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## Parental Restriction of Movie Viewing Prospectively Predicts Adolescent Alcohol and Marijuana Initiation: Implications for Media Literacy Programs

Melissa J. Cox<sup>1,2</sup>, Joy Gabrielli<sup>3</sup>, Tim Janssen<sup>1</sup>, Kristina M. Jackson<sup>1</sup>

<sup>1</sup>Department of Behavioral and Social Sciences, Center for Alcohol and Addiction Studies, Brown University School of Public Health, Providence, RI, USA

<sup>2</sup>Department of Health Education and Promotion, East Carolina University, 2206 Carol Belk Building, Mail Stop 529, Greenville, NC 27858, USA

<sup>3</sup>Department of Data Science, Geisel School of Medicine, Dartmouth College, Hanover, NH, USA

### Abstract

Youth are heavy consumers of media, and exposure to mature media content is associated with initiation and progression of substance use. Parental restriction of such content has been shown to be an effective mechanism to reduce negative consequences attributed to exposure to mature media content. This study assessed the influence of parental restriction of movie watching across Motion Picture Association of America rating categories on subsequent alcohol and marijuana initiation at 1- and 2-year follow-up. Using data from a longitudinal study of adolescent substance use ( $N=1023$ ), we used logistic regression analyses to determine the odds of alcohol and marijuana initiation across movie rating categories, within R-rated restriction categories in particular, and based on changes in parental restriction of movies over time. All analyses controlled for important parental, personality, and behavioral correlates of adolescent substance use. Results suggest that restriction of R-rated movies is protective of both alcohol and marijuana initiation. Important differences among parental restriction of R-rated movie categories emerged such that being allowed to watch them with adult supervision was protective of substance use, while those who reported watching R-rated films despite parental restrictions were at heightened risk for alcohol initiation. Changes in parental movie restrictions were not predictive of substance use initiation over the subsequent year. Implications of these findings for media literacy program prevention strategies are discussed.

### Keywords

Parental restriction of movies; Adolescent alcohol initiation; Adolescent marijuana initiation; Media parenting

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Melissa J. Cox, [coxmel17@ecu.edu](mailto:coxmel17@ecu.edu).

Compliance with Ethical Standards

**Ethical Approval** All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standard.

**Informed Consent** Informed consent was obtained from all individual participants included in the study.

**Conflict of Interest** The authors declare that they have no conflict of interest.

## Introduction

Youth substance use is a critical target for prevention efforts given its association with a range of consequential physical, social, and emotional outcomes (DuRant et al. 1999; Erskine et al. 2015; Fergusson and Boden 2008; Gore et al. 2011). Substance use behavior typically initiates during adolescence, and early initiation leads to higher and more chronic engagement in substance use, increased risk for addiction, and other negative outcomes across the life course (Behrendt et al. 2009; Chen et al. 2009). Early adolescence is a critical developmental period as youth begin to individuate from their parents, which calls into question the role of parental oversight and how parents adjust their restrictions in developmentally appropriate ways. One aspect in which parental rules and oversight affect adolescent substance use is through restricting exposure to media that may be harmful, such as mature movie content. The purpose of this study was to examine the longitudinal association of parental media restrictions with the initiation of adolescent alcohol and marijuana use.

### Media as a Modifiable Risk Factor

Exposure to media depictions of substance use, specifically alcohol, tobacco, and illicit drug use, has been linked to initiation and progression of substance use behavior among youth in multiple longitudinal studies (e.g., Mejia et al. 2016; Sargent et al. 2006; Morgenstern et al. 2011a). Entertainment media frequently depicts drinking and drug use or contains embedded marketing for products associated with substance use (Roberts et al. 2016; Sargent et al. 2006; Sargent et al. 2007; Siegel et al. 2016). For example, studies on depictions of alcohol use in movies have shown that alcohol use occurs in approximately 83% of the top grossing movies each year (57% of movies rated G/PG; 88% of PG-13 movies; and 90% of R movies; Dal Cin et al. 2008). Marijuana is the most common illegal substance depicted in films (Primack et al. 2009), a trend that is likely to continue given the changing legal environment of marijuana in the USA. Movie exposures to substance use have been demonstrated as independent risk factors for early initiation and progression into more problematic behaviors, including smoking, binge drinking, and drug use (Sargent et al. 2006; Wills et al. 2009). There is building scientific consensus around the idea that media and marketing exposures may exert a causal influence on alcohol and other substance use initiation and maintenance (Koordeman et al. 2012). For example, the 2012 Surgeon General Report on Adolescent Smoking deemed tobacco marketing and movie smoking exposures as causal influences on youth smoking initiation, which led to regulation of tobacco product marketing in entertainment media (US Department of Health and Human Services 2012). This regulatory approach appears to have reduced depictions of tobacco use in movies through 2011, but trend analyses suggest that depictions of alcohol use and alcohol brands in movies have remained stable or increased since that time (Bergamini et al. 2013). Without regulation of alcohol and marijuana depictions in films, youth are vulnerable to the negative consequences that often result from such exposure.

Youth consume high rates of screen time (7–8 h per day across devices; Rideout 2016) in escalating amounts across age, which increases their likelihood for exposure to media

depictions of substance use. Social Learning Theory suggests that one's propensity for engaging in a behavior can be influenced merely by observing another participate in that behavior. For example, media depictions of characters using substances followed by positive consequences (e.g., having fun at a party) and avoidance of negative consequences (e.g., no car accident when driving home drunk) can influence youth perceptions of social norms related to substance use. This in turn can produce vicarious reinforcement of youth substance use (Bandura 1977). Thus, approaches to reduce media exposures offer a medium for prevention of early initiation of substance use in youth. While regulation of substance-related depictions in media would likely be the most effective prevention approach to reduce youth exposure to media substance use, regulation of marketing of the two most commonly abused substances by youth (alcohol and marijuana) has been minimal, and changes in regulation can take many years to employ.

### Restrictive Media Parenting

An alternative method for limiting the impact of substance use portrayed in the media is through parental restriction of mature media content (Sargent et al. 2003; Tanski et al. 2010). Youth reporting greater parental restriction have lower levels of exposure to substance use depictions in movies than youth without restrictions (Gentile and Walsh 2002; Sargent et al. 2003; Tanski et al. 2010). Importantly, adolescents who report media restrictions also report lower rates of engagement with substance use behavior in both cross-sectional and longitudinal analyses (Dalton et al. 2002; Dalton et al. 2006; Mejia et al. 2016; Sargent et al. 2004; Tanski et al. 2010). These associations are independent of social influences (such as friend or parent substance use) and individual risk factors (such as sensation seeking and rebelliousness). Importantly, unique media parenting effects have been found even when accounting for general reports of parenting (e.g., authoritative parenting; Tanski et al. 2010). A major gap in this literature remains, however, around the impact of parental media restriction on youth initiation of cannabis use. Cannabis initiation represents an emerging area of concern, as legalization of cannabis extends across the country. Efforts to influence parental restriction around mature media content may serve as a prevention approach for multiple substance use behaviors in youth, thus increasing its importance as a modifiable environmental influence.

