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Hurting, Helping, or Neutral? The Effects of Parental Permissiveness toward Adolescent Drinking on College Student Alcohol Use and Problems

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Abstract

To enhance prevention efforts to reduce college drinking, parents have been identified as an important source of influence that can be modified with brief interventions. Research suggests parental permissiveness toward drinking in adolescence is positively related to college student drinking, though existing studies have not comprehensively accounted for potential confounders (e.g., parental drinking). The present study used propensity modeling to estimate the effects of pre-college parental permissiveness on college student drinking and consequences while accounting for an inclusive range of confounders. A random sample of 1518 incoming students at a large university completed baseline measures of parental permissiveness and a list of confounders (e.g., parental drinking, family history). At follow up 15 months later, participants reported on their drinking and alcohol-related consequences. To control for potential confounders, individuals were weighted based on their propensity scores to obtain less biased estimates of the effects of parental permissiveness on drinking and consequences. Analyses revealed parental permissiveness was consistently and positively associated with college drinking and consequences when the confounders were not accounted for, but these effects were attenuated after weighting. Parent's allowance of drinking was not related to college drinking or consequences after weighting. Students' perceived parental limits for consumption were related to drinking and consequences in the weighted models. Prevention efforts may benefit from targeting parents' communication of acceptable limits for alcohol consumption.

Keywords

college student drinking; parental permissiveness; propensity model

High risk drinking among college students is a pervasive health problem, and recent research suggests almost half of all college students in the U.S. report being intoxicated in the last month (Johnston, O'Malley, Bachman, & Schulenberg, 2011). Heavy drinking has been consistently shown to be associated with serious consequences for college students, including social, academic, legal, and physical problems such as being injured or assaulted (Hingson, Heeren, Winter, & Wechsler, 2005; Read, Beattie, Chamberlain, & Merrill, 2008; Shillington & Clapp, 2006). In response, NIAAA has made college drinking prevention an important research priority, though rates of drinking and related consequences have yet to decline (NIAAA, 2007; Johnston et al., 2011).

With the goal of enhancing prevention efforts including early intervention, studies have identified predictors of college heavy drinking that exist prior to college (Baer, 1994; Borsari & Carey, 2001; Borsari, Murphy, & Burnett, 2007; Neal & Fromme, 2007; Read, Wood, Kahler, Maddock, & Palfai, 2003; Weitzman, Nelson, & Wechsler, 2003). In particular, one factor that is longitudinally related to college student drinking and modifiable in a brief intervention context is the influence of parents (Cleveland, Lanza, Ray, Turrissi, & Mallett, 2012; Turrissi, Abar, Mallett, & Jaccard, 2010; Walls, Fairlie & Wood, 2009). Parent-based interventions with demonstrated efficacy are delivered as a 20-page handbook that describes problems associated with college drinking along with parenting practices that are protective against college drinking (e.g., monitoring, effective communication; see Turrissi et al., 2013). Although parents are generally thought of as protective influences that can offset the comparatively negative influence of peers (Wood, Read, Mitchell, & Brand, 2004; Turrissi & Ray, 2010), there is also evidence that certain parental behaviors may be related to higher levels of college student drinking. For example, permissive behavior such as allowance of drinking during high school has been associated with more alcohol-related problems longitudinally (van der Vorst, Engels, & Burk, 2010), though other research conflicts with these findings (Foley, Altman, Durant, & Woolfson, 2004).

Debate on the Role of Parental Permissiveness and College Drinking

Researchers and the general media have debated the role of parental permissiveness in heavy drinking during college. For example, arguments have been made in the popular press that parental allowance of drinking in the home is protective against later heavy drinking. Proponents of this view have argued that by allowing adolescents to drink in the home, parents are able to teach adolescents to drink responsibly, demystify drinking, and reduce adolescents' interest in drinking (see Cloud, 2008; Peele, 2007). Empirical evidence does not support this claim and shows rates of heavy drinking among college students and emerging adults and rates of alcoholism among adults are higher in countries with lower legal drinking ages than they are in the U.S. (Anderson & Baumberg, 2006). Further, parental allowance of drinking inside the home has been associated with higher levels of problem drinking in countries where alcohol use is legal at younger ages (van der Vorst et al., 2010).

Research on the effects of parental permissiveness, and specifically parental allowance of drinking, on heavy drinking among college students in the U.S. is scarce. One existing study examined the drinking outcomes of female first-year students whose parents allowed them to drink at home either during meals or with friends during high school (Livingston, Testa, Hoffman, & Windle, 2010). Findings indicated students whose parents allowed them to drink in the home engaged in more frequent heavy drinking in college than those who were not permitted to drink at all (Livingston et al., 2010). This study had several limitations that preclude strong conclusions about parental allowance of drinking and college heavy drinking, such as not including male students and not accounting for potential confounders (e.g., parents' own drinking habits).

