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Specificity of Early Movie Effects on Adolescent Sexual Behavior and Alcohol Use

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Abstract

Adolescents' movie sex exposure (MSE) and movie alcohol exposure (MAE) have been shown to influence later sexual behavior and drinking, respectively. No study to date, however, has tested whether these effects generalize across behaviors. This study examined the concurrent influences of early (i.e., before age 16) MSE and MAE on subsequent risky sex and alcohol use among a national sample of 1,228 U.S. adolescents. Participants reported their health behaviors and movie viewing up to six times between 2003 and 2009 in telephone interviews. The Beach method was used to create a population-based estimate of each participant's MSE and MAE, which were then entered into a structural equation model (SEM) to predict lifetime risky sex and past month alcohol use at ages 18–21. For both men and women, MAE predicted alcohol use, mediated by age of initiation of heavy episodic drinking (HED) and age of sexual debut; MAE also predicted risky sex via age of sexual debut. Among men only, MSE indirectly predicted risky sex and alcohol use. Findings indicated that early exposure to risk content from movies had both specific and general effects on later risk-taking, but gender differences were evident: for men, MSE was a stronger predictor than MAE, but for women, only MAE predicted later risk behavior. These results have implications for future media research, prevention programs for adolescent sex and alcohol use, and movie ratings that can guide parents' decisions as to which movies are appropriate for their children.

Keywords

United States; movies; specificity; risky sex; alcohol; adolescents

Parents, politicians, and psychologists have long been concerned about the effects of media exposure on adolescent risk-taking. Accumulating evidence indicates that media influence a variety of adolescent behaviors, including alcohol use (for a review, see Anderson et al., 2009) and sex (Bleakley et al., 2008; Brown et al., 2006; Collins et al., 2004; Hennessy et al., 2009; Martino et al., 2005; O'Hara et al., 2012; Pardun et al., 2005). Movies, in

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particular, appear to have a stronger influence than other forms of media on adolescents' beliefs and perceived norms related to risk-taking (Bleakley et al., 2009) and on actual risk-taking (Pardun et al., 2005). The mechanisms underlying this influence, however, are not yet well understood. Do adolescents mimic what they see on screen (i.e., specificity), or do risk portrayals in movies promote a lifestyle characterized by risk-taking (i.e., generalization)? To determine whether these effects are specific or generalized, the current study examined the influence of early exposure to sex and alcohol use in movies on sexual behavior and drinking up to 6 years later.

Specificity versus Generalization

To the extent that movies causally influence risk-taking (for experimental results, see Engels et al., 2009; Koordeman et al., 2012), two mechanisms could potentially explain this influence: specificity and generalization. The specificity hypothesis asserts that movies influence behavior through a social learning process in which young people model the actions they see on screen (Bandura, 2001). For example, adolescents exposed to a lot of alcohol use in movies would be more likely to drink, but not necessarily more likely to have sex or smoke. Evidence for specificity comes from a study of adolescent drinking in six European nations: MAE, but not exposure to smoking in movies, predicted HED when modeled simultaneously (Hanewinkel et al., 2012). Multiple behavior-specific models assert that media influence behavior via specific cognitive inputs, such as sexual media facilitating the formation and activation of sexual scripts (Wright et al., 2012). These models, to some extent, assume specificity—that media primarily influence the viewer's behavior with regard to the specific behavior(s) portrayed.

An alternative explanation is generalization, the idea that watching movies with risk content promotes a "deviant" lifestyle. According to problem behavior theory, adolescent risk behaviors are attributable to a common risk-taking factor (Donovan & Jessor, 1985). For example, an adolescent who uses alcohol is more likely to have sex, and vice versa, because they exhibit a tendency toward deviance. Movies, therefore, may promote all types of risk behavior by glamorizing the risk-taking that they commonly portray (Nalkur et al., 2010; Tickle et al., 2009). Some support for this argument comes from evidence that exposure to R-rated movies has been longitudinally associated with increased use of both alcohol and tobacco (de Leeuw et al., 2011; Jackson et al., 2007; Stoolmiller et al., 2010).

It is also possible that both specific and general effects are at work. In other words, an adolescent exposed to risk-taking in movies would be more likely to engage in all types of risk, but the effects may be stronger for those behaviors portrayed on screen. A meta-analysis that combined experimental and non-experimental studies on different types of risk-glorifying media supported this idea (Fischer et al., 2011). Although risk-glorifying media appeared to influence all types of risk-taking, studies with better fit, defined as the degree of correspondence between measures of media exposure and behavioral outcomes, produced significantly larger effects. Despite the utility of this between-samples approach, however, examining specificity within the same sample is essential to determining the mediators through which media may influence adolescent risk behavior. The current study, therefore, is the first to address the issue of specificity by directly comparing effects of two different risk exposures on two different health behaviors over the course of adolescence and young adulthood.