While the *Motion Picture Association of America* (MPAA) has provided movie ratings to guide selection of age-appropriate movies for youth, the MPAA rating system does not differentiate movie ratings based on substance use. As evidence of this, a 2009 study of 900 movies determined that movie ratings were insufficient for parents to use to adequately limit youth exposure to tobacco or alcohol use (Tickle et al. 2009). Importantly, depictions of alcohol use and alcohol brand placement are similar in PG-13 and R-rated films (Dal Cin et al. 2008). Therefore, it is unclear what level of movie rating category should be targeted for parental restrictions to most effectively reduce youth exposure to media depictions of substance use. Many parents employ some form of media restriction for early adolescent youth, which is an important protective factor, yet parents report uncertainty about the boundaries (e.g., what level of media restriction is appropriate for particular ages) of media restriction (Jordan et al. 2006).

Further, as children age and develop, parental restrictions likely change over time to promote youth autonomy and independence (Dalton et al. 2006). In a study by Tanski et al. (2010), a shift towards more lenient restrictions over time resulted in higher rates of alcohol use than either no change in parental media restrictions or change towards greater restrictiveness. While it is developmentally appropriate for parents to adjust parental restrictions over time based on child age, little is known about how parents approach developmental adjustments to media restriction over time or across rating categories.

### Current Study

While findings have consistently demonstrated a link between parental movie restriction and reduced risk for substance use, gaps exist in our understanding of the extent to which restrictive media parenting predicts youth substance use. All prior studies have examined parental restriction of R-rated movies only, yet youth may be restricted on PG-13 or PG movies as well. Additionally, the majority of studies have examined tobacco or alcohol use, with minimal research on youth marijuana use. The present study seeks to address these gaps in the literature through examination of parental movie restriction across movie rating categories on youth alcohol and marijuana use.<sup>1</sup> Our first goal was to describe the nature of parental movie restrictions across the MPAA movie rating categories (PG, PG-13, R). Our second goal was to assess the effect of parental movie restrictions across movie rating categories on youth alcohol and marijuana use. Third, we examined the effects of R-rated movie restrictions in particular on substance use. Finally, we assessed whether changes in parental movie restrictions impacted youth alcohol and marijuana use. Results of this study will be informative to family-based prevention strategies for youth substance use, as previous research has demonstrated that higher levels of media literacy are protective of both concurrent and future susceptibility to substance use (Primack et al. 2006; Primack et al. 2009). In particular, this study will inform parenting programs directed at media literacy to increase parents' knowledge of consequential effects of mature media content, and skills to facilitate adolescents' interaction with such content.

## Methods

### Participants and Procedure

Data for this study were drawn from an ongoing longitudinal study of factors that influence the initiation and progression of substance use during adolescence. At time of enrollment, adolescents ( $N = 1023$ ; 52% female; 12% Hispanic; 76% Caucasian, 5% Black, 8% mixed race, 11% other race/ethnicity; mean age = 12.22 years; range 10–15 years,  $SD = 0.95$ ) were recruited from six Rhode Island middle schools, with data collected from five school cohorts enrolled semiannually between Fall 2009 and Fall 2011. The sample was largely representative of the schools from which it was drawn with respect to gender and grade level, but with some evidence of greater racial diversity and less economic disadvantage than the school averages (for more details, see Jackson et al. 2015).

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<sup>1</sup>The current study did not investigate initiation of tobacco use. While it would have been useful to contrast findings of marijuana initiation with smoking initiation, preliminary data analysis revealed that very little smoking initiation occurred in the current sample (3.60% between W1 and W2, 6.01% between W1 and W3). Therefore, we concluded that rates were too low to reliably test whether parental restrictions influenced tobacco initiation.

Participants were recruited through schools, with information packets distributed by faculty and mailed to students' homes. Interested students who had parental consent were scheduled to participate in an after-school small-group orientation session that involved a baseline web-based survey. This was followed by a series of surveys (administered outside of the school setting) that could be completed anywhere with Internet connectivity. In total, participants completed five semi-annual surveys across 2 years and a follow-up survey 1 year later. The study was then re-funded by the NIH, at which point web surveys were administered on a quarterly basis. Participants received \$25 for completion of the baseline assessment, and \$20 for each completed assessment thereafter. All procedures were approved by the university's Institutional Review Board, and a Certificate of Confidentiality was obtained from NIAAA to ensure participant confidentiality.

We used three waves of data for the current study. The first wave coincided with the first movie assessment, which occurred on average 1 year following enrollment (mean age = 13.7; Wave 1, W1). Subsequent waves reflected data collected 1 year (Wave 2, W2), and 2 years (Wave 3, W3) following the first movie assessment.<sup>2</sup> We use parental movie restriction data from W1 and W2, and substance use data from W2 and W3. We restricted the sample to those who had parental movie restriction data at either W1 or W2 ( $n = 943$ ), those aged 12–16 years at W1 ( $n = 938$ ) due to the sparseness of data in those waves for 11-year-old ( $n = 4$ ) and 17-year-old participants ( $n = 1$ ), and to those who were substance naïve for alcohol ( $n = 819$ ) and marijuana ( $n = 826$ ) at W1. Among those with any movie restriction data, those who were substance-naïve at W1 were more likely to be younger (alcohol  $t(158) = 6.01$ ,  $p < .001$ ; marijuana  $t(140) = 2.64$ ,  $p < .01$ ), but did not differ based on sex, race/ethnicity, or eligibility for lunch subsidies.

## Measures

**Parental restriction of movies** Youth were asked whether their parents allow them to watch PG, PG-13, and R-rated movies. For each movie rating category, youth responded based on the following options: “No, and I never watch them” (0), “No, but I watch them anyway” (1), “Yes, if supervised by an adult” (2), and “Yes, without adult supervision” (3). From these three items, we created a combined parental movie restriction measure. First, we created a binary item for each movie rating restriction item as restricted (0; response options 0–2), or unrestricted (1; response option 3). Second, we combined the three binary items into a combination score such that 1 = only allowed to watch PG-rated movies (fully restricted), 2 = only allowed to watch PG or PG-13 rated movies (partially restricted), and 3 = allowed to watch all movies (unrestricted). We also created a change score that reflected changes in this combination score from W1 to W2 (no change, more lenient, more restrictive; see Table 6 for complete change categories).

**Adolescent substance use** At each survey, youth indicated whether they had ever consumed a full drink of alcohol or used marijuana. For never users, we created indicators of

<sup>2</sup>For Cohort 2 only, measurement of the second wave of parental restriction data occurred at W3, rather than W2. Thus, Cohort 2 is excluded from analyses in which the second wave of parental restriction data is used, which are only results presented in Table 6 assessing the influence of changes in parental restrictions on subsequent substance use.

participant status on *alcohol initiation* and status on *marijuana initiation* at 1 and 2 years after W1 movie assessment.

**Covariates** At baseline, adolescents reported their date of birth (used to calculate age), sex, and race/ethnicity (recoded as non-Hispanic White, non-Hispanic Black, non-Hispanic other race, Hispanic). Parents, who were simultaneously recruited with their child and completed a paper and pencil survey at baseline, indicated whether their child was eligible for free or reduced priced lunch, which was included as a marker of family socio-economic status.

