that families are an important source of strength and resilience for AI adolescents (Limb et al., 2014) and that family environments characterized by conflict (which may be related to low family warmth) are associated with increased risk for alcohol use (Stanley et al., 2014b). It may be that, because AI communities tend to be highly family-oriented and place great importance on the role of the extended family and community (Garrett and Garrett, 1994), low perceived family warmth is associated with negative outcomes like alcohol use. With respect to the observed association between family warmth and depressive symptoms, it may also be that youth who are more depressed perceive their family to care less about them, possibly because of cognitive distortions (e.g., feelings of worthlessness) common in depression (Orchard et al., 2019).

Next, we found that depressive symptoms were associated with less perceived family warmth, which in turn was associated with increased alcohol use, and that these effects were moderated by parent monitoring. Perceiving greater family warmth may suggest that adolescents also have stronger family relationships, which has been identified by AI adolescents as an important alternative reinforcer to alcohol use (Spillane et al., 2020).

Further, parent monitoring was shown to moderate this mediation model, such that the negative association between family warmth and alcohol use was stronger at high (versus low) levels of parent monitoring, suggesting that family warmth and parent monitoring both reflect important components of family functioning and that parent monitoring may increase the positive effects of family warmth, or could offset the negative effects of low family warmth, as it relates to youth alcohol use. This finding is supported by existing literature showing that parent monitoring is an important protective factor for AI adolescent substance use (Rodgers-Farmer, 2001, Nalven et al., 2020, Spillane et al., 2017) and that family environments characterized by both warmth and consistent monitoring protect against engagement in health-compromising behaviors, such as alcohol use, among adolescents who are members of historically marginalized racial and ethnic groups (Springer et al., 2002). While traditional approaches to parenting are often non-intrusive and indirect (BigFoot and Funderburk, 2011), previous work focused on AI families has found that more direct monitoring reduces the likelihood that adolescents will engage in alcohol use (Moon et al., 2016, Boyd-Ball et al., 2014).

Findings of the present study have potentially important implications for future research and clinical practice. For instance, family-level interventions may benefit from providing parents with skills focused on strategies to communicate a sense of warmth and to monitor their adolescents. Importantly, such interventions should aim to enhance both warmth and monitoring (or should first aim to enhance warmth then to enhance monitoring rather than promoting monitoring indiscriminately in the absence of behaviors which communicate warmth), given previous research suggesting that children whose parents use authoritative parenting styles (i.e., high warmth and monitoring) report decreased depression and alcohol use compared to those whose parents use authoritarian (i.e., low warmth and high monitoring) or permissive (i.e., high warmth and low monitoring) styles (Piko and Balázs, 2012, Ebrahimi et al., 2017). It is likely that increasing the extent to which parent's communicate warmth to their youth might facilitate communication and promote child disclosure, a form of parent monitoring which has been found to be most strongly related to reducing risky adolescent behavior (Stattin & Kerr, 2000).

Additionally, prevention and treatment programs targeting youth depressive symptoms and aiming to reduce alcohol use may benefit from the inclusion of family, as has been recommended in previous literature when working with AI individuals (Sue et al., 2019). Such approaches may also reflect a trauma-informed approach given the effects of historical trauma related to colonization and residential boarding schools on family structures and traditional parenting practices (Walls and Whitbeck, 2012, Whitbeck et al., 2014). Future research should continue to examine the nature of the associations among variables of interest in the present study to inform the optimal timing of interventions, as alternative models may provide other important insights. For example, it is likely that the relations examined in the present study are actually bidirectional in nature, though we are not able to test this given the nature of these data. For instance, while we examined depressive symptoms as a predictor of perceived family warmth and alcohol use, longitudinal investigations suggest that parental rejection (similar to low perceived warmth) are prospectively associated with later depressive symptoms (Hipwell et al., 2008; Lloyd et al., 2017). It may be that depression leads adolescents to perceive their families as caring

about them less and that this decreased sense of warmth subsequently leads to worsening depressive symptoms. Future research may also benefit from efforts to develop measures including a focus on family monitoring and warmth by members of the extended family and by fictive kin (as opposed to only parent monitoring) given the importance of extended kinship networks in AI communities and the unique role that the extended community plays in monitoring AI youth (Mooradian et al., 2007, Walls and Whitbeck, 2012).

