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Indirect and moderated effects of parent-child communication on drinking outcomes in the transition to college

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Parent-child communication; Parental monitoring; Alcohol use; Values; College transition

1. Introduction

Alcohol use plays a substantial role in the collegiate lifestyle, putting young adults at risk for alcohol-related consequences (Casper, Child, Gilmour, McIntyre, & Pearson, 2006; Ham & Hope, 2003; O'Malley & Johnston, 2002). In fact, first year college students have significantly higher rates of alcohol dependence than young adults not in college (Grekin & Sher, 2006). College student alcohol use is also associated with cognitive deficits (Hermens et al., 2013), poor academic performance (see Perkins, 2002), and higher levels of violence (Lindsay, 2012). Thus, it is imperative to identify factors that protect against alcohol-related risks during the transition to college.

1.1. Parent-child communication and parental monitoring

Parenting behaviors are one set of factors that are associated with lower risk for heavy drinking and alcohol-related problems (Abar & Turrise, 2008; Cail & LaBrie, 2010; Harris & Goodall, 2008; LaBrie & Sessoms, 2012; Wood, Read, Mitchell, & Brand, 2004). Parent-child communication (PCC), discussion of emotional topics and information (Ryan, Jorm, & Lubman, 2010), and parental monitoring (PM; Fosco, Stormshak, Dishion, & Winter, 2012), are associated with lower levels of adolescent and young adult alcohol use (Arria et al., 2008; Ryan et al., 2010; Turrise, Jaccard, Taki, Dunnam, & Grimes, 2001; Walls, Fairlie, & Wood, 2009). Although PCC and PM are both protective, they may have either additive or interactive effects. Interactive effects may result from differences in the way children perceive PCC that comes from parents who are high versus low in PM. Communication from a parent who shows a clear investment in the welfare of the child may be perceived as more supportive and may therefore be met with more open communication and less defensiveness.

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Existing literature supports the importance of studying PCC and PM in conjunction. Accounting for multiple parenting behaviors using latent profile analyses, Varvil-Weld, Mallett, Turrissi, and Abar (2012) demonstrated that general PCC as well as PM distinguished latent parenting profiles, which were related to offspring substance-related consequences. Additionally, PM has been shown to moderate the relationship between PCC and adolescent risk behavior. In a study of adolescent sexual behavior, PCC was linked to higher odds of risk behavior; however, high PCC in the presence of high PM was related to the lowest odds of sexual risk behavior (Santa Maria, Markham, Swank, Baumler, McCurdy, & Tortolero, 2014). The researchers suggested that PCC is more likely to be reactive in the absence of PM, whereas PCC may be more proactive when parents are also high in PM. The current study addresses the possibility that PCC and PM may also have interactive effects in relation to alcohol use and problems, and that less permissive drinking values in adolescence may mediate these interactive parental influences.

1.2. Parenting and heavy drinking/alcohol-related consequences in the transition to college

Parenting practices such as PCC and PM during adolescence may also have long-term relationships with offspring heavy drinking and alcohol-related consequences (see DeVore & Ginsburg, 2005; see Ryan et al., 2010). Kaynak et al. (2013) found that PM in the last year of high school was associated with reduced risk for alcohol dependence in the first year of college. Furthermore, in a review of longitudinal parenting behavior studies, Ryan et al. (2010) found evidence that both general PCC and PM were prospectively associated with lower levels of alcohol use and later alcohol use initiation. Abar and Turrissi (2008) also found that lower levels of PM in high school were associated with increased alcohol use during the first year of college. Taken together, these studies speak to the continued importance of parents during the transition to young adulthood.