We also included a series of known correlates of parenting and media exposure as covariates in all models to isolate unique effects of parental media restriction on subsequent youth substance use. All covariates used in the models were drawn from the same time point as the W1 movie assessment. Youth completed the Sources of Parental Knowledge Scale (Kerr and Stattin 2000), which included five items representing *parental solicitation* (e.g., “How often do your parents start a conversation about things that happened during a normal day at school”;  $\alpha = 0.87$ ), five items representing *parental control* (e.g., “Do you need to have your parent’s permission to stay out late on a weekday evening?”;  $\alpha = .90$ ), and five items representing *child disclosure* (e.g., “Do you keep a lot of secrets from your parents about what you do during your free time?”;  $\alpha = 0.77$ ). All items were measured on a five-point Likert scale, and averages were created for each parental knowledge subscale. *Exposure to alcohol use* in movies was assessed using the Beach method for content coding of movies viewed which combines content analysis and random assignment of movie titles to youth surveys (for full details on content coding, see Sargent et al. 2003; Sargent et al. 2006). Coders recorded the amount of time alcohol use appeared in each film, and a measure of scaled alcohol exposure was computed by calculating the number of minutes seen by the participant, prorated across the total set of movies. This variable was then broken down by movie rating (PG, PG-13, R). As a measure of *general screen time*, youth responded to how often they watch TV/ videos/DVDs on a scale from never (0) to more than once a day (5). We used a binary measure of *perceived availability of substances*, “If you wanted to get some beer, wine, or hard liquor (for example: vodka, whiskey, or gin) could you get some?” (Arthur et al. 2000). A parallel item was asked separately for marijuana. Response options were no (0) or yes (1). We used two items from a 19-item scale measuring deviant peer behavior (Arthur et al. 2000) to assess *peer alcohol and marijuana use* with the prompt, “Think of your three best friends (the friends you feel closest to). In the past six months, have any of your friends tried beer, wine, or hard liquor (for example: vodka, whiskey, or gin) when their parents didn’t know about it?” (with a parallel item for “Used marijuana?”). Response options were no (0) or yes (1). *Sensation-seeking* was measured using six items from the UPPS+P Impulsive Behavior Scale (e.g., “I quite enjoy taking risks”; Lynam et al. 2006). Responses ranged from disagree strongly (1) to agree strongly (4) and were averaged across the six items ( $\alpha = .82$ ). The UPPS has demonstrated predictive validity in substance use and other behavioral addictions (Cyders et al. 2007). Delinquency was measured using six items from the Problem Behavior Frequency Scale (e.g., How often in the past 30 days did you skip school/damage property/been suspended?; Farrell et al. 1992). Responses ranged from never (1) to 20 or more times (6), and were summed across the six items.

## Data Analysis

We first calculated descriptive statistics using SAS 9.4 (SAS Institute Inc., Cary, NC) to assess the nature of parental movie restrictions and adolescent substance use across W1–W3. We then conducted a series of logistic regressions predicting alcohol initiation and marijuana initiation based on multiple parental movie restriction variables. To assess the influence of parental movie restrictions across movie ratings on substance use, we predicted alcohol and marijuana initiation at W2 and W3 from the W1 combination parental restriction measure (i.e., fully restricted, partially restricted, unrestricted) in multiple steps. Following crude analyses, adjusted analyses in Steps 1–5 accounted for socio-demographic variables, general time-invariant covariates, parenting covariates, exposure to substance use content in movies, and individual differences, respectively. Each step in these analyses was a further control to the variables included in the previous step to ascertain specific covariate effects. We then predicted alcohol and marijuana initiation as a function of the four response categories of R-rated movie restrictions assessed at W1 to look within R-rated movies in a more nuanced way, following the same steps described above.

Finally, to assess the effects of changes in parental movie restrictions, we predicted W3 substance initiation from the parental movie restriction change score (indicating changes in restrictions across movies categories from W1 to W2) among those who were substance-naïve at W2 (alcohol  $n = 615$ ; marijuana  $n = 627$ ). Analyses regarding changes in parental restrictions exclude participants in Cohort 2, as the second assessment of parental restrictions was measured simultaneously to W3 substance use for this cohort, thereby precluding prospective prediction. All logistic regression models were performed using Mplus 7.2 (Muthén and Muthén 2012), and missing data were accommodated using maximum likelihood estimation under assumption of missing at random dependent on predictors included in the models.

## Results

### Descriptive Analysis of Parental Movie Restrictions and Adolescent Alcohol and Marijuana Use

Table 1 provides correlations of key study variables. Table 2 provides descriptive information regarding parental restriction of movies in the current sample. The vast majority of participants reported unrestricted rules for PG-rated films at W1 and W2 (93.50 and 97.55%, respectively), and for PG-13-rated movies at W1 and W2 (88.46 and 94.37%, respectively). There was considerable variation in reporting of R-rated movie restrictions with 19.75% reporting full restriction, 6.96% reporting viewing in spite of restrictions, 30.25% reporting viewing with adult supervision, and 43.04% reporting unrestricted viewing at W1. Though the frequencies shift towards unrestricted viewing at W2, there remained considerable variation in response frequencies at that time point as well.

Table 3 presents alcohol and marijuana initiation rates based on movie restriction categories. Overall, the percentage of participants reporting consumption of a full drink increased from W2 to W3 (12.67 and 35.76%, respectively), as did marijuana initiation rates (10.15 and 21.22%, respectively). Examining alcohol initiation across movie rating categories, those

participants who reported full restrictions initiated at the lowest rate at W2 (5.95%), followed by those reporting partial restrictions (6.76%), and those reporting unrestricted access (17.20%). The same pattern occurred at W3 with participants reporting full restriction initiating alcohol use at the lowest rate (21.18%), followed by those reporting partial restrictions (31.19%), and those indicating unrestricted access (45.29%). W2 marijuana initiation resulted in slightly different patterns, with those reporting partial restrictions initiating at the lowest rate at W2 (4.59%), followed by those reporting full restrictions (9.33%), and those with unrestricted access (14.39%). At W3, marijuana initiation rates were the lowest among those reporting full restrictions (14.29%), followed by participants reporting partial restrictions (16.98%), and those reporting no restrictions on movie watching (27.39%).

Examining R-rated movie restrictions in more detail (see Table 3) revealed that those who reported that they are not allowed to watch R-rated movies but do so anyway reported the highest alcohol initiation rates across all response categories (28.89% at W2 and 59.52% at W3), followed by those who were allowed to watch films without adult supervision (17.06% at W2 and 44.89% at W3), those who were allowed to watch R-rated films with adult supervision (5.24% at W2 and 31.80% at W3), and those who were not allowed and do not watch R-rated films (2.00% at W2 and 16.45% at W3). For marijuana initiation, the same pattern of initiation was held with those who reported watching R-rated films despite parental restrictions initiating at the highest rate (17.02% at W2, 38.30% at W3), followed by those who reported being able to watch with no adult supervision (14.29% at W2, 27.16% at W3), those who are allowed to watch R-rated films with adult supervision (3.65% at W2 and 15.38% at W3), and those who are not allowed and do not watch R-rated films (4.41% at W2 and 10.07% at W3).

### Predicting Initiation from Restrictions across Rating Categories

Table 4 presents results for the prediction of alcohol and marijuana initiation based on parental restriction of movies across rating categories. In prospectively predicting alcohol initiation, relative to youth who reported that their parents did not restrict the movies they watched, those youths whose parents restricted R-rated movies (partially restricted group) were 48% less likely to consume a full drink at W2 (OR = 0.52; 95% CI 0.28,0.96) in the fully adjusted model. This protective effect did not hold at W3 in the fully adjusted model (OR = 0.67, CI 0.44, 1.03) but did hold in the model adjusting for demographic characteristics, general behavioral covariates, parenting covariates, and exposure (Step 4 OR = 0.65, CI 0.43, 0.99). Partial movie restriction was protective of marijuana initiation at W2 (OR = 0.44; 95% CI 0.22, 0.89), but only in the model adjusting for demographics at W3 (Step 1 OR = 0.63; 95% CI 0.40,0.97). Full restriction of movies (i.e., only allowed to watch PG-rated movies), as compared to partial restrictions, was associated with greater odds for marijuana use at W2 (OR = 2.83; 95% CI 1.03, 7.75). When compared to those participants reporting unrestricted access to movies, those reporting full restriction of movies was only protective of W2 alcohol initiation in the crude model (OR = 0.30; 95% CI 0.12, 0.80), W3 alcohol initiation in the model adjusting for demographics, behavioral covariates, and parenting covariates (Step 3 OR = 0.48; 95% CI 0.25, 0.91), and W3 marijuana initiation in the crude model (OR = 0.44; 95% CI 0.22, 0.88).



