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ADOLESCENT/YOUNG ADULT ADDICTION (T CHUNG, SECTION EDITOR)

Media/Marketing Influences on Adolescent and Young Adult Substance Abuse

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Abstract

Purpose of Review We describe the state of research on substance use portrayals in marketing and media, considering exposure to tobacco, alcohol, e-cigarette, and marijuana content. Putative mechanisms are offered, and recommendations are made for effective prevention strategies for mitigating the influence of these portrayals.

Recent Findings There is consistent evidence that adolescents and young adults are highly exposed to substance use portrayals and that these portrayals are associated with subsequent substance use. Exposure via new media (social networking sites, brand Websites) has risen rapidly. Social norms and cognitions appear to at least partially account for the effects of portrayals on youth substance use.

Summary Digital media has surpassed traditional marketing, which is concerning because youth have on-demand access to content and are active consumers of digital media. Developmentally appropriate media literacy interventions that include a parenting component and target multiple substances and media domains are recommended.

Keywords Alcohol · Smoking · Media · Advertising · Marketing · Adolescent · Young adult

Introduction

Although adolescent and young adult rates of alcohol and tobacco use are declining in the USA, prevalence is still high and marijuana use is on the rise [1, 2]. Use of substances among adolescents and young adults is a known risk factor for a myriad of adverse outcomes. A host of individual, social, and environmental risk factors have been implicated in youth substance use, with environmental risk factors predominating at early stages of use [3, 4]. Given that media representations constitute a primary source of learning about substance use, particularly for youth without direct lived experience, paid industry advertising and portrayals of substance using behaviors in the media are key environmental influences on youth substance use [5••, 6••, 7••, 8••, 9•, 10•].

It has long been recognized that the tobacco industry targets youth, and it might be argued that the alcohol industry does the same, in the form of paid placements of products in films, television, and video games that are popular among youth, sponsorship of sporting events and concerts, and colorful packaging. Moreover, youth are high consumers of entertainment media [11], and they are highly susceptible to media influence due to preoccupation with personal image and identity that makes them more likely to identify with and model what they view [6••, 12]. They also lack cognitive capacities to distinguish the reality portrayed in ads from real-life experiences [13] and are still developing executive control which makes them susceptible to stylistic features such as animation, frequent camera cuts, and loud/fast music [14•].

The purpose of this review is to describe the current state of the field with regard to substance use portrayals in marketing and in entertainment media, as well as in digital media including the internet and social networking sites. Degree of exposure to tobacco, alcohol, e-cigarette, and marijuana content is characterized, and associations between content and adolescent and young adult substance use is reviewed. Putative mechanisms of these associations, described in the context

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of psychological theory, are offered. Finally, recommendations are made for the most effective prevention strategies for mitigating the influence of these substance use portrayals in marketing and the media.

Early Years: Exposure to Tobacco Content

Research on the influence of marketing and media on youth initially focused on exposure to tobacco content. In 1997, on the basis of internal documents made public as result of lawsuits against the tobacco industries stating that the industries had focused advertising and promotions on young people, the Surgeon General report concluded that there was a positive, potentially causal, association between exposure to tobacco marketing and adolescent tobacco use [15]. Acknowledging the potential influence of marketing and the media on youth, in 1998, the tobacco industry signed the Master Settlement Agreement (MSA) [16], agreeing to end tobacco company payment for paid product placements in movies, TV, and other entertainment venues. It also prohibited direct and indirect cigarette advertising to youth. Additional restrictions on youth access and promotional practices were set forth by the 2009 Family Smoking and Tobacco Control Act, which gave the Food and Drug Administration (FDA) the authority to regulate tobacco products including restrictions on youth access and promotional practices [17].