There is scant but conflicting evidence suggesting parental permissiveness may actually be protective against college drinking. In a sample that included both high school and college students (ages 16–20), Foley and colleagues (2004) examined how participants obtained alcohol (e.g., from family members, from same-age friends) as a predictor of heavy drinking in the past 30 days. Among those who reported drinking, drinking alcohol provided by a parent or relative was protective against heavy drinking relative to drinking alcohol provided by a non-adult (Foley et al., 2004). The authors concluded that parental permissiveness during adolescence might be a protective factor against later heavy drinking. In consideration of the studies described above, research on the association between parental allowance of drinking and college heavy drinking remains inconclusive.

Researchers and proponents of allowing youth to drink at home have offered an untested explanation for this inconsistency, which is that parental allowance of drinking is often confounded with other, higher-risk parental influences that have not been assessed (Livingston, et al., 2010; van der Vorst, Engels, Meeus, & Dekovic, 2006; Windle, 2000). For example, parents who allow adolescent alcohol use may be heavier drinkers themselves, or they may pass on a genetic predisposition to alcohol abuse. In addition to parental modeling and genetic risk, there are many possible confounders that could account for the association between parental permissiveness and increased levels of drinking, including lack of parental monitoring, earlier age of drinking onset, and overall parent-child relationship quality (Arria, et al., 2008; Chassin & Handley, 2006 ; Fromme, 2006; Patock-Peckham, King, Morgan-Lopez, Ulloa, & Filson-Moses, 2011; White, Johnson & Buyske, 2000). These factors are complex and interrelated, making analysis of the effect of parental permissiveness on college drinking using traditional regression methods (e.g., ANCOVA) difficult. To date the unique effect of parental permissiveness on college heavy drinking, after accounting for potential confounders, has not been fully explored.

Further complicating the debate, parental permissiveness of drinking can be conceptualized in different ways. For example, some parents who allow their adolescents to drink may set conservative limits and allow them to have one or two drinks at family celebrations. Other parents may be more lenient and allow their adolescents to have several drinks at parties with friends. Reflecting these differences, in addition to explicit allowance of drinking (Livingston et al., 2010), parental permissiveness can be construed as students' perceptions of what their parents would consider to be an acceptable limit for consumption per occasion (e.g., Abar, 2012; Fairlie, Wood, & Laird, 2011; Wood et al., 2004). When assessed in terms

of perceived parental limits, parental permissiveness has been consistently and positively associated with college drinking (Abar, 2012; Fairlie et al., 2011; Varvil-Weld, Mallett, Turrisi, & Abar, 2012). However, the impact of each specific aspect of parental permissiveness (i.e., explicit allowance of drinking and acceptable limits for consumption) on college drinking, after accounting for the effects of other important confounders, remains unknown.

Present Study

To address these gaps in the literature, the present study employed propensity modeling (Rosenbaum & Rubin, 1983), to estimate the effects of both types of parental permissiveness (allowance of drinking and perceived parental limits for consumption) on drinking and related consequences during college. Propensity modeling is used to estimate the causal effect of a factor (i.e., parental permissiveness) in observational studies (Rosenbaum & Rubin, 1983). Propensity modeling weights individuals within a sample based on levels of confounders in order to obtain an unbiased, or less biased, estimate of the causal effect of the factor on the outcome of interest (i.e., drinking, related consequences) independent of the effects of the confounders (Coffman & Zhong, 2013). In the present study, propensity modeling was used to estimate the effect of parental permissiveness on drinking and related consequences during college, after controlling for an inclusive range of confounders chosen based on the extant literature (e.g., family history of problems with alcohol, parental modeling of alcohol use, parental monitoring, age of onset of alcohol use, etc.). The effects of both facets of parental permissiveness, parents' explicit allowance of drinking prior to college and perceived parental limits, were estimated. The objective was to determine whether parental permissiveness was protective, risky, or neutral, in terms of its relation to college drinking and related consequences.

We used previous literature that has documented the association between parental permissiveness and heavy drinking during college to guide our hypotheses. First, based on previous research documenting positive associations between parental permissiveness and college drinking (Abar, Abar, & Turrisi, 2009; Fairlie et al., 2011; Livingston et al., 2010) we expected that both aspects of parental permissiveness would be associated with higher levels of college drinking and consequences, even after accounting for potential confounders. We did not expect to find support for permissiveness as a method to teach adolescents to drink responsibly. Second, previous findings on the relationship between parental allowance of drinking and later alcohol problems are inconclusive (e.g., Livingston et al., 2010; Foley et al., 2004), while evidence of a positive association between perceived parental limits and college drinking is more consistent (Abar et al., 2009; Abar, 2012; Varvil-Weld et al., 2012). Therefore we expected perceived parental limits, rather than parents' allowance of drinking, would have a larger effect on college drinking and consequences after accounting for the confounders.