### Predicting Initiation from R-Rated Movie Restrictions

Table 5 presents results of the effects of parental restriction of R-rated movies at W1 on subsequent alcohol and marijuana initiation. As compared to participants who reported that they were allowed to watch R-rated movies without supervision, those who reported being restricted and never watching them were at significantly lower odds for both alcohol and marijuana initiation at W3 (alcohol OR = 0.34; CI 0.19, 0.60; marijuana OR = 0.47; CI 0.24, 0.94) in the fully adjusted models. The odds for alcohol initiation at W2 also reached significance (OR = 0.17; CI 0.05, 0.60); although with only three individuals in this group, we caution against interpreting this effect. Those participants who were allowed to watch R-rated movies with adult supervision were also at lower risk for alcohol initiation at W2 (OR = 0.39; CI 0.19, 0.82) and W3 (OR = 0.63; CI 0.40, 0.997), and for marijuana initiation at W2 (marijuana OR = 0.33; CI 0.14, 0.79). Though not significant in the fully adjusted analyses, odds of initiation of marijuana at W3 was significantly lower in the adjusted analyses accounting for general time-invariant covariates among those who reported being able to watch R-rated films with adult supervision (Step 2; OR = 0.89, CI 0.35, 0.97). Participants who reported not being able to watch R-rated films but do so anyway were at greater odds for alcohol initiation at W2 in the fully adjusted model (OR = 2.39; CI 1.04, 5.49), as compared to those who were allowed to watch without adult supervision.

### Predicting Initiation from W1 to W2 Changes in Parental Movie Restrictions

Table 6 presents results pertaining to the effects of changes in parental movie restrictions from W1 to W2 on substance use initiation at W3. Among those adolescents whose parents fully restricted movies at W1, the majority reported more lenient restrictions at W2 ( $n = 33$ ), though others reported no change in restrictions at W2 ( $n = 21$ ). Among those whose parents employed partial restriction of movies at W1,  $n = 91$  reported consistent restrictions,  $n = 90$  reported more lenient restrictions, and only  $n = 4$  reported more restrictions at W2. Participants whose parents allowed unrestricted access to movies at W1 largely reported having the same access at W2 ( $n = 234$ ), though a few reported more restriction on movies at W2 ( $n = 17$ ). Changes in parental movie restrictions from W1 to W2 were not predictive of subsequent alcohol or marijuana initiation.

## Discussion

In this study, we sought to investigate parental restriction of movies across MPAA rating categories, and the influence of those restrictions on subsequent adolescent alcohol and marijuana initiation. The vast majority of students reported that their parents allowed them to watch movies rated PG and PG-13 without adult supervision. Parents likely believe such unrestricted access to these movies is developmentally appropriate, given that the mean age of students at the time of the first movie assessment was 13.1 years. Thus, most parents in our sample followed the Motion Picture Association of America's rating rationale that these movies are appropriate for individuals aged 13 years and older. Although viewing PG-13 movies may be normative in our sample given the age of the participants, we expected to find that restriction of PG-13 movies would be protective of youth substance use, given the high portrayals of substance use in these films. Surprisingly, our results indicate that restricting PG-13 films was risk-inducing for marijuana use 1 year later. Adolescents may

perceive restriction of PG and PG-13 films to be excessive control, in which they respond with rebellious acts such as using marijuana. Contrary to expectations, restricting PG-13 films was not protective of alcohol use in the fully adjusted models. It may be that these restrictions impact precursors to initiation, such as substance use expectancies and norms. Indeed, repeated exposure to use of substances in media can shape youth perceptions of substance-related norms and expectancies, which influences later adoption of substance use behavior (McClure et al. 2013; Morgenstern et al. 2011b). Given the high levels of exposure to substance use in PG and PG-13 movies, future research should examine restriction of these rating categories at younger ages when such restriction is more developmentally aligned.

Whereas most students reported unrestricted access to PG and PG-13 movies, they reported greater restriction for R-rated movies. As expected, those with restricted access to movies with adult content were at lower subsequent risk for alcohol and marijuana initiation, as those who reported being restricted and not watching R-rated movies were at decreased risk for alcohol initiation 1 and 2 years later, and for marijuana initiation 2 years later. Our findings corroborate previous research that links exposure to adult content in movies to substance use initiation (Dal Cin et al. 2009; Wills et al. 2008). The vast majority of references to substances in movies are pro-social in nature. That is, depictions of substance use occur in the context of positive social situations and are associated with idealized or popular identities (Stern and Morr 2013; Stern 2005). The harms and consequences of alcohol and other substances are rarely portrayed in movies. Therefore, adolescents likely associate positive social norms regarding substance use through witnessing substance use portrayals in movies. This may result in adolescents perceiving substance use as more acceptable or conferring favorable cognitive images of drinkers, which in turn may increase substance use uptake (Gerrard et al. 2008; Andrews et al. 2011).

Parents may try to mitigate risk by co-viewing movies with adolescents, and youth who reported being allowed to watch R-rated movies with adult supervision were at decreased risk for alcohol and marijuana initiation as compared to those who are allowed to watch R-rated films without an adult. Co-viewing is one of three strategies within the field of parental mediation of media, which also includes active mediation (i.e., talking with youth about the media content they saw), and restrictive mediation (i.e., setting rules and regulations about media viewing). Research suggests that the shared experience of watching a movie with an adult can be perceived by teens in multiple ways; only some of which may protect them from negative consequences. On the one hand, if parents discuss the substance use being depicted in the movie, communicating the dangers of use, and their own disapproval of use, then co-viewing of movies may be protective of subsequent use by their teen. This tactic represents active mediation, which describes communication by parents to mitigate negative effects of media on their children (Clark 2011). On the other hand, parents may imply permissive attitudes and implicit approval of use when they do not address substance use depictions in movies while watching with their child, which in turn may be risk-inducing for their child's involvement with substances.

Adolescents who responded that they watch R-rated movies despite parental restrictions had higher odds of consuming alcohol when compared to those reporting unrestricted access to

R-rated films. Importantly, this finding holds even when controlling for sensation-seeking, which is a personality dimension consistently associated with risk-taking behavior such as substance use (Crawford et al. 2003), and delinquency. Thus, even when parents employ restrictions on R-rated movies, youth may still be exposed to these movies in other environments (Hanewinkel et al. 2008). Furthermore, descriptively, those who reported viewing R-rated movies against parental rules initiated alcohol and marijuana use at the highest rate at 1- and 2-year follow-up. Our results align with previous research by Tanski et al. (2010) that also identified a group of youth who reported viewing R-rated movies despite parental restrictions to do so. It may be that these adolescents are rebelling against what they perceive as a form of excessive parental control. Previous research indicates that perceptions of developmentally inappropriate levels of parental control can negatively impact youth behavioral outcomes (Stice et al. 1993). The specific risks and mechanisms through which media risk is conferred within this subgroup are a necessary venture for future research. Furthermore, mechanisms that underlie the effects of parental restriction of movies on adolescent substance use found in this study are a needed next step in this line of research. Doing so would provide a more nuanced understanding of how media confers risk for substance use, and how such mechanisms may differentially influence certain subgroups of adolescents.