To some degree, the MSA appears to have shown success, with an abrupt decline in movie brand placement and tobacco screen time which coincided with the MSA-related enforced restraints [18, 19]. Yet, a high proportion of adolescents are exposed to pro-tobacco ads in stores, magazines, and the Internet despite attempts to reduce exposure [20, 21]. The tobacco industries have been adept at shifting platforms to avoid the restrictions imposed by the MSA by marketing through alternate mediums. There is no regulation of generic images of tobacco content (whether paid for or not) in the media; yet, these generic images are arguably no less influential than branded images on smoking behavior.

Marketing and media smoking content portrays themes that are appealing to youth such as glamour, independence, rebelliousness, romance, socializing, and celebrating; the negative health outcomes of smoking are rarely depicted [22]. There is fairly robust evidence on the basis of laboratory, epidemiological, and qualitative studies for strong, dose-dependent, associations between exposure to tobacco products in movies and other forms of marketing/media and youth tobacco use [17–20, 22–24]. Both Wellman et al. [24] and Leonardi-Bee et al. [5••] estimate that the odds of becoming a tobacco user are increased roughly twofold by exposure to marketing and media. Notably, evidence from rigorous, controlled longitudinal studies support effects of exposure on smoking initiation [5••], and DiFranza et al. [23] concluded there was a causal link between exposure to tobacco promotion and the initiation of tobacco use based on the rigorous Hill criteria for determining whether a causal link exists between exposure to a risk factor and development of a disease [25]. These associations are robust, transcend culture, span early adolescence through young adulthood and beyond, and include a range of outcomes including tobacco-related cognitions, smoking initiation, and progression to heavier smoking. Thus, although efforts to minimize adolescent and young adult exposure to tobacco products have been somewhat successful, work remains to be done.

Exposure to Alcohol Content

In contrast with the tobacco industry, the alcohol industry is guided by self-regulated marketing and advertising codes [26]; among the guiding principles are the prohibition to place alcohol marketing in any media where the audience composition exceeds 30% under the legal purchase age and restriction on the use of content that can be appealing to minors. However, unless explicitly featuring branded products, there are no restrictions for alcohol product placement in entertainment media such as television, movies, music. As with smoking, alcohol marketing and media portray favorable images, associating alcohol use with social, sexual, and financial success, with little depiction of the hazards of drinking or discouragement of drinking [27]. Much of the content features youth-oriented themes, in the interest of creating "intoxigenic" or "alcogenic" environments that normalize youth drinking behavior and promote a culture of alcohol use [7••, 28••].

Young persons' exposure to alcohol content in marketing and the media is high [29, 30]. Teens report greater exposure to and engagement in alcohol marketing than other age groups [14•]. In one study, more than half of 7th graders reported past 3-month exposure to alcohol media content [31], and Collins et al. [32•] estimate that on average, adolescents encounter three alcohol advertisements per day. In an ecological study on a sample of middle and high school students, Scharf et al. [33] extrapolated that if rates of exposure to promotions (e.g., point-of-sale, television, movies) were constant, adolescents would experience 221 alcohol and 111 tobacco exposures per year. Bergamini, Demidenko, and Sargent [18] performed a content analysis of top 100 box-office hits released in the USA from 1996 through 2009 and observed that alcohol brand placement is found in movies rated for youth as young as 13 years, despite the industry's intent to avoid marketing to underage persons. This is alarming because certain brands of alcohol are youth oriented, being associated with positive images and emotions. In one study, Borzekowski et al. [34] empirically categorized underage youth into types of media user that were associated with exposure to specific brands; for

example, Coors Light and Budweiser were associated with heavy-drinking clusters characterized by late-night cable viewing and heavy mainstream media use, whereas youth in the celebrity-watcher cluster were alcopop consumers. Industry targeting of youth-oriented themes was first observed in Camel's "Old Joe" cartoon character tobacco advertisements [35]; this effective marketing tactic may have been adopted by the alcohol industry. Of note, self-regulated industry codes are more likely to be violated in advertisements with specific thematic content (e.g., sociability, romance, individuality) [36], a concerning trend given that voluntary measures by the alcohol industry are found to be largely ineffective [37•].

