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Media as a “Super Peer”: How Adolescents Interpret Media Messages Predicts their Perception of Alcohol and Tobacco Use Norms

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Abstract

Adolescents’ media environment offers information about who uses substances and what happens as a result—how youth interpret these messages likely determines their impact on normative beliefs about alcohol and tobacco use. The Message Interpretation Processing (MIP) theory predicts that substance use norms are influenced by cognitions associated with the interpretation of media messages. This cross-sectional study examined whether high school adolescents’ ($n=817$, 48% female, 64% white) media-related cognitions (i.e., similarity, realism, desirability, identification) were related to their perceptions of substance use norms. Results revealed that adolescents’ media-related cognitions explained a significant amount of variance in perceived social approval for and estimated prevalence of peer alcohol and tobacco use, above and beyond previous use and demographic covariates. Compared to prevalence norms, social approval norms were more closely related to adolescents’ media-related cognitions. Results suggest that critical thinking about media messages can inhibit normative perceptions that are likely to increase adolescents’ interest in alcohol and tobacco use.

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Authors’ Contributions

KE conceived of the study, performed the statistical analyses, and drafted the manuscript; TMS conceived of the study, coordinated the data collection, participated in the design of the analyses and interpretation of the data, and helped to draft the manuscript; JBK conceived of the study, participated in the design of the analyses and interpretation of the data, and helped to draft the manuscript. All authors read and approved the final manuscript.

Conflicts of Interest

The authors report no conflict of interests.

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 standards.

Informed Consent

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

Keywords

media; message processing; adolescents; norms; alcohol; tobacco

Introduction

Adolescents in the U.S. live in a media-saturated environment. They spend an average of eight hours each day engaged with media channels including television, video games, music, and the internet (Rideout, Foehr, & Roberts, 2010), and 92% of adolescents report that they go online every day (Pew Research Center, 2015). These media usage rates are alarming when considered in light of research linking adolescents' media exposure to increased risk of alcohol (e.g., Grenard, Dent, & Stacy, 2013; Tucker, Miles, & D'Amico, 2013) and tobacco use (e.g., Tickle, Sargent, Dalton, Beach, & Heatherton, 2001; Villanti, Boulay, & Juon, 2011). The associations between media exposure and substance use have led some to argue that media serve as a "super peer" (Strasburger & Wilson, 2002), offering youth information about substance use that they may not encounter through other channels.

Although some regulatory efforts have been introduced to limit U.S. youth's exposure to alcohol and tobacco advertising, adolescents continue to encounter substance use portrayals throughout their media landscape. For example, industry guidelines call for alcohol advertisements to appear only in television programming with an underage audience of 28.4% or less, yet nearly a quarter of alcohol ads aired exceed this voluntary threshold (Jernigan, Ross, Ostroff, McKnight-Eily, & Brewer, 2013) and youth who watch television see, on average, 366 alcohol ads a year (CAMY, 2012). Similarly, recent surveys report that 70.9% of U.S. high school students have been exposed to advertising for e-cigarettes, mostly in retail stores (Singh et al., 2016), and the prevalence of tobacco use in video games has actually increased over time (Barrientos-Gutierrez, Barrientos-Gutierrez, Lazcano-Ponce, & Thrasher, 2012).

Portrayals of alcohol and tobacco use in media, such as popular music lyrics (Primack, Dalton, Carroll, Agarwal, & Fine, 2008) or music videos (Cranwell et al., 2015), largely present positive consequences of substance use, leading researchers to focus on the effects of media messages on adolescents' expectancies of how substance use will enhance their lives (e.g., Fleming, Thorson, & Atkin, 2004). These beliefs that substance use will result in positive outcomes such as having fun and making friends have been identified as one pathway through which exposure to advertising impacts subsequent substance use (e.g., Austin, Chen, & Grube, 2006; Sargent et al., 2002). Youth who hold the most positive expectancies about the benefits of smoking are 3.3 times more likely to start smoking than their peers (Song et al., 2009). However, media convey messages not just about what happens when one smokes or drinks but also about who smokes and drinks. Extending the idea of the media as a "super peer," we hypothesized that the ways in which adolescents interpret and make sense of media messages are related to their normative beliefs about peer substance use, the subject of the current study.

Understanding the media-related factors that shape teens' perceptions of smoking and drinking norms is as important now as it ever has been. Although teen cigarette smoking has

declined over the past decade, current rates of tobacco use will lead to the premature death of 1 in every 13 individuals who are under the age of 18 in the U.S. today (Eriksen et al., 2015). At the same time, underage drinking carries even more immediate risk, causing more than 4,000 deaths of young people under the age of 21 in the U.S. each year (CDC, 2013). Furthermore, new media in the form of social networking such as Facebook and Twitter create new opportunities for youth's perceptions of substance use to be influenced by content from both marketing companies (Winpenny, Marteau, & Nolte, 2014) and peers (Cavazos-Rehg, Krauss, Sowles, & Bierut, 2015). Adolescents' interpretations of these messages may offer unique insight into their perceptions of smoking and drinking norms.