1.3. Value acquisition

An enduring relationship between PM and PCC and young adult heavy drinking and alcohol-related consequences might be explained, at least in part, by the acquisition of alcohol-related values during adolescence. As the primary agents of value and belief transmission (Copen & Silverstein, 2008; Grusec, 2002), parents may contribute to the value systems their offspring carry into their young adult lives. PCC and PM have been linked to specific values and the extent to which values are acquired by children. For instance, value acquisition depends, in part, on the accurate perception of parents' values, and adolescents' accurate perception is related to PCC. Indeed, adolescents who receive clear, consistent, open communication are more likely to correctly perceive their parents' values and to internalize those values (Grusec, 2002; Knafo & Schwartz, 2009). PM is also associated with the internalization of parents' behaviors and attitudes, when feelings of control are partialled out (Baumrind, 1991; Grusec, 2002). It would follow that the interactive effects of PM and open communication may be linked to less permissive drinking values. Moreover, less permissive personal drinking values are consistently related to less alcohol consumption and fewer related consequences (Boyle & Boekeloo, 2009; Pedersen et al., 2017; Sheppard, Usdan, Higginbotham, & Cremeens-Matthews, 2016). Thus, to the extent that there are interactive effects of PCC and PM in relation to personal drinking values in adolescence,

these values may serve as an important mediator of relations between parental behaviors and both drinking behavior and related consequences during young adulthood.

1.4. Current study

Prior studies have yet to explore interactive effects of PCC and PM during adolescence in relation to young adult heavy drinking and alcohol-related consequences. Moreover, potential mechanisms (e.g. drinking values) through which interactions between PCC and PM may relate to drinking behavior have not been examined in existing literature. Previous studies using this data set have examined PM (Quinn & Fromme, 2011; Wetherill & Fromme, 2007; Wetherill, Neal, & Fromme, 2010) and drinking values (Corbin, Iwamoto, & Fromme, 2011; Corbin, Vaughan, & Fromme, 2008; Iwamoto, Corbin, & Fromme, 2010) in relation to drinking outcomes, but none have examined PCC in any capacity. Further, personal drinking values have not been examined as a mediator of relations between parental behaviors and drinking outcomes.

The current study seeks to address this gap in the literature by examining interactive effects of PCC and PM in relation to drinking behavior during the transition from high school to college and the extent to which personal values regarding alcohol use serve to mediate these effects. While prior research has examined a variety of drinking outcomes, we chose to focus on binge drinking in the current study given the high prevalence of binge drinking in high school and college, and the strong association between binge drinking and alcohol-related problems (Wechsler, Lee, Kuo, & Lee, 2000). Binge drinking is common in high school and college given strong social motives for drinking and drinking contexts that typically involve social or party environments (Hingson & White, 2014; Kuntsche, Knibbe, Gmel, & Engels, 2005; Reifman & Watson, 2003; Wechsler & Nelson, 2008). Binge drinking in adolescence is associated with a host of negative outcomes including physical, psychological, and cognitive impairments (Rafanelli, Bonomo, & Gostoli, 2016; Trolan, An, & Pascarella, 2016). Moreover, parents may engage in PCC and/or PM with the goal of reducing risk for heavy drinking, rather than any drinking, given high overall rates of alcohol use during this developmental period.

We hypothesize indirect relations between greater PCC and reduced risk for later binge drinking operating through less permissive drinking values, but only for students whose parents are also high in PM. We also expect reciprocal longitudinal relations between binge drinking and alcohol-related problems. Permissive personal drinking values are expected to be positively related to drinking behaviors and consequences, both cross-sectionally and longitudinally. Evidence in support of these hypotheses would provide information about the long-term relations between parenting practices and alcohol use, and the conditions under which PCC is associated with reduced risk for heavy drinking and alcohol-related consequences in the transition to college.

2. Methods and materials

2.1. Participants and procedures

The sample for the current study included 2245 incoming first-year college students who were part of a 6-year longitudinal study on alcohol use and risk behaviors (40% male). Participants completed web-based assessments annually or semi-annually starting the summer prior to the first-year of college and ending in the fall of senior year with two additional surveys in years 5 and 6. Waves 1 (summer before college) and 3 (spring of first-year) were used in the current study given the focus on drinking during the transition into college, and 90.2% of those who completed wave 1 also completed the wave 3 survey. Eligible participants were unmarried, first-time college students between the ages of 17 and 19. Of the total sample, 1779 (79.1%) identified as Non-Hispanic, 431 (19.2%) identified as Hispanic, and 35 (1.9%) did not report their ethnicity or race. Of those who identified as Non-Hispanic and reported on their race, the breakdown was as follows: approximately 70.8% White, 0.7% American Indian/Alaskan Native, 25.0% Asian, 6.0% Black or African American, and 1% Native Hawaiian or Other Pacific Islander. Note that the total percentage exceeds 100% as 3.5% of participants identified multiple races. Of those who identified as Hispanic ($n = 431$), only 89 also reported on race, presumably due to confusion about the difference between race and ethnicity. The racial composition among Hispanic participants who reported on race was approximately 83.1% White, 3.4% American Indian/Alaskan Native, 14.6% Asian, 5.6% Black or African American, and 1.1% Native Hawaiian or Other Pacific Islander. Again, percentages for race totaled $> 100\%$ because 7.9% reported more than one race.