In the past decade, several rigorous reviews have concluded that exposure to alcohol content in marketing and the media increases risk of drinking among youth ranging in age from young adolescent to young adult [6••, 9•, 10•, 38, 39]. These review papers include rigorous prospective cohort studies, albeit with inconsistent control for confounders. Exposure to alcohol content is shown to be associated with alcohol involvement across drinking milestones ranging across cognitions (e.g., implicit and explicit expectancies about the effects of drinking), drinking initiation, and risky/hazardous drinking. In general, effects range from small to moderate, with smaller effects for longitudinal and experimental research; however, it is important to recognize that if sustained, even small effects could have a meaningful impact on consumption at the population level [7••]. Further, much of the prior research on youth media exposure to substance use or substance-related products has focused on only one type of media exposure (e.g., movie smoking or television alcohol advertisements). Industries often use integrated marketing campaigns across media venues to promote their products, so assessment of only one domain of media exposure underestimates the broad influence of media and marketing on youth behavior. There is support for a linear dose-response relationship, although two studies on brand-specific exposure and brand-specific underage drinking conducted by Ross et al. [40] (one individual level and one population level) suggest a nonlinear relationship between exposure and drinking with diminishing effects at higher levels of exposure. Unfortunately, this suggests that substantial declines in exposure would be necessary to reduce youth consumption of brands with high exposure. Advertisements that feature "partying" themes with lifestyle or image-oriented content are shown to be associated with particularly elevated risk of youth alcohol use and initiation, suggesting there may be value in thematic restrictions above and beyond the current policies that regulate where and when ads are placed [19]. Anderson et al. [38] note in their review that these studies likely under-estimate any effects because they are focused primarily on marketing, which is only part of the multi-pronged approach the alcohol industry uses to promote alcohol products.

New Directions: New Products, New Media

New Products The past decade has seen a rapid rise in the use of electronic cigarettes by youth [41], with concerns raised with regard to whether these products are of public health concern [42]. Corresponding to the rise in prevalence of use is an increase in advertising expenditures [43], along with an increase in portrayals of e-cigarettes in marketing and the media [44•]. Prior to 2012, e-cigarette companies primarily advertised on the internet, but in recent years, in part because tobacco companies have entered the e-cigarette market and increased advertising expenditures, media campaigns have a broader reach. Exposure to e-cigarettes occurs across a variety of media channels and marketing platforms, including print and internet media and point-of-sale advertising, and the research conducted to date suggests that adolescent and young adult exposure is high [44•]. However, unlike conventional cigarettes, e-cigarettes are not subject to marketing regulations by the FDA unless advertised as a smoking cessation aid. E-cigarettes are often portrayed using themes similar to those used to promote conventional tobacco products, including content related to social status, sex, and glamour, celebrity endorsements, and flavors that are appealing to youth [45]. In addition, e-cigarette ads include claims that these products are "healthy" and have advantages over conventional cigarettes [46]. Given that youth report high media exposure, there is legitimate concern about the role of e-cigarette marketing in recruiting new e-cigarette users.

Exposure to e-cigarette content has been shown to be associated in a dose-dependent manner with e-cigarette use in adolescents and young adults [47•, 48], as well as with greater susceptibility and curiosity about trying e-cigarettes among never users [47•, 49]. However, as the limited research to date is cross-sectional, it is not possible to determine directionality; youth who engage in e-cigarette use or who are susceptible or curious may just be more likely to notice e-cigarette media and marketing and report greater exposure [47•]. However, two studies support media and marketing's influence on youth: in one study, receptivity to e-cig marketing (e.g., grabbed my attention; was convincing) prospectively predicted adolescent/young adult e-cigarette use [46], and an experimental study demonstrated that adolescent non-users who viewed TV advertisements on the benefits of e-cigarettes (relative to nonviewing) subsequently reported greater intent to try an e-cigarette [50].