Relations between Alcohol Use and Sexual Behavior

To test specificity, we examined the influence of movies on sexual behavior and alcohol use. We selected these risk behaviors because they are interrelated, particularly for adolescents. Alcohol consumption, especially earlier in life, is associated with unintended and unsafe sex

(for reviews, see Cooper, 2006; George & Stoner, 2000). For example, Dogan et al. (2010) found that 9th grade alcohol use predicted change in annual sexual partners through age 21, controlling for related third variables such as impulsivity, excitement seeking, and conduct problems. In addition, adolescent sexual behavior has been linked to later increases in alcohol use (Stueve & O'Donnell, 2005).

When adolescents initiate these behaviors is also important for predicting later risk-taking. The age at which adolescents first engage in HED, which is more indicative of risky, non-normative development than just drinking (Miller et al., 2007), predicts both later problematic drinking patterns (Pitkänen et al., 2005) and increased sexual risk-taking (Miller et al., 2007; Stueve & O'Donnell, 2005). Likewise, earlier sexual debut predicts increased sexual risk (Sandfort et al., 2008) as well as greater alcohol use (Stueve & O'Donnell, 2005). Although multiple mechanisms have been proposed to explain these associations (see Cooper, 2006), the current study is focused on how these relations may be influenced by movie exposure.

Movie Effects on Adolescent Sexual Behavior and Alcohol Use

As previously mentioned, movies have been shown to influence both sexual behavior and alcohol use among adolescents. Research using the current data, for example, demonstrated that MSE predicted an earlier age of sexual debut and, subsequently, more risky sexual behavior by young adulthood, controlling for characteristics of both the adolescents and their families (O'Hara et al., 2012). Furthermore, adolescents from multiple samples (including the current one) who reported higher MAE initiated drinking at earlier ages (Sargent et al., 2006; Stoolmiller et al., 2012), showed increased use over time (Dal Cin et al., 2009; Gibbons et al., 2010; Hanewinkel et al., 2012; Stoolmiller et al., 2012), and had more alcohol problems (Wills et al., 2009).

Further complicating matters, the same movies often portray sexual behavior and alcohol use, as evidenced by how commonly both behaviors appear in popular movies. From 1950–2006, over 84% of the top-grossing movies contained sexual content, including 68% of G-rated, 82% of PG-rated, 85% of PG13-rated, and 88% of R-rated movies (Nalkur et al., 2010). Similarly, among the top-grossing 534 movies from 1998–2003, 83% portrayed alcohol use, including 57% of G/PG-rated, 88% of PG13-rated, and 90% of R-rated movies (Dal Cin et al., 2008). The co-occurrence of drinking and sex in movies makes it challenging to disentangle their effects because different types of exposure tend to be highly correlated (Sargent et al., 2008); however, for both the theoretical and applied importance of doing so, this was the main goal of the current study.

The Current Study

The simultaneous effects of early MSE and early MAE on two health risk behaviors—risky sex (i.e., multiple partners and inconsistent condom use) and alcohol use (i.e., HED, frequency, and quantity)—were examined. We focused on early exposure (occurring before age 16) as evidence suggests that media may be most impactful for children when they are younger and less knowledgeable about media influence on their behavior (Cantor et al., 2003; Primack et al., 2006). This analysis expands upon earlier findings by testing whether movie effects on sexual behavior (O'Hara et al., 2012) and alcohol use (e.g., Dal Cin et al., 2009; Gibbons et al., 2010) generalize across risk behaviors. These questions were addressed using data from a 6-year longitudinal survey of U.S. adolescents' media exposure and health behaviors (Sargent et al., 2005). This study employed the Beach method, a comprehensive system for media content coding and population-based estimation of youths' movie risk exposure (Sargent et al., 2008), to construct comparable estimates of MSE and

MAE. The data were analyzed using SEM, which allowed for simultaneous testing of both specific and general effects of multiple types of movie risk exposure on different risk behaviors, and also accounted for independent and shared variance between MSE and MAE. The specific hypotheses were:

- Hypothesis 1** Early MAE will predict risky sex and alcohol use 6 years later, mediated by age of sexual debut and age of HED initiation.
- Hypothesis 2** Early MSE will also predict risky sex and alcohol use 6 years later, mediated by age of sexual debut and age of HED initiation.

Method

Participants and Procedure

At Time 1 (T1), data were collected in a random-digit-dial telephone survey of 6,522 adolescents, ages 10 to 14, living in the U.S. (Sargent et al., 2005). Parental consent and adolescent assent were obtained prior to the T1 interview. The next three follow-up surveys were conducted approximately every 8 months; the final two follow-up surveys approximately 4 and 6 years after T1. All data were collected via telephone; sensitive questions were answered using touchtone to ensure participants' privacy, a procedure that has been well-validated in earlier reports (e.g., Gibbons et al., 2010; O'Hara et al., 2012; Sargent et al., 2005).