Findings of the present study should be considered in the context of several limitations. First, the cross-sectional and correlational nature of these data precludes our ability to examine the exact nature and directions of these associations; our findings support examining these factors prospectively within a longitudinal framework. Second, this study relied exclusively on self-report measures of depressive symptoms, family factors, and alcohol use. It may be that adolescents have poor insight into their emotional experiences or that their retrospective reports of depressive symptoms and alcohol use were over- or under-inflated (Brenner et al., 2003). Additionally, while the measures used in the present study have been used in previous research focusing on substance use among AI adolescents, additional research is needed to examine their psychometric properties. Third, the nature of school-based samples precludes examination of these associations among adolescents who have dropped out of school, including those who may have dropped out of school as a consequence of severe depressive symptoms or patterns of alcohol use, for whom these associations may be especially important (Dupéré et al., 2018). Fourth, this study was a secondary analysis of de-identified data; thus, a community advisory board or tribal IRB review representing the individual communities whose youth are represented in these data was not possible. Future research should ensure that they are incorporating AI community input in the design and conduct of research studies and interpretation of research findings, such as through community-based participatory research methods (Israel et al., 2005). Finally, while the large sample of AI adolescents attending schools on or near reservation communities across 11 states is a notable strength of the present study, it warrants mention that this does not capture the experiences of all AI youth and that the data was collected (in some cases) more than a decade ago. For instance, it is possible that urban versus rural AI youth, or youth who are more or less acculturated, would experience these associations differently. Further, given the relatively low correlation coefficients and small indirect effect identified in the present study, it is likely that there are other factors that would more fully explain the association between depressive symptoms and alcohol use. For instance, socioeconomic status (Steele et al., 2007), mental health stigma (Corrigan et al., 2014; Gary, 2005), and mistrust of medical providers (Goodkind et al., 2011) may contribute to a decreased likelihood of accessing mental health services for depressive symptoms, thereby increasing the likelihood of individuals turning to maladaptive coping strategies, such as alcohol use. Additionally, emotion dysregulation, lack of coping skills, and diminished reinforcement from alternative activities to alcohol use in the context of depressed mood might explain the association between depressive symptoms and alcohol use (Audrain-McGovern et al., 2011; Schick et al., 2019; Wang et al., 2018). Future studies should consider these important contextual factors and should replicate these analyses to understand whether there has been a change in these associations over time.

In summary, results of the present study suggest that family context plays an important role in the association between depressive symptoms and alcohol use among AI adolescents. These findings underscore the importance of recognizing families as a source of protection against alcohol use, especially among AI adolescents also struggling with depressive symptoms. Specifically, parents and other caregivers of AI adolescents who are endorsing depressive symptoms and drinking alcohol should be encouraged to communicate warmth and be equipped with tools to effectively monitor their AI adolescents.

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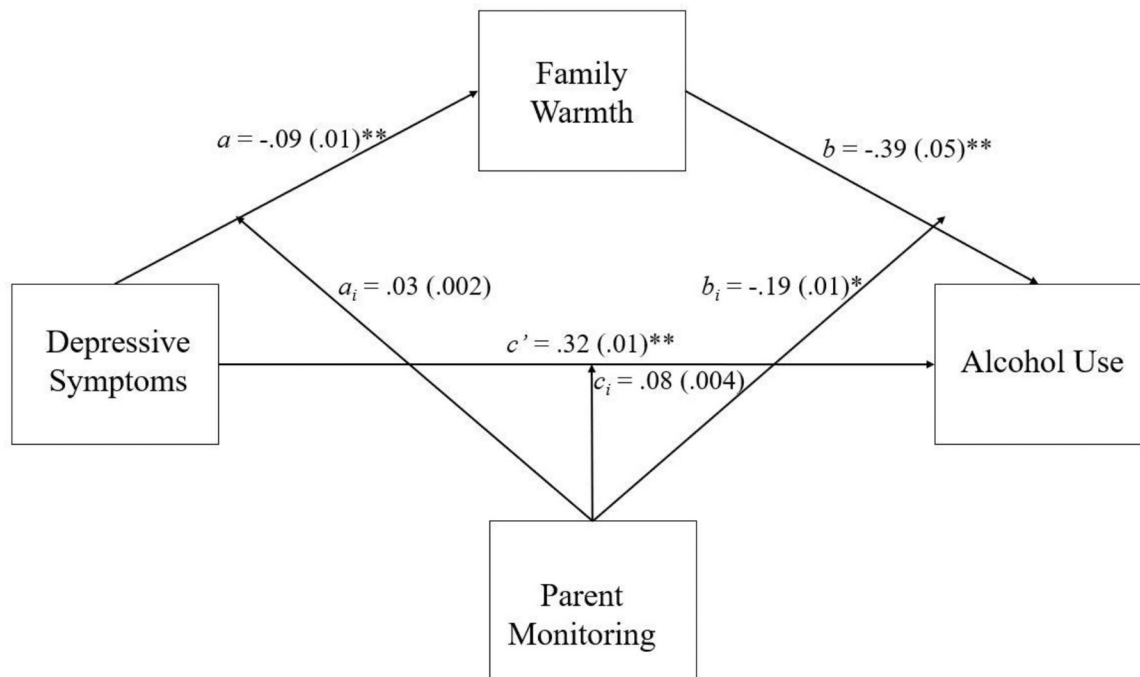


Figure 1. Summary of Moderated Mediation Analyses Explicating the Mediating Role of Perceived Family Warmth and the Moderating Role of Parent Monitoring in the Relation Between Depressive Symptoms and Alcohol Use

Note. Values presented are standardized *bs*, values in parentheses are standard errors based on unstandardized regression coefficients; path labels denoted with *i* represent interaction effects; age and sex are not depicted here but were included as covariates in the model; * $p < .01$, ** $p < .001$.