Normative Influence

Social norms are one of many factors that impact adolescents' decision making about substance use, but theory connects norms to both the developmental period of adolescence and the influence of the media in important ways. First, adolescence is a time when peer affiliation becomes a prominent goal (Blakemore & Mills, 2014) and sensitivity to peer acceptance versus rejection peaks (Sebastian, Biding, Williams, & Blakemore, 2010). Thus, adolescents are quite sensitive to normative information about what behaviors are common and accepted, even showing a greater tendency than adults to be influenced by peers toward riskier decision making (Gardner & Steinberg, 2005). Second, norms are linked to media messages through social learning theory, which argues that individuals learn about the consequences of behaviors by vicariously observing the actions of others (Bandura, 1986). Media viewing offers an opportunity to observe the social consequences of alcohol and tobacco use (Green & Clark, 2013), and, returning to the idea of a "super peer," media can offer adolescents an opportunity to gather normative information even in the absence of substance-using peers.

Social norms related to alcohol and tobacco use are conceptualized in several different ways. The current investigation addresses two types of norms, namely, descriptive and injunctive norms. The former describes perceptions about the prevalence of use; the more prevalent a behavior is judged to be, the more normative it is perceived to be in the peer group (e.g., Prentice & Miller, 1993). The latter describes perceptions about the degree of social approval of substance use, such as the valence of social judgments about users (e.g., Keyes et al., 2012). A long history of research in persuasion and social influence traces the impact of norms on behavior, through both deliberate and automatic processes (e.g., Cialdini, 1984; Cialdini & Goldstein, 2004). Estimates of substance use prevalence and social approval of use are positively related to one another; however, they are distinct constructs that are independently related to substance use behaviors (Primack, Switzer, & Dalton, 2007).

In the case of descriptive norms, longitudinal studies find that individuals' estimates of alcohol and tobacco use prevalence are positively associated with their later drinking (Marks, Graham, & Hansen, 1992) and smoking (Collins et al., 1987). Even among adolescents who have never tried substances previously, higher estimates of peer use prevalence are associated with higher intentions to use alcohol (Olds, Thombs, & Tomasek, 2005) and actual alcohol use (D'Amico & McCarthy, 2006). Further, experimental work has manipulated perceptions of alcohol use prevalence and demonstrated effects on intentions to

use alcohol (Litt & Stock, 2011). As a result, overestimation of others' substance use is not only an important predictor of substance use behaviors, but also a key target of prevention efforts designed to provide youth with more accurate perceptions of the prevalence of peer use, particularly for drinking in university settings (e.g., DeJong et al., 2006; Perkins & Craig, 2006).

Turning to the second category of normative beliefs, injunctive norms also impact decision-making about substance use. Youth who perceive more social approval for alcohol and tobacco use are more likely to engage in those behaviors themselves (e.g., Kuther & Higgins-D'Alessandro, 2003; LaBrie, Hummer, Neighbors, & Larimer, 2010; Neighbors, Lee, Lewis, Fossos, & Larimer, 2007). The influence of injunctive norms has also been shown experimentally; adolescents who were randomly assigned to a computer-mediated interaction discussing alcohol with a pre-programmed "peer," later reported interest in alcohol use that conformed to the norms established by their interaction partner (Teunissen et al., 2012). Injunctive norms can also be understood in connection to "drinker prototypes," which are qualities that one associates with the typical alcohol user that may include tacit measures of perceived social approval such as popularity and coolness (Gibbons & Gerrard, 1995). More positive prototypes are also associated with greater interest in alcohol consumption (Gerrard et al., 2002).

In addition to perceptions of greater substance use prevalence and social approval being associated with increased risk of substance use, one's own drinking and smoking behaviors can increase perceptions that substance use is normative. Thus, these processes of influence are likely to be cyclical in that smoking and drinking increases prevalence estimates of use of those substances (Gerrard, Gibbons, Benthin, & Hessling, 1996). These normative effects on substance use behavior may operate through norms alleviating feelings of risk associated with substance use. Given that most youth are taught the risks associated with drinking and smoking, one way to alleviate those feelings of risk is to believe that many peers are taking the same risk that they are (Snyder & Wicklund, 1981). This process is termed the "false consensus" effect (Ross, Greene, & House, 1977) and has been observed with both smoking (Botvin, Botvin, Baker, Dusenbury, & Goldberg, 1992) and drinking (Gibbons & Gerrard, 1995). With the expectation that both types of norms may be influenced by one's previous use decisions through the false consensus pathway, we examined potential influences on both types of norms controlling for adolescents' previous experience using alcohol and tobacco.