Although marijuana is not a new product per se, the landscape of marijuana use is changing in the USA with the recent rise in marijuana-related approval, norms, and use due to the legalization of recreational marijuana in several states [51]. At the same time, there is a rise in advertising of recreational marijuana and medical marijuana. Unfortunately, the cannabis industry is fragmented, with control policies handled at the state level [52]. Regulations range from no restrictions to

child-safe packaging of marijuana products and total prohibition of print and broadcast media altogether. Yet, there is little doubt that as the legal marijuana industry continues to grow, so will commercial advertising [53]. This is concerning, as exposure to advertising of marijuana through traditional and new media and marketing channels is high; for example, among young adult marijuana users in the USA (age 18–34), half reported having seen or heard marijuana advertisements in the past 30 days [53]. As with e-cigarette products, marijuana dispensaries advertise the benefits of using marijuana [54•].

Initial work in this area indicates that among adolescents, advertising exposure is prospectively associated with intentions to use and use itself [55•]. At the same time, users may be more attentive to marijuana advertising [55•]. An older study specifically looking at exposure to alcohol and marijuana content in music and movies showed associations between marijuana use (but not alcohol use) and music exposure in a dose-response fashion, but the opposite was true for movie portrayals [56]. Weaker associations for marijuana may be because it is portrayed less frequently in films than alcohol, or the portrayal of alcohol may be more compelling. It will be important to replicate this study in the present climate that favors marijuana use and promotes its use through media and marketing.

New Media Traditional means of marketing, including print and broadcast media and point-of-sale advertising, has been replaced by anytime, anywhere, on-demand access to content via digital devices [57•]. Digital marketing involves new media such as social networking sites (SNS) and brand websites [10•]. There is great potential for exposure to alcohol, tobacco, e-cig, and marijuana content for youth who are active consumers of digital media, with SNS platforms (e.g., Instagram, Twitter, Facebook, as well as YouTube) being an integral feature of young persons' lives. Indeed, adolescents and young adults have been shown to receive greater exposure via new (digital) media as compared with traditional media [14•, 53]. Youth-oriented television alcohol advertising has declined over time [58], as has smoking content in movies [59]; at the same time, social media marketing has increased over time [60], and as with traditional marketing, the content is particularly appealing to youth [61]. It is also customized to the user via social media algorithm predictions which present certain brands on the basis of friends' interactions or third-party content such as music or sporting events [28••].

Digital marketing and media encourage user engagement and interaction (e.g., message boards, posting comments or pictures, contests, and games) [62]. Viewers become "active agents" in the promotion of products by Liking, Sharing, retweeting, following, or posting branded commercial messages and photos of products; this is referred to as "viral marketing" [63]. In moving from passive marketing to active marketing, there is a change from expert-driven information sources to a user-generated participatory medium [28••, 64]. As with traditional advertising, exposure to online content is associated with subsequent use [8••, 39, 65, 66, 67•].

Perhaps not surprisingly yet still of great concern is the relative lack of age verification creating online accounts, accessing industry content, and following brand websites (e.g., [54•, 57•]). For example, Bierut et al. [54•] examined the content of Weedmaps, an online directory of marijuana dispensaries, and found that underage youth are able to create online profiles, post content on this forum, and engage/connect with other Weedmaps' online community members. Thus, current regulations may not be adequately preventing youth from viewing alcohol, tobacco, and marijuana content on social media and online marketing [68]. Given the lack of regulatory authority over online content, the internet may be the first point of exposure to tobacco (and other) products [69•], which may set in motion the progression to heavy and risky use. With the borderless reach of digital media, this becomes an international health concern.

