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Exposure to Parent and Peer Alcohol Use and the Risk of Drinking Onset and Escalation Among Adolescents

Karen A. Randolph[1] · Leah P. Cheatham[2] · Ursula Keller Weiss[3] · Jaclyn Williams[1]

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Abstract Although the rate of alcohol use among adolescents has declined, it remains their drug of choice. Parent and peer alcohol use are powerful risk factors for youth alcohol use. However, questions remain about how these factors influence underage drinking. The present study investigates the relationship between exposure to parent or peer alcohol use and two stages of adolescent drinking—onset and escalation—overall and at five age points during adolescence. Participants were 9348 adolescents in Waves I (WI) and II (WII) of the National Longitudinal Study of Adolescent Health, whose parents completed interviews at WI, and who identified themselves as either non-drinkers or experimental drinkers at WI. Reports of WII alcohol use were used to measure onset among WI non-drinkers and escalation among WI experimenters. Risk ratios were calculated to assess the overall impact of exposure to parent or peer alcohol use on onset and escalation, and at five age points (i.e., ≤ 13, 14, 15, 16, and ≥ 17). Findings show that exposure to either parent or friend alcohol use increased the risk of onset and escalation. Age-based analyses reveal a more nuanced relationship, showing variability in the nature and strength of influence by stage of drinking and by age. This study highlights the relevance of both parent and peer modeling on youth drinking throughout adolescence. Implications in advancing prevention and treatment include parental education about the impact of their own behaviors and the importance of monitoring teens' friendships.

Keywords Adolescents · Alcohol · Parent alcohol use · Peer alcohol use · Relative risk ratio

More than other life stages, adolescence is characterized as a time when many youth engage in risky behavioral experimentation, including alcohol use (Arnett, 1999). While the rate of alcohol use among adolescents continues to decline in the United States (Johnston, O'Malley, Miech, Bachman, & Schulenberg, 2016), it remains the most commonly used drug of choice in this age group (Johnston et al., 2016, US Department of Health and Human Services, 2007). Alcohol use among youth can have devastating consequences, both immediately and later on. Youth who drink alcohol are more likely to experience problems across many domains in their lives (e.g., brain development, family and peer relationship difficulties, school failure) and are more likely to engage in problem behaviors that lead to negative consequences (e.g., abuse of other drugs, alcohol-related car crashes, unprotected sexual activity) (e.g., D'Amico & McCarthy, 2006; U.S. Department of Health and Human Services, 2007). Understanding the correlates of teen alcohol use and their underlying theoretical support is critical to developing successful interventions.

✉ Karen A. Randolph
krandolph@fsu.edu

Leah P. Cheatham
leah.p.cheatham@gmail.com

Ursula Keller Weiss
Ursula.Weiss@msmc.com

Jaclyn Williams
jmw03u@my.fsu.edu

[1] Florida State University College of Social Work, Tallahassee, FL 32306-2570, USA

[2] University of Alabama School of Social Work, Tuscaloosa, AL 35487, USA

[3] Mount Sinai Medical Center of Florida, Miami Beach, FL, USA

Theoretical Background

Much attention has been given to developing theories that explain and inform efforts to delay or minimize engaging in risky behaviors during adolescence, including alcohol use. Two prominent theories in this area are Social Learning Theory (SLT) and developmental theory.

Social Learning Theory

Social Learning Theory has been used extensively to explain adolescent alcohol use (Andrews, Hops, & Duncan, 1997; Petraitis, Flay, & Miller, 1995). One of the main propositions of SLT is that learning occurs through observing the behaviors of influential people in their lives (e.g., parents or friends) and then imitating these behaviors (Bandura, 1977). In this case, SLT scholars who study adolescent behavior have noted that both parents and friends are among the most important influences on alcohol use among youth (e.g., Bonnie & O'Connell 2004). Adolescents are influenced by observing parents and/or friends engaging in drinking (e.g., McLaughlin, Baer, Burnside, & Pokorny, 1985). They then imitate this behavior being modeled by these individuals. Observations of alcohol use by key role models can be especially powerful in affecting adolescents' own alcohol use (e.g., Latendresse, Rose, Viken, Pulkkinen, Kaprio, & Dick, 2008; Randolph, Russell, Harker-Tillman, & Fincham, 2010).

Developmental Theory

Adolescence is marked by rapid changes across many dimensions of the self (e.g., biological, cognitive, psychosocial) (Arnett, 1999). Thus, understanding the nature of behavioral change during this time is an important aspect in fully explaining adolescent risky behaviors. Developmental theory has been used to inform explanations of changes in adolescent risky behaviors. Theorists of this persuasion (e.g., Erikson, 1968) posit that as youth enter adolescence, they experience a major shift toward independence and autonomy. It is during this time that adolescents begin to develop their own sense of identity. In the process, they become acutely aware of perceived peer norms, which are likely to differ from the behavioral standards established by their parents. Part of establishing a sense of unique identity often involves experimenting with new behaviors perceived to be more in line with peer norms in order to gain acceptance from friends. Thus, a major tenet of developmental theory as it explains the developmental processes of adolescent risky behaviors is that the influence of parental factors decrease and the influence of peer factors increase as youth age.