Media and Norms

As outlined above, adolescents' perceptions of norms have consequences for their substance use decisions. Although youth have opportunities to observe substance use norms from their own peer group, media messages about substance use offer additional socialization opportunities beyond direct social contacts (Arnett, 1995). When operating as a "super peer," media messages serve as a potentially powerful and influential source of information about alcohol and tobacco use.

A number of studies have investigated social norms as a potential pathway through which media exposure may impact substance use decisions. For example, exposure to portrayals of

substance use in film and television has been linked to adolescents' perceptions of descriptive and injunctive norms related to both alcohol use (Osberg, Billingsley, Eggert, & Insana, 2012) and tobacco use (Nan & Zhao, 2016). Among younger adolescents (ages 10 to 14), alcohol use in movies had the greatest impact through students' perceptions of social approval of drinkers (i.e., imagining the average drinker as popular and smart) rather than beliefs about the prevalence of alcohol use (Dal Cin et al., 2009). Similarly, exposure to smoking in movies impacted middle school students' smoking intentions through increasing beliefs that "most kids who are like you" will start smoking, more so than through beliefs about whether most adults smoke (Tickle, Hull, Sargent, Dalton, & Heatherton, 2006). It is possible that adolescents' perceptions of social approval norms are more sensitive to media influence than their prevalence estimates, or at least more important for their own intentions to use. Youth seem to calibrate their thinking about media messages, particularly those that are pro-substance use, based on how they think that the messages will affect their peers (Gunther, Bolt, Borzekowski, Liebhart, & Dillard, 2006). Thus, adolescents make predictions about the effect of pro-smoking messages on their peers, and these peer approval norm estimates, in turn, shape their own smoking decisions.

As outlined above, traditional media impact youth substance use in part through shaping social normative beliefs; social media add unique opportunities to gather normative information. When adolescents interact with social media, the line between media messages and peer messages is increasingly blurred as marketers' messages may be transmitted through peer-to-peer channels (Griffiths & Casswell, 2010). In addition, adolescents' efforts to curate their online identities in socially desirable ways lead many to post their own images and experiences related to alcohol use (Ridout, Campbell, & Ellis, 2012). Exposure to these online portrayals of risky behaviors are particularly impactful among youth whose offline close friends do not engage in alcohol and tobacco use (Huang et al., 2014), perhaps because these social network connections extend their access to self-relevant social normative information.

However, measuring the impact of media exposure is only one way to understand how media messages shape adolescents' perceptions of substance use norms. As argued by Chapman and Davis (1997), the impact of any particular media portrayal of substance use will depend upon how the viewer interprets that instance of substance use based on the viewer's context and characteristics.

Interpretation of Media Messages

Perspectives on media influence argue that how adolescents interpret media messages will determine their effects on judgments and behavior. In this study, we used the Message Interpretation Processing (MIP) model (Austin & Johnson, 1997; Austin & Meili, 1994) as a theoretical basis for examining whether adolescents' media-related cognitions predicted their perceptions of social norms about substance use. The Message Interpretation Processing model traces the influence of media messages through a set of cognitions that capture both logical and emotional processing. When encountering media messages about substance use, youth who find the messages more similar to their own experiences (*similarity*), more appealing (*desirability*), and more accurate in their depiction of the real

world (*realism*) are more likely to incorporate those messages into their own thinking. These favorable perceptions of media messages contribute to youth identifying with and wishing to see themselves in situations portrayed within those messages (*identification*). These Message Interpretation Processing variables are associated with pre-drinking behaviors, intentions to drink and smoke, and actual drinking and smoking behaviors across work with children (Scull, Kupersmidt, & Erausquin, 2014) and adolescents (Scull, Kupersmidt, Parker, Elmore, & Benson, 2010). In light of work connecting media exposure to perceived substance use norms, we hypothesized that these media-related cognitions would be associated with adolescents' perceptions of substance use norms.

Previous work has shown that normative beliefs are influenced by personal histories with substance use (e.g., Botvin et al., 1992; Gerrard et al., 1996; Gibbons & Gerrard, 1995) as well as demographic characteristics—specifically, adolescents who are female and majority (White) racial group members report higher perceived prevalence norms, as do older adolescents (e.g., D'Amico & McCarthy, 2006; Juvonen, Martino, Ellickson, & Longshore, 2007; Pedersen et al., 2013). We tested for associations between media-related cognitions and normative beliefs controlling for demographic characteristics and lifetime substance use, which had the potential to overshadow any associations between our variables of interest and, thus, offered a relatively conservative test of our hypotheses.