2.2. Demographics

Participants were asked to report their sex and race/ethnicity. Men were coded as 1 and women were coded as 0. Ethnicity was dichotomized into either “Non-Hispanic White” which was coded as 0, or “Other” which included all other races/ethnicities and was coded as 1.

2.3. Predictor variables

2.3.1. Perceived parent-child communication—Parent-child communication consisted of four items developed for the current study. Students were asked to indicate their perceived level of communication with their parents. Responses ranged from 1 = *never* to 5 = *always*. One of the four questions was related to alcohol while the other three addressed more general behaviors. Internal consistency reliability for the measure was adequate at both wave 1 ($\alpha = 0.76$) and wave 3 ($\alpha = 0.78$). See the Appendix for all items on all measures used in the analyses.

2.3.2. Perceived parental monitoring—This six-item measure was created for the larger study and assessed the extent to which participants perceived that their parents or guardians knew and cared about their involvement in various behaviors during the past three months (Wetherill & Fromme, 2007), which is aligned with a widely accepted definition of PM (Dishion & McMahon, 1998). Responses ranged from 1 = *not at all* to 5 = *always*. Internal consistency reliability coefficients were 0.92 (wave 1) and 0.95 (wave 3). Although

participants could report on guardians other than parents, 97.5% of the sample indicated that they lived with at least one parent, so we use the term parental monitoring throughout.

2.3.3. Personal drinking values—Participants were asked about their personal drinking values using a four-item scale (adapted from Perkins & Berkowitz, 1986). The original measure asked participants to select a single item that best reflected their drinking values. The current study asked participants to rate each item on a 7-point likert scale. Further, a fifth item, “Drinking is all right, but a student shouldn’t get ‘smashed,’” was dropped due to low intercorrelations with the other four items and concern about the ability of participants to understand the item. A higher total score represents more permissive drinking values. Internal reliability for the measure was adequate at both wave 1 ($\alpha = 0.71$) and wave 3 ($\alpha = 0.75$).

2.4. Outcome variables

2.4.1. Binge drinking—At both waves, participants reported the number of times they binge drank during the past 3 months, (i.e., four or more standard drinks in a sitting for women and five or more standard drinks for men).

2.4.2. Alcohol-related problems—Alcohol-related problems in the past 3 months were assessed using the Rutgers Alcohol Problem Index (RAPI; White & Labouvie, 1989). The measure includes 23 items assessing the frequency of negative consequences resulting from drinking. Responses range from 1 = *0 times* to 5 = *> 10 times*. The measure had high internal consistency ($\alpha = 0.92$) at both wave 1 and wave 3.

2.5. Data analytic plan

Given minimal missing data on individual items, summary scores for the measures were computed only for those with complete data. Prior to conducting the primary outcome analyses, we examined distributions of the summary variables to evaluate assumptions of normality. All predictor variables were centered, and the interaction term (PCC X PM) was created by multiplying the centered variables for PCC and PM. The primary study hypotheses were tested within Mplus 7.0 using standard procedures for cross-lagged panel models (McArdle & Nesselroade, 2014). Full information maximum likelihood (FIML) estimation was utilized to estimate missing data, and bootstrapping (5000 bootstraps) was used to address any non-normality in the data. We used bias corrected bootstrapping with 95% asymmetric confidence intervals to test for indirect effects (MacKinnon, Fritz, Williams, & Lockwood, 2007). We utilized the approach outlined by Preacher, Rucker, and Hayes (2007) to test for moderated indirect effects with the Model Indirect and Model Constraint subcommands within Mplus.