Both SLT and developmental theory informed the current study. Reflecting SLT explanations of adolescent behavior, we investigated the impact of exposure to parent and peer alcohol use (i.e., modeling) on two stages of youth drinking—alcohol use onset and escalation. Acknowledging developmental explanations of behavioral change during adolescence, we examined exposure to parent and peer modeling at five age points across adolescence.

The Nature of Parent and Peer Influences on Underage Drinking

The nature of parent and peer influences on underage drinking is complex, with multiple dimensions that can influence this process. Given the important role of parents and peers in alcohol use among teens (as posited by social learning theorists) and changes in the nature of these influences (as posited by developmental theorists), we review research on two aspects of parental and peer influence on underage drinking—(1) variability in parent and peer effects at different stages of teen alcohol use (e.g., onset, escalation, regular drinking), and (2) variability in the relative influence of parent and peer effects on teen alcohol use at different ages.

Differences by Stage of Alcohol Involvement

Adolescent alcohol use is not a static phenomenon wherein teens either drink or not. Rather, it is a dynamic process in that youth may progress through stages of drinking, from onset to experimentation to regular or heavy drinking (Kandel & Andrews, 1987; Randolph, 2004). As such, factors associated with drinking may vary at the different stages of alcohol use. In other words, what predicts onset may not necessarily predict regular or heavy drinking.

In fact, in their study on predictors of marijuana use across five stages of involvement, van dee Bree and Pickworth (2005) found differences in predictor effects based on the particular stage of marijuana use. While peer substance use predicted experimentation, it was not related to regular marijuana use. This has been shown in studies examining predictors of the different stages of adolescent alcohol use as well. For instance, in their examination of the growth of alcohol use among 200 at-risk boys, Capaldi, Stoolmiller, Kim, and Yoerger (2009) found that parent alcohol use predicted onset but not escalation, whereas peer modeling was associated with both onset and escalation. In another study, Power, Stewart, Hughes, and Arbona (2005) found differences in predictors across four stages of alcohol involvement (i.e., abstainer, normative drinker, high risk drinker, and problem drinker).

As the research indicates, the influence of parental or peer factors (e.g., modeling) can vary based on the different stages of youth alcohol use. A comprehensive examination of alcohol use among teens should account for factors that may be uniquely related to particular stages. We examine the impact of exposure to parental or peer alcohol use on two alcohol-related stages among teens— initiation (e.g., onset) and escalation.

Differences by Youth Age

Finally, the impact of parent or peer modeling may vary as youth move through adolescence. In other words, predictors during early adolescence may not be the same as predictors during late adolescence. This idea has its origins in developmental theory. Traditional developmental theorists posit that, as adolescents move through this stage of development, parent influences decrease and peer influences increase (e.g., Erikson, 1968). Bush, Weinfurt, and Iannotti (1994) found evidence to support this thinking in that the impact of perceptions of parent use was stronger when youth were younger and the impact of peer use was stronger when youth were older.

However, other evidence suggests that the relative influence of parent and peer modeling on adolescent behaviors is dynamic and fluid as teens move through adolescence. Duncan, Gau, Duncan, and Strycker (2011) found that adolescents whose parents reported heavier alcohol use at age 13 as well as those who reported increases in alcohol use over time were more likely increase their own alcohol use. These findings support previous research that highlights the relevance of parental modeling of alcohol use as teenagers move into young adulthood (Fischer, Forthum, Pidcock, & Dowd, 2007) and demonstrates the influence of both parents and peer behavior to engage in alcohol use. Thus, it is important to investigate parent and peer influences of teen behavior at different points throughout adolescence. We use youth age to examine parent and peer modeling effects at five age points across adolescence (i.e., ≤ 13, 14, 15, 16, and ≥ 17).

The Present Study

First, differences in parent and peer modeling by stage of alcohol use informs our interest in examining these relationships at two stages—onset and escalation. Second, changes in the nature of parent and peer modeling as youth move through adolescence supports the investigation of these influences at specific age points. This study used data from the National Longitudinal Study of Adolescent Health (Add Health; Harris, Florey, Tabor, Bearman, Jones, & Udry, 2003). Add Health is a longitudinal study that provides measures of parent and peer alcohol use, in addition to adolescent alcohol use. These data allow us to examine parent and friend modeling effects on two important markers in adolescent drinking—onset and escalation—among youth from a nationally representative sample. We examine onset and escalation at five age points. The relative risk ratio, a unit-free measure of effect size, is used to measure effects. Four research questions are investigated, as follows:

- What is the relationship between exposure to parent alcohol use and drinking onset among adolescents?
- What is the relationship between exposure to friend alcohol use and drinking onset among adolescents?
- What is the relationship between exposure to parent alcohol use and drinking escalation among adolescents?
- What is the relationship between exposure to friend alcohol use and drinking escalation among adolescents?

