

# Exposure to Alcohol Use in Movies and Problematic Use of Alcohol: A Longitudinal Study Among Latin American Adolescents

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**ABSTRACT. Objective:** This study assesses the association between exposure to alcohol in movies and alcohol use transitions among Latin American adolescents. **Method:** A school-based longitudinal study involving 33 secondary schools in Argentina and 57 in Mexico was performed. The baseline sample included 1,504 never drinker adolescents in Argentina and 5,264 in Mexico (mean age = 12.5 years), of whom 1,055 and 3,540, respectively, completed a follow-up survey a year and a half later. Exposure to the 500 popular contemporary films was assessed by querying adolescents on 50 randomly selected titles. Films were content-coded for alcohol and exposure estimated from films seen. Logistic regression models estimated adjusted relative risk (aRR) for the following outcomes, net covariates, at follow-up: use of alcohol (having ever drunk), current drinking (drinking in the past 30 days), ever binge

drinking ( $\geq 4$  drinks [females] or 5 for males). **Results:** At follow-up, respective adolescent drinking rates for Mexico and Argentina were 31% and 36% for use of alcohol, 18% and 27% for current drinking, and 8% and 19% for ever binge drinking. Greater exposure to alcohol in movies was independently associated with trying alcohol (aRR = 1.30, 95% CI [1.17, 1.43]), current drinking (aRR = 1.22, 95% CI [1.03, 1.44]), and binge drinking (aRR = 1.71, 95% CI [1.30, 2.25]) in Mexican adolescents, whereas in Argentina, movie alcohol exposure was associated only with trying alcohol (aRR = 1.25, 95% CI [1.02, 1.53]). **Conclusions:** Exposure to alcohol in movies predicted underage drinking transitions in these Latin American adolescents, replicating prior results for U.S. and European cohorts. (*J. Stud. Alcohol Drugs*, 80, 69–76, 2019)

ALCOHOL IS A PSYCHOACTIVE SUBSTANCE with numerous negative health and social consequences to drinkers and their family members. It has been estimated that 5.9% of all deaths worldwide may be attributable to alcohol consumption (World Health Organization [WHO], 2014). The 2016 edition of the Global Burden of Disease study estimated that 335,000 deaths worldwide were caused by cirrhosis and other chronic liver diseases due to alcohol consumption and that 174,000 deaths were attributable to alcohol use disorders (Global Health Data Exchange, 2016). Furthermore, early use of alcohol is common among Latin American adolescents (Oficina de las Naciones Unidas contra la Droga y el Delito, 2010). In 2016, approximately 34% of Argentine adolescents ages 12–17 years had consumed alcohol in the past month (Secretaría de Políticas Integrales

sobre Drogas de la Nación Argentina, 2017). In 2016, 28% of Mexican adolescents consumed alcohol in the past year and 8.3% engaged in binge drinking in the previous month (Secretaría de Salud, 2017).

Recent reviews have found that exposure to alcohol marketing is associated with subsequent alcohol consumption in youths in the United States and Europe (Anderson et al., 2009; Jernigan et al., 2017; Smith & Foxcroft, 2009). The alcohol industry promotes its products through multiple channels, including youth-oriented radio, television, sports events and popular music concerts, websites, social media, mobile phones, and product placements in movies and television shows (Monteiro et al., 2017). In response to this, the WHO (2010) and the Pan American Health Organization (2016) recommend multinational cooperation and governmental action to reduce adolescent exposure to alcohol marketing. Although the Argentinean National Law Against Alcoholism N° 24.788 prohibits the advertising of alcoholic beverages to minors of 18 years (Ministerio de Justicia y Derechos Humanos, 1997), in practice only television advertising during the daytime is prohibited. In Argentina, 43% of students saw ads for alcoholic beverages daily in the last month on television, videos, magazines, the internet, cinemas, sports events, or concerts (Ministe-

Received: May 29, 2018. Revision: October 12, 2018.

This research was funded by the Fogarty International Center and by the National Cancer Institute from the National Institutes of Health (grants R01 TW009274 and CA077026). The content is solely the responsibility of the authors and does not necessarily represent the official views of the National Institutes of Health.

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rio de Salud de la Nación, 2012). In Mexico, the General Health Law specifies that advertising of tobacco and alcohol to minors is prohibited; this prohibition extends to motion pictures as stated in Chapter II, Article 33 (Cámara de Diputados del Honorable Congreso de la Unión, 2014). Unfortunately, there are no known data about alcohol advertising exposures for Mexican adolescents.