Hypotheses

In this study, we examined the associations between high school students' media-related cognitions (i.e., identification, similarity, desirability, and realism) and their normative beliefs related to alcohol and tobacco use. We examined two types of normative beliefs, descriptive and injunctive norms, as separate outcomes to allow for the possibility that media-related cognitions may have different effects not only on the two substances, but also on the two types of normative beliefs, which are conceptually distinct (e.g., Primack et al., 2007). We hypothesized that adolescents' media-related cognitions would be significantly related to their perceptions of descriptive and injunctive norms about alcohol and tobacco use, even after controlling for previous use and demographic characteristics of sex, race, age, and socioeconomic status. More specifically, we hypothesized that adolescents' media-related cognitions would be positively related to their perceptions of the prevalence and social approval of alcohol and tobacco use.

Method

Participants

The data were collected in a baseline assessment as part of an evaluation of a media literacy education, substance-abuse prevention program with high school students. Adolescent participants were drawn from 38 classrooms in 14 high schools in 7 U.S. states found across multiple regions. In total, 817 out of 854 adolescents had complete data and were included in the final sample for analysis. Participants ranged in age from 12 to 19 years old ($M=14.8$ years old, $SD=1.0$ years), 52% were male, most were white (64.4% White, 13.8% African American, 21.8% Other racial groups) and non-Hispanic (88.7% non-Hispanic, 11.3% Hispanic), and 38% were eligible for free or reduced lunch.

Procedure

This cross-sectional study examined only the data collected in the first baseline questionnaire of a program evaluation study conducted in 2012. Thus, these responses were collected prior to classrooms being randomly assigned to conditions. Students who received parent permission and assented to participate in the study completed web-based questionnaires in the school computer labs, while non-participating students completed schoolwork.

Measures

Demographic characteristics—Participants reported demographic information that included their gender, age, race, and a measure of their socioeconomic status (i.e., eligibility to receive either free or reduced-price lunch). For analytic purposes, race was collapsed into two categories, either (1) non-White or (2) White, as was socioeconomic status, either (1) not eligible or (2) eligible for free or reduced-lunch.

Previous substance use—Previous substance use measures were drawn from the Youth Risk Behavior Survey questionnaire (Brener et al., 2002). To create a binary measure of “Previous alcohol use,” participants were asked “Have you ever in your lifetime...” “had beer,” “had wine,” “had hard liquor,” and “had an energy drink combined with alcohol.” Responding yes to any of those questions resulted in a code of 1=previous alcohol use, otherwise responses were coded as 0=no previous alcohol use (24.1% of sample reported previous alcohol use). To measure “Previous tobacco use,” participants who reported having “smoked cigarettes, even one of two puffs,” “used smokeless tobacco,” or “smoked tobacco in a hookah” were coded 1=previous tobacco use; otherwise they were coded 0=no previous tobacco use (14.0% of sample reported previous tobacco use).

Descriptive norms—Participants reported their perceived descriptive norms for alcohol use in a series of estimations of alcohol use among their age group. Four open-ended items asked participants to estimate “What percentage of people your age...” “drink beer,” “drink wine,” “drink hard liquor,” and “drink energy drinks combined with alcohol.” Participants entered a number between 0 and 100 percent. Percentage estimates were averaged across the four alcohol items ($\alpha = .87$, $M = 36.5\%$, $SD = 23.4$).

Participants also estimated the “percentage of people your age” who “smoke cigarettes,” “use smokeless tobacco,” and “smoke tobacco in a hookah” as a measure of perceived descriptive norms related to tobacco use ($\alpha = .82$, $M = 32.4\%$, $SD = 23.7$).

Injunctive norms—In order to measure perceived injunctive norms, participants were asked to make judgments about the social status of the prototypical peer who uses alcohol or tobacco to capture the perceived social acceptability of substance use (adapted from Dal Cin et al., 2009). Participants were prompted to “think about the type of person your age who drinks alcohol” and rate a series of social judgments, “How popular is this person” followed by ratings of how “smart,” “cool,” “good-looking,” and “boring (reverse coded)” this type of person is on a scale ranging from 1 (not very) to 5 (extremely). These five items were

averaged to create a mean of injunctive norms about alcohol use ($\alpha = .79$, $M = 2.76$, $SD = .89$) with higher values indicating more social approval.

Participants responded to the same five items again, after being prompted to “think about the type of person your age who uses tobacco.” These five items were averaged to create a mean estimate of injunctive norms about tobacco use ($\alpha = .78$, $M = 2.38$, $SD = .84$) with higher values indicating more social approval.

Media-related cognitions—Measures of cognitions about substance use media messages were drawn from Message Interpretation Processing constructs adapted from the work of Austin & Johnson (1997); we adapted these items to increase their specificity and allow us to examine media constructs related to alcohol and tobacco separately. For all items, participants rated their agreement on a standard response scale (1=strongly agree to 5=strongly agree). We grouped items by their focus on cognitions specific to either alcohol or tobacco, and in cases of multiple items related to a single substance and construct, we created a construct mean by averaging participant responses across the relevant items.