Methods

Participant Characteristics

The sample are 9348 youth who participated in the first two waves of the Add Health (Harris et al., 2003), whose parents completed interviews at WI, who identified themselves as either non-drinkers or experimental drinkers at WI (as explained in more detail in a subsequent paragraph), and with responses to key measures in the study. Forty-seven percent are male; 53% are female. The mean age at WI was 15.6 years ($SD = 1.56$). Respondents identified themselves as 56% non-Hispanic white, 21% non-Hispanic black, 17% Hispanic, and 6% Asian.

Procedures

Data came from WI and II of the Add Health. The aim of the Add Health is to investigate the correlates and causes of health-related behaviors as youth move from adolescence into adulthood, particularly with regard to how these behaviors are affected by relevant factors in important domains (e.g., families, friends, schools; Harris et al., 2003). This is a representative sample of adolescents in grades 7 through 12 at WI. The Add Health used a multistage, stratified, school-based, cluster sampling design. Students were recruited from 80 public and private high schools, and from one junior high or middle school feeding into each high school. Information on health-related behaviors such as physical activity, sexual activity, and substance use is provided. We utilized secure-use data from adolescent in-home interviews at WI, conducted in 1994, and follow up interviews at WII, conducted in 1996, along with selected data from parent interviews collected at WI. The research was conducted with prior

approval of the Human Subjects Committee at the sponsoring university.

Measures

We replicated the approach Dauber, Hogue, Paulson, and Leiferman (2009) in their use of the ADD Health data to operationalize and categorize non-drinkers and experimental drinkers at WI, and then used this to identify cases for the analysis. We selected this typology because this categorization scheme has been used in previous research (Colder & Chassin, 1999; Dauber et al., 2009; Reboussin, Song, Shrestha, Lohman, & Wolfson, 2006; Steinhausen & Metzke, 2003; Windle, 1996) to acknowledge different influences that are correlated with different stages of youth drinking (e.g., abstainers, experimenters, moderate drinkers, and heavy drinkers).

Cases were divided into two mutually exclusive groups based on reported alcohol use at WI—non-drinkers ($n=5127$) and experimental drinkers ($n=4221$). The non-drinker group included youth who responded "no" to the following, "Have you had a drink of beer, wine, or liquor—not just a sip or a taste of someone else's drink—more than 2 or 3 times in your life?" Experimental drinkers were youth who reported alcohol use of once per month or less in the past 12 months, identified based on their response to the question, "During the past 12 months, on how many days did you drink alcohol?" Those cases of youth who selected either "once a month or less" or "1–2 days in the past month" were identified. From these cases, we then eliminated those who had responded "no" to the item we used to create the non-drinker group (as described previously). Youth who reported drinking more than once per month at WI (n = 3646; 32% of those with legitimate responses to this item) were considered as engaging in alcohol use that was beyond experimental, and thus their cases were not included in the analysis. Figure 1 shows sample sizes both groups at WI (non-drinkers = 5127; experimental drinkers = 4221).

Reported alcohol use at WII was used to create measures of onset for WI non-drinkers and escalation for WI experimenters. Reported alcohol use at WII was dichotomized. As shown in Fig. 1, of the WI non-drinkers, 78% ($n=4002$) reported continued non-drinking at WII, while 22% ($n=1125$) reported drinking onset. Of the WI experimental drinkers, 80% ($n=3366$) reported that they had either discontinued use or maintained infrequent drinking at WII. Twenty percent ($n=855$) reported that they had progressed to moderate (drank 2–3 days per month in the past 12 months) or heavy use (drank at least 1–2 days per week in the past 12 months).

Parental responses to the item, "How often do you drink alcohol?" from the WI Parent Questionnaire were used to