Methods

Sample

Participants—Participants were randomly selected incoming freshmen ($N=1,518$) at a large, public northeastern university during the early summer prior to college entrance in 2008 and 2009. Invitation letters listing study procedures, compensation, the URL for the online survey, and a personal identification number (PIN) were mailed on university letterhead and then emailed (for convenience) to all potential participants. This study was part of a larger intervention study, so participants were randomized to one of four intervention conditions prior to recruitment (statistical controls are described later). Of the 2400 participants initially contacted, 1518 consented to participate in the study and completed the web-based baseline assessment, yielding a 63% overall response rate, consistent with others using a web-based approach (McCabe et al., 2002; McCabe et al., 2005).

Data were collected online at two time points: 1) baseline, in the summer prior to college entrance, and 2) follow up, in the fall of the second year of college. There was an 80% retention rate for students at follow up. There were no differences in drinking or consequences between those that completed the study versus those that were lost to follow up. Students received \$20 for completion of each survey, and they received a \$5 bonus if they responded within 48 hours of recruitment. The local institutional review board approved all study procedures.

The demographic characteristics of the sample were as follows: 54% female, 86% Caucasian, 5% Asian, 5% Hispanic, 3% African American, and 2% multi-racial or other. These proportions are representative of the larger campus community from which the sample was drawn. The mean age for the sample was 17.5 years ($SD = .32$).

Measures

Both types of parental permissiveness and potential confounders were assessed at baseline (summer prior to college entrance), and drinking and consequences were assessed at follow up (fall of the sophomore year). Student-reported data on parenting have been found to be reliably correlated with student drinking outcomes (Varvil-Weld, Turrissi, Scaglione, Mallett, & Ray, 2013).

Parental Permissiveness and Confounders

Parental Permissiveness – Allowance of Drinking: Perceived parental allowance of drinking was assessed using one item, “How old were you the first time you drank alcohol (more than a few sips) with permission from your parents?” and response options were recoded as (0) *never permitted*, and (1) *ever permitted*.

Parental Permissiveness – Perceived Parental Limits: Perceived parental limits were assessed using one item, “During your senior year of high school, how many drinks would your parents consider to be an upper limit for you to consume on any given occasion?” with the following response options: (0) *no amount*, (1) *one drink*, (2) *two drinks*, (3) *three*

drinks, (4) four drinks, (5) five drinks, (6) six to 12 drinks, and (7) there is no upper limit (Abar et al., 2009).

Potential Confounders: Propensity score modeling allows for the inclusion of a large number of confounders; therefore, confounders were chosen liberally and with the goal of inclusiveness. Potential confounders included in the models included age of onset of alcohol use, gender, intervention condition, baseline typical daily drinking, baseline peak drinking, descriptive peer norms, parental history of problem drinking, parental monitoring, parental modeling, parent-teen alcohol-specific communication, and general parent-teen relationship quality. Confounders can be entered as individual items rather than sum scores. Therefore, the items used to assess each potential confounder will be described briefly along with a few representative examples. Further details can be found in the original sources. All measures chosen have been used previously in the literature on college student drinking and have shown good validity and reliability.

To assess age of onset, participants were asked to indicate their age 1) the first time they drank alcohol (more than a few sips), and 2) the first time they got drunk (Mallett et al., 2010). Previous research suggests self-reported age of onset data is generally reliable (Johnson & Mott, 2001). Typical daily drinking and peak drinking at baseline were assessed using the same measures as for the drinking outcomes (see below). Descriptive peer norms were assessed using a modified version of the Daily Drinking Questionnaire (DDQ; Collins, Parks, & Marlatt, 1985). Participants reported how many drinks their friends consumed on each day of a typical week. To assess parental history of problem drinking, participants indicated: 1) how often each parent drank alcohol, 2) how many drinks each parent had per drinking occasion, and 3) whether they believed each parent was an alcoholic (Sher & Descutner, 1986). Parental monitoring was assessed with four items asking the extent to which participants' parents tried to know what they did during their free time and about their drinking (Wood et al., 2004). Parental modeling of alcohol use was assessed with 16 items related to parental drinking style (e.g., "My parents drink alcohol at the dinner table"; Abar et al., 2009). Parent-teen alcohol-specific communication was assessed using six items relating to six specific alcohol-related content areas that parents may have discussed with their teens (e.g., "how alcohol works in the body," Turrise, Wiersma, & Hughes, 2000). Finally, parent-teen relationship quality was assessed with six items asking participants to report their perceptions of their parents' warmth and trust (Varvil-Weld et al., 2012).

Drinking and Consequence Outcomes

Peak Drinking Occasion: Peak drinking occasion was assessed using one item from the Quantity/Frequency/Peak questionnaire (Dimeff, Baer, Kivlahan, & Marlatt, 1999). Participants reported the number of drinks they consumed on the occasion when they drank the most in the past month. A standard drink chart was provided (one standard drink = 12 oz. beer, 10 oz. wine cooler, 5 oz. wine, 1 oz. 100 proof [1 ¼ oz. 80 proof] liquor).

Typical Daily Drinking: The average number of drinks consumed on a typical day was assessed using the DDQ (Collins et al., 1985). Participants reported the number of drinks

they consumed on each day of a typical week, and each day was averaged to create an average number of daily drinks.