At Time 6 (T6), 2,718 participants responded (38.2% retention). Participants lost to follow-up were more at-risk than those retained (e.g., higher movie exposure; higher sensation-seeking), and more likely to be minorities. T6 was the first wave that included measures of sexual behavior, and these items were asked only of participants who were at least 18 years old ($n = 1,300$). To ensure MSE occurred before sexual debut, adolescents who debuted before Time 2 (T2) were omitted from the analysis ($n = 72$), leaving a final sample of 1,228 participants. They ranged in age from 12 to 14 years old at T1 ($M = 12.89$, $SD = .79$) and from 18 to 21 years old at T6 ($M = 18.90$, $SD = .81$). The sample included 611 men and 617 women; and 891 European Americans, 159 Hispanics, 71 African Americans, and 107 members of other racial/ethnic groups. Ethics approval for the study was obtained from the Committee for the Protection of Human Subjects at Dartmouth College.

Measures

The Beach method was used to capture adolescents' T1 and T2 *MSE* and *MAE* from the 684 top-grossing movies from 1998–2004. Previous research has shown that adolescents can reliably recall movies they saw over a year ago, and that the Beach method produces valid estimates of movie exposure (Sargent et al., 2008). This technique has been used to estimate movie effects on adolescent alcohol use (e.g., Hanewinkel et al., 2012; Gibbons et al., 2010) sexual behavior (O'Hara et al., 2012), and smoking (e.g., Sargent et al., 2005). Given adequate sample size (in this case, over 1,200), the Beach method creates an unbiased, population-based estimate of movie exposure from a wide array of popular movies, far more than could be included in a single survey.

In the Beach method, each movie is rated by one of two trained coders for the total length, in seconds, of portrayals of a variety of health-risk behaviors—for the purposes of the current study, sexual content (e.g., heavy kissing; intercourse) and alcohol use (e.g., consumption of a beverage that is clearly alcohol; buying of alcohol). A random sub-sample of 10% of movies was double-coded (inter-rater reliability: $r = .76$ for MSE; $r = .77$ for MAE). At every wave, a unique list of 50 movies, stratified by rating, was randomly-generated for each participant from the larger pool, and they reported which movies on their list they had ever

seen. Because randomization may produce movie lists with disproportionately high or low durations of sex or alcohol exposure, MSE and MAE were calculated for each participant based on their reported exposure versus the total possible exposure from their unique list. This proportion was used to extrapolate participants' total MSE and MAE, in hours, from all coded movies in the parent pool. For example, if an individual's list of 50 movies included 100 seconds of sexual content, and they reported seeing movies that included a total of 10 seconds of sexual content, their MSE would be 10% of the sexual content of all coded movies. This process reduces the bias in each estimate and more accurately rank-orders participants based on total possible exposure. In the SEM, both MSE and MAE were square-root transformed to correct for positive skew.

Age of sexual debut was reported at T6 by non-virgins, and these responses were recoded into an ordinal variable from 1 = 14 years to 5 = 18 years (T6 virgins were coded as '5'). *Risky sex* was measured at T6 with two items: lifetime number of vaginal or oral sexual partners (open response), and lifetime instances of casual sex without a condom (defined as vaginal sex not with a "serious or steady dating partner"; 0 = never, 5 = five or more times). Both items were recoded into ordinal variables. T6 virgins were coded as never having had casual sex without a condom, but because lifetime partners included oral sex, 23.1% of virgins ($n = 105$) had a risky sex score greater than zero.

Age of HED initiation was interpolated from participants' responses at each wave to the question "have you ever had 5 or more drinks in a row?" Initiation was recoded as an ordinal variable matching age of sexual debut. *Alcohol use* was measured at T6 with three items regarding participants' past month consumption: number of days of HED (i.e., "5 or more drinks in a row"; 0 = none to 4 = 6 or more days), number of days of any drinking (0 = none to 4 = 6 or more days), and average number of drinks per day when drinking (0 = none to 5 = 10 or more drinks), $r = .89$.

Covariates previously shown to be related to movie exposure and/or risk behavior were collected at T1: participants reported on maternal responsiveness and demandingness (9 and 7 items, respectively, r 's = .71 & .59; Jackson et al., 1998), sensation seeking (4 items, $r = .60$; Sargent et al., 2010), how often they attended church or religious activities, daily hours of television viewing, and whether they had a television in their bedroom. They also reported with whom they lived, which was used to code family structure as intact (i.e., living with both biological parents) or divided (i.e., any other family structure). In addition, gender, race, and age were reported by the parent. Finally, the models controlled for MSE that occurred between T2 and sexual debut (cf. O'Hara et al., 2012), and MAE between T2 and initiation of HED. Inclusion of these covariates focused the models on the effects of *early* exposure by removing variance explained by MSE and MAE that occurred after T2, but before each behavior began. For example, later MSE would comprise only T3 MSE for a participant who sexually debuted by T3, but would be the accumulation of T3–T6 MSE for a participant who debuted by T6 (the same process was used to calculate later MAE based on age of HED initiation).