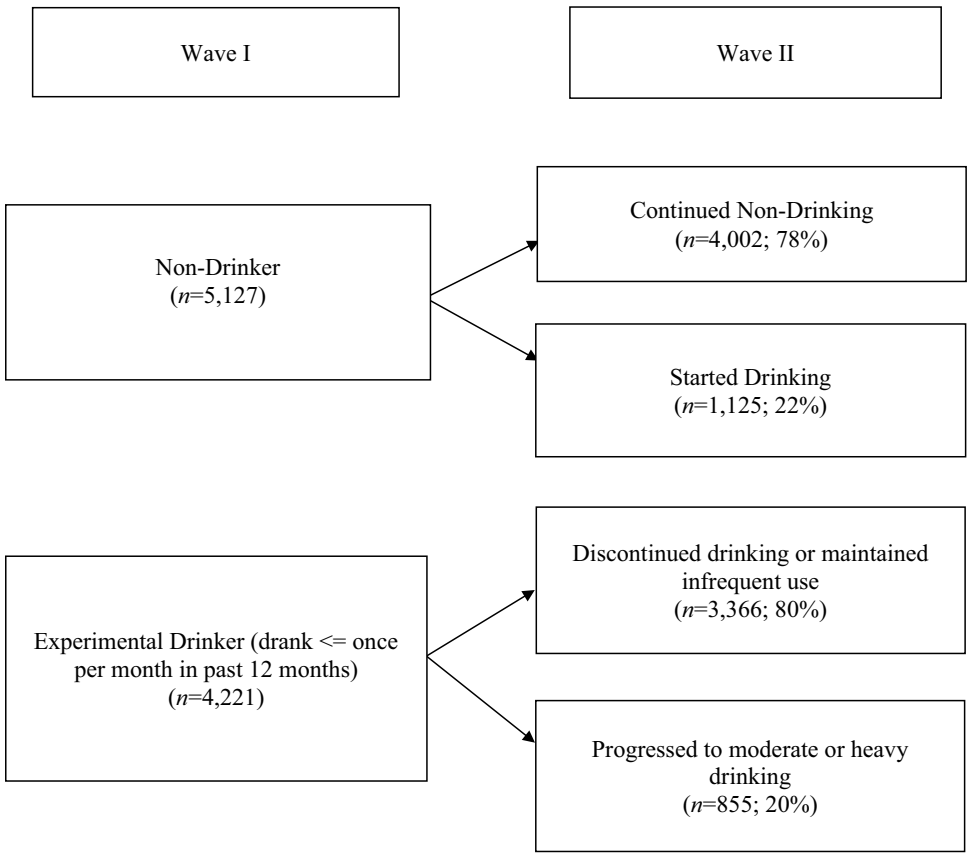

Fig. 1 Drinker types based on Wave I and Wave II drinking behavior

measure parent use. A total of 17,579 parents provided usable responses to this item, using the following six response options: Never (n = 7960; ~45%); Once a month or less (n = 5665; ~32%); 2 or 3 days a month (n = 1658; ~9.4%); once or twice a week (n = 1608; ~9.1%); 3–5 days per week (n = 403; ~2.3%); and nearly every day (n = 285; ~1.6%). We combined these responses to create a dichotomous variable, coded as "0" = no alcohol use from those who marked "Never" in the original study and "1" = alcohol use from those who selected one of the other five other response options in the original study. We then matched these cases with the cases of youth who were included in our analysis, and deleted those parent cases who did not match to youth cases in our analysis.

A dichotomous variable was also created to measure friend use, based on youth responses to the item, "Of your three best friends, how many drink alcohol at least once a month?" from the WI Youth In-Home Questionnaire, with "0" = no friends and "1" = one, two, or three friends. The total number of usable responses to this item in the original study was 6351, with the following distribution: 44% (n = 2777) reporting "no friends", 22% (n = 1400) reporting "one friend", 14% (n = 901) reporting "two friends", and 20% (n = 1273) reporting "three friends. We combined these responses to create a dichotomous variable, coded as "0" = "no friends" from those who marked "no friends" in the original study and "1" = one, two, or three friends from those who selected one of the other three response options in the original study. We then matched these cases with the cases of youth who were included in our analysis, and deleted those cases with missing data on this item.

Respondents' age was based on self-reported data. We created five age groups for the analysis—≤ 13, 14, 15, 16, and ≥ 17.

Data Analysis

We used the multinomial logistic regression procedure in STATA, V11 to calculate the relative risk ratios. A relative risk ratio (*RR*) is one of several types of effect size measures (e.g., correlation, odds ratio). Measures of effect size provide valuable information, beyond statistical significance, about the magnitude or strength and (typically) direction of the relationship between two variables. Another feature of *RR*s is that they are unit-free, which permits comparison across outcomes.

Relative risk ratios indicate the probability of experiencing an outcome when *exposed* to a risk factor divided by the probability of experiencing an outcome when *not exposed* to the risk factor (Rossi, 2010). This then allows for a comparison of the risk of experiencing the outcome for those exposed to the risk factor, relative to the risk of experiencing the outcome for those not exposed to the risk factor. Risk ratios greater than 1 indicate that experiencing the outcome is *higher* for individuals who are exposed to the risk factor than it is for those who are not exposed to the risk factor. Risk ratios less than 1 indicate that those who are exposed to the "risk" factor are *less likely* to experience the outcome. Risk ratios at or near 1 indicate no difference in experiencing the outcome based on exposure to the risk factor. Risk ratios are unit-free, which permits comparison across outcomes.

To evaluate the statistical significance of the individual *RR*s and compare parent and peer RRs, we calculated 95% confidence intervals (CIs). Risk ratios with CIs that contain the value of "1.00" are interpreted as not statistically significant, as 1 is the null value (Peat, Barton, & Elliott, 2009). Confidence intervals can also be used to determine statistically significant differences between two risk ratios by examining whether their CI ranges overlap. If CI ranges do not overlap, the two risk ratios are considered statistically different from one another (Scholte, Poelen, Willemsen, Boomsma, & Engels, 2008).