As depicted in Fig. 1, the model included both cross-sectional and longitudinal components. The cross-sectional component included paths from PCC, PM, and their interaction to drinking values, binge drinking, and problems. We hypothesized that PCC and PM would interact in relation to students’ values prior to college entry. In order to decompose any possible PCC by PM interactions, we examined effects of PCC on outcome variables at objectively low (2.0) and high (4.0) levels of PM. We selected these values rather than 1 SD

above and below the mean, because the mean value for PM was 3.88 such that 1 SD above the mean would be outside the range of possible scores. Moreover, 1 SD below the mean was a score of 2.60 which was only slightly below the mid-point of the scale.

The longitudinal part of the model tested lagged paths among values, binge drinking, and problems from wave 1 to wave 3. Although all lagged paths were included, the primary longitudinal paths of interest were from wave 1 values to both wave 3 binge drinking and problems. Stability coefficients were included to control for prior alcohol use and problems when predicting wave 3 outcomes, and reverse paths were included to account for reciprocal relations between values and drinking outcomes. Finally, we tested a moderated mediation hypothesis that higher PCC would be indirectly related to less negative drinking outcomes through the mediating mechanism of less permissive drinking values, but only when PM was high.

3. Results

3.1. Preliminary analyses

The parental variables at wave 1 and drinking values at both waves had skewness and kurtosis values that were in the normal range, but the outcome variables were positively skewed and kurtotic (skew values between 0.102 and 7.188; kurtosis values between 0.217 and 38.630). The outcomes were left in their original form to facilitate interpretation of the findings as bootstrapping within Mplus can handle moderate non-normality in the data. Means, standard deviations, and correlations among variables are presented in Table 1.

3.2. Primary outcome analyses

The model¹ provided excellent fit to the data, $\chi^2(15) = 43.157, p < .001$; RMSEA = 0.029; CFI = 0.994, SRMR = 0.014. Unstandardized coefficients are provided in the text with standardized coefficients provided in Fig. 2. All parameters not included in Fig. 2 are presented in Table 2.

With respect to the cross-sectional part of the model, there were significant main effects of PM on all three wave 1 outcomes with greater PM associated with less permissive drinking values, less binge drinking, and fewer problems (values coefficient = $-0.151, SE = 0.016, p < .001$; binge coefficient = $-0.638, SE = 0.116, p < .001$; problems coefficient = $-0.655, SE = 0.101, p < .001$). The only significant main effect involving PCC was to binge drinking at wave 1. Interestingly, higher levels of PCC, controlling for the effects of PM, were associated with more binge drinking episodes (coefficient = $0.413, SE = 0.136, p = .002$). Although PCC was associated with greater risk overall, this effect was qualified by a significant interaction with PM (coefficient = $-0.302, SE = 0.114, p = .008$)². To

¹We tested a model that included direct effects from wave 1 parenting variables to wave 3 outcomes, however, the model provided worse fit to the data, $\chi^2(8) = 419.553, p < .001$; RMSEA = 0.151; CFI = 0.910, SRMR = 0.055. The log likelihood chi-square difference test showed that the alternative model fit the data significantly worse than the original model, $\chi^2(7) = 138.417, p < .001$. Further, inclusion of these effects did not change the direction or significance of the paths from either the independent variables to the mediators or the mediators to the outcomes.

²In order to determine whether the alcohol-specific communication item was significantly impacting the results, we ran follow-up analyses excluding this item. The pattern of results were similar, though the parental monitoring by parental communication interaction became a marginally significant predictor of personal drinking values.

decompose the interaction, we examined effects of PM on drinking values at objectively low and high levels of PM. At high levels of PM, greater PCC was not significantly associated with binge drinking at wave 1 (coefficient = 0.221, $SE = 0.127$, $p = .081$). However, at low levels of PM, higher levels of PCC were related to greater frequency of binge drinking (coefficient = 0.977, $SE = 0.293$, $p = .001$).