This study examines the association between alcohol in movies and adolescent drinking. Alcoholic beverage companies actively seek product placement of their products in entertainment media (Federal Trade Commission, 2014). Movies are a primary source of popular entertainment and a powerful vehicle for promoting products and behaviors (Boing et al., 2013), and alcohol is extremely common in movies. One multicountry study of nationally produced films found that the presence of alcohol ranged from 76% in films made in the Netherlands to 97% in Italian films. In Latin America, 70% and 92% of youth-rated films from Mexico and Argentina, respectively, portrayed alcohol (Barrientos-Gutierrez et al., 2015). In Argentina, 82% of boys 3–17 years old watch movies sometimes or frequently (Sistema de Información Cultural de la Argentina, 2013). In Mexico in 2017, 338 million tickets were sold to commercial theaters, which makes Mexico the fourth largest film consumer in the world (Instituto Mexicano de Cinematografía, 2017).

Experimental studies have shown that exposure to alcohol portrayals in films is associated with alcohol intake, as measured by young adults imitating the sipping of actors while watching a movie (Engels et al., 2009; Koordeman et al., 2011). Cross-sectional (Hanewinkel et al., 2007, 2012; Morgenstern et al., 2011b, 2014; Sargent et al., 2006; Waylen et al., 2015) and longitudinal studies (Dal Cin et al., 2009; Hanewinkel & Sargent, 2009; Hanewinkel et al., 2014; Morgenstern et al., 2011a) have reported a consistent association between exposure to alcohol use in films and alcohol use and binge drinking among adolescents in the United States, England, and Germany. Last, a prior cross-sectional study in Mexico and Argentina also found this association (Mejia et al., 2016), but we are not aware of any longitudinal study in a Latin American population of adolescents.

The objective of this study was to assess the degree to which exposure to alcohol in movies among Latin American adolescents who had never tried alcohol predicts subsequent alcohol use. The hypothesis of our study was that greater exposure to alcohol portrayals in movies would increase the likelihood of trying alcohol, current drinking, and binge drinking. The results of this study could inform consistency of the association found in prior studies.

### Method

A school-based longitudinal study was carried out in large Argentinian (Buenos Aires, Córdoba, and Tucumán) and Mexican (Mexico City, Guadalajara, and Monterrey) metro-

politan areas. A sample of 18 public and 15 private secondary schools in Argentina was purposively selected to capture a range of socioeconomic diversity. In Mexico, 57 public schools were selected using a stratified, multi-stage random sampling scheme. A detailed description of the school selection in both countries has been published elsewhere (Mejia et al., 2016).

The aim of the survey was to assess the associations between media/marketing exposures and adolescent risk behaviors. The questionnaire included items used in surveys for adolescents previously implemented in Argentina, Mexico, and the United States (Alderete et al., 2009; Dal Cin et al., 2008; Mejia et al., 2016, 2017; Thrasher et al., 2008). Items in English were translated and reviewed by Spanish-speaking research staff, and the final survey instrument was pilot tested with students from both countries to ensure adequate understanding of questions, instructions, and confidentiality statements. The self-administered questionnaires were completed in the classroom under the supervision of trained research staff.

A passive parental consent procedure was implemented, along with active consent for first-year secondary school students who completed a self-administered survey under the supervision of trained research staff. A linking procedure was used to allow for follow-up while ensuring anonymity (Galanti et al., 2007). Study protocols were approved by NIH-certified human subjects' research boards in Argentina (i.e., Centro de Educación Médica e Investigaciones Clínicas) and Mexico (Instituto Nacional de Salud Pública).

Baseline data collection took place between May and July 2014 in Argentina and February and March 2015 in Mexico, with the follow-up survey between October and November 2015 in Argentina (mean between-wave interval = 17.1 months; range: 16.0–19.3 months) and between October and November 2016 in Mexico (mean between-wave interval = 20.4 months; range: 19.5–21.4 months).