Results

Descriptive Statistics

The median untransformed MSE accumulated across T1 and T2 was 0.85 hr (interquartile range: 0.44 hr – 1.33 hr) and the median untransformed MAE was 6.96 hr (interquartile range: 3.99 hr – 10.87 hr). This large discrepancy between MSE and MAE is not surprising given that movies contain more alcohol content than sex, and movie ratings are based more on sexual content than substance use, thereby more effectively preventing youth from seeing movies with more sex (Tickle et al., 2009). By T6, 63.0% of participants had sexually

debuted; of those non-virgins, 15.4% debuted at or before age 15, 53.3% at age 16 or 17, and 31.2% at age 18 or older. Among non-virgins, the median number of lifetime sexual partners was two (interquartile range: 1 – 4 partners), and 25.2% of participants reported having had casual sex without a condom. Also by T6, 56.1% of the sample had engaged in HED: of those participants, 30.0% initiated at or before age 15, 30.8% at age 16 or 17, and 39.3% at age 18 or older. T6 drinkers, on average, drank 2 or 3 days in the past month ($M = 2.08$, $SD = 1.48$), drank 2 or 3 drinks per occasion ($M = 1.93$, $SD = 1.47$), and drank heavily once or less in the past month ($M = 0.67$, $SD = 0.47$). Men had more sexual partners, used condoms less consistently with casual partners, and used more alcohol in the past month than did women, $ps < .05$ (Table 1).

Zero-order Correlations

The full correlation matrix is displayed in Table 2 separately by gender; several correlations that were consistent across genders are worth noting. Both MSE and MAE were significantly correlated with age of sexual debut, T6 risky sex, age of HED initiation, and T6 alcohol use. Correlations for men versus women were significantly stronger for the relations between MSE and sexual debut ($-.34$ v $-.22$), MSE and T6 risky sex ($.35$ v $.18$), MAE and sexual debut ($-.35$ v $-.23$), and MAE and T6 risky sex ($.36$ v $.19$), all $|z|s > 2.20$, $ps < .03$. Finally, as expected, MSE and MAE were highly correlated for both genders, $rs = .88$, $ps < .001$.¹

SEM

The model predicting T6 alcohol use and T6 risky sex was evaluated using the robust weighted least-squares approach in *MPlus 6.12* (Muthén & Muthén, 1998–2007). MSE, MAE, and the covariates were exogenous manifest variables; age of sexual debut and age of HED initiation were endogenous manifest variables; and T6 risky sex (factor loadings = .73) and T6 alcohol use (factor loadings = .92) were endogenous latent variables. Participants missing exogenous variables (including covariates) were omitted from the model ($n = 159$); pairwise likelihood was used to handle missing data for endogenous variables. A non-significant path, HED initiation → T6 risky sex, was trimmed from the final model (Figure 1). This model provided good fit to the data, $\chi^2(103) = 412.42$, $p < .001$; $\chi^2/df = 4.00$; root mean square error of approximation (RMSEA) = .053; confirmatory fit index (CFI) = .97; Tucker-Lewis index (TLI) = .95. Total indirect effects are listed in Table 3.

Predicting alcohol use—After accounting for the influence of covariates, MSE and MAE explained 6% of the variance in age of HED initiation (total $R^2 = .85$) and 4% of the variance in T6 alcohol use (total $R^2 = .47$). As hypothesized, MAE indirectly predicted T6 alcohol use (total indirect effect: $b = .48$, $p < .001$). However, this effect occurred through two paths. First, MAE predicted age of HED initiation, $b = -.57$, $p < .001$, which, in turn, predicted T6 alcohol use, $b = -.33$, $p < .02$ (specific indirect effect: $b = .19$, $p < .03$). MAE

¹To alleviate concern that collinearity between MSE and MAE would bias the results, we examined the degree of overlap between these two constructs. First, we calculated the variance inflation factor, which quantifies the degree to which estimates from an ordinary least squares regression are biased due to multicollinearity. The obtained value of 4.61 was well below the recommended cutoff of 10 for serious multicollinearity (see Kline, 2011). Second, we examined the movie-level correlation between sexual content and alcohol content, which was modest, $r = .34$. This figure suggested that even though adolescents who reported high MSE tended to also report high MAE, it is not the case that all movies with sexual content contained alcohol use, or vice versa. In fact, we divided coded movies into four classifications based on level of sexual and alcohol content (high / low for each). Due to the wide disparity in length between movie portrayals of sex versus alcohol, the demarcation for both types of exposure was 33 s (67th percentile for sex exposure). Using this criterion, 47.8% of movies were classified as having high alcohol and low sex, although only 1.4% of movies were classified as having high sex and low alcohol. In other words, movies with sex generally also portray alcohol use, whereas movies with alcohol do not necessarily include sex. Together, these results suggest that SEM estimates were not seriously biased by collinearity between the exogenous predictors.

also predicted age of sexual debut, $b = -.68$, $p < .001$, which then predicted T6 alcohol use, $b = -.43$, $p = .001$ (specific indirect effect: $b = .29$, $p = .003$).