Psychological Processes Underlying Media and Marketing Influences

Literature has begun to pinpoint the psychological impact of media and marketing influences on adolescents and young adults. For instance, media and marketing may create positive expectations about alcohol use, influence perceived peer norms, and increase the willingness to accept drug offers from peers. While most literature on this subject has covered relatively traditional forms of media influences (e.g., movie substance exposure, traditional physical advertising), the recent expansion of the digital media landscape and social media have radically transformed the tools by which psychological effects, in particular, may be imparted. In this section, we cover (1) the dominant psychological theories that form the mechanisms by which media and marketing influences exert their effects on adolescent and young adult psychology, (2) recent (2013–2018) evidence that links these influences and psychological effects, and the evidence for their role as putative mediators of subsequent substance use as well as moderators of the relations between media/marketing influence and psychological mechanisms, and (3) a perspective on the future of research in this area given the transformation of the media landscape.

Psychological Models and Theories Although the original theories themselves are not novel, we focus on three interrelated theories that posit the action of media and marketing on psychological mechanisms.

First, several theories refer to the impact of media and marketing on social identity; these include social identity

theory itself, as well as brand allegiance, information seeking, and the role of social media [70–72]. Generally, these theories posit that media and marketing influence behavior by encouraging the formation of a drinking or ingroup-aligned identity, which subsequently influences alcohol consumption. Research shows that adolescents and young adults may be particularly vulnerable to ingroup-based advertising. The proposed cognitive mechanisms underlying social identification further include both proximal (e.g., peer, family) norms and distal (e.g., cultural) norms. There is recent cross-sectional [73, 74•, 75] and longitudinal [71, 76••, 77••] evidence for the effect of marketing and media portrayals on peer descriptive, injunctive, and/or cultural norms. Further, recent cross-sectional [72, 75] and longitudinal [39] evidence exists for the effect of marketing and portrayals on drinker identity, although it is scant.

Second, social learning theory suggests that the behavior of others offers sources of information upon which persons may model their own behavior [78]. Ample attention has been placed on the potential of media figures to be presented as "super-peers" [74•]. These prominent figures demonstrate or endorse substance use behavior that may create learned expectations regarding positive consequences of that behavior. Relative to social identity, it could be argued that social learning implies a more passive form of influence by which media and marketing affect behavior. Proposed psychological mechanisms underlying social learning theory prominently include substance use expectations, along with peer norms. There is recent cross-sectional [67•, 73, 74•, 79] and longitudinal [80, 81] evidence for the effect of advertising and media portrayals on outcome expectancies, as well as prospective null findings [77••]. Common elements in social learning and identity theories are incorporated in the Message Interpretation Process model [81, 82].

Third, a set of theories, including dual process models, prototype/willingness models, and the earlier notion of peripheral versus central routes of information processing [83–85], suggest dual modes of decision making by which media and marketing affect behavior. Typically, these dual modes include a relatively reflective mode which involves reasoned decision making resulting in goal-oriented behavior. The other mode, often described as more automatic and reflexive, involves performing impulsive action based on (implicit) associations between substance use stimuli and a behavioral response. None of these theories imply that these dual processes are necessarily at odds with each other, although contrasts between impulsive decisions and reasoned decisions can occur. Proposed psychological mechanisms of dual process models include implicit and explicit attitudes and expectancies, behavioral intentions, and implicit action tendencies. There is recent evidence for the effect of advertising and portrayals on explicit attitudes [79, 86], as well as recent evidence for the effect of advertising and portrayals on implicit cognitions [7••, 86], findings summarized in a recent meta-analysis [7••]. Evidence for the effect on behavioral intentions, a proposed component of reflective processing, also has been established in the context of traditional and social media [77••, 87, 88].