#### *Exposure to alcohol use in films (independent variable)*

Films chosen for this study included films released in Argentina between 2009 and 2013 and listed by the Argentinian National Institute of Cinema and Visual Arts among the top 100 revenue grossing films for the year released. The top 100 films for Mexico were listed by the Mexican Institute of Cinematography, from 2010 to 2014, because data collection took place 1 year after that in Argentina. The Argentinian analytic film sample (2009–2013) included 427 films, of which 47 were produced in Argentina and 380 in the United States; the whole sample depicted 24.74 hours of alcohol use. The Mexican analytic sample of films (2010–2014) included 446 films, 46 of which were produced in Mexico and 400 in the United States; that sample depicted 24.85 hours of alcohol use. Films made in other countries were excluded from the sample because of their small number.

To estimate exposure to movie alcohol, we used methods validated for measuring exposure to film smoking by the Dartmouth Media Research Laboratory (Bergamini et al., 2013; Dalton et al., 2002) described elsewhere (Mejia et al., 2016, 2017). In brief, for each film, depictions of alcohol were timed when there was real or implied use of an alcoholic beverage by one or more characters, including purchases and occasions when alcoholic beverages were clearly in the possession of a character. All alcohol use and implied use was timed in seconds from the moment the alcohol appeared on screen. Empty alcoholic beverage containers and those displayed but not implied as being consumed were not timed as alcohol use. To evaluate inter-rater reliability, a random sample of 10% of films was coded by two coders yielding an  $\alpha$  of .76 for alcohol time depictions.

The Beach method (Sargent et al., 2008) was used to assess exposure. Each student received a randomly selected unique subsample of 50 film titles from the list of films and indicated which films they had seen. Movie alcohol exposure to the full sample of films was determined by (a) summing the seconds of exposure across all films the adolescent reported having seen, (b) dividing by the total seconds of movie alcohol across all 50 films in the participant's unique list, and (c) multiplying that proportion by the total seconds of movie alcohol in the full list of films (Argentina = 88,920 seconds; Mexico = 89,460 seconds). Movie alcohol exposure was scaled to hours of exposure and then classified into terciles for use in logistic regression.

#### *Assessment of alcohol consumption and drinking susceptibility (dependent variables)*

The analytic sample included all students who reported never drinking alcohol (not even a sip) at baseline ( $n = 3,500$  in Mexico and  $n = 1,055$  in Argentina). At follow-up, a respondent was an "experimenter" if he or she reported having ever drunk (even a sip) but not in the past 30 days, and a "current drinker" if he or she reported any number greater than 0 to the question, "During the past 30 days, on how many days did you drink alcohol?" We assessed binge drinking by asking the maximum number of alcoholic drinks consumed in a single occasion, with responses coded separately for males and females (5 vs. 4 drinks in a row, respectively) (Courtney & Polich, 2009).

#### *Covariates*

We adjusted for characteristics that could increase movie exposure and be associated with youth substance use. Socio-demographic variables assessed included age, gender, and highest educational attainment of either parent ( $\leq 12$ ,  $> 12$  years of formal education). Any current drinking among the students' five best friends was assessed (any friend vs. none). We also adjusted for sensation seeking (four items,  $\alpha = .79$

for Argentina and .82 for Mexico) (Sargent et al., 2010; Stephenson & Helme, 2006) and parenting style from mother and father combined (three items to describe responsiveness,  $\alpha = .82$  for Argentina and .81 for Mexico, and another three items for demandingness,  $\alpha = .70$  for Argentina and .80 for Mexico) (Jackson et al., 1998; Peña et al., 2017; Sargent et al., 2010; Stephenson & Helme, 2006), with scores for both dimensions averaged because they were highly positively correlated (Peña et al., 2017).

#### *Analyses*

All data analyses were conducted with Stata Version 13 (StataCorp LP, College Station, TX). To assess the extent of possible attrition bias, chi-square for categorical and  $t$  tests for continuous variables were used to assess significant differences between students who were and were not followed up.

The association between movie alcohol exposure and each outcome was estimated using multilevel logistic regression with random intercepts for school via generalized estimating equation methods. For the regression analyses, movie alcohol exposure was split into terciles, with the first tercile being used as the reference group. Crude and adjusted relative risks (RRs) with 95% confidence intervals (CIs) were used as summary statistics, derived from a log-binomial generalized estimating equation model. We tested interaction between sex and alcohol exposure for all outcomes. As it was not significant in all cases ( $p > .15$ ), the interaction term was excluded from the models. To assess potential biases from attrition, we re-estimated all models adjusting for individual weights based on the inverse probability of being followed up. There was no meaningful difference in the pattern of results or inferences from them. Therefore, we present only the nonweighted results.