Likewise, as hypothesized, MSE predicted T6 alcohol use through both age of HED initiation and age of sexual debut (total indirect effect: $b = .68$, $p < .02$). More specifically, MSE predicted age of HED initiation, $b = -1.26$, $p < .001$, and the MSE → HED initiation → T6 alcohol use specific indirect effect was significant, $b = .41$, $p < .04$. MSE also predicted age of sexual debut, $b = -.64$, $p < .05$, as expected, but the specific indirect effect from MSE to T6 alcohol use through sexual debut was not significant, $b = .27$, $p < .09$. These results indicated a specific effect of MAE, as this type of exposure was a stronger predictor of later alcohol use than was MSE. There also appeared a general effect of movie exposure, though, as MSE was a significant (albeit weaker) predictor of later alcohol use.

Predicting risky sex—Excluding the influence of covariates, MSE and MAE explained 14% of the variance in age of sexual debut (total $R^2 = .71$) and 4% of the variance in T6 risky sex (total $R^2 = .57$). MSE significantly predicted T6 risky sex (total indirect effect: $b = .26$, $p < .05$), as did MAE (total indirect effect: $b = .28$, $p < .001$). Both effects, however, were mediated by age of sexual debut (sexual debut → T6 risky sex, $b = -.41$, $p < .001$), as age of HED initiation did not predict T6 risky sex. These results showed the hypothesized specific effect of MSE on later risky sex, as well as a more general movie effect, as MAE also predicted sexual behavior. However, both effects operated solely through the promotion of an earlier age of sexual debut.²

Moderation by gender—The model was reanalyzed with paths allowed to vary by gender. This multi-group model provided good fit to the data, $\chi^2(216) = 482.91$, $p < .001$; $\chi^2/df = 2.24$; RMSEA = .048; CFI = .97; TLI = .96 (total indirect effects listed in Table 3). Releasing the equality constraint on the MSE → age of sexual debut path improved model fit, $\chi^2(1) = 43.72$, $p < .001$, indicating that this path differed significantly between men and women. The path from MSE to age of sexual debut was significant for men, $b = -1.12$, $p < .001$, but not for women, $b = -.18$, $p > .58$. Indirect effects from MSE → T6 risky sex and MSE → T6 alcohol use were both significant for men, $ps < .02$, but neither path was significant among women. As in the whole sample model, however, MAE had significant indirect effects on both outcomes among both genders, $ps < .01$. These results supported a general effect of movies on risk-taking among adolescent males, but suggested that MAE is a stronger risk factor than MSE for health risk-taking among adolescent females.

Discussion

This study was the first to compare media effects on adolescent sexual behavior and alcohol use within the same model. Adolescents with higher MAE initiated HED and sexual intercourse earlier, both of which predicted more alcohol use in early adulthood. MAE also predicted more risky sex via an earlier sexual debut. It was only among adolescent males, however, that MSE showed significant indirect effects on later risk behavior. Men exposed to more sexual content in movies had sex earlier, which predicted more risky sex and more alcohol use. They also engaged in HED earlier, which was associated with more alcohol use later in life. Thus, the SEM showed specific effects—MAE predicted alcohol use controlling

²As recommended by an anonymous reviewer, we tested alternative SEMs that included either MSE or MAE as a predictor of all endogenous variables. For both models, all paths were significant (except for age of sexual debut → T6 alcohol use), as were all indirect effects. As expected, direct and indirect effects of MSE and MAE were stronger in the individual SEMs due to the absence of the collinear exposure variable, but these models increase our confidence that each type of exposure uniquely predicts later risk behavior, as demonstrated in the full SEM.

for MSE, and men's MSE predicted risky sex controlling for MAE—as well as general effects.