Finally, contrary to expectations, changes in parental movie restriction were not predictive of subsequent substance use initiation. Restrictions during early adolescence may exert a greater influence than later on as youth are less likely to be fully engaged with substances at that age. Further, youth may internalize media restrictions to a greater extent at younger ages, in contrast to when they get older and seek greater autonomy. These findings align with literature on more general parental control behaviors that suggests that parental control and monitoring early in adolescence confer protection for substance use into later adolescence (van der Vorst et al. 2006).

This study is strengthened by the prospective prediction of substance initiation among substance-naïve participants. Additionally, this study extends analyses of parental media restrictions to initiation of marijuana, which is rare for studies of media's role in adolescent substance use. Despite these strengths, results from this study should be viewed within the context of several limitations. First, the sample of participants is restricted to one state, and therefore, results may not be generalizable to youth living in other areas. Second, adolescents are exposed to substance use depictions in other forms of media beyond motion picture films, such as popular music (Primack et al. 2014) and music videos (van den Bulck and Beullens 2005). Additionally, some participants in the sample may not fully understand how MPAA ratings are applied, and the nature of parental restrictions on movies (e.g., time restrictions vs. content restrictions) cannot be assessed based on wording of the item. We had low rates of initiation within several parental movie restriction categories which may have reduced the stability and reliability of those effects. Replication of this study with a larger sample, or one in which rates of substance use are higher, is warranted. There was a lack of variability in responses to parental restriction of PG and PG-13 movies in our sample, which may have limited our ability to detect differences based on these restrictions. Finally, future research is needed to examine mediators of the relationship between parental movie restrictions and substance use to fully investigate the underlying mechanisms through

which these parental practices mitigate risks associated with exposure to mature media content.

### Implications for Prevention and Intervention

There exists little guidance for parents on what level of media restriction is most appropriate and how this should be modified over time. Among early adolescents, parents exert relatively greater influence on media usage (Lee et al. 2009), and parental restrictions related to media use seem impactful for adolescent emotional, behavioral, and risk behavior outcomes (Gentile and Walsh 2002; Gentile et al. 2014). Our results extend this work to demonstrate that restriction of mature media content reduces risk for alcohol and marijuana use initiation.

Parents have an important role to play in helping their children navigate and respond to an expanding digital world. Scholars have called on parents to engage their children in critical dialogs regarding their experience with media (Jenkins et al. 2009). In doing so, parents retain an active role in facilitating their child's use and interpretation of media content. To date, much of the research in this area has centered on parental mediation, or strategies parents use to control, supervise, or interpret media content (Warren 2001). However, authors note that parental mediation strategies are not synonymous with media literacy practices, which refer to the ability to access, analyze, evaluate, and communicate messages from an array of media sources (Mendoza 2009), and further research is needed to integrate best practices in literacy education within the current media climate.

Indeed, media literacy for parents may go beyond these traditional bounds of parental mediation. Our study revealed important information with regard to the disconnect between parental restriction and R-rated movie viewing, as a portion of youth endorsed watching R-rated movies without their parents knowing. With the emergence of easily accessible video-sharing platforms such as YouTube in combination with adolescent usage of mobile devices (smartphones, tablets) that are not easily monitored, we expect that the rates of unsanctioned viewing of mature media content will increase rapidly over the coming years. Currently, few resources are available to parents that offer knowledge on the current media landscape, skills on how to properly monitor their child's consumption of and interaction with media, or strategies to engage constructive conversations on the content of media. Thus, a necessary target for prevention programs would be to educate adults in media monitoring specific to the platforms most readily accessed by youth. Given the documented risks associated with viewing mature media content, and the expanded access youth have to media outlets, media literacy programs may be an effective means of preventing youth substance use both now and in the future.

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Table 1

Descriptive statistics and correlations of key study variables

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	
1. W1 PG restriction	–																							
2. W1 PG13 restriction	.46	–																						
3. W1 R restriction	.15	.35	–																					
4. W2 PG restriction	.38	.42	.06	–																				
5. W2 PG13 restriction	.32	.51	.18	.71	–																			
6. W2 R restriction	.15	.39	.59	.22	.38	–																		
7. W2 full drink	.05	.10	.27	.01	.05	.24	–																	
8. W3 full drink	.04	.10	.12	.01	.10	.29	.61	–																
9. W2 marijuana use	-.04	-.05	.26	-.08	-.04	.08	.37	.30	–															
10. W3 marijuana use	-.01	.01	.14	-.04	.02	.13	.34	.39	.76	–														
11. Parental knowledge- child disclosure	.08	-.10	-.23	.04	-.01	-.18	-.29	-.24	-.22	-.23	–													
12. Parental knowledge- control	.04	-.03	-.19	.10	.07	-.16	-.24	-.18	-.21	-.18	.54	–												
13. Parental knowledge- solicitation	.06	-.05	-.19	.07	.01	-.13	-.17	-.10	-.16	-.14	.58	.49	–											
14. Peer alcohol use	.05	.08	.20	.05	.03	.15	.30	.27	.26	.31	-.22	-.14	-.12	–										
15. Peer marijuana use	.06	.09	.20	.04	.06	.15	.32	.26	.31	.31	-.24	-.17	-.14	.58	–									
16. Availability alcohol	.12	.13	.17	.08	.11	.19	.35	.29	.20	.19	-.23	-.14	-.12	.35	.32	–								
17. Availability marijuana	.08	.12	.21	.05	.09	.21	.41	.32	.34	.29	-.27	-.20	-.14	.38	.48	.60	–							
18. Sensation seeking	.15	.16	.11	.13	.15	.12	.13	.19	-.05	.02	-.02	.02	.04	.13	.12	.25	.23	–						
19. Exposure to R movies	.09	.09	.17	-.07	-.02	.10	.09	.15	.12	.12	-.03	-.15	.01	.03	-.01	.04	.07	.10	–					
20. Exposure to PG13 movies	.08	.17	.28	.03	.11	.26	.17	.25	.07	.11	-.01	-.02	-.01	.11	.07	.12	.10	.10	.36	–				
21. Exposure to PG movies	.07	.06	-.07	-.01	-.01	-.05	.02	.07	-.02	.02	.08	.02	.11	.01	.01	-.01	.01	.03	.23	.22	–			
22. Screen time	-.01	.01	-.03	.02	.06	.02	-.09	-.03	-.11	-.05	.12	.16	.07	.01	-.03	-.01	-.08	.11	-.04	.03	.05	–		



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	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
23. Delinquency	-.06	.00	<b>.13</b>	<b>-.13</b>	<b>-.08</b>	<b>.08</b>	<b>.21</b>	<b>.22</b>	<b>.22</b>	<b>.27</b>	<b>-.25</b>	<b>-.19</b>	<b>-.15</b>	<b>.21</b>	<b>.29</b>	<b>.21</b>	<b>.30</b>	<b>.08</b>	.00	.05	-.05	-.06	-
Mean	2.90	2.86	1.97	2.96	2.93	2.39	.24	.43	.20	.30	3.70	4.18	3.09	.11	.07	.29	.21	2.24	2.01	3.43	1.05	2.77	.59
SD	.44	.44	1.14	.26	.31	.96	.42	.50	.40	.46	.93	1.05	1.14	.31	.26	.45	.41	.84	1.98	2.82	.80	1.65	1.66