Identification: Two items measured participants’ level of identification with media messages about teens and substance use. Participants rated how much they agreed with items “I would like to do the things that people do in beer and alcohol ads” ($M = 1.87$, $SD = 1.01$) and “I would like to do the things that people do in tobacco ads” ($M = 1.61$, $SD = .83$).

Similarity: Participants responded to two items that assessed the amount of similarity they perceived between their own lives and portrayals of teens and substance use in media messages. Participants rated their agreement with items “I like the kinds of things that people in beer and alcohol ads like” ($M = 1.93$, $SD = .99$) and “I like the kinds of things that people in tobacco ads like” ($M = 1.75$, $SD = .90$).

Desirability: Two items measured how desirable and appealing participants found media messages that include substance use by rating their agreement with items “I like media messages that include people using alcohol” ($M = 2.04$, $SD = .98$) and “I like media messages that include people using tobacco” ($M = 1.89$, $SD = .90$).

Realism: Three items assessed the level of realism—the extent to which things in the media actually happen in real life—that participants perceived in substance-related media messages. Participants rated their agreement with two statements about alcohol portrayals, “Teens in the media drink alcohol as often as most teens do” and “Teens in the media act like most teens do when they drink alcohol” ($\alpha = .71$, $M = 2.58$, $SD = .95$), and one statement about the realism of tobacco portrayals, “Teens in the media use tobacco as often as most teens do” ($M = 2.46$, $SD = 1.06$).

Results

Overview of Analyses

There was a low proportion of missing data (less than 7% missing for all study variables), which was addressed through the use of multiple imputation in SPSS to replace missing data

values in the predictor and outcome variables of interest, media-related cognitions and norms (MCMC method, $m=20$).

As reported below, we first calculated the bivariate correlations among the predictor and outcome variables of interest. We then conducted four hierarchical linear regressions to predict our outcomes of interest: descriptive and injunctive norms related to alcohol use, and descriptive and injunctive norms related to tobacco use. In each analysis, the regression models first introduce a block of demographic variables and previous use and then introduce a block of media-related cognitions. This approach allows us to determine whether the introduction of the media-related cognitions block explains a significant amount of additional variance above and beyond demographic characteristics and previous use experiences. We did not anticipate classroom-level effects, but due to the nesting of students in schools, we also ran a series of multilevel models for each outcome of interest. We confirmed that the significance patterns reported for the media-related predictors were identical in both the multilevel model and the hierarchical regression results reported here, thus we have reported the hierarchical models for parsimony.

Bivariate Results

Bivariate correlations among the key predictor and outcome variables of interest are shown in Table 1. Students' perceptions of the percentage of peers drinking alcohol (descriptive norms) were positively related to their perceptions of social approval (injunctive norms) of drinking ($r = .26, p < .001$). Perceptions of tobacco use prevalence and social approval for tobacco use were also positively related ($r = .19, p < .001$). There were also moderate to strong correlations between the perceived prevalence of alcohol and tobacco use ($r = .73, p < .001$) as well as social approval for alcohol and tobacco use ($r = .52, p < .001$).

Among the alcohol-specific media influence variables, the interscale correlations ranged from .25 (similarity and realism) to .72 (similarity and identification). The range of interscale correlations among the tobacco-specific media influence variables looked quite similar, ranging from .24 (similarity and realism) to .62 (similarity and desirability). The average interscale correlation among the media influence variables was .46 among the alcohol-specific variables and .42 among the tobacco-specific variables, suggesting that the scales are moderately related constructs but can be examined separately. As would be expected, correlations of the media variables across the two substances were highest within the same construct (for example, similarity to alcohol and tobacco ads, $r = .77$). On the whole, the alcohol-specific media-variables were more strongly correlated with injunctive norms (range from .14 to .35, average .28) than descriptive norms for alcohol (range from .17 to .23, average .20). The tobacco-specific media variables also showed stronger correlations with injunctive norms (range from .19 to .26, average .23) than descriptive norms (range from .11 to .16, average .13). Realism had the lowest correlations with norms, while similarity had relatively higher correlations.

Multivariate Results: Norms related to Alcohol Use

Table 2 shows the results of the multivariate analyses examining the relationship between media-related cognitions and norms related to alcohol use.

After accounting for demographics and previous substance use, the block of media-related cognitions explained a small (1%) but significant amount of variance in adolescents' perceptions of the percentage of peers who drank alcohol [$F(4,807)=3.30, p=.011$]. Among the demographic variables, older age, female gender, and previous experience drinking alcohol were associated with perceptions of a larger number of peers drinking alcohol. Among the media-related cognitions, stronger belief that ads depicting alcohol use are realistic depictions of use frequency ($b=1.91, p<.05$) was a significant predictor of descriptive alcohol use norms.