Consequences: The Young Adult Alcohol Problem Screening Test (YAAPST; Hurlbut & Sher, 1992) assessed alcohol-related consequences. Participants indicated how many times they had experienced seventeen alcohol-related consequences (e.g., hangover, vomited, became rude or obnoxious as a result of drinking, blacked out, arrived late for school or work because of drinking, etc.) in the past year. These consequences were chosen because they typically have at least a 5% prevalence rate among first-year college students who drink (Mallett, Marzell, Varvil-Weld, Turrissi, & Guttman, 2011). Response options ranged from (0) *no, never* to (9), *40 or more times in the past year*, and responses were summed to create a composite consequence score.

Analytic Approach

A four-step analytic approach was used to model the effects of two types of parental permissiveness on students' drinking and consequences. The steps were to: 1) calculate propensity scores for each type of permissiveness (allowance of drinking and perceived parental limits), 2) weight individuals based on their propensity scores with the goal of creating groups that are equivalent on the range of confounders, 3) evaluate whether weighting successfully achieved group balance, and 4) fit the weighted outcome models to estimate the effects of each type of parental permissiveness on student drinking and consequences at follow up. Each of these steps will be described in detail below.

Step 1 - Propensity Model—Propensity models are well-established analytic tools used to improve causal inference when using observational data (Robins, Hernan, & Brumback, 2000; Rosenbaum & Rubin, 1983). Propensity models were employed here to estimate the probability, or propensity score, for: 1) allowance of drinking, and 2) students' perceived parental limits. Specifically, propensity scores (p_i) are calculated according to the following equation and estimate the probability that an individual (i) was exposed to a factor (T_i) given measured confounders (X_i ; D'Agostino, 1998; Harder, Stuart, & Anthony, 2010; Rosenbaum & Rubin, 1983).

Propensity scores can be calculated for both dichotomous (i.e., allowance of drinking) and continuous (i.e., perceived parental limits) exposures. In order to assess the impact of both forms of parental permissiveness separately the other exposure variable was included in the propensity model (i.e., allowance of drinking was included in the perceived limits model and perceived limits were included in the allowance model).

Step 2 - Inverse Probability Weights—Propensity scores were then used as the basis for inverse probability weights (IPWs; see Cole & Hernan, 2008; Robins et al., 2000). The IPWs are the inverse probability of being exposed to the factor (parental permissiveness) given the confounders included in the propensity model (Coffman & Zhong, 2013). The IPWs are implemented similarly to survey weights in order to balance the levels of each type of parental permissiveness across the confounders included in the propensity model.

Step 3 - Balance Diagnostics—Balance was assessed slightly differently for dichotomous and continuous exposures. For dichotomous exposures, a standardized mean difference (SMD) between groups (i.e., ever allowed to drink versus never allowed to drink) was calculated before and after weighting for each of the confounders in the propensity model (Rosenbaum & Rubin, 1983). If all weighted SMDs were less than .20 but greater than $-.20$, balance was considered to be acceptable (Cohen, 1992). For continuous exposures (i.e., perceived parental limits), the weighted and unweighted Pearson correlations for each of the confounders were assessed similarly to the SMDs. Weighted correlations of less than .2 for all confounders was also considered to be acceptably balanced.

Step 4 - Outcome Analysis—The impact (i.e., risky, protective, or neutral) of each type of parental permissiveness on college student drinking and consequences was assessed using weighted regression models. The effects of parental allowance of drinking and perceived parental limits were estimated in two outcome models with and without the respective IPWs for each drinking and consequence-related outcome variable. Because 12 models were estimated, .01 was used as the significance level to reduce the possibility of a type I error due to multiple comparisons. The models were estimated using PROC MIXED in SAS, which has a weighting function that includes the IPWs in the models and provides robust standard errors (Littell, 2006).

Missing Data—Missing data were less than 5% for all variables, and data were confirmed to be missing at random (MAR; Rubin, 1976). Prior to estimating the propensity scores, multiple imputation was conducted in Stata (StataCorp, 2011). Multiple imputation is an appropriate method for handling missing data when the percentage of missing data is low and the data is missing at random (Schafer & Graham, 2002), as it was in this case.

Results

Descriptives

The sample was evenly split with respect to parental allowance of drinking: 50.5% of the sample reported that their parents had never allowed them to drink and 49.5% reported that they had. For perceived parental limits, the mean was 1.37 (SD=1.86).

Balance Diagnostics

Prior to weighting, the absolute value of many of the SMDs was greater than .2, indicating significant associations between the confounders and parental permissiveness. Weighting lowered or maintained the SMDs of each confounder and no confounders had an absolute SMD greater than .2 after weighting. Therefore balance and overlap were judged to be acceptable.