In this case, we examined two WII outcomes (i.e., drinking onset and escalation) based on exposure to two WI risk factors (i.e., parent or peer alcohol use). We estimated risk ratios for onset and escalation based on exposure to parent or peer alcohol use for the overall sample and by WI age. Other potential factors that explain onset and escalation were not tested, and are beyond the scope of this analysis.

Results

In this section, we report findings of the overall sample and then examine two sets of comparisons. First, we describe differences in the risk of onset and escalation by exposure to either parent or friend alcohol use. Then, to more specifically understand the source of influence, we report differences in the risk of onset and escalation among youth exposed to parent alcohol use, and differences in the risk of onset and escalation among youth exposed to friend alcohol use.

Risk Ratios for Initiation and Escalation: Overall Sample

As Table 1 shows, youth exposed to either risk factor at WI (i.e., parents or friends who drink) are at greater risk of onset or escalation at WII, as indicated by the positive values of the risk ratios. As the CIs indicate, the RRs are statistically significant. The magnitudes of the risk ratios show differences by the particular stage of drinking. For youth exposed to parent alcohol use, the *RR* for onset is 1.69 [z = 5.76, p < .00, 95% CI (1.41, 2.02)]; the *RR* for escalation is weaker, at 1.26 [z = 2.15, p = .03, 95% CI (1.02, 1.55)]. This suggests that exposure to parent alcohol use has stronger effect on onset than escalation. On the other

Table 1 Risk ratios for WII drinking onset or escalation by exposure to parent or friend alcohol use at WI

Drinker type	Exposure to parent alcohol use						Exposure to friend alcohol use					
	Yes		No		*RR*	95% CI	Yes		No		*RR*	95% CI
	%	*n*	%	*n*			%	*n*	%	*n*		
Onset	26	661	18	464	1.69***	[1.41, 2.02]	30	435	19	690	1.78***	[1.48, 2.15]
Escalation	22	547	18	308	1.26*	[1.02, 1.55]	24	681	12	174	2.25***	[1.77, 2.86]

RR risk ratio, *CI* confidence interval

*p < .05

***p < .001

hand, for youth exposed to friend drinking, the *RR* is 1.78 [z = 6.12, p < .00, 95% CI (1.48, 2.15)] for onset, and 2.25 [z = 6.62, p < .00, 95% CI (1.77, 2.86)] for escalation, suggesting that exposure to friend drinking is more likely to lead to escalation, relative to onset.

In comparing differences by parent or friend alcohol use, the risk of onset for youth exposed to parents who drink is 1.69 [z = 5.76, p < .00, 95% CI (1.41, 2.02)]; the risk of onset is slightly stronger [*RR* = 1.78; z = 6.12, p < .00, 95% CI (1.48, 2.15)] for youth exposed to friends who drink. Thus, there appears to be little difference in the risk of onset based on exposure to parent versus friend alcohol use. The overlapping CIs indicate that differences between these RRs are not statistically significant. In contrast, for youth who had begun to experiment with alcohol use at WI, the risk of escalation at WII is less for youth exposed to parents who drink [*RR* = 1.26; z = 2.15, p = .03, 95% CI (1.02, 1.55)] compared to youth exposed to friend drinking [*RR* = 2.25; z = 6.62, p < .00, 95% CI (1.77, 2.86)]. The non-overlapping CIs indicate a statistically significant difference.

Parent and Friend Risk Ratios by Age

Table 2 provides risk ratios for onset and escalation at WII at ≤ 13, 14, 15, 16, and ≥ 17 for youth exposed to parent or friend alcohol use at WI. These results provide more nuanced information about the relationship between exposure to parent or friend alcohol use and the risk of onset or escalation, relative to results of the overall sample.

Parent and Friend Risk Ratios for Onset by Age

To enhance comparisons by age, Fig. 2 provides plots of parent and friend risk ratios and CIs for onset. The values of both parent and friend risk ratios are above "1" at each age point, suggesting exposure to parent or friend alcohol

Table 2 Risk ratios for WII drinking onset or escalation by exposure to parent or friend alcohol use and youth age at WI

Age	Exposure to parent alcohol use						Exposure to friend alcohol use					
	Yes		No		*RR*	95% CI	Yes		No		*RR*	95% CI
	%	*n*	%	*n*			%	*n*	%	*n*		
(a) Drinking onset												
≤ 13	23	158	14	83	1.84**	[1.26, 2.69]	31	64	16	177	2.40***	[1.56, 3.68]
14	27	145	22	98	1.23	[0.837, 1.79]	28	64	24	179	1.09	[0.716, 1.65]
15	30	146	19	101	1.84**	[1.24, 2.72]	32	104	21	143	1.80**	[1.20, 2.69]
16	24	101	15	75	1.86**	[1.19, 2.89]	24	78	16	98	1.64*	[1.05, 2.56]
≥ 17	29	111	21	107	2.12***	[1.39, 3.24]	35	125	17	93	2.44***	[1.59, 3.73]
(b) Drinking escalation												
≤ 13	15	46	9	14	1.31	[0.613, 2.82]	18	42	8	18	2.19*	[1.07, 4.47]
14	21	79	12	27	2.17*	[1.16, 3.99]	21	77	12	29	1.47	[0.825, 2.60]
15	20	114	17	63	1.25	[0.791, 1.97]	22	140	12	37	2.56***	[1.53, 4.28]
16	23	149	21	93	1.17	[0.794, 1.72]	26	202	13	40	2.28**	[1.41, 3.68]
≥ 17	27	159	21	111	1.18	[0.797, 1.75]	28	220	16	50	2.12**	[1.33, 3.39]