Importantly, the effects of MAE versus MSE differed by gender. For men, both types of exposure predicted later risk behavior, but MSE appeared to be the stronger predictor for both risky sex and alcohol use. For women, however, MAE alone predicted risky sex and alcohol use. This gender difference may be due to adolescent males and females paying attention to different characteristics of risk-taking in movies (especially with regard to sex), or adolescent males having more positive reactions to depictions of sex (Cantor et al., 2003). Also, men are generally encouraged in western culture to initiate sex and engage with multiple partners, whereas women are taught to be chaste (Marston & King, 2006). If movies reinforce these mores, then it would be expected that MSE would increase risk-taking among men, but have less effect on women. MAE, however, would influence sexual behavior among both genders to the extent that it encourages alcohol use, leading to risky sexual decision making (Cooper, 2006; George & Stoner, 2000).

Implications for Media Research

From a theoretical perspective, these results support earlier research suggesting that risk-promoting media have independent specific and general effects (Fischer et al., 2011). An implication of these findings, therefore, is that a potentially significant portion of movie effects (and, perhaps, media effects in general) on risk behavior may be nonspecific. It is recommended that future research on media effects go beyond the study of a single behavior in isolation. Instead, investigators should use multiple types of exposures within and across media to predict adolescent health risks. As was the case in the current study, however, different types of exposure tend to be collinear, thereby complicating statistical analyses (Sargent et al., 2008); nonetheless, we believe researchers should explore these issues of media specificity. Experimental research in which the effects of exposure to risk cues (e.g., movie clips) are examined across behavioral domains (e.g., alcohol use; sex; smoking) will also be necessary to determine specificity.

Modifying Adolescent Risk-Taking

Movie ratings—The results of this study suggest that restricting exposure to only one type of risk portrayed in movies (i.e., sex or alcohol) would be helpful in reducing movie effects on adolescent sexual behavior and/or alcohol use, but ultimately inadequate and unrealistic. It is recommended, therefore, that parents review their children's movie choices for both types of content. This is the goal, in fact, of the movie ratings system employed by the Motion Picture Association of America (MPAA), in which parents catalogue and rate the content of films so that other parents can make informed choices about their children's movie viewing (Classification and Rating Administration, 2012). Unfortunately, alcohol risk depictions are prevalent across all ratings of movies (Dal Cin et al., 2008), and only portrayals of sex reliably predict MPAA rating (Nalkur et al. 2010; Tickle et al., 2009). These findings suggest revisions to the ratings system may be necessary, such that movies with higher amounts of alcohol content are more consistently given age-restrictive ratings, thereby better informing parents' decisions about which movies their children are allowed to see.

Media literacy—Because MAE and MSE influence multiple types of adolescent risk-taking, this study also underlines the importance of media literacy approaches to promoting adolescent health (Brown, 2006). These programs aim to teach youth how media influence their behaviors both explicitly (i.e., advertising) and implicitly (e.g., movie risk portrayals). Theoretically-based media literacy programs have been shown to be effective in changing alcohol-related expectations and reducing desire to use alcohol-branded items (Austin &

Johnson, 1997) and increasing sexual abstinence intentions and self-efficacy (Pinkleton et al., 2008). Unfortunately, practically all media literacy interventions to date have focused on a single health outcome at a time (for a review, see Bergsma & Carney, 2008). Although some evidence suggests that behavior-specific interventions may be more effective than general interventions (Austin & Johnson, 1997), the results of the current study indicate that future efforts should be broadened to address the effects of media across multiple adolescent health risk behaviors.

Limitations and Future Directions

Mediation—Some limitations of our study should be acknowledged. Participants did not report on their sexual behavior until at least age 18, and retrospective memory for sexual events may have been biased, especially given the timeframe assessed (Schroder et al., 2003). This would be especially problematic if these biases were systematically related to MSE or MAE, but this seems unlikely. Also, these data did not include cognitive or psychosocial measures that may mediate relations between movie exposure and sexual risk-taking, such as risk prototypes (Gibbons & Gerrard, 1995; Gibbons et al., 2003), or perceived norms (Buhi & Goodson, 2007). One possible mediation pattern is that both MSE and MAE influence a single mechanism—at least for men—that predicts earlier ages of sexual debut and HED initiation, and subsequent risk-taking. However, it remains plausible that MSE and MAE could act upon different mechanisms, an important distinction that must be understood to effectively intervene in these processes. Additionally, previous studies have found evidence of reciprocal effects between movie viewing and both behavior (Bleakley et al., 2008) and personality (Stoolmiller et al., 2010), another avenue we could not explore with sexual behavior measured at a single wave, but certainly worth future pursuit.