There was also a significant interaction between PCC and PM for personal drinking values at wave 1 (coefficient = -0.039 , $SE = 0.017$, $p = .025$). When we decomposed the interaction, there was no significant relation between PCC and values at low levels of PM, (coefficient = 0.042, $SE = 0.044$, $p = .330$). At high levels of PM, greater PCC was associated with less permissive drinking values (coefficient = -0.055 , $SE = 0.024$, $p = .021$). The PCC by PM interactions for wave 1 binge drinking and values are presented in Figs. 3 and 4, respectively.

Regarding the longitudinal component of the model, all stability coefficients were significant (see Fig. 2). Of central relevance to study hypotheses, more permissive drinking values at wave 1 were associated with more binge drinking at wave 3 (coefficient = 1.864, $SE = 0.200$, $p < .001$) and more problems at wave 3 (coefficient = 1.258, $SE = 0.163$, $p < .001$), accounting for wave 1 binge drinking and problems. Additionally, more binge drinking at wave 1 was associated with more permissive drinking values at wave 3 (coefficient = 0.015, $SE = 0.004$, $p < .001$) and more problems at wave 3 (coefficient = 0.125, $SE = 0.055$, $p = .023$).

Finally, we tested for moderated indirect effects of PCC (by levels of PM), on wave 3 alcohol use and problems, operating through wave 1 values. Higher PCC was indirectly associated with decreased risk for both binge drinking and problems through less permissive values among those with high levels of PM (binge drinking indirect effect at high PM = -0.103 , $SE = 0.047$, 95% CI [-0.202 , -0.019]; problems indirect effect at high PM = -0.022 , $SE = 0.012$, 95% CI [-0.049 , -0.003]). In contrast, at low levels of PM, indirect effects of PCC on binge drinking and problems through personal values were not significant (binge drinking indirect effect at low PM = 0.079, $SE = 0.082$, 95% CI [-0.076 , 0.244]; problems indirect effect at low PM = 0.017, $SE = 0.019$, 95% CI [-0.017 , 0.057]).

4. Discussion

This study aimed to examine relations between parenting behaviors and drinking behavior across the transition to college. Specifically, we were interested in relations between PCC and PM in high school and students' alcohol use and problems in the first year of college, and the extent to which these relations were mediated by personal drinking values. We hypothesized that, in the presence of higher PM, higher levels of PCC would be related to less risky drinking and related consequences through less permissive drinking values prior to college entry. To our knowledge, this is the first study to examine this moderated mediation hypothesis.

Consistent with our hypothesis and previous research on parental value acquisition (Acock & Bengtson, 1978; Copen & Silverstein, 2008; Min, Silverstein, & Lendon, 2012; Smith &

Self, 1980), for those with high PM, more PCC was associated with less permissive drinking values in the summer before college matriculation. Adolescents may be more willing to adopt less permissive drinking values when messages are communicated by parents who are aware of and concerned about their children's activities. For teens with low PM, higher levels of PCC were linked to more binge drinking episodes. It is possible that parents who are low in PM are participating in reactive communication with their adolescents as opposed to proactive communication. In other words, they may only communicate with their adolescents when something goes wrong. Such communication may be more negative in valence than more proactive communication. This possibility is supported by previous studies showing that, in some cases, alcohol-specific communication is associated with greater rather than lower levels of alcohol use (Boyle & Boekeloo, 2009; Napper, Hummer, Lac, Frazier, & Labrie, 2013). Evidence that PM moderated the relationship between communication and alcohol outcomes in the current study could help explain inconsistent findings in previous studies, though future studies of interactions between alcohol-specific communication and PM are needed to address this possibility.

As expected, more permissive personal drinking values during the summer before college were associated with more binge drinking and alcohol-related consequences during the first-year of college. These results are consistent with previous research showing that drinking values are related to later drinking outcomes (Boyle & Boekeloo, 2009; Kilty, 1978; Martinez, Garcia, & Sher, 2009). Additionally, we found support for less permissive personal drinking values as a mediator of the relationship between PCC in the summer before college and alcohol use and problems during the first-year of college. Interestingly, the negative relationship existed only when PM was high. Such findings help clarify our understanding of complex relations between PCC and drinking outcomes.