Outcome Analyses

Unweighted models estimated the effects of students' perceptions of parental allowance of drinking and perceived parental limits for consumption, on the drinking and consequences outcomes, without accounting for the confounders. Weighted models estimated the effects of the predictors after accounting for the confounders. Table 1 shows the weighted and

unweighted regression coefficients associated with the effects of parental allowance of drinking on each of the outcomes, and Table 2 shows the weighted and unweighted regression coefficients associated with perceived parental limits.

In the unweighted models, parental allowance of drinking was significantly and positively associated with peak drinking, typical daily drinking, and consequences (see Table 1). After applying the IPWs, parental allowance of drinking was no longer significantly associated with any of the outcome variables. There was a marginally significant negative association between parental allowance of drinking and typical daily drinking in the weighted model.

Additional models were run to determine whether *age* at which parents allowed their students to drink (see original wording of parental allowance of drinking variable above) would differentially impact drinking or consequences. The pattern of results was identical as described above. Therefore we chose to focus on the more streamlined, dichotomous classification for parental allowance of drinking rather than age.

Perceived parental limits were significantly and positively associated with all three outcome variables in the unweighted models. After applying the IPWs, the significant and positive effects remained with respect to all three outcome models.

Discussion

We used propensity modeling to examine the impact of two types of parental permissiveness of alcohol use on college student drinking and consequences while accounting for a range of potential confounders. To our knowledge this is the first study to estimate the effects of parental permissiveness with adequate control for often cited confounds (e.g., parental drinking habits, family history). Consistent with our first hypothesis, parental permissiveness was significantly and positively associated with college student drinking and consequences, even after accounting for confounders. The effects were substantially attenuated when confounds were accounted for. Parental allowance of drinking was significantly associated with the drinking and consequence outcomes before accounting for confounders, but was not significantly associated with any of the outcomes after accounting for the confounders. In contrast, students' perceived parental limits were associated with drinking and consequences even after accounting for confounders. This provides support for our second hypothesis that students' perceived parental limits would have stronger effects than parental allowance of drinking.

Although previous research on parental permissiveness has consistently shown a positive association between permissiveness and drinking (Abar & Turrissi, 2008; Livingston et al., 2010; van der Vorst et al., 2006; 2010), existing studies have not sufficiently addressed the role of confounders, such as genetic risk, parental modeling, monitoring, peer norms, etc. The use of propensity modeling allowed us to obtain a less biased estimate of the causal effect of parental permissiveness on college student drinking, independent of such confounders. Interestingly, our findings suggest parental allowance of drinking during adolescence does not predict higher levels of drinking or consequences during college. Instead, it is students' perceived parental limits that are associated with later drinking and

consequences. Returning to the earlier example of the parent who allows their adolescent to have one or two drinks versus the parent who allows their adolescent to have several drinks, it appears this is a critical difference that affects students' drinking and related problems when they reach college. It is possible that students' perceptions of conservative parental limits help adolescents internalize regulation of their drinking. Finally, it is important to note that our findings do not support the assertion that either type of parental permissiveness is protective against future drinking and related problems (Peele, 2007). Claims that permissiveness helps parents teach their adolescents to drink responsibly appear to be unfounded.

These findings have important implications for family-based prevention programs designed to reduce adolescent and college drinking. Prevention efforts directed at parents typically focus on strengthening protective parent characteristics, such as monitoring and positive communication, and mitigating negative parent characteristics, such as conflict (e.g., Spoth et al., 2011; Stormshak & Dishion, 2009; Turrissi et al., 2009; 2012). The present findings highlight parents' own alcohol-related behavior as an additional risk factor that may need to be addressed. More work is needed to determine the most effective way to intervene with parents who believe they can teach their children to drink responsibly by allowing them to drink. Based on the present findings, it may be more effective to direct prevention efforts toward parental limits related to drinking, rather than focusing more generally on parental allowance of drinking. For example, parent intervention materials may benefit from including information on the impact of students' perceptions of parental limits and on the importance of explicit conversations about acceptable limits.

Limitations and Future Directions

Though the present study used a suitable statistical approach to examine the effects of parent permissiveness on college student drinking, it is not without limitations. Measures of parental permissiveness did not account for context, such as whether parents allowed their students to drink at home, at family functions, or at parties with friends. Future studies would benefit from employing more differentiated items assessing what kind of drinking is allowed (a single beer versus sponsoring a keg party), and whether the drinking is sanctioned at home versus out of the home to understand how specific parenting practices may impact college students' drinking trajectories and consequences.

Other future directions include extending this work to other universities and non-college populations. The present study was conducted at a single university with relatively little racial or ethnic diversity. The present findings may not generalize to students from universities in other settings (e.g., smaller, private universities, universities in urban settings etc.). It would also be beneficial to use a similar statistical approach to assess the effects of parental permissiveness on drinking and related consequences within a non-college emerging adult sample, which may represent a qualitatively different population than their college-attending peers.