Collinearity—The correlation between MSE and MAE was very high, and relations between these exposures and the other variables did not show evidence of discriminant validity, which would call into question the practicality of including both measures in the SEM. It could be expected that two collinear exogenous variables would fail to predict any outcomes, as neither would explain any unique variance in the presence of the other, or, more likely, that one variable would “steal” the predictive power from the other, resulting in inflated estimates. On the contrary, both variables showed significant effects on alcohol use and sexual behavior when modeled separately (see footnote 2) or simultaneously, thereby mitigating these concerns. Furthermore, there appears to be co-occurrence but not complete overlap between sexual content and alcohol content in movies (see footnote 1), suggesting these are distinguishable phenomena that could have unique effects on adolescents' behavior. Given the lack of discrimination between the measures, though, caution should be exercised in interpreting these results before they are replicated, although future media content coding for alcohol use and sexual behavior will confront similar issues with collinearity. It will be important in future research to also analyze *how* movies depict the relation between sex and alcohol use, and whether these images communicate distinct gender roles. Movies that portray the behaviors as co-occurring or causally linked, especially in a positive or provocative manner, could change adolescents' alcohol expectancies, thereby influencing their risk-taking (Jones et al., 2001).

Gender and racial differences—The current study provides evidence that media effects on adolescent sexual behavior may be stronger among men than among women. However, explanations for this gender difference are still unclear and warrant more research. Additionally, the current sample included too few African Americans to test moderation by race. African Americans tend to sexually debut at a younger age and engage in more risky sex than European Americans (Halpern et al., 2004), but they engage in consistent alcohol

use *later* than European Americans (Cooper et al., 2008) and are less likely to use substances in conjunction with sex (Halpern et al., 2004). Furthermore, African Americans tend to be *less responsive* than European Americans to media depictions of sex (Brown et al., 2006; Hennessy et al., 2009) and alcohol use (Gibbons et al., 2010). Future research should, therefore, examine the media specificity issue in a more diverse sample.

Generalizability—Participants lost at follow-up were more at-risk than those retained in the study, a pattern typical in longitudinal research (Boys et al., 2005). However, we have no reason to believe that this pattern of attrition dramatically altered the results. Also, these findings may not generalize to nations with sex and drinking norms different from those of the U.S., although movie effects on alcohol use have been found to be similar across samples from the U.S. and other countries (e.g., Hanewinkel et al., 2012). Finally, this study focused on just two behaviors, alcohol use and sex, which are known to be associated in life (Cooper, 2006; George & Stoner, 2000) and to co-occur in movies (Nalkur et al., 2010; Tickle et al., 2009). It cannot be concluded, therefore, that all movie risk exposures are associated with all types of adolescent risk-taking. In fact, Hanewinkel et al. (2012) showed no relation between movie smoking exposure and HED among European adolescents when controlling for MAE. The discrepancy between our findings and those of Hanewinkel et al. may be explained by the differing ways in which alcohol is portrayed in movies in conjunction with either smoking or sexual behavior, or the possibility that the cross-sectional nature of the Hanewinkel et al. study precluded the identification of effects that may emerge over time. Either way, further research is necessary on the issue of specificity among other types of risk exposures and behaviors.

Conclusion

Movie exposure to sexual behavior and alcohol use is associated with increased adolescent risk-taking through specific and general effects. However, men appeared to be more influenced by MSE than were women, whereas women were only influenced by MAE. It is yet unknown whether these effects operate through one or multiple psychological mechanisms, but it does suggest that movie effects on behavior go beyond a simple modeling process. It is recommended that researchers not always study a single exposure-behavior relation in isolation, nor should parents or interventionists assume that restricting one type of exposure will necessarily prevent, delay, or reduce the associated behavior. Finally, we suggest that raters more consistently give movies with a variety of risk-taking content more age-restrictive ratings, as viewing of this content may influence an array of adolescent risk behaviors.

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Research Highlights

- Male adolescents' exposure to sexual and alcohol content in movies predicts later risky sexual behavior and alcohol use.
- Female adolescents' exposure to alcohol content in movies alone predicts later risky sexual behavior and alcohol use.
- Movie effects on adolescent health-risk taking appear to include both specific and non-specific components.

Figure 1.

Structural equation model predicting T6 risky sex and T6 alcohol use from T1+T2 movie risk exposures.

Note. $N = 1069$. Coefficients for paths moderated by gender are in parentheses, with the men above the line and women below the line. All coefficients are unstandardized. Fit statistics are from the full (unstacked) model. Double-headed arrows indicate correlated errors. T1 = time 1, T2 = time 2, T6 = time 6, MSE = movie sex exposure; MAE = movie alcohol exposure., HED = heavy episodic drinking. $*p < .05$; $**p < .01$; $***p < .001$.

Table 1

Descriptive statistics for main study variables by gender.