Table 1

Sample Characteristics (N = 3,498)

| | <i>n</i> (%) | <i>M</i> (<i>SD</i>) | Range |
|-------------------------|---------------|------------------------|--------------|
| Age | | 14.76 (1.70) | 10 – 21 |
| <i>Sex</i> | | | |
| Male | 1,708 (50.5%) | | |
| Female | 1,672 (49.5%) | | |
| <i>Grade in School</i> | | | |
| 7 th grade | 775 (22.2%) | | |
| 8 th grade | 728 (20.8%) | | |
| 9 th grade | 601 (17.2%) | | |
| 10 th grade | 521 (14.9%) | | |
| 11 th grade | 508 (14.5%) | | |
| 12 th grade | 365 (10.4%) | | |
| Depressive Symptoms | | 6.57 (5.59) | 0 – 21 |
| Perceived Family Warmth | | 8.16 (1.79) | 0 – 9 |
| Parent Monitoring | | 8.14 (3.16) | 0 – 12 |
| <i>Alcohol Use</i> | | | |
| Lifetime Alcohol Use | 2,082 (59.7%) | | |
| Lifetime Intoxication | 1,523 (43.7%) | | |
| Alcohol Use | | 2.69 (4.41) | 0 – 28 |

Note: Percentages reflect valid percentages.

Table 2

Bivariate Correlations among Variables of Interest

| Construct | 1 | 2 | 3 | 4 | 5 | 6 |
|----------------------------|---|------|--------|---------|---------|---------|
| 1. Age | - | .002 | -.04* | .05** | -.09*** | .21*** |
| 2. Sex | | - | .10*** | .04* | .18*** | .05** |
| 3. Depressive Symptoms | | | - | -.11*** | -.09*** | .11*** |
| 4. Perceived Family Warmth | | | | - | .13*** | -.11*** |
| 5. Parent Monitoring | | | | | - | -.23*** |
| 6. Alcohol Use | | | | | | - |

Note:

*
 $p < .05$.**
 $p < .01$,***
 $p < .001$;

sex is coded such that 0 = male and 1 = female

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Table 3

Summary of Moderated Mediation Analyses

| Path | <i>b</i> | <i>SE</i> | β | <i>t</i> | <i>p</i> | 95% <i>CI</i> |
|---|----------|-----------|---------|----------|----------|---------------|
| <i>a</i> path | | | | | | |
| Depressive Symptoms → Family Warmth | -.03 | .01 | -.09 | -5.21 | <.001 | [-.04, -.02] |
| Parent Monitoring → Family Warmth | .07 | .01 | .13 | 7.01 | <.001 | [.05, .09] |
| Age → Family Warmth | .07 | .02 | .07 | 3.92 | <.001 | [.04, .11] |
| Sex → Family Warmth | .09 | .06 | .03 | 1.41 | .16 | [-.04, .22] |
| Depressive Symptoms X Parent Monitoring → Family Warmth | .002 | .002 | .03 | 1.49 | .14 | [-.001, .01] |
| <i>b</i> path | | | | | | |
| Family Caring → Alcohol Use | -.22 | .05 | -.39 | -4.87 | <.001 | [-.30, -.13] |
| Parent Monitoring → Alcohol Use | -.29 | .03 | -.94 | -11.72 | <.001 | [-.34, -.24] |
| Age → Alcohol Use | .48 | .05 | .82 | 10.68 | <.001 | [.39, .57] |
| Sex → Alcohol Use | .69 | .15 | .34 | 4.45 | <.001 | [.38, .99] |
| Family Warmth X Parent Monitoring → Alcohol Use | -.03 | .01 | -.19 | -3.22 | .001 | [-.05, -.01] |
| <i>c'</i> path | | | | | | |
| Depressive Symptoms → Alcohol Use | .06 | .01 | .32 | 4.13 | <.001 | [.03, .08] |
| Depressive Symptoms X Parent Monitoring → Alcohol Use | .01 | .004 | .08 | 1.16 | .25 | [-.003, .01] |

Note. Sex is coded such that 0 = male and 1 = female