Putative Mechanisms Recent evidence in support of the mediational effects of psychological mechanisms has been few and scattered. Few articles published between 2013 and 2018 performed formal tests of mediation by psychological mechanisms. For brand allegiance, an example of social identity, we found that many articles examining brand exposure and consumption treated brand allegiance as an implied mechanism, and did not formally examine mediation [40, 89–92]. Hence, although the link between advertising for particular brands and brand allegiance as a psychological mechanism appears quite strong [90, 93], its status as a formal mediator is mostly untested in studies below. Two studies used cross-sectional data. In one, drinking identity and brand allegiance, but not outcome expectancies or norms, mediated the effect of alcohol marketing on underage binge drinking among adolescents and young adults aged 15–20 years [75]. Another provided evidence for the role of outcome expectancies as mediators between social media e-cig portrayal and young adult e-cig use [67•]. Three studies used longitudinal data. One investigated alcohol-related social networking by friends, finding that injunctive norms mediated their effect on subsequent initiation and heavy episodic drinking [76••]. Another examined the effect of alcohol content in popular music, finding that its effect on subsequent substance use initiation was mediated by peer group association [39]. A third study demonstrated how peer norms and susceptibility, but not alcohol outcome expectancies, mediated the effect of media alcohol exposure on subsequent alcohol initiation among adolescents [77••].

Additional studies have examined potential moderators of the link between advertising and media portrayals, and psychological mechanisms. It has been proposed that such moderators impart vulnerabilities and susceptibilities to marketing, and/or reflect differences in stages of marketing receptivity. One found that impulsivity moderated alcohol portrayals, such that high-impulsivity adolescents were more willing to drink after viewing positive movie alcohol portrayals [94]. Another found that using ecological momentary assessment data, race moderated the link between advertising exposure and perceived norms, such that this link only existed among non-Hispanic Whites [80], and, using the same dataset, others found that this link was only significant if adolescents liked the ads they were exposed to [81]. Finally, Wills et al. had originally found that media exposure had a stronger effect on psychological mechanisms among women [95]. However, a recent meta-analytic review found too few experimental studies have tested moderation to determine whether it

consistently occurred [7••]. Experimental findings further suggest that baseline substance use [86, 87], brand familiarity [87], and self-control [96] may also moderate the effect of marketing.

From a developmental perspective, different mechanisms may relate to different stages of substance use involvement and the progression of substance use. For instance, dual process models differentiate progression from relatively goal-oriented (in classic incentive-sensitization theory: liking) to relatively automatic (wanting) behavior. Developmental cascades are also supported by progression of increasing marketing receptivity over time, which further establishes the importance of longitudinal data examining these links at crucial developmental stages. Marketing receptivity describes how the progression to hazardous substance use may coincide with increasing youth engagement with marketing and substance use-related media. This engagement may start with passive absorption of marketing, moving through interactive marketing engagement [97], and ending with youth serving as a marketing tool themselves by communicating preferences and brand allegiance to peers (viral marketing), as well as showing automated response tendencies to substance use stimuli. Hence, developmental considerations draw from all previously mentioned theories to describe the progressive effects of media and marketing on adolescent and young adult substance use behavior, and affect demographic subgroups with notable vulnerabilities that may be time sensitive (e.g., adolescents with self-control deficits; reward-sensitive adolescents and young adults) [92, 94, 96, 98].

Future Research on Mechanisms It is clear that researchers should be sensitive to the differential effects of marketing and media influences in the context of stage of substance use, ranging from initiation and progression to severe use and negative consequences, and ultimately to addiction. There are opportunities to elucidate mechanisms of action in the context of the transition to automaticity of drinking, and the context of increasing normativity of drinking as adolescents move to college-age years, as these time-sensitive mechanisms could be the target of intervention. Furthermore, new media have blurred the lines between what is considered traditional advertising and social-identity inspired sharing of substance-related information and preferences, involving new substances and delivery methods [67•]. To reiterate: as adolescents and young adults are in formative years of identity formation, researchers should expect adolescents to be particularly sensitive to social communication of substance-related information. Finally, there are exciting developments in assessment methodology and modeling methodology that permit elucidation of the fine-grained, as well as the developmental, within-person effects of media and marketing on behavior. Techniques such as EMA, passive assessment, and qualitative approaches form a foundation upon which researchers can build knowledge on the when (e.g., night-time advertising), where (online, actionable content), how (method of engagement, social groups), and for whom (moderators) of media and advertising's effect on people. For instance, Atkinson et al. describe how social media engagement and interactions shape perspectives using online content analysis; Martino et al. describe the context under which alcohol advertising influences adolescent beliefs using EMA approaches; and Chambers et al. utilized passive assessments (wearable cameras) to obtain a more objective measure of exposure [99].