## **Results**

Overall, 3,172 students in Argentina (participation rate: 83%) and 7,646 students in Mexico (participation rate: 84%) completed the survey at baseline. Of those, 1,504 (47.4%) students in Argentina and 5,264 (68.8%) in Mexico reported never having tried alcohol at baseline and were therefore eligible for inclusion. Of these 6,768 baseline never drinkers, Wave 2 data collection was completed for 1,055 (70.2%) Argentinean and 3,540 (67.2%) Mexican students.

Table 1 shows the baseline characteristics of eligible participants who were and were not lost to follow-up for each country. In both Argentina and Mexico, students lost to follow-up were more likely to be male, older, and have parents with lower educational attainment. In Argentina, adolescents lost to follow-up were more likely to attend public schools and have friends who drink alcohol.

At follow-up, 31% ( $n = 1,102$ ) had tried alcohol, 17.9% ( $n = 630$ ) were current drinkers, and 8.5% ( $n = 310$ ) had

TABLE 1. Characteristics of students who were and were not successfully followed

Variable	Mexico			Argentina		
	Not followed	Followed	<i>p</i> <sup>a</sup>	Not followed	Followed	<i>p</i> <sup>a</sup>
Total, <i>n</i> (%)	1,724 (32.8)	3,540 (67.2)		449 (29.9)	1,055 (70.2)	
Girls, <i>n</i> (%)	853 (49.7)	1,841 (52)	.11	168 (37.6)	660 (44.1)	.001
Age, years, <i>M</i> ( <i>SD</i> )	12.47 (0.63)	12.36 (0.54)	.001	12.82 (0.84)	12.56 (0.76)	.001
Parents with >12 years of education, <i>n</i> (%)	684 (44.9)	1,644 (51.7)	.001	176 (39.6)	665 (44.8)	.01
Sensation seeking, 1–5, <i>M</i> ( <i>SD</i> )	2.72 (1.05)	2.53 (1.03)	.001	2.96 (1.02)	2.80 (1.00)	.004
At least one friend who drinks, <i>n</i> (%)	376 (22.0)	712 (20.2)	.13	153 (34.3)	457 (30.5)	.04
Parenting style, 1–5, <i>M</i> ( <i>SD</i> )	3.97 (0.85)	4.03 (0.84)	.01	4.07 (0.77)	4.14 (0.67)	.21
Hours of exposure to alcohol in films, <i>M</i> ( <i>SD</i> )	6.49 (4.91)	6.08 (4.56)	.001	6.46 (5.08)	5.93 (4.28)	.06
Alcohol use at follow up						
Experimenters, prior use, not current, <i>n</i> (%)	–	1,102 (31.1)	–	–	385 (36.5)	–
Current drinkers, <i>n</i> (%)	–	630 (17.9)	–	–	286 (27.2)	–
Binge drinking, ever, <i>n</i> (%)	–	301 (8.5)	–	–	200 (19.2)	–

<sup>a</sup>Chi-squared test for categorical and *t* test for continuous variables.

engaged in binge drinking in Mexico; and 36.5% ( $n = 385$ ) had tried alcohol, 27.2% ( $n = 286$ ) were current drinkers, and 19.2% ( $n = 200$ ) reported binge drinking in Argentina.

Figure 1 illustrates the wide range of exposure to alcohol in the 500 movies, depending on how many films the adolescents had seen. Some adolescents had little or no exposure; others had upwards of 15 hours of exposure. First tercile movie alcohol exposure means for Mexico and Argentina, respectively, were 2.21 ( $SD = 1.11$ ) and 1.98 ( $SD = 0.97$ ), second tercile means were 5.87 ( $SD = 1.18$ ) and 5.05 ( $SD = 0.93$ ) hours, and third tercile means were 12.37 ( $SD = 3.6$ ) and 10.76 ( $SD = 3.68$ ) hours, respectively.

Figure 2 illustrates the unadjusted associations between movie alcohol exposure and drinking for the three outcomes. In Mexico, there was a distinction between drinking across all three terciles of exposure, whereas in Argentina these

distinctions were not so clear, especially for the more problematic drinking outcomes.

As shown in Table 2, after controlling for other baseline covariates, in Mexico movie alcohol exposure was significantly associated with increased adjusted relative risk (aRR) for trying alcohol (aRR<sub>T3vT1</sub> = 1.30, 95% CI [1.17, 1.43]), current drinking (aRR<sub>T3vT1</sub> = 1.22, 95% CI [1.03, 1.44]), and ever binge drinking (aRR<sub>T3vT1</sub> = 1.71, 95% CI [1.30, 2.25]).