Conclusion

The present study utilized a suitable methodological approach to account for a range of confounders that have troubled past research interested in estimating the effect of parental permissiveness on college student drinking and consequences. Findings suggest higher perceived parental limits related to consumption predict more problematic drinking-related outcomes in college. However, students' reports that their parents allowed them to drink while in high school were not associated with more drinking or consequence during college. Further study of the context in which parental patterns of drinking-related behaviors occur across adolescence is needed to fully understand the impact of parent behavior on college drinking outcomes.

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References

- Abar CC. Examining the relationship between parenting types and patterns of student alcohol-related behavior during the transition to college. *Psychology of Addictive Behaviors*. 2012; 26:20–29. [PubMed: 21842968]
- Abar C, Abar B, Turrisi R. The impact of parental modeling and permissibility on alcohol use and experienced negative drinking consequences in college. *Addictive Behaviors*. 2009; 34:542–547. [PubMed: 19398278]
- Abar C, Turrisi R. How important are parents during the college years? A longitudinal perspective of indirect influences parents yield on their college teens' alcohol use. *Addictive Behaviors*. 2008; 33:1360–1368. [PubMed: 18635318]
- Anderson, P.; Baumberg, B. *Alcohol in Europe*. London, England: Institute of Alcohol Studies; 2006.
- Arria AM, Kuhn V, Caldeira KM, O'Grady KE, Vincent KB, Wish ED. High school drinking mediates the relationship between parental monitoring and college drinking: A longitudinal analysis. *Substance Abuse Treatment, Prevention, and Policy*. 2008; 3:567–579.
- Baer JS. Effects of college residence on perceived norms for alcohol consumption: An examination of the first year in college. *Psychology of Addictive Behaviors*. 1994; 8:43–50.
- Borsari B, Carey KB. Descriptive and injunctive norms in college drinking: A meta-analytic integration. *Journal of Studies on Alcohol*. 2003; 64:331–341. [PubMed: 12817821]
- Borsari B, Murphy JG, Barnett NP. Predictors of alcohol use during the first year of college: Implications for prevention. *Addictive Behaviors*. 2007; 32:2062–2086. [PubMed: 17321059]
- Chassin L, Handley ED. Parents and families as contexts for the development of substance use and substance use disorders. *Psychology of Addictive Behaviors*. 2006; 20:135–137. [PubMed: 16784356]
- Cleveland MJ, Lanza ST, Ray AE, Turrisi R, Mallett KA. Transitions in first-year college student drinking behaviors: Does pre-college drinking moderate the effects of parent- and peer-based intervention components? *Psychology of Addictive Behaviors*, Advance online publication. 2011
- Cloud, J. Should you drink with your kids?. *TIME Magazine*. Jun 19. 2008 Retrieved from <http://www.time.com/time/magazine/article/0,9171,1816475,00.html>
- Cohen J. Statistical power analysis. *Current Directions in Psychological Science*. 1992; 1:98–101.
- Coffman DL, Zhong W. Assessing mediation using marginal structural models in the presence of confounding and moderation. *Psychological Methods*. 2013 In press.
- Cole SR, Hernan MA. Constructing inverse probability weights for marginal structural models. *American Journal of Epidemiology*. 2008; 168(8):656–664. [PubMed: 18682488]