These results may have important implications for prevention and intervention efforts, particularly those that target parents to reduce risk for college drinking. Promoting PM as well as communication could potentially add to the efficacy of such efforts and lead to decreases in alcohol use and related consequences, thereby lowering the risks associated with the transition to college. Although interventions that have encouraged parents to communicate with their children about alcohol-related topics have led to decreases in alcohol consumption, the efficacy of these interventions may be due to improvements in parenting characteristics other than frequency of communication like valence of the communication, warmth, relationship quality, and monitoring. In contrast, efforts to target PCC in the absence of efforts to facilitate parenting skills like PM, could have potentially iatrogenic effects, as alcohol-specific communication has been less consistently protective and, in some cases, harmful outside the context of parent-based interventions (Boyle & Boekeloo, 2009; Cleveland, Lanza, Ray, Turrise, & Mallett, 2012). These findings suggest that discussion regarding alcohol-specific topics in the absence of PM may have equally or more detrimental effects than more broad communication, though future studies are needed to directly address potential interactions between alcohol-specific communication and PM.

Although parents may feel that it is best to provide less supervision of their children as they prepare to go to college and live independently, our findings provide evidence that parenting practices that occur at home before college are closely related to adolescents' values which,

in turn, may impact alcohol use when children leave home. Indeed, Turrissi et al. (2013) found that parent-based interventions that were administered prior to college matriculation were more effective in reducing alcohol use than those administered after college entry. Thus, the summer before college may be a critical time for parents to show interest in their children's behavior, including alcohol use.

Although this study addresses an important gap in the literature and may have important prevention and intervention implications, there are limitations to consider. Due to the lack of monitoring scales that address a wide range of risk behaviors, a measure of PM was developed for the current study and has not been formally validated. However, the measure's internal consistency in this sample was excellent, and several published papers have shown that this measure is associated with outcomes of interest in adolescence and young adulthood (Iwamoto et al., 2010; Wetherill et al., 2010; Wetherill & Fromme, 2007). Similarly, the PCC measure was developed for the current study. Because it measures general communication, it is unclear how and what is being communicated. Therefore, future studies that utilize measures of alcohol-specific communication and that capture the valence of communication are needed to better understand the interactive effects of PCC and PM. Additionally, a solely college sample limits generalizability. Future studies should consider examining whether PCC and PM interact in relation to drinking values and later drinking outcomes in non-college samples. Furthermore, given the influence of culture on parenting practices and acceptance of alcohol use, models that incorporate cultural variables would greatly benefit the field.

The cross-sectional nature of the data concerning relations between parenting variables and personal values should also be noted. Ideally, we would have measured PCC and PM earlier in adolescence to allow for prospective prediction of drinking values prior to college entry, as such values are likely to be relatively well established by the end of high school. Additional studies are needed to demonstrate prospective effects of PCC and PM on drinking values from early to late adolescence. Such studies would also benefit from examining relations between parental drinking values and those of their children.

Despite these limitations, our study adds to the current literature by investigating interactive roles of PCC and PM in relation to drinking values and later drinking outcomes. To our knowledge, this is the first study to explore indirect effects of PCC on drinking behaviors operating through personal drinking values, and the extent to which these indirect effects are moderated by levels of PM. Our findings have the potential to impact alcohol prevention and intervention efforts and provide valuable information to parents about ways to reduce alcohol consumption and associated risks during the college transition.

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Appendix A. Appendix

Demographics

1. **Your gender:**
 - a. female
 - b. male
2. **Your ethnicity:**
 - a. Hispanic or Latino
 - b. Not Hispanic or Latino.
3. **Your race (circle all that apply):**
 - a. American Indian/Alaska Native
 - b. Asian.
 - c. Black or African American.
 - d. Native Hawaiian or Other Pacific Islander.
 - e. White or Caucasian.

Predictor variables (parent-child communication and parental monitoring)

Using the response options provided, please indicate how often you engaged in the following activities while you were a senior in high school.