In Argentina, movie alcohol exposure was independently associated only with trying alcohol (aRR<sub>T3vT1</sub> = 1.25, 95% CI [1.02, 1.53]). Although the independent association between movie alcohol exposure and current drinking (RR<sub>T3vT1</sub> = 1.22, 95% CI [0.96, 1.54]) and binge drinking (RR<sub>T3vT1</sub> = 1.32, 95% CI [0.98, 1.78]) did not quite reach statistical significance, the adjusted estimates for the effect size were similar to the estimate for drinking onset (Table 3 and Figure 2).

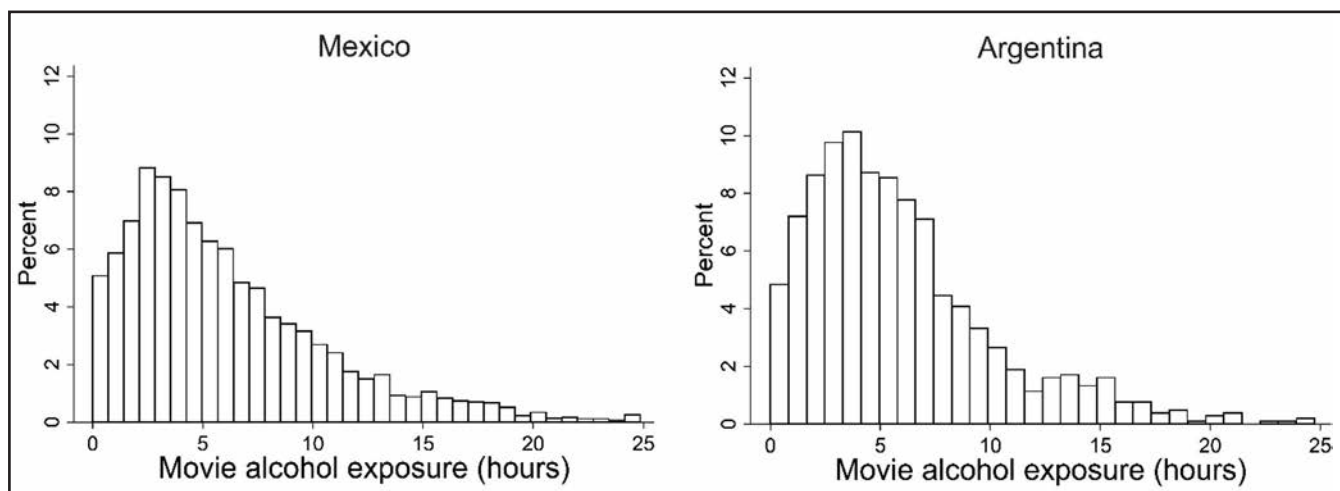


FIGURE 1. Distribution for the estimated exposure to alcohol use in films in Mexico (left;  $M = 6.07$ ,  $SD = 4.56$ ,  $Mdn = 4.93$ ) and Argentina (right;  $M = 5.92$ ,  $SD = 4.28$ ,  $Mdn = 5.11$ )