Bold indicates significance at alpha < 0.05

**Table 2**

Rates of movie restriction response category endorsement (W1:  $n = 877$ ; W2:  $n = 817$ )

	<u>PG-rated restrictions</u>		<u>PG13-rated restrictions</u>		<u>R-rated restrictions</u>	
	W1	W2	W1	W2	W1	W2
No, and I never watch them	1.60%	0.49%	1.14%	0.49%	19.75%	9.91%
No, but I watch them anyway	0.46%	0.12%	0.23%	0.12%	6.96%	4.16%
Yes, if supervised by an adult	4.45%	1.84%	10.17%	5.02%	30.25%	23.38%
Yes, without adult supervision	93.50%	97.55%	88.46%	94.37%	43.04%	62.55%

**Table 3**

Rates of alcohol and marijuana initiation among W1 substance-naïve participants

	Full drink		Marijuana use	
	<i>n</i> = 819	<i>n</i> = 826	<i>n</i> = 819	<i>n</i> = 826
	% onset by W2	% onset by W3	% onset by W2	% onset by W3
Full sample	<i>n</i> = 93; 12.67%	<i>n</i> = 241; 35.76%	<i>n</i> = 75; 10.15%	<i>n</i> = 143; 21.22%
% youth reporting substance use by W1 full, partial, and unrestricted movie restriction categories				
Fully restricted	<i>n</i> = 5; 5.95%	<i>n</i> = 18; 21.18%	<i>n</i> = 7; 9.33%	<i>n</i> = 11; 14.29%
Partially restricted	<i>n</i> = 23; 6.76%	<i>n</i> = 102; 31.19%	<i>n</i> = 15; 4.59%	<i>n</i> = 54; 16.98%
Unrestricted	<i>n</i> = 43; 17.20%	<i>n</i> = 101; 45.29%	<i>n</i> = 40; 14.39%	<i>n</i> = 66; 27.39%
% youth reporting substance use by W1 R-rated movie restriction categories				
No, and I never watch them	<i>n</i> = 3; 2.00%	<i>n</i> = 25; 16.45%	<i>n</i> = 6; 4.41%	<i>n</i> = 14; 10.07%
No, but I watch them anyway	<i>n</i> = 13; 28.89%	<i>n</i> = 25; 59.52%	<i>n</i> = 8; 17.02%	<i>n</i> = 18; 38.30%
Yes, if supervised by an adult	<i>n</i> = 12; 5.24%	<i>n</i> = 69; 31.80%	<i>n</i> = 8; 3.65%	<i>n</i> = 32; 15.38%
Yes, without adult supervision	<i>n</i> = 43; 17.06%	<i>n</i> = 101; 44.89%	<i>n</i> = 40; 14.29%	<i>n</i> = 66; 27.16%

**Table 4**  
Logistic regressions predicting W2 and W3 alcohol and marijuana use based on W1 parental movie restrictions

	Full drink ( <i>n</i> = 819)				Marijuana use ( <i>n</i> = 826)			
	W2		W3		W2		W3	
	OR	95% CI	OR	95% CI	OR	95% CI	OR	95% CI
Crude								
Fully restricted vs. partially restricted	0.87	[0.32, 2.35]	0.59	[0.33, 1.04]	2.12	[0.83, 5.40]	0.81	[0.40, 1.63]
Fully restricted vs. unrestricted	<b>0.30</b>	<b>[0.12, 0.80]</b>	<b>0.32</b>	<b>[0.18, 0.58]</b>	0.61	[0.26, 1.42]	<b>0.44</b>	<b>[0.22, 0.88]</b>
Partially restricted vs. unrestricted	<b>0.35</b>	<b>[0.20, 0.60]</b>	<b>0.55</b>	<b>[0.38, 0.78]</b>	<b>0.29</b>	<b>[0.15, 0.53]</b>	<b>0.54</b>	<b>[0.36, 0.81]</b>
Adjusted Step 1								
Fully restricted vs. partially restricted	1.26	[0.45, 3.54]	0.75	[0.41, 1.35]	2.64	[0.99, 7.00]	0.88	[0.43, 1.82]
Fully restricted vs. unrestricted	0.49	[0.18, 1.35]	<b>0.39</b>	<b>[0.21, 0.72]</b>	0.84	[0.34, 2.06]	0.55	[0.26, 1.15]
Partially restricted vs. unrestricted	<b>0.39</b>	<b>[0.22, 0.69]</b>	<b>0.52</b>	<b>[0.35, 0.77]</b>	<b>0.32</b>	<b>[0.16, 0.61]</b>	<b>0.63</b>	<b>[0.40, 0.97]</b>
Age	1.66	[1.24, 2.24]	1.36	[1.11, 1.67]	1.14	[0.83, 1.56]	1.23	[0.98, 1.55]
Sex (1 = male)	0.64	[0.38, 1.09]	0.50	[0.35, 0.71]	0.82	[0.47, 1.43]	0.65	[0.43, 0.98]
Race/ethnicity (1 = non-Hispanic White)	-	-	-	-	-	-	-	-
Non-Hispanic Black	0.34	[0.04, 2.80]	0.47	[0.16, 1.40]	1.88	[0.56, 6.34]	2.74	[1.11, 6.80]
Hispanic	1.45	[0.63, 3.36]	1.21	[0.68, 2.17]	0.69	[0.23, 2.14]	1.17	[0.60, 2.30]
Non-Hispanic Other	0.66	[0.22, 2.02]	1.29	[0.72, 2.33]	1.33	[0.52, 3.42]	1.23	[0.63, 2.39]
Lunch subsidy (1 = yes)	1.00	[0.99, 1.00]	1.00	[0.99, 1.00]	1.00	[0.99, 1.00]	1.00	[0.99, 1.00]
Cohort (ref = Cohort 1)	-	-	-	-	-	-	-	-
Cohort 2	1.20	[0.59, 2.45]	0.43	[0.24, 0.76]	1.17	[0.56, 2.43]	0.97	[0.52, 1.83]
Cohort 3	0.77	[0.32, 1.84]	0.66	[0.37, 1.16]	0.69	[0.29, 1.66]	1.16	[0.61, 2.22]
Cohort 4	1.61	[0.56, 4.61]	0.62	[0.29, 1.30]	0.51	[0.15, 1.79]	1.09	[0.48, 2.50]
Cohort 5	0.65	[0.28, 1.49]	0.56	[0.33, 0.94]	0.41	[0.16, 1.09]	0.74	[0.39, 1.40]
Adjusted Step 2								
Fully restricted vs. partially restricted	1.40	[0.49, 4.01]	0.83	[0.45, 1.51]	<b>2.87</b>	<b>[1.07, 7.71]</b>	0.93	[0.45, 1.94]
Fully restricted vs. unrestricted	0.66	[0.23, 1.87]	<b>0.48</b>	<b>[0.25, 0.89]</b>	1.07	[0.42, 2.71]	0.64	[0.30, 1.35]
Partially restricted vs. unrestricted	<b>0.47</b>	<b>[0.26, 0.85]</b>	<b>0.58</b>	<b>[0.39, 0.86]</b>	<b>0.37</b>	<b>[0.19, 0.73]</b>	0.68	[0.44, 1.07]
Screen time	0.87	[0.74, 1.02]	0.99	[0.89, 1.11]	0.93	[0.78, 1.10]	0.97	[0.86, 1.10]
Availability	3.23	[1.81, 5.74]	2.00	[1.30, 3.08]	3.53	[1.79, 6.96]	2.02	[1.17, 3.47]
Peer use	1.54	[0.63, 3.76]	3.36	[1.58, 7.15]	1.67	[0.60, 4.69]	3.71	[1.42, 9.67]
Adjusted Step 3								
Fully restricted vs. partially restricted	1.54	[0.53, 4.44]	0.84	[0.46, 1.55]	<b>3.21</b>	<b>[1.18, 8.72]</b>	1.00	[0.48, 2.09]
Fully restricted vs. unrestricted	0.77	[0.27, 2.21]	<b>0.48</b>	<b>[0.25, 0.91]</b>	1.37	[0.53, 3.65]	0.70	[0.33, 1.51]