“During your senior year in high school, how often...”	Never	Rarely	Sometimes	Often	Always
1. Did you talk with your parent(s) about what you did when you weren't in class or studying?	0	1	2	3	4
2. Did you talk with your parent(s) about where you went on nights or weekends?	0	1	2	3	4
3. Did you talk with your parents about your sexual orientation (heterosexual, bisexual, or homosexual), experiences, and/or partners?	0	1	2	3	4
4. Did you talk with your parent(s) about your alcohol use?	0	1	2	3	4
5. Was there an adult (e.g., parent, guardian) who knew and cared:					
a. where you were going when you went out at night and on weekends?	0	1	2	3	4
b. what you were doing and who you were with when you were not in class or studying?	0	1	2	3	4
c. if you drank alcohol?	0	1	2	3	4
d. if you had sex?	0	1	2	3	4
e. if you got into a physical fight or verbal argument?	0	1	2	3	4
f. if you used illicit drugs?	0	1	2	3	4

Mediating variable (personal drinking values)

Please indicate the extent to which you agree that the following behaviors are appropriate
FOR YOU using the scale below:

	Disagree ←←←←	Neither	Agree →→→→				
-3=Strongly disagree							
-2=Moderately disagree							
-1=Slightly disagree							
0=Neither disagree nor agree							
+1=Slightly agree							
+2=Moderately agree							
+3=Strongly agree							
<hr/>							
1. It is okay for me to occasionally get drunk as long as it doesn't interfere with my grades or responsibilities.	-3	-2	-1	0	+1	+2	+3
2. It is okay for me to get drunk frequently if that is what I want to do.	-3	-2	-1	0	+1	+2	+3
3. Drinking is never a good thing for me to do.	-3	-2	-1	0	+1	+2	+3
4. It is okay for me to get drunk even if it sometimes interferes with my grades or responsibilities.	-3	-2	-1	0	+1	+2	+3

Outcome variable (binge drinking)

During the past 3 months (**semester, senior year of high school**), how often did you become intoxicated? _____.

MEN ONLY: During the past 3 months, how many times did you have **five or more** drinks at a sitting? _____.

WOMEN ONLY: During the past 3 months, how many times did you have **four or more** drinks at a sitting? _____.

Outcome variable (alcohol-related problems)

Directions:	Never	1 to 2 times	3 to 5 times	6 to 10 times	>10 times
How many times did the following things happen to you <u>while</u> you were drinking or <u>because of</u> your alcohol use during the last 3 months?					
Circle the number corresponding to your answer.					
1. Not able to do your homework or study for a test?	1	2	3	4	5
2. Got into fights, acted bad, or did mean things?	1	2	3	4	5
3. Missed out on other things because you spent too much money on alcohol?	1	2	3	4	5
4. Went to work or school high or drunk?	1	2	3	4	5
5. Caused shame or embarrassment to someone?	1	2	3	4	5
6. Neglected your responsibilities?	1	2	3	4	5
7. Relative avoided you?	1	2	3	4	5
8. Felt that you needed more alcohol than you used to use in order to get the same effect?	1	2	3	4	5
9. Tried to control your drinking by trying to drink only at certain times of the day or in certain places?	1	2	3	4	5
10. Had withdrawal symptoms, that is, felt sick because you stopped or cut down on drinking?	1	2	3	4	5
11. Noticed a change in your personality?	1	2	3	4	5
12. Felt that you had a problem with alcohol?	1	2	3	4	5
13. Missed a day (or part of a day) of school or work?	1	2	3	4	5
14. Tried to cut down or quit drinking?	1	2	3	4	5
15. Suddenly found yourself in a place that you could not remember getting to?	1	2	3	4	5
16. Passed out or fainted suddenly?	1	2	3	4	5
17. Had a fight, argument or bad feelings with a friend?	1	2	3	4	5
18. Had a fight, argument or bad feelings with a family member?	1	2	3	4	5
19. Kept drinking when you promised yourself not to?	1	2	3	4	5
20. Felt you were going crazy?	1	2	3	4	5
21. Had a bad time?	1	2	3	4	5
22. Felt physically or psychologically dependent?	1	2	3	4	5
23. Was told by a friend or neighbor to stop or cut down drinking?	1	2	3	4	5

* All questions included the response "I choose not to answer."