Variable	<i>M (SD)</i>		<i>t-value</i>
	Men (<i>n</i> = 611)	Women(<i>n</i> = 617)	
T1 + T2 MSE	0.97 (0.64)	0.92 (0.61)	NS
T1 + T2 MAE	7.98 (5.24)	7.56 (4.71)	NS
Age of sexual debut	16.94 (1.25)	17.02 (1.29)	NS
T6 number of sexual partners ¹	3.16 (5.01)	2.27 (3.56)	3.54***
T6 casual sex without a condom ¹	0.40 (1.11)	0.26 (0.82)	2.60**
Age of HED initiation	16.73 (1.82)	16.88 (1.98)	NS
T6 past month days using alcohol ²	2.18 (1.50)	1.98 (1.45)	2.12*
T6 average drinks per day ²	2.14 (1.59)	1.71 (1.31)	4.61***
T6 past month HED days ²	0.76 (0.43)	0.58 (0.49)	6.02***

Note. T1 = time 1; T2 = time 2; T6 = time 6; MSE = movie sex exposure; MAE = movie alcohol exposure; HED = heavy episodic drinking.

¹ among non-virgins;

² among drinkers. NS = non-significant;

* *p* .05;

** *p* .01;

*** *p* .001.

Table 2

Correlations between study variables.

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1. Sexual debut	---	-.50	.41	-.25	-.22_a	-.23_c	-.09	-.17	-.28	.13	.20	.12	.13	.06	.11
2. T6 risky sex	-.49	---	-.32	.32	.18_b	.19_d	.05	.11	.20	-.11	-.16	-.12	-.09	.00	-.02
3. HED initiation	.38	-.40	---	-.37	-.28	-.30	.02	-.14	-.32	.17	.27	.13	.03	-.10	.00
4. T6 alcohol use	-.32	.44	-.49	---	.29	.34	.03	.04	.27	-.17	-.13	-.13	.08	.07	.12
5. T1+T2 MSE ¹	-.34_a	.35_b	-.37	.31	---	.88	.12	.25	.33	-.14	-.14	-.14	-.04	-.06	.20
6. T1+T2 MAE ¹	-.35_c	.36_d	-.36	.32	.90	---	.13	.26	.35	-.12	-.15	-.15	-.04	-.04	.22
7. TV use	-.04	.02	.06	-.05	.04	.08	---	.21	.16	.00	-.05	-.15	-.10	-.12	.00
8. TV in bedroom	-.12	.14	-.12	.08	.22	.24	.14	---	.16	-.03	-.01	-.03	-.12	-.12	.06
9. Sensation seeking	-.27	.32	-.32	.28	.36	.37	.10	.07	---	-.17	-.42	-.25	-.05	-.06	.11
10. Church attendance	.11	-.18	.10	-.11	-.13	-.14	-.02	-.14	-.10	---	.12	.20	.02	-.04	-.06
11. Mat. respon.	.09	-.18	.13	-.13	-.12	-.13	-.05	-.02	-.32	.06	---	.46	.00	.05	-.03
12. Mat. demand.	.05	-.16	.09	-.11	-.14	-.17	.01	.00	-.16	.11	.36	---	.01	-.02	-.11
13. Family structure ²	.05	-.04	.02	.04	-.10	-.11	-.09	-.11	-.04	.05	.05	.02	---	.20	.05
14. Race ³	.03	.01	-.07	-.11	-.13	-.09	-.15	-.06	.06	-.05	.08	-.03	.06	---	.02
15. Age	.02	.17	-.06	.09	.22	.24	-.03	.04	.13	-.06	-.09	-.16	.02	.00	---

Note. Men (below the diagonal): $n = 615$; Women (above the diagonal): $n = 595$. Correlations with like subsamples are significantly different between genders. T1 = time 1; T2 = time 2; T6 = time 6; HED = heavy episodic drinking; MSE = movie sex exposure; MAE = movie alcohol exposure; Mat. respon. = maternal responsiveness; Mat. demand. = maternal demandingness.

¹ Square-root transformed;

² coded: 0 = intact, 1 = divided;

³ coded: 0 = minority, 1 = European American.

Underlined: $p < .05$; italicized: $p < .01$; boldface: $p < .001$.

Table 3

Total indirect effects of early movie exposure on risky sex and alcohol use.

	Total		Men (<i>n</i> = 528)		Women (<i>n</i> = 541)	
	<i>B</i>	<i>z</i>	<i>B</i>	<i>z</i>	<i>B</i>	<i>z</i>
Total indirect effect						
MSE T6 risky sex ^{<i>I</i>}	0.26	2.00*	0.39	2.64**	0.01	0.05
MSE T6 alcohol use ^{<i>I</i>}	0.68	3.12**	1.37	3.38***	0.13	0.52
MAE T6 risky sex	0.28	4.54***	0.17	2.95**	0.46	3.39***
MAE T6 alcohol use	0.48	5.94***	0.48	3.47***	0.50	4.87***

Note. T6 = time 6; MSE = movie sex exposure; MAE = movie alcohol exposure. Unstandardized coefficients for men and women derived from separate structural equation models for each gender.

^{*I*}Total indirect effects significantly different between genders.

* *p* .05;

** *p* .01;

*** *p* .001.