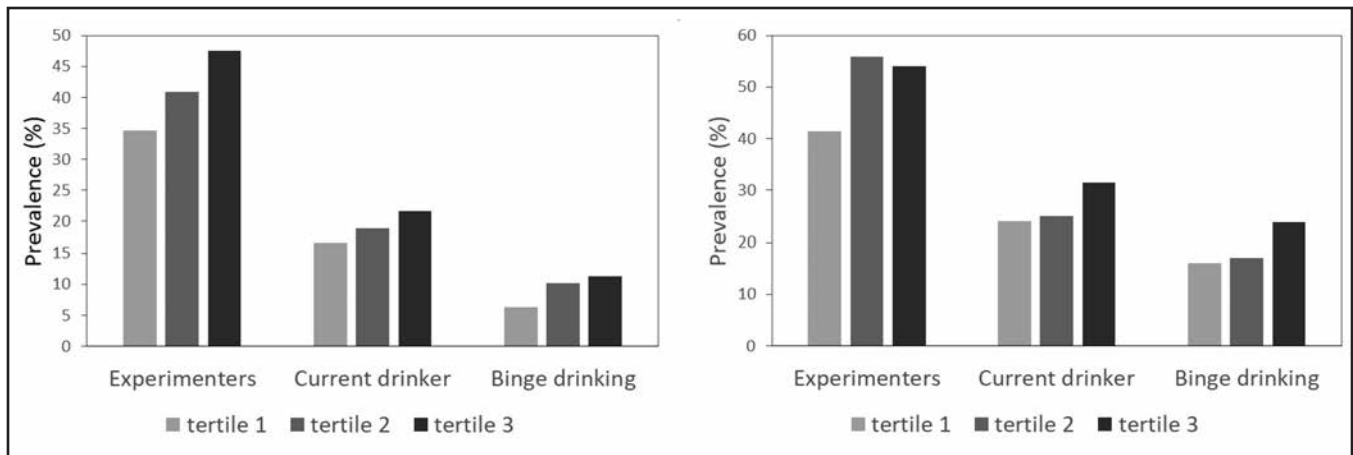


FIGURE 2. Adjusted prevalence for transition from never drinker to experimenter, current drinker, or binge drinking by tertiles of exposure to alcohol imagery in films, among Mexican (left) and Argentinean (right) adolescents

TABLE 2. Adjusted relative risk (aRR) of becoming experimenters, current drinkers, and binge drinkers among early adolescents in Mexico

Variable	From never drinker to experimenter <sup>a</sup> (n = 2,905)			From never drinker to current drinker (n = 3,139)			From never drinker to ever binge drinking (n = 3,139)		
	% of participants	Crude RR [95% CI]	aRR [95% CI]	% of participants	Crude RR [95% CI]	aRR [95% CI]	% of participants	Crude RR [95% CI]	aRR [95% CI]
Sex									
Boys (ref.)	37.2	1	1	15.6	<b>1</b>	<b>1</b>	6.6	<b>1</b>	<b>1</b>
Girls	38.7	1.03 [0.94, 1.13]	1.09 [0.99, 1.20]	20.0	<b>1.28</b> [1.10, 1.48]	<b>1.34</b> [1.15, 1.56]	10.3	<b>1.56</b> [1.27, 1.93]	<b>1.65</b> [1.30, 2.09]
Age, years		1.02 [0.95, 1.10]	1.00 [0.93, 1.08]		<b>1.18</b> [1.07, 1.30]	<b>1.17</b> [1.05, 1.29]		1.11 [0.94, 1.31]	1.12 [0.94, 1.35]
Parental education									
≤12 years of education (ref.)	38.4	1	1	20.7	<b>1</b>	<b>1</b>	10.3	<b>1</b>	1
>12 years of education	38.8	1.02 [0.93, 1.12]	1.02 [0.93, 1.13]	15.9	<b>0.83</b> [0.73, 0.96]	<b>0.87</b> [0.76, 1.00]	7.5	<b>0.79</b> [0.65, 0.96]	0.84 [0.68, 1.04]
Sensation seeking, range: 1–5		<b>1.12</b> [1.07, 1.17]	<b>1.12</b> [1.07, 1.17]		<b>1.12</b> [1.05, 1.19]	<b>1.09</b> [1.02, 1.17]		<b>1.13</b> [1.02, 1.25]	1.09 [0.98, 1.21]
Parenting style, range: 1–5		0.96 [0.91, 1.01]	0.99 [0.94, 1.05]		<b>0.87</b> [0.81, 0.94]	<b>0.89</b> [0.82, 0.96]		<b>0.83</b> [0.72, 0.95]	0.86 [0.74, 1.00]
Friends drinkers									
No (ref.)	36.3	<b>1</b>	1	16.3	<b>1</b>	<b>1</b>	7.7	<b>1</b>	<b>1</b>
Yes	44.5	<b>1.20</b> [1.08, 1.33]	1.10 [0.99, 1.24]	24.0	<b>1.41</b> [1.22, 1.63]	<b>1.35</b> [1.16, 1.56]	11.7	<b>1.48</b> [1.17, 1.87]	<b>1.29</b> [1.02, 1.63]
Exposure to AUF									
Tercile 1 (ref.)	33.6	1	1	15.8	1	1	6.3	1	1
Tercile 2	38.2	<b>1.16</b> [1.03, 1.29]	<b>1.15</b> [1.03, 1.27]	17.5	1.11 [0.96, 1.29]	1.11 [0.95, 1.30]	9.4	<b>1.51</b> [1.16, 1.97]	<b>1.61</b> [1.20, 2.15]
Tercile 3	45.2	<b>1.34</b> [1.21, 1.49]	<b>1.30</b> [1.17, 1.43]	21.9	<b>1.38</b> [1.18, 1.60]	<b>1.22</b> [1.03, 1.44]	<b>10.8</b>	<b>1.73</b> [1.34, 2.22]	<b>1.71</b> [1.30, 2.25]