RR risk ratio, *CI* confidence interval

*p < .05

**p < .01

***p < .001

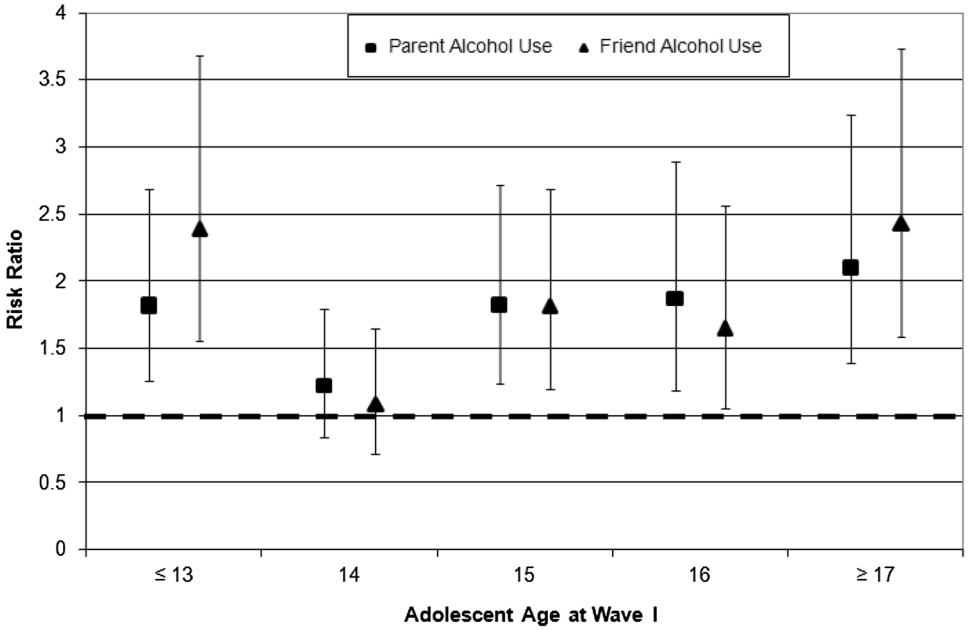

Fig. 2 Risk ratios and confidence intervals for Wave II drinking onset by exposure to parent or friend alcohol use and youth age at Wave I

use increases the risk on onset regardless of age. However, the bottom values of CIs for both risk ratios at age 14 are less than "1", indicating lack of statistical significance of the *RR*s at this age.

The magnitudes of the risk ratios at each age suggest that risk varies by age and by type of exposure (i.e., parent or friend alcohol use). For youth exposed to friend alcohol use, risk ratios are stronger at age ranges ≤ 13 and ≥ 17, the beginning and end of adolescence, relative to middle adolescence. The magnitudes of the risk ratios across each age point for youth exposed to parent alcohol use show a different pattern. The values are about the same at age points ≤ 13, 15, and 16; the lowest risk ratio is at age 14; the highest risk ratio is at ≥ 17. The overlapping CIs of the parent and friend *RR*s at each age point indicate that the differences are not statistically significant.

Parent and Friend Risk Ratios for Escalation by Age

Figure 3 provides plots of parent and friend risk ratios and CIs for escalation. Similar to onset, all parent and friend risk ratios are above the value of '1' at each age point, suggesting exposure to parent or friend alcohol use increases the risk on drinking escalation regardless of age. However, the bottom