The block of media-related cognitions also explained a significant amount of variance (6%) in adolescents' perceptions of injunctive norms related to alcohol, over and above demographic variables and previous use [$F(4,807)=14.59, p<.001$]. Female gender and previous experience with alcohol were both associated with the perception of greater social approval of drinking. Within the block of media-related variables, stronger feelings of similarity ($b=.16, p<.01$) with media messages about alcohol use predicted greater perception of social approval of alcohol use.

Multivariate Results: Norms related to Tobacco Use

Table 3 shows the results of the multivariate regressions predicting norms related to tobacco use.

The block of media-related cognitions added a small (1%) but significant increase to the variance explained in students' perceptions of tobacco use prevalence [$F(4,807)=2.90, p=.021$]. Female gender, older age, and previous tobacco use were all significantly related to higher estimates of peer tobacco use. Similar to the results for descriptive norms related to alcohol use, belief that media messages offer realistic portrayals of the frequency of alcohol use predicted descriptive alcohol use norms ($b=2.16, p<.01$).

In addition, adolescents' media-related cognitions explained a significant amount of variance (5%) in their perceptions of the social approval for tobacco use above and beyond demographic and previous use variables [$F(4,807)=12.76, p<.001$]. Along with previous tobacco use experience, female gender and minority group membership were related to significantly higher perceptions of social approval for tobacco use. Among the media-related cognitions, belief that media messages depicting tobacco use are desirable ($b=.11, p<.01$), show people similar to oneself ($b=.10, p<.05$), and offer realistic portrayals of the frequency of tobacco use ($b=.06, p<.05$) emerged as significant predictors of increased perceptions of social approval.

Discussion

Adolescents' normative beliefs about alcohol and tobacco use influence their subsequent substance use decisions in norm-consistent ways (e.g., Chassin, Presson, Sherman, Montello, & McGrew, 1986; Kuther & Higgins-D'alessandro, 2003). Previous work has linked exposure to media messages about alcohol and tobacco to perceptions of norms (e.g., Nan & Zhao, 2016; Osberg et al., 2012), but the potential for adolescents' interpretations of media messages to impact normative beliefs has been left unexplored. This study examined

the possibility that media act as a “super peer” to adolescents in socializing their attitudes about the prevalence and acceptability of adolescent substance use. Drawing from theory on message interpretation (Austin & Johnson, 1997), we predicted that normative beliefs would reflect adolescents’ interpretations of media messages about substance use within our large, cross-sectional sample of high school students. Given that adolescence is a critical period in which early initiation of alcohol and tobacco use is linked to serious risk outcomes (e.g., alcohol disorders, DeWit, Adlaf, Offord, & Ogborne, 2000; elevated nicotine addiction, Kendler et al., 2013), understanding the relationship between youth’s normative beliefs and how they make sense of media messages has important implications.

The findings from this study supported the media as “super peer” prediction by revealing a significant relationship between media-related cognitions and perceptions of descriptive and injunctive norms for both alcohol and tobacco use. This study fills an important gap in the media influence literature by making a direct link between media-related cognitions and perceptions of substance use norms. Notably, stronger relationships emerged between media cognitions and social approval norms compared to descriptive norms. Overall, social approval norms were more closely related to teens’ perception that they are similar to people portrayed in tobacco and alcohol ads, while prevalence norms were more closely related to teens’ perceptions of the realism of media portrayals.

These findings were also of interest given that the associations among these cognitions, although modest, were observed even after controlling for other factors that are known to strongly influence substance use norms including previous substance use and demographic characteristics. Media cognitions alone cannot tell the whole story of youth decision making about alcohol and tobacco use, and we expect that individual temperament and risk-taking traits, parents, and peers all exert important influences. However, our finding that perceptions of the media seem to be interrelated to how youth perceive peer norms suggests another pathway through which these influences may unfold over time.

This study extends previous work linking media exposure to normative beliefs (e.g., Osberg, Billingsley, Eggert, & Insana, 2012; Tickle et al., 2006) by identifying specific media message processing constructs that contribute to adolescents’ normative beliefs about substance use. In addition, this study uncovered distinct relationships between media-related cognitions and descriptive and injunctive norms for both alcohol and tobacco use separately. Perceptions of injunctive and descriptive norms were similarly associated with media-related cognitions for both alcohol and tobacco; the media variables block explained similar amounts of variance in both models. Across both substances, descriptive norms were particularly related to perceptions of realism, which makes sense given that the measure captured belief that media accurately portray how often people use substances. Perceptions of similarity between oneself and media portrayals were linked to perceptions of social approval for both alcohol and tobacco use, perhaps reflecting motivated perceptions of social approval for the actions of individuals similar to oneself. Results also revealed that perceptions of social approval for tobacco use were related to a larger set of media cognitions (i.e., desirability, realism) than approval for alcohol use. This is notable because despite some decreases in media placement of tobacco in recent years (e.g., popular films,

Bergamini, Demidenko, & Sargent, 2013), media-related cognitions do appear to influence tobacco norms related to social approval.