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HIGHLIGHTS

- Effects of parental communication depend on levels of parental monitoring.
- High parental communication with low monitoring related to more binge drinking.
- High parental communication with high monitoring linked to less permissive values.
- Less permissive drinking values related to lower levels of binge drinking.
- Drinking values mediate relations between parental behaviors and binge drinking.

Fig. 1.

Conceptual figure including all paths that were tested apart from covariate effects (sex and ethnicity) and correlations among the outcomes at waves 1 and 3. Paths of primary interest are in bold.

Fig. 2.

Lagged panel model with significant paths shown in black and non-significant paths shown in grey. Standardized coefficients are given. Ethnicity was significantly related to all three outcome variables at wave 1 but paths were not included in the figure. * $p < .05$, ** $p < .01$, *** $p < .001$.

Fig. 3. Graph of the simple slopes for the relationship between communication and binge drinking at wave 1 at high (4 on the scale) and low (2 on the scale) levels of parental monitoring at wave 1.

Fig. 4. Graph of the simple slopes of the relation between communication and drinking values, at wave 1, at high (4 on the scale) and low (2 on the scale) levels of parental monitoring at wave 1.

Table 1

Means, standard deviations, and correlations among all variables.

M/%	SD	n	Measure	1	2	3	4	5	6	7	8	9	10
40.1%	Male	2245	1. Sex	1.00									
54.8%	Caucasian	2210	2. Ethnicity	-0.03	1.00								
2.54	0.88	2214	3. Communication	-0.16	-0.23	1.00							
3.87	1.27	2172	4. Monitoring	-0.11	-0.14	0.38	1.00						
2.17	0.86	2230	5. Drinking values (wave 1)	0.03	-0.15	-0.08	-0.19	1.00					
2.16	5.41	2238	6. Binge drinking (wave 1)	0.03	-0.13	0.04	-0.09	0.41	1.00				
1.96	4.81	2226	7. Alcohol problems (wave 1)	0.02	-0.06	0.00	-0.13	0.37	0.56	1.00			
2.58	0.96	1997	8. Drinking values (wave 3)	0.05	-0.16	-0.06	-0.19	0.67	0.35	0.28	1.00		
3.51	7.19	2019	9. Binge drinking (wave 3)	0.06	-0.15	0.01	-0.08	0.41	0.51	0.37	0.49	1.00	
2.81	5.73	1996	10. Alcohol problems (wave 3)	0.04	-0.08	-0.01	-0.10	0.33	0.34	0.40	0.42	0.55	1.00

Table 2

All proposed paths not included in Fig. 2. Bolded paths are significant.

Path	<i>B</i>	<i>p-Value</i>
Sex on drinking values (wave 1)	−0.006	0.779
Sex on binge drinking (wave 1)	0.012	0.591
Sex on alcohol problems (wave 1)	0.001	0.946
Ethnicity on drinking values (wave 1)	−0.184	<0.001
Ethnicity on binge drinking (wave 1)	−0.133	<0.001
Ethnicity on alcohol problems (wave 1)	−0.073	0.006
Sex with ethnicity	−0.028	0.187
Sex with communication	−0.156	<0.001
Sex with monitoring	−0.111	<0.001
Sex with interaction	−0.046	0.032
Ethnicity with communication	−0.232	<0.001
Ethnicity with monitoring	−0.143	<0.001
Ethnicity with interaction	0.030	0.181
Communication with monitoring	0.378	<0.001
Communication with interaction	0.069	0.057
Monitoring with interaction	−0.301	<0.001
Drinking values (wave 1) with binge drinking (wave 1)	0.387	<0.001
Drinking values (wave 1) with alcohol problems (wave 1)	0.342	<0.001
Binge drinking (wave 1) with alcohol problems (wave 1)	0.551	<0.001
Drinking values (wave 3) with binge drinking (wave 3)	0.315	<0.001
Drinking values (wave 3) with alcohol problems (wave 3)	0.275	<0.001
Binge drinking (wave 3) with alcohol problems (wave 3)	0.432	<0.001