Notes: **Bold** indicates statistical significance at  $p < .05$ . CI = confidence interval; ref. = reference; AUF = alcohol use in films. <sup>a</sup>Tried, but not currently (i.e., current drinkers are not included).

## Discussion

Our study supports the conclusion that exposure to alcohol use in movies promotes underage drinking transitions. Our results are consistent with a previous cross-sectional study in Mexico and Argentina (Mejia et al., 2016), as well as with studies in other countries (Hanewinkel & Sargent, 2009; Hanewinkel et al., 2007, 2012; Sargent et al., 2006; Waylen et al., 2015; Wills et al., 2009). Evidence to support

the association for earlier drinking transitions was stronger for Argentinian adolescents, for whom current and binge drinking estimates did not reach statistical significance, in part because there were fewer common transitions and the sample size was smaller there.

Recently it has been suggested that it is difficult to attribute substance use to youth exposure to film depictions of the substance (Chapman & Farrelly, 2011). This is because youth who are at risk for alcohol consumption due to personal character-

TABLE 3. Adjusted relative risk (aRR) of becoming experimenters, current drinkers, and binge drinking at follow up by exposure to alcohol use in films (AUF) in Argentina

Variable	From never drinker to experimenter <sup>a</sup> (n = 747)			From never drinker to current drinker (n = 1,014)			From never drinker to ever binge drinking (n = 1,009)		
	% of participants	Crude RR [95% CI]	aRR [95% CI]	% of participants	Crude RR [95% CI]	aRR [95% CI]	% of participants	Crude RR [95% CI]	aRR [95% CI]
Sex									
Boys (ref.)	50.7	1	1	21.9	<b>1</b>	<b>1</b>	16.0	<b>1</b>	<b>1</b>
Girls	49.5	0.99	0.99	33.0	<b>1.49</b>	<b>1.44</b>	22.5	<b>1.39</b>	<b>1.37</b>
		[0.84, 1.17]	[0.83, 1.18]		<b>[1.14, 1.95]</b>	<b>[1.09, 1.90]</b>		<b>[1.06, 1.83]</b>	<b>[1.05, 1.79]</b>
Age, years		0.95	0.91		0.94	<b>0.86</b>		1.02	0.94
		[0.86, 1.04]	[0.81, 1.03]		[0.82, 1.08]	<b>[0.75, 0.99]</b>		[0.87, 1.19]	[0.79, 1.11]
Parental education									
≤12 years of education (ref.)	48.1	1	1	27.7	1	1	20.7	1	1
>12 years of education	51.5	1.05	1.06	26.3	0.99	1.02	17.7	0.91	0.97
		[0.91, 1.23]	[0.91, 1.24]		[0.81, 1.22]	[0.84, 1.25]		[0.72, 1.14]	[0.76, 1.23]
Sensation seeking, range 1–5		<b>1.10</b>	<b>1.06</b>		<b>1.16</b>	1.09		<b>1.24</b>	<b>1.18</b>
		<b>[1.04, 1.17]</b>	<b>[1.00, 1.12]</b>		<b>[1.04, 1.29]</b>	[0.98, 1.22]		<b>[1.10, 1.40]</b>	<b>[1.04, 1.35]</b>
Parenting style, range 1–5		0.94	0.97		0.91	0.95		<b>0.83</b>	0.90
		[0.83, 1.05]	[0.86, 1.10]		[0.79, 1.06]	[0.82, 1.10]		<b>[0.69, 1.00]</b>	[0.76, 1.07]
Friends drinkers									
No (ref.)	47.4	<b>1</b>	<b>1</b>	22.0	<b>1</b>	<b>1</b>	15.4	<b>1</b>	<b>1</b>
Yes	58.8	<b>1.26</b>	<b>1.21</b>	40.2	<b>1.86</b>	<b>1.76</b>	28.2	<b>1.84</b>	<b>1.69</b>
		<b>[1.07, 1.48]</b>	<b>[1.01, 1.45]</b>		<b>[1.54, 2.24]</b>	<b>[1.47, 2.11]</b>		<b>[1.49, 2.28]</b>	<b>[1.34, 2.13]</b>
Exposure to AUF									
Tercile 1 (ref.)	41.7	<b>1</b>	<b>1</b>	24.9	1	1	16.2	1	1
Tercile 2	56.5	<b>1.34</b>	<b>1.33</b>	25.6	1.04	1.04	17.4	1.07	1.03
		<b>[1.12, 1.60]</b>	<b>[1.10, 1.61]</b>		[0.79, 1.37]	[0.79, 1.37]		[0.79, 1.47]	[0.77, 1.39]
Tercile 3	52.7	<b>1.27</b>	<b>1.25</b>	31.3	<b>1.29</b>	1.22	23.9	<b>1.53</b>	1.32
		<b>[1.06, 1.52]</b>	<b>[1.02, 1.53]</b>		<b>[1.05, 1.60]</b>	[0.96, 1.54]		<b>[1.16, 2.01]</b>	[0.98, 1.78]