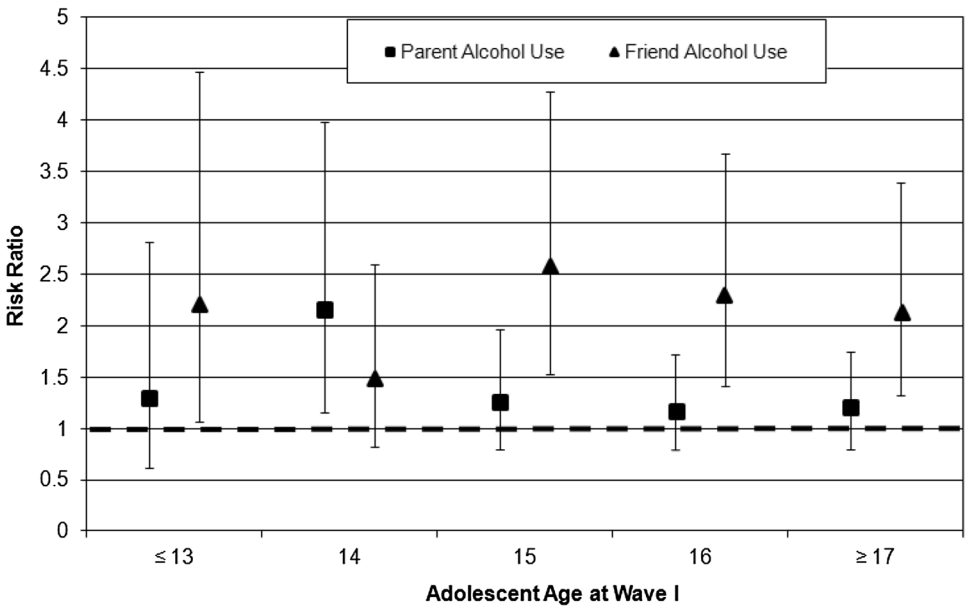

Fig. 3 Risk ratios and confidence intervals for Wave II drinking escalation by exposure to parent or friend alcohol use and youth age at Wave I

values of CIs of risk ratios for exposure to parent alcohol use at ages ≤ 13, 15, 16, and ≥ 17 are less than "1", indicating lack of statistical significance. On the other hand, only one of the bottom values of the CIs of risk ratios for exposure to friend alcohol use is less than "1" [at age 14; *RR* = 1.47, z = 1.30, p = .19; 95% CI (0.825, 2.60)], indicating that the RRs are statistically significance at the other ages.

Also similar to onset, the magnitudes of risk ratios at each age suggest that risk of escalation varies by age and by type of exposure (i.e., parent or friend alcohol use). For youth exposed to friend alcohol use, risk ratios are well above 2 at ages ≤ 13, 15, 16, and ≥ 17. On the other hand, the magnitudes of the risk ratios across the same age point for youth exposed to parent alcohol use are well below 2. Interesting, the value of the magnitudes flip at age 14, such that the risk ratio for exposure to parent alcohol use [*RR* = 2.17, z = 2.48, p = .01; 95% CI (1.18, 3.99)] is higher than the risk ratio for exposure to friend alcohol use [*RR* = 1.47, z = 1.30, p = .19; 95% CI (0.825, 2.60)]. The overlapping CIs of the parent and friend risk ratios at each age point indicate that differences between these RRs are not statistically significant.

Discussion

Alcohol use among adolescents continues to be a major concern in the U.S. Although rates have declined, it remains a popular drug among this group. Further, alcohol use has been linked to problems such as relationship difficulties, poor school achievement, and problems in brain development. The current study used data from the Add Health (Harris et al., 2003) to examine the influence of exposure to parent or friend alcohol use on two stages of youth drinking—onset and escalation.

Similar to previous research (e.g., Donovan & Molina, 2011), our findings revealed that a substantial number of youth progressed from nonuse to onset, and from experimentation to moderate or heavy drinking. This underscores the importance of conceptualizing adolescent alcohol use as a dynamic process in which many teens are at risk of moving into stages of increased drinking (Randolph, 2004). These progressions are likely to be accompanied by the potential for increased harm and negative consequences (Bonnie & O'Connell, 2004).

Consistent with other tests of SLT's modeling proposition (e.g., Jackson, 1997), we found that exposure to either parent or friend alcohol use is strongly related to adolescent drinking. However, these relationships differed depending on the stage of drinking. Youth exposed to parent alcohol use were at higher risk of onset, relative to escalation. This finding is similar to previous studies reporting that parental drinking affects alcohol initiation more than regular drinking (e.g., Capaldi et al., 2009). On the other hand, exposure to friend alcohol use may have a slightly stronger effect on escalation than onset.

This study also shows the importance of considering youth age in evaluating the impact of exposure to parent or friend alcohol use on drinking onset and escalation. For onset, exposure to either parent or friend alcohol use remains a risk factor across adolescence, extending previous findings identifying these influences during early adolescence (D'Amico & McCarthy, 2006), and also suggesting that peer influences on onset remain important. Further, these findings lend support to conclusions that exposure to parent alcohol use has a stronger effect on onset, relative to escalation, as indicated by comparing parent risk ratios for onset and escalation across age points. The lack of statistical significance in these relationships as revealed by the overlapping CIs should be considered in drawing conclusions. Nonetheless, to our knowledge no other study has examined risk at these age points as they impact alcohol onset and escalation.

The magnitudes of the risk ratios for exposure to both parent or friend alcohol use at age 14 for onset and, to a lesser extent, escalation are notable in the manner in which they deviate from the *RRs* at other age points. For onset, both parent and friend *RRs* at age 14 are much weaker than at other ages. For escalation, the age 14 parent *RR* is stronger than at other ages, whereas the age 14 friend *RR* is weaker than at other ages. In their examination on the risk of smoking based on parent or peer modeling, Bauman, Carver, and Gleiter (2001) also found unusual patterns in *RR* magnitudes at age 14 relative to the other risk ratios albeit differently than our findings. In the Bauman et al. study, the magnitude of the *RR* for smoking onset by exposure to peer smoking was the lowest at age 14 and the magnitude of the RR for smoking onset by parent smoking was the highest.