Prevention/Policy

Industry Regulation The most effective approaches to prevention of health risk behavior are those that are passive in nature, that is, prevention efforts that do not require any behavior change by the subject. Thus, in the context of youth exposure to media depictions of substance use, regulation of industry promoted media content would likely be the most effective means for prevention of youth substance abuse following media exposures. The MSA, which led to constraints on tobacco industry advertisements, could be considered a social experiment of this type of approach. While smoking in movies remains an ongoing influence on youth smoking behavior, the dosing of smoking depictions from movies is likely lower given this change in regulation. With new developments around state regulation of the marijuana industry, a unique opportunity exists to shape industry practices as legislation continues to evolve [55•]. Media and marketing, particularly as it relates to youth exposure should be a factor considered in development of state regulatory practices as state legislation related to cannabis has been associated with youth cannabis use behavior [100].

Unfortunately, industry regulation is particularly complex and takes years of effort from advocates as well as substantial and consistent evidence from research. Despite the 2012 Surgeon General's Report stating that there is a "causal relationship between depictions of smoking in the movies and the initiation of smoking in young people" [15], and recommendations from researchers and clinicians to include substance use in media ratings [101], smoking and other substance use can still be found in movies and television shows rated for youth [102].

Counter Campaigns Another approach to counter youth exposure to media messaging related to substance use is through use of counter advertisement campaigns. Some features that make this prevention strategy attractive to those interested in reducing youth risk for substance use are the high scalability, ease of dissemination, and low cost per capita [103]. There have been many counter advertisement campaigns

implemented to address smoking [104], drinking [105•], and other drug use [106•].

The literature on the effectiveness of counter marketing campaigns to address youth substance use is mixed. In general, there appears to be some strong evidence for mass media anti-tobacco campaigns [103, 107], little evidence for anti-alcohol campaigns [38, 105•, 108•], and mixed findings for other substances [106•]. One major issue that has arisen from mass media campaigns is the potential for reactance effects, whereby the messages disseminated to increase negative attitudes toward substance use actually create more positive attitudes toward substance use. An example of this is found in a study done by Czyzewska and Ginsburg [109], which demonstrated boomerang effects in young adult attitudes toward marijuana use but not tobacco use following exposure to anti-marijuana messages.

One factor that likely holds great import on whether a counter marketing campaign will be effective is the financial motivations behind campaign development and dissemination. In a comparison of the *Truth* campaign and Phillip Morris advertisements, both of which were purported to promote anti-tobacco attitudes and beliefs in youth, only the *Truth* campaign demonstrated effective changes in the wanted direction [50, 110] Industry sponsored anti-substance use campaigns appear to have little risk reduction effect, and, in some cases, appear to increase positive views of substance-related products [38].

Media Literacy Interventions A more intensive preventative intervention approach seeks to improve media literacy skills for youth, to enhance youth self-efficacy in evaluating marketing messages and developing evidence-informed cognitions related to substance use. Media literacy interventions typically involve psychoeducational and analytical thinking components, designed to support youth skill development in critical consumption of marketing in the media [111–115]. A recent review of this literature suggests that media literacy programs have "tremendous potential" for health prevention programs related to substance use [114].