Notes: **Bold** indicates statistical significance at  $p < .05$ . CI = confidence interval; ref. = reference. <sup>a</sup>Current drinkers are not including in the analytic sample.

istics, such as sensation seeking and peer alcohol use, may self-select to watch films that contain more alcohol portrayals than youth who are not at risk. In our study, associations between exposure to movie alcohol and drinking persisted after adjusting for covariates that are plausible confounders of media exposure effects, including sensation seeking (Stoolmiller et al., 2010), peer alcohol use, and parenting style. Although other confounding factors may yet be identified, our results generally support the idea that exposure to movie alcohol both precedes transitions in drinking behavior and is an independent environmental risk factor.

This study has several limitations that should be acknowledged. First, compared with students who were followed up, those lost to follow-up were more likely to have a range of risk factors for alcohol use, such as higher sensation seeking or drinking among close friends. Moreover, selecting never drinkers at baseline would tend to select for lower risk adolescents. It is not known whether movie alcohol would have a weaker or stronger influence on drinking behaviors among relatively higher risk adolescents, who were less likely to be selected and followed. Hence, care should be taken when generalizing these results to the broader population. Second, although schools were selected to represent the range of socioeconomic diversity in three large cities in each country, they were not randomly selected, and this could represent

another source of bias. Last, we examined exposure to only one type of entertainment media. Because alcohol advertising is pervasive in both countries, we were not able to determine whether the effects of movie alcohol are independent of exposure to alcohol use in other entertainment media (e.g., television shows, video games) or through direct marketing (e.g., point of sale, street ads, television ads). In previous studies, controlling for such variables in similar studies on youth tobacco initiation does not explain away the effects of exposure to tobacco content in films (Mejia et al., 2017). Additional research is needed to clarify the independent contributions of these sources.

### Conclusions

Despite these limitations, the results of this longitudinal study document a longitudinal association between exposure to movie alcohol during early adolescence and drinking among adolescents from Latin America and add consistency when compared to other studies that have examined this same question.

These findings are important because public policies that aim to restrict youth exposure to alcohol advertising are being promoted as key strategies for reducing injury and chronic disease around the world (Monteiro et al., 2017; Pan

American Health Organization, 2016). Because the alcohol industry may increasingly invest its promotional resources in movies as a strategy to bypass the restrictions to direct marketing, policy makers should consider alcohol in their rating system for movies deemed appropriate for youth. It would also be appropriate to include restrictions on alcohol advertising in all entertainment media, such as video games, television programs, and series, which are used by young people in addition to banning traditional marketing strategies such as billboards, print materials, and direct advertising.

### Acknowledgment

Study protocols were approved by NIH-certified human subjects' research boards in Argentina (i.e., Centro de Educación Médica e Investigaciones Clínicas) and Mexico (Instituto Nacional de Salud Pública). The data sets used and/or analyzed during the current study are available from the corresponding author on reasonable request. RM initiated and conceived the study with the assistance of JFT and JDS, who provided advice on the data. PM and SB conducted the field work and the movies content analysis in Argentina; EAS conducted the field work in Mexico. AP analyzed the data. RM drafted the manuscript. AP, PM, SB, EAS, JDS, and JFT provided constructive inputs in the revising of the manuscript. All authors approved the final draft and agree to be accountable for all aspects of the work.

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