How can these counterintuitive findings be explained? It may simply be an aberration in the data. On the other hand, it may suggest that age 14 is a critical marker in adolescence. While youth experience several transitions throughout adolescence, one of the most notable, which typically occurs around age 14 for many youth, is changing schools—from middle school to high school. This move may be accompanied by instability and shifts in friendship groups, weakening the influence of peers, with youth looking to their parents for familiarity and stability, as youth navigate this change. Such a change could be a factor in explaining the patterns in the age 14 *RR*s, and one that requires further investigation.

These findings also have implications for practitioners and policy makers. The magnitudes of the risk ratios for exposure to parent drinking, especially onset, highlight the role of parents in preventing underage drinking. These findings suggest that parents remain relevant in influencing their children's alcohol use behavior throughout adolescence, particularly among youth who have not started drinking yet. This has important practical implications for prevention

and early intervention. Parents should be educated about the importance and impact of their alcohol use behaviors on their children's drinking. Specifically, practitioners and policy makers should inform parents of the powerful influence of their own alcohol use behaviors as observed by their children, even when household rules and norms are intended to discourage youth alcohol use (e.g., Van Der Vorst, Engels, Meeus, & Deković, 2006). Given the magnitudes of the RRs for exposure to peer drinking, parents also need to closely monitor their children's selection of friends.

While informative, these findings should be interpreted within the limitations of the study. First, other factors that may contribute to understanding the relative roles of parents and peers in drinking onset and escalation among youth were not considered in our analyses. For instance, we did not examine alcohol onset or escalation for youth who were simultaneously exposed to both parent and friend alcohol use. Exposure to parent and friend drinking, in combination, may have a synergistic effect, as research has shown that youth whose parents and friends use substances have relatively high rates of substance use, compared to other groups (e.g., Chassin, Curran, Hussong, & Colder, 1996). It has also been shown that friend substance use predicted subsequent substance use among youth whose parents were substance users, but not for youth whose parents did not use substances (e.g., Li, Pentz, & Chou, 2002). Future research should examine the impact of simultaneous exposure to parent and peer alcohol use on youth alcohol use progression, including onset and escalation.

Related, while the relative risk ratio (as an effect size measure) allows for comparison of the influence of parent and peer alcohol use on youth onset and escalation, the relative influence of parent and peer alcohol use on youth alcohol use onset and escalation was not examined in a multivariate model. Thus, other predictors were not accounted for in this study. This limits conclusions that can be drawn about the relative importance of both factors.

In examining peer-related effects, our focus was on peer socialization (i.e., observing and modeling peer behaviors). The effects of peer selection (i.e., youth intentionally affiliating with peers who share similar beliefs, attitudes, and behaviors) on alcohol onset and escalation were not examined. In fact, it may be that both processes have a role in accounting for the influence of peers in youth drinking (e.g., Becker & Curry, 2014). This is another limitation of our study.

Dichotomous measures of parent and peer alcohol use were used to assess the impact on the outcomes. A full behavioral conceptualization of alcohol use includes not only whether an individual uses alcohol, but the frequency (i.e., how often one engages in alcohol use) and intensity (i.e., how much one drinks during a particular episode) as well. Both components have a role in fully understanding the impact of alcohol use (e.g., Vermeulen-Smit et al., 2012). The likely consequence of the dichotomous measurement is an underestimation of the impact of exposure to parent or peer alcohol use on the risk of onset and/or escalation among adolescents.

Further, while previous research suggests that the impact of parent and peer alcohol use on youth alcohol use may vary based on background characteristics (e.g., family structure; Brown & Rinelli, 2010) we did not conduct analyses by gender, race/ethnicity, immigrant status, or family structure due to insufficient cell sizes in some subgroups. Finally, the study design is such that results are correlational. It is beyond the scope of this study to posit causality.

Despite these limitations, this study makes important contributions in advancing research and practice in the prevention and treatment of underage drinking. This study extends knowledge in understanding the influence of exposure to parent or friend alcohol use on the risk of drinking onset and escalation among adolescents. Of note is the fact that both parent and friend modeling are relevant throughout adolescence, although the magnitude of the influence varies by the stage of drinking. Also of note is the impact at particular age points. This level of detail has the potential to uncover key markers in the progression of alcohol use and abuse among adolescents. While the findings from this study do not apply to behaviors beyond drinking onset and escalation or to other measures of parent and friend influence, the use of data drawn from a national probability sample strengthens assertions that exposure to either parent or peer alcohol use are risk factors for drinking onset and escalation, and that these risk factors remain relevant throughout adolescence among youth in the United States.

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Compliance with Ethical Standards

Conflict of interest The authors report no conflicts of interest. The authors alone are responsible for the content and writing of the paper.

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