	Full drink (n = 819)			Marijuana use (n = 826)				
	W2		W3	W2		W3		
	OR	95% CI	OR	95% CI	OR	95% CI		
Partially restricted vs. unrestricted	<b>0.50</b>	[0.27, 0.92]	<b>0.57</b>	[0.38, 0.86]	<b>0.43</b>	[0.22, 0.84]	0.70	[0.45, 1.11]
Knowledge_child_disclosure	0.70	[0.46, 1.04]	0.72	[0.55, 0.95]	0.87	[0.56, 1.29]	0.71	[0.53, 0.96]
Knowledge_parental_control	0.79	[0.58, 1.08]	0.89	[0.71, 1.12]	0.91	[0.67, 1.26]	0.92	[0.72, 1.19]
Knowledge_parental_solicitation	1.19	[0.86, 1.65]	1.32	[1.06, 1.64]	0.85	[0.61, 1.24]	1.18	[0.91, 1.52]
Adjusted Step 4	1.61	[0.55, 4.69]	0.91	[0.49, 1.70]	n/a		n/a	
Fully restricted vs. unrestricted	0.81	[0.28, 2.38]	0.59	[0.30, 1.15]	n/a		n/a	
Partially restricted vs. unrestricted	<b>0.50</b>	[0.27, 0.93]	<b>0.65</b>	[0.43, 0.99]	n/a		n/a	
Alcohol exposure R-rated	0.99	[0.83, 1.17]	1.04	[0.92, 1.19]	n/a		n/a	
Alcohol exposure PG13-rated	1.02	[0.92, 1.14]	1.13	[1.05, 1.22]	n/a		n/a	
Alcohol exposure PG-rated	1.28	[0.89, 1.84]	1.12	[0.88, 1.44]	n/a		n/a	
Adjusted Step 5	1.56	[0.53, 4.66]	1.04	[0.55, 1.96]	<b>2.83</b>	[1.03, 7.75]	1.00	[0.47, 2.12]
Fully restricted vs. unrestricted	0.81	[0.27, 2.42]	0.70	[0.36, 1.38]	1.25	[0.47, 3.32]	0.73	[0.34, 1.60]
Partially restricted vs. unrestricted	<b>0.52</b>	[0.28, 0.96]	0.67	[0.44, 1.03]	<b>0.44</b>	[0.22, 0.89]	0.74	[0.46, 1.17]
Sensation seeking	1.24	[0.87, 1.77]	1.45	[1.14, 1.83]	0.63	[0.43, 0.93]	0.93	[0.71, 1.22]
Delinquency	1.13	[0.99, 1.29]	1.20	[1.01, 1.42]	1.14	[0.96, 1.36]	1.41	[1.17, 1.68]

Bold text highlights significant effects for focal parental movie restriction predictors of substance use initiation. Step 1 of adjusted analyses controls for socio-demographic variables, Step 2 for general time-invariant covariates, Step 3 for parenting covariates, Step 4 for exposure to alcohol content in movies, and Step 5 controls for personal characteristics

**Table 5**  
Logistic regressions predicting W2 and W3 alcohol and marijuana use based on W1 R-rated movie restriction

	Full drink ( <i>n</i> = 819)				Marijuana use ( <i>n</i> = 826)				
	W2		W3		W2		W3		
	OR	95% CI	OR	95% CI	OR	95% CI	OR	95% CI	
<b>Crude</b>									
No, and never watch them	<b>0.10</b>	[0.03, 0.33]	<b>0.24</b>	[0.15, 0.40]	<b>0.28</b>	[0.11, 0.67]	<b>0.30</b>	[0.16, 0.56]	
No, but watch anyway	1.98	[0.96, 4.07]	1.81	[0.92, 3.53]	1.23	[0.54, 2.83]	1.66	[0.87, 3.19]	
Yes, if supervised by an adult	<b>0.27</b>	[0.14, 0.52]	<b>0.57</b>	[0.39, 0.84]	<b>0.23</b>	[0.10, 0.50]	<b>0.49</b>	[0.30, 0.79]	
Yes, without adult supervision (ref)	-	-	-	-	-	-	-	-	
<b>Adjusted Step 1</b>									
No, and never watch them	<b>0.13</b>	[0.04, 0.45]	<b>0.25</b>	[0.14, 0.43]	<b>0.38</b>	[0.15, 0.97]	<b>0.38</b>	[0.19, 0.73]	
No, but watch anyway	<b>2.34</b>	[1.06, 5.14]	1.68	[0.83, 3.41]	1.35	[0.57, 3.23]	1.89	[0.95, 3.74]	
Yes, if supervised by an adult	<b>0.29</b>	[0.14, 0.58]	<b>0.54</b>	[0.35, 0.82]	<b>0.23</b>	[0.10, 0.53]	<b>0.53</b>	[0.32, 0.87]	
Yes, without adult supervision (ref)	-	-	-	-	-	-	-	-	
Age	1.61	[1.18, 2.18]	1.31	[1.07, 1.61]	1.08	[0.79, 1.48]	1.18	[0.93, 1.50]	
Sex (1 = male)	0.63	[0.37, 1.09]	0.47	[0.33, 0.68]	0.85	[0.48, 1.48]	0.64	[0.42, 0.97]	
Race/ethnicity (1 = non-Hispanic White)	-	-	-	-	-	-	-	-	
Non-Hispanic Black	0.25	[0.03, 2.10]	0.42	[0.14, 1.28]	1.67	[0.49, 5.72]	2.68	[1.07, 6.71]	
Hispanic	1.19	[0.49, 2.87]	1.11	[0.61, 2.01]	0.69	[0.22, 2.17]	1.22	[0.62, 2.42]	
Non-Hispanic Other	0.70	[0.22, 2.18]	1.34	[0.74, 2.43]	1.12	[0.43, 2.91]	1.09	[0.55, 2.15]	
Lunch subsidy (1 = yes)	1.00	[0.99, 1.00]	1.00	[0.99, 1.00]	1.00	[0.99, 1.00]	1.00	[0.99, 1.00]	
Cohort (ref = Cohort 1)	-	-	-	-	-	-	-	-	
Cohort 2	1.31	[0.63, 2.75]	0.44	[0.25, 0.79]	1.20	[0.57, 2.50]	1.01	[0.53, 1.92]	
Cohort 3	0.83	[0.34, 2.04]	0.63	[0.35, 1.13]	0.71	[0.30, 1.72]	1.13	[0.58, 2.18]	
Cohort 4	2.15	[0.72, 6.42]	0.69	[0.32, 1.47]	0.55	[0.16, 1.93]	1.17	[0.50, 2.73]	
Cohort 5	0.68	[0.29, 1.62]	0.58	[0.34, 0.98]	0.39	[0.15, 1.03]	0.74	[0.39, 1.42]	
<b>Adjusted Step 2</b>									
No, and never watch them	<b>0.17</b>	[0.05, 0.57]	<b>0.29</b>	[0.17, 0.51]	<b>0.47</b>	[0.18, 1.23]	<b>0.43</b>	[0.22, 0.84]	
No, but watch anyway	<b>2.31</b>	[1.02, 5.20]	1.73	[0.84, 3.56]	1.24	[0.51, 3.05]	1.85	[0.92, 3.71]	
Yes, if supervised by an adult	<b>0.35</b>	[0.17, 0.72]	<b>0.60</b>	[0.39, 0.92]	<b>0.28</b>	[0.12, 0.66]	<b>0.89</b>	[0.35, 0.97]	
Yes, without adult supervision (ref)	-	-	-	-	-	-	-	-	
Screen time	0.88	[0.74, 1.03]	0.99	[0.89, 1.12]	0.93	[0.79, 1.11]	0.98	[0.86, 1.11]	
Availability	2.74	[1.52, 4.95]	1.84	[1.19, 3.51]	3.05	[1.56, 5.98]	1.73	[0.99, 3.01]	