There have been a few randomized control trials of media literacy prevention interventions [111, 112]. For example, in elementary aged youth, the media literacy intervention *Media Detective* provided significant effects on youth intention to use alcohol or tobacco products [116]. *Media Detective* contains ten lessons that involve interactive activities and critical thinking skills to support youth understanding of media marketing and pro-substance use messages. The *keepin' it Real* prevention program is designed for elementary/middle school aged youth and is disseminated through schools. This program includes traditional substance use prevention skills such as drug resistance and decision making with critical thinking skills that address media influences on youth perceptions of substance use [117–120]. In high school students, the *AD IT UP* anti-smoking media literacy curriculum produced improvements in smoking media literacy and perceptions related to the true prevalence of smoking. This study and other follow up studies of the program did not produce significant differences in tobacco-related attitudes or intentions to smoke [121, 122•]. Most of these media literacy programs have been implemented in school settings, but they have also been trialed in a few community settings and online.

Parenting Interventions Many youth interventions for substance use involve a parenting component. Indeed, the *Media Detective* intervention described above also recently added a family component to the intervention involving parent-child discussion about media and marketing [123]. Moreover, there is research evidence that parental monitoring and clear house rules related to youth substance use can have a protective effect for youth substance use initiation [124–126]. In the area of media exposure and parenting, there is strong evidence that parental restriction of R-rated media content is protective against youth initiation and progression of smoking behavior and drinking behavior, with emerging evidence for an influence on other substance use as well [127–129, 130•]. In general, findings suggest that, above the effects of individual covariates such as age, gender, sensation seeking, social effects such as peer and parent substance use, and parenting factors such as maternal authoritativeness/responsiveness, parental restriction of mature media content is associated with reduced youth risk for substance use.

Prior research suggests that parental communication about substance use with youth may serve as a protective factor [131–134], although findings are mixed depending on how communication is operationalized. In terms of influence on media exposures to health risk behavior [135••], parental restriction likely reduces total media time as well as youth exposure to mature content. Parental active mediation, or the practice of discussing media content with youth, may influence the relation between youth exposure to mature media depictions of substance use and youth engagement with substance use behavior [135••]. Thus, parents may be an important agent in the approach to intervening with youth exposure to substance use in the media.

Recommendations

Based on this review and our understanding of current gaps in the field of intervention and prevention science for youth substance use as it relates to media exposure, we offer a few targeted recommendations for next steps in this field of research. First, preventative interventions should seek to target substance use-related cognitions and expectancies that *precede* the onset of substance use behavior. If known precursors to substance use can be influenced, the overarching

trajectory toward substance initiation and progression can be influenced. Second, interventions and their associated target audience should be developmentally appropriate. For example, a media literacy intervention that includes a parenting component is likely to be more effective in younger youth (e.g., middle school aged or below) as parents have more control over youth media environments prior to adolescence. Third, cross-cutting interventions (such as media literacy approaches) that address multiple substance categories, rather than one specific type of substance use behavior may be more powerful in addressing a range of related risk factors. Relatedly, interventions that address multiple domains of a youth's media environment can support parental management of media-related risks that occur in the home and beyond. Lastly, to increase impact and decrease the influence of media substance use exposure on youth behavior, interventions that are multi-systemic in nature (e.g., include parenting, school, and individual level components) have the greatest likelihood of sustained effect. Application of digital methods of dissemination of interventions may also support multi-systemic approaches and increase the scope and scalability of interventions.

Conclusions

The burgeoning literature on marketing and media strongly supports robust influences on adolescents and young adults, with portrayals of tobacco, alcohol, e-cigarette, and marijuana use both frequent and impactful. Although these effect sizes are modest, exposure to such content is pervasive and may have a sustained effect on rates of substance use and misuse in the population. This population is at risk for such influences due to their concerns about image and identity and their developing media literacy skills. Researchers are beginning to understand the mechanisms underlying these influences; these involve social and cultural norms and cognitions such as attitudes and expectancies. Although recommending policy changes at the level of the industry is unlikely to be successful, targeting modifiable cognitions (specifically related to interpretation of media and marketing messages) and behaviors in both youth and parents in a developmentally appropriate manner has great promise.

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Papers of particular interest, published recently, have been highlighted as:
- • Of importance
- •• Of major importance

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