- Collins RL, Parks GA, Marlatt GA. Social determinants of alcohol consumption: The effects of social interaction and model status on the self-administration of alcohol. *Journal of Consulting and Clinical Psychology*. 1985; 53:189–200. [PubMed: 3998247]
- D'Agostino RB. Propensity score methods for bias reduction in the comparison of a treatment to a non-randomized control group. *Statistics in Medicine*. 1998; 17:2265–2281. [PubMed: 9802183]
- Dimeff, LA.; Baer, JS.; Kivlahan, DR.; Marlatt, GA. *Brief Alcohol Screening and Intervention for College Students (BASICS): A harm reduction approach*. New York, NY: Guilford Press; 1999.
- Fairlie AM, Wood MD, Laird RD. Prospective protective effects of parents on peer influences and college alcohol involvement. *Psychology of Addictive Behaviors*. 2012; 26:30–41. [PubMed: 21574670]
- Foley KL, Altman D, Durant RH, Wolfson M. Adults' approval and adolescents' alcohol use. *Journal of Adolescent Health*. 2004; 35:17–26. [PubMed: 15193570]
- Fromme K. Parenting and other influences on the alcohol use and emotional adjustment of children, adolescents, and emerging adults. *Psychology of Addictive Behaviors*. 2006; 20:138–139. [PubMed: 16784357]
- Harder VS, Stuart EA, Anthony JC. Propensity score techniques and the assessment of measured covariate balance to test causal associations in psychological research. *Psychological Methods*. 2010; 15:234–249. [PubMed: 20822250]
- Hingson R, Heeren T, Winter M, Wechsler H. Magnitude of alcohol-related mortality and morbidity among U.S. college students ages 18–24: Changes from 1998 to 2001. *Annual Review of Public Health*. 2005; 26:259–279.
- Hurlbut SC, Sher KJ. Assessing alcohol problems in college students. *Journal of American College Health*. 1992; 41:49–58. [PubMed: 1460173]
- Johnson TP, Mott JA. The reliability of self-reported age of onset of tobacco, alcohol, and illicit drug use. *Addiction*. 2001; 96:1187–1198. [PubMed: 11487424]
- Johnston, LD.; O'Malley, PM.; Bachman, JG.; Schulenberg, JE. *Monitoring the Future national survey results on drug use, 1975–2010: Volume II, College students & adults ages 19–50*. Ann Arbor, MI: Institute for Social Research, The University of Michigan; 2011.
- Littell, R. *SAS for mixed models*. 2nd ed.. Cary, NC: SAS Institute; 2006.
- Livingston JA, Testa M, Hoffman JH, Windle M. Can parents prevent heavy episodic drinking by allowing teens to drink at home? *Addictive Behaviors*. 2010; 35:1105–1112. [PubMed: 20805017]
- Mallett KA, Marzell M, Varvil-Weld L, Turrissi R, Guttman K. One-time or repeat offenders? An examination of the patterns of alcohol-related consequences experienced by college students across the freshman year. *Addictive Behaviors*. 2011; 36:508–511. [PubMed: 21276662]
- Mallett KA, Ray AE, Turrissi R, Belden C, Bachrach RL, Larimer ME. Age of drinking onset as a moderator of the efficacy of parent-based, brief motivational, and combined intervention approaches to reduce drinking and consequences among college students. *Alcoholism: Clinical and Experimental Research*. 2010; 34:1154–1161.
- McCabe SE, Boyd CJ, Couper MP, Crawford S, D'Arcy H. Mode effects for collecting alcohol and other drug use data: Web and US mail. *Journal of Studies on Alcohol*. 2002; 63:755–761. [PubMed: 12529076]
- McCabe SE, Hughes TL, Bostwick W, Boyd CJ. Assessment of difference in dimensions of sexual orientation: implications for substance use research in a college-age population. *Journal of Studies on Alcohol*. 2005; 66:620–629. [PubMed: 16331847]
- National Institute on Alcohol Abuse and Alcoholism. *What colleges need to know now: An update on college drinking research* (NIH Publication No. 07-5010). Bethesda, MD: National Institutes of Health; 2007.
- Neal DJ, Fromme K. Event-level covariation of alcohol intoxication and behavioral risks during the first year of college. *Journal of Consulting and Clinical Psychology*. 2007; 75:294–306. [PubMed: 17469887]
- Patock-Peckham JA, King KM, Morgan-Lopez AA, Ulloa EC, Filson-Moses JM. Gender-specific mediational links between parenting styles, parental monitoring, impulsiveness, drinking control, and alcohol-related problems. *Journal of Studies on Alcohol and Drugs*. 2011; 72:247–258. [PubMed: 21388598]