Given our focus on norms in this study, it is useful to consider the estimates of prevalence norms among our sample in comparison to actual use norms. The most recent national survey data from the U.S. revealed that the past month rates for 10th grade students for alcohol use was 22% and for cigarette use was 6% (Johnston, O'Malley, Miech, Bachman, & Schulenberg, 2016). Within our sample (of, on average, 10th grade students), estimates of “percentage of people your age” who use averaged 36.5% for alcohol and 32.4% for tobacco—both being substantial overestimates when compared to the national data and to actual substance use prevalence in this sample, which was 24.1% for alcohol and 14.0% for tobacco. The prevalence estimates observed within our sample are similar to the prevalence estimates reported in many other studies with adolescents and college students (e.g., Juvonen et al., 2007; Page, Hammermeister, & Roland, 2002; Pedersen et al., 2013). In other words, youth across samples tend to overestimate the number of youth who are substance users.

Limitations & Future Directions

This study has several limitations. The cross-sectional nature of this study limits our ability to draw causal conclusions about the direction of effects. Longitudinal studies could further our understanding by connecting media-related cognitions and norms to both media exposure and actual substance use over time. In support of the possibility that media-related cognitions affect subsequent perceptions of norms, there is longitudinal work demonstrating that media exposure affects later judgments about norms (Osberg et al., 2012). In fact, youth may seek out peers that reflect the norms that they perceive in the media; for example, adolescents with greater exposure to smoking in movies are more likely to select a peer group of smokers (Wills et al., 2007). However, the opposite direction of effects—adolescents' perceptions of norms shaping their media-related cognitions—is also plausible. Youth may observe that peers around them approve of substance use, which may lead them to perceive media portraying substance use to be more salient, realistic, or desirable. Overall, we expect that these relationships are reciprocal in nature, such that media-related cognitions impact normative beliefs and those normative beliefs, in turn, impact cognitions about media.

Additional limitations arise due to the measurement of norms utilized in this study. The measure of descriptive norms asked participants to estimate percentages of people their age who used various substances. Although this measurement approach is not unusual, students may have found it difficult to generate these numbers without a clear anchor upon which to base their estimates or a specific definition of the amount of substance use that qualified (e.g., a sip vs. an entire beer). It is also possible that students varied in their interpretation of “people their age;” some may have thought of peers at their school while others may have thought about nationwide averages. Future work could consider whether media-related cognitions affect beliefs about local and national norms equally. In addition, measures that specify more narrow groups may offer additional insights. For example, estimates of norms within one's own gender group have been shown to be a more accurate predictor of later substance use (Lewis, Neighbors, Oster-Aaland, Kirkeby, & Larimer, 2007).

Implications for Prevention

A number of interventions focusing on changing inaccurate social norms have been used with university students to demonstrate that substance use is less prevalent and less approved of by peers than they may realize. Although reviews of these interventions indicate that some of them are effective, these effects tend to be small and relatively brief (Foxcroft, Moreira, Almeida Santimano, & Smith, 2015). The results from this study suggest that social norms campaigns targeting substance use may be strengthened by also addressing media influence. The inclusion of media literacy skills practice may help young people be more skeptical of the portrayals of substance use they encounter in the media and could offer a complementary path to lowering perceptions of pro-substance use norms.

Prevention efforts must also contend with rapidly changing technologies in both social media and substance use. Social media platforms offer forums for pro-substance use messages that are largely unregulated (Jernigan & Rushman, 2014), and companies may take advantage of the unique pressures in these settings. For example, adolescents' desire for peer social approval creates pressure to develop pro-drinking online identities (Ridout, Campbell, & Ellis, 2012) and may increase the appeal of niche online communities that support unhealthy substance use decisions, as observed in YouTube communities posting videos about their use of smokeless tobacco (Seidenberg, Rodgers, Rees, & Connolly, 2012). Anticipating these shifting social media influences is a challenge, as is predicting the rise of new substance use technologies. Exposure to and use of e-cigarettes has increased quickly among adolescents across recent years (Singh et al., 2016), and e-cigarettes appear to attract youth who otherwise may not initiate tobacco use (Wills, Knight, Williams, Pagano, & Sargent, 2015). Another innovation, powdered alcohol, has generated fears about its potential underage appeal and pre-emptive bans in many states (CAMY, 2016). In response to these shifting landscapes, teaching youth to think critically about claims from advertisers and peers alike may inoculate youth to pro-alcohol and tobacco use messages even when the specific source and content of these messages is unknown.