	Full drink (n = 819)				Marijuana use (n = 826)			
	W2		W3		W2		W3	
	OR	95% CI	OR	95% CI	OR	95% CI	OR	95% CI
Peer use	1.58	[0.64, 3.89]	3.34	[1.55, 7.17]	1.58	[0.56, 4.45]	3.86	[1.46, 10.20]
Adjusted Step 3	<b>0.17</b>	<b>[0.05, 0.59]</b>	<b>0.28</b>	<b>[0.16, 0.50]</b>	0.55	[0.21, 1.47]	<b>0.44</b>	<b>[0.22, 0.87]</b>
No, but watch anyway	2.24	[0.99, 5.09]	1.66	[0.80, 3.45]	1.24	[0.50, 3.05]	1.72	[0.85, 3.49]
Yes, if supervised by an adult	<b>0.38</b>	<b>[0.18, 0.78]</b>	<b>0.59</b>	<b>[0.38, 0.91]</b>	<b>0.32</b>	<b>[0.13, 0.77]</b>	0.60	[0.36, 1.01]
Yes, without adult supervision (ref)	-	-	-	-	-	-	-	-
Knowledge_child disclosure	0.73	[0.48, 1.11]	0.75	[0.57, 0.99]	0.94	[0.62, 1.42]	0.76	[0.56, 1.03]
Knowledge_parental control	0.80	[0.58, 1.09]	0.89	[0.70, 1.11]	0.90	[0.66, 1.23]	0.92	[0.72, 1.19]
Knowledge_parental solicitation	1.25	[0.89, 1.76]	1.34	[1.07, 1.67]	0.87	[0.61, 1.26]	1.20	[0.93, 1.56]
Adjusted Step 4	<b>0.17</b>	<b>[0.05, 0.60]</b>	<b>0.30</b>	<b>[0.17, 0.53]</b>	n/a	n/a	n/a	n/a
No, but watch anyway	2.25	[0.99, 5.12]	1.74	[0.83, 3.63]	n/a	n/a	n/a	n/a
Yes, if supervised by an adult	<b>0.38</b>	<b>[0.18, 0.79]</b>	<b>0.61</b>	<b>[0.39, 0.95]</b>	n/a	n/a	n/a	n/a
Yes, without adult supervision (ref)	-	-	-	-	n/a	n/a	n/a	n/a
Alcohol exposure R-rated	1.01	[0.87, 1.18]	1.12	[0.99, 1.26]	n/a	n/a	n/a	n/a
Adjusted Step 5	<b>0.17</b>	<b>[0.05, 0.60]</b>	<b>0.34</b>	<b>[0.19, 0.60]</b>	0.54	[0.20, 1.44]	<b>0.47</b>	<b>[0.24, 0.94]</b>
No, but watch anyway	<b>2.39</b>	<b>[1.04, 5.49]</b>	1.73	[0.82, 3.65]	1.36	[0.54, 3.41]	1.92	[0.93, 3.96]
Yes, if supervised by an adult	<b>0.39</b>	<b>[0.19, 0.82]</b>	<b>0.63</b>	<b>[0.40, 0.997]</b>	<b>0.33</b>	<b>[0.14, 0.79]</b>	0.61	[0.36, 1.04]
Yes, without adult supervision (ref)	-	-	-	-	-	-	-	-
Sensation seeking	1.17	[0.82, 1.66]	1.42	[1.12, 1.79]	0.60	[0.41, 0.89]	0.89	[0.68, 1.17]
Delinquency	1.17	[1.02, 1.33]	1.20	[1.01, 1.41]	1.14	[0.96, 1.36]	1.41	[1.18, 1.70]

Bold text highlights significant effects for focal parental movie restriction predictors of substance use initiation. Step 1 of adjusted analyses controls for socio-demographic variables, Step 2 for general time-invariant covariates, Step 3 for parenting covariates, Step 4 for exposure to alcohol use content in movies, and Step 5 controls for personal characteristics

**Table 6** Logistic regression predicting W3 substance use based on change in parental movie restrictions from W1 to W2 among those who are substance-naïve at W2

W1 restriction level	Full drink (n = 615)		Marijuana use (n = 627)	
	Change from W1 to W2	Total N	% onset W2-W3	Adjusted odds ratio <sup>a</sup> [95% CI]
Fully restricted	Group 1: no change	21	6.25%	0.18 [0.02, 1.50]
	Group 2: more lenient	33	20.00%	0.39 [0.10, 1.54]
	Group 3: no change	91	29.73%	0.86 [0.44, 1.67]
Partially restricted	Group 4: more restrictive	4	75.00%	–
	Group 5: more lenient	90	32.00%	1.05 [0.54, 2.04]
Unrestricted	Group 6: no change	234	31.72%	(Reference)
	Group 7: more restrictive	17	21.43%	0.38 [0.08, 1.76]
Pairwise comparisons of change within baseline restriction level groups				
		1 v 2: Wald (1) = 0.38, p = 0.54		
		3 v 5: Wald (1) = 0.25, p = 0.62		
		3 v 5: Wald (1) = 0.05, p = 0.82		
	Total N	% onset W2-W3	Adjusted odds ratio <sup>a</sup> [95% CI]	Adjusted odds ratio <sup>a</sup> [95% CI]
	22	21.43%	1.26 [0.25, 6.36]	–
	36	0%	–	1.59 [0.68, 3.69]
	101	14.29%	–	–
	91	19.72%	1.42 [0.61, 3.32]	(Reference)
	233	13.48%	–	–
	18	20.00%	2.07 [0.47, 9.16]	–

<sup>a</sup> All models control for age, sex, race/ethnicity, lunch subsidy, school cohort, parental knowledge (three subscales), exposure to substance use (alcohol model only), average screen time, availability of substance, peer use, sensation seeking, and delinquency. Dashes indicate that the test was inestimable due to low or zero cell size counts. Cohort 2 is removed from these analyses because of contemporaneous measurement of W2 and W3 data for that cohort. Of those participants who were alcohol-naïve at W2, 125 were missing either W1 or W2 parental restriction data. Of those participants who were marijuana-naïve at W2, 122 were missing either W1 or W2 parental restriction data