- Peele, S. *Addiction-proof your child*. New York, NY: Three Rivers Press; 2007.
- Read JP, Beattie M, Chamberlain R, Merrill JE. Beyond the “binge” threshold: Heavy drinking patterns and their association with alcohol involvement indices in college students. *Addictive Behaviors*. 2008; 33:225–234. [PubMed: 17997047]
- Read JP, Wood MD, Kahler CW, Maddock JE, Palfai TP. Examining the role of drinking motives in college student alcohol use and problems. *Psychology of Addictive Behaviors*. 2003; 17:13–23. [PubMed: 12665077]
- Robins JM, Hernán MA, Brumback B. Marginal structural models and causal inference in epidemiology. *Epidemiology*. 2000; 11:550–560. [PubMed: 10955408]
- Rosenbaum PR, Rubin DB. The central role of the propensity score in observational studies for causal effects. *Biometrika*. 1983; 70:41–55.
- Rubin DB. Inference and missing data. *Biometrika*. 1976; 63(3):581–592.
- Schafer JL, Graham JW. Missing data: Our view of the state of the art. *Psychological Methods*. 2002; 7(2):147–177. [PubMed: 12090408]
- Shillington AM, Clapp JD. Heavy alcohol use compared to alcohol and marijuana use: Do college students experience a difference in substance use problems? *Journal of Drug Education*. 2006; 36:91–103. [PubMed: 16981642]
- Sher KJ, Descutner C. Reports of paternal alcoholism: Reliability across siblings. *Addictive Behaviors*. 1986; 11:25–30. [PubMed: 3716913]
- Spoth R, Redmond C, Clair S, Shin C, Greenberg M, Feinberg M. Preventing substance misuse through community-university partnerships: Randomized controlled trial outcomes 4 ½ years past baseline. *American Journal of Preventive Medicine*. 2011; 40:440–447. [PubMed: 21406278]
- StataCorp. *Stata Statistical Software: Release 12*. College Station, TX: StataCorp LP; 2011.
- Stormshak EA, Dishion TJ. A school-based family-centered intervention to prevent substance abuse: The Family Check-Up. *The American Journal of Drug and Alcohol Abuse*. 2009; 35:227–232. [PubMed: 20180675]
- Turrissi R, Abar C, Mallett KA, Jaccard J. An examination of the mediational effects of cognitive and attitudinal factors of a parent intervention to reduce college drinking. *Journal of Applied Social Psychology*. 2010; 40:2500–2526. [PubMed: 21318080]
- Turrissi R, Mallett KA, Cleveland MJ, Varvil-Weld L, Abar C, Scaglione N, Hultgren B. Evaluation of timing and dosage of a parent based intervention to minimize college students’ alcohol consumption. *Journal of Studies on Alcohol and Drugs*. 2013; 74(1):30–40. [PubMed: 23200148]
- Turrissi R, Larimer ME, Mallett KA, Kilmer JR, Ray AE, Mastroleo NR, ... Montoya H. A randomized clinical trial evaluating a combined alcohol intervention for high-risk college students. *Journal of Studies on Alcohol and Drugs*. 2009; 70:555–567. [PubMed: 19515296]
- Turrissi R, Ray AE. Sustained parenting and college drinking in first-year students. *Developmental Psychobiology*. 2010; 52:286–294. [PubMed: 20213752]
- Turrissi R, Wiersma KA, Hughes KK. Binge-drinking-related consequences in college students: Role of drinking beliefs and mother–teen communications. *Psychology of Addictive Behaviors*. 2000; 14:342–355. [PubMed: 11130153]
- Van der Vorst H, Engels RCME, Burk WJ. Do parents and best friends influence the normative increase in adolescents’ alcohol use at home and outside the home? *Journal of Studies on Alcohol and Drugs*. 2010; 71:105–114. [PubMed: 20105420]
- Van der Vorst H, Engels RCME, Meeus W, Dekovic M. The impact of alcohol-specific rules, parental norms about early drinking and parental alcohol use on adolescents’ drinking behavior. *Journal of Child Psychology and Psychiatry*. 2006; 47:1299–1306. [PubMed: 17176385]
- Varvil-Weld L, Mallett K, Turrissi R, Abar C. Using parent profiles to predict membership in a subset of college students experiencing excessive alcohol consequences: Findings from a longitudinal study. *Journal of Studies on Alcohol and Drugs*. 2012; 73:434–443. [PubMed: 22456248]
- Varvil-Weld L, Turrissi R, Scaglione N, Mallett KA, Ray AE. Parents’ and students’ reports of parenting: Which are more reliably associated with college student drinking? *Addictive Behaviors*. 2013; 38(3):1699–1703. [PubMed: 23254221]

- Walls TA, Fairlie AM, Wood MD. Parents do matter: A longitudinal two-part mixed model of early college alcohol participation and intensity. *Journal of Studies on Alcohol and Drugs*. 2009; 70:908–918. [PubMed: 19895767]
- Weitzman ER, Nelson TF, Wechsler H. Taking up binge drinking in college: The influences of person, social group, and environment. *Journal of Adolescent Health*. 2003; 32:26–35. [PubMed: 12507798]
- White HR, Johnson V, Buyske S. Parental modeling and parenting behavior effects on offspring alcohol and cigarette use: A growth curve analysis. *Journal of Substance Abuse*. 2000; 12:287–310. [PubMed: 11367605]
- Windle M. Parental, sibling and peer influences on adolescent substance use and alcohol problems. *Applied Developmental Science*. 2000; 4:98–110.
- Wood MD, Read JP, Mitchell RE, Brand NH. Do parents still matter? Parent and peer influences on alcohol involvement among recent high school graduates. *Psychology of Addictive Behaviors*. 2004; 18:19–30. [PubMed: 15008682]

Table 1

Impact of parental allowance of drinking on college drinking and consequences

	Estimate	SE	95% Confidence Limits		t	p
Peak drinking	Unweighted	1.020*	0.26	0.50	1.53	3.87 <.0001
	Weighted	-0.001	0.27	-0.53	0.52	-0.01 0.9960
Typical daily drinking	Unweighted	0.270*	0.08	0.12	0.42	3.54 0.0004
	Weighted	-0.170†	0.08	-0.32	-0.01	-2.14 0.0328
Consequences	Unweighted	3.060*	0.68	1.73	4.40	4.49 <.0001
	Weighted	0.147	0.72	-1.27	1.56	0.21 0.837

* $p < .01$

† $p < .05$ (trend-level association)

Table 2

Impact of perceived parental limits for consumption on college drinking and consequences

	Estimate	SE	95% Confidence Limits	t	p
Peak drinking	Unweighted	0.63 [*]	0.08	0.79	7.88
	Weighted	0.48 [*]	0.09	0.30	5.33
Typical daily drinking	Unweighted	0.25 [*]	0.02	0.21	0.29
	Weighted	0.19 [*]	0.02	0.14	0.23
Consequences	Unweighted	1.87 [*]	0.20	1.48	2.25
	Weighted	1.40 [*]	0.21	0.99	1.81

*
p < .01