Conclusion

Drawing upon a long tradition of research in adolescent development, adolescent substance use attitudes, beliefs, and behaviors are best understood within a network of ecological factors (e.g., Wiium & Wold, 2009). Ecological systems theory (Bronfenbrenner, 1979) argues that youth development occurs within a multilayered system of contextual factors that range from proximal to quite distal. Notably, these contextual factors do not influence adolescents in a vacuum, instead they interact dynamically both with one another and the adolescent. Our findings reflect interactions across factors; in our sample, perceptions of peer norms were related to adolescents' interpretations of the images that they see in the media. In the near future, it is possible that adolescents' interpretations of media messages and their substance use norms will be increasingly intertwined. The distinction between interactions with media and interactions with peers is becoming less clear; in recent surveys, 72% of teens report spending time with their friends through social media (Pew Research Center, 2015). Whether youth are encountering substance use portrayals in entertainment, advertisements, or their own peer social networks, we can likely help youth correct mistaken

perceptions about alcohol and tobacco use by encouraging them to question the intentions and accuracy of what they see or hear in media messages.

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Table 1

Correlations among outcome and media-related variables ($n = 817$)

Measure	1	2	3	4	5	6	7	8	9	10	11	12
Alcohol												
1 Descriptive Norms	--	.26**	.73**	.18**	.20**	.23**	.20**	.17**	.10*	.19**	.14**	.18**
2 Injunctive Norms		--	.11*	.52**	.32**	.35**	.29**	.14**	.20**	.29**	.22**	.13**
Tobacco												
3 Descriptive Norms			--	.19**	.08	.07	.09	.07	.11*	.14**	.12*	.16**
4 Injunctive Norms				--	.17**	.21**	.22**	.11*	.21**	.26**	.26**	.19**
Alcohol												
5 Identification					--	.72**	.60**	.27**	.67**	.51**	.45**	.22**
6 Similarity						--	.65**	.25**	.50**	.77**	.52**	.20**
7 Desirability							--	.25**	.42**	.52**	.75**	.25**
8 Realism								--	.16**	.16**	.19**	.71**
Tobacco												
9 Identification									--	.61**	.52**	.25**
10 Similarity										--	.62**	.24**
11 Desirability											--	.27**
12 Realism												--

* $P < .01$

** $P < .001$

Table 2

Demographic characteristics, previous use, and alcohol-specific media-related variables predicting adolescent's injunctive and descriptive norms related to alcohol use

Variable	Descriptive norms related to alcohol use			Injunctive norms related to alcohol use		
	<i>b</i>	<i>SE</i>	Sig. (<i>p</i>)	<i>b</i>	<i>SE</i>	Sig. (<i>p</i>)
Constant	4.34	4.24	.306	1.94	.16	.000
Demographics						
Gender ^a	7.15	1.52	.000	.11	.06	.048
Race ^b	2.60	1.69	.123	-.09	.06	.169
Age	2.67	.80	.001	.03	.03	.287
SES	2.48	1.67	.137	-.11	.06	.089
Lifetime Alcohol Use	4.66	.56	.000	.12	.02	.000
Media-related Cognitions						
Identification	.29	1.12	.797	.08	.04	.064
Similarity	1.61	1.21	.183	.16	.05	.000
Desirability	.12	1.07	.911	.03	.04	.519
Realism	1.91	.84	.022	.02	.03	.569
<i>R</i> ²		.19			.18	
<i>R</i> ² change ^c		.01	.011		.06	.000

^aReference group is male

^bReference group is non-white

^c*R*² change is the additional variance explained by the addition of the media-related cognitions block

Table 3

Demographic characteristics, previous use, and tobacco-specific media-related variables predicting adolescent's descriptive and injunctive norms related to tobacco use

Variable	Descriptive norms related to tobacco use			Injunctive norms related to tobacco use		
	<i>b</i>	<i>SE</i>	Sig. (<i>p</i>)	<i>b</i>	<i>SE</i>	Sig. (<i>p</i>)
Constant	7.22	4.42	.102	1.59	.15	.000
Demographics						
Gender ^a	6.56	1.61	.000	.17	.06	.003
Race ^b	.98	1.78	.583	-.19	.06	.002
Age	2.61	.86	.002	.04	.03	.201
SES	2.95	1.79	.100	.10	.06	.099
Lifetime Tobacco Use	5.89	1.10	.000	.16	.04	.000
Media-related Cognitions						
Identification	-.33	1.25	.793	.03	.04	.549
Similarity	1.39	1.27	.273	.10	.04	.026
Desirability	.23	1.18	.846	.11	.04	.008
Realism	2.16	.80	.007	.06	.03	.024
<i>R</i> ²		.11			.15	
<i>R</i> ² change ^c		.01	.021		.05	.000

^aReference group is male

^bReference group is non-white

^c*R*² change is the additional variance explained by the addition of the media-related cognitions block