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VIEWPOINT

A public health framework for the regulation of marketing

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Abstract Cross-sectional, longitudinal, and experimental studies have found a link between youth exposure to cigarette marketing and youth initiation of smoking. These decisive research findings led to regulations of cigarette marketing to youth—including no television or radio ads, prohibitions on the use of cartoons, bans on transit and billboard advertisements, and disallowing tobacco brand sponsorships of sporting events or concerts. Similar products that may cause more harm than benefits include alcohol, electronic cigarettes, and opioids. We review the evidence linking problematic use of these products with exposure to marketing and discuss standards for assessing the potential harmfulness of marketing. We next address how public health agencies might apply regulatory principles to these harmful products similar to those applied to cigarette advertising, in the advancement of public health.

Keywords Tobacco · E-cigarettes · Marketing · Public health regulations · Adolescent health

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Introduction

Cigarettes kill approximately 480,000 Americans yearly [1]; they have resulted in the deaths of 20 million Americans since knowledge of their carcinogenic effects emerged in the 1950s [2]. The World Health Organization [3] reports that smoking kills 6 million people yearly worldwide (890,000 from others' smoking). Insofar as cigarette marketing contributes to these deaths, it is appropriate to target cigarette advertisements as preventable risk factors in smoking-related illness.

This raises the question of what standards to use in determining if marketing actually influences people to smoke. Here, we review evidence from *U.S. vs. Philip Morris* et al. [4], the basis for the federal court's ruling that cigarette marketing influences youth smoking. We compare this with advertising for other products (alcohol, e-cigarettes, and opioids) and suggest appropriate standards of evidence when choosing to regulate advertising in general.

Cigarette Marketing and Youth Smoking

Initial research on marketing cigarettes to youth demonstrated a correlation between youth exposure to marketing and youth smoking. A chapter in a National Cancer Institute (NCI) monograph [5] described 52 studies that assessed the relationship between various measures of exposure to cigarette marketing (e.g., self-reported exposure, awareness/recall of ads, attitudes toward advertising, brand recognition, and owning or being willing to own tobacco promotional items) and the smoking status of young people. Of the 23 studies that assessed relationships between smoking and advertising exposure, 17 found significant relationships between the two. None of them found negative relationships. Twelve looked at relationships between smoking and youths' ability to name the product or brand in an ad with the brand name obscured; 10 studies found they could. Twelve studies assessed relationships between attitudes to advertising and smoking, finding that youth with more positive attitudes to the ads were more likely to smoke. Three of four studies that estimated youth exposure to advertising (based on how often they visited convenience stores, lived in areas with ads for specific brands, or read magazines with cigarette ads) found an association between these exposures and more smoking.

Cross-sectional studies cannot rule out the possibility that youth began smoking for reasons beyond exposure to advertising and that they began noticing ads only after they started smoking. Smoking or being interested in smoking could make youth more aware of, and more likely to recall the ads they saw in magazines or convenience stores.

The NCI chapter [5] described evidence from 16 longitudinal studies that assessed whether youth ever exposed to cigarette marketing became more likely to smoke at a later time. All but two studies found that youth who were receptive to promotional items or exposed to/aware of ads were more likely to smoke

at follow-up. Pierce et al. [6] found that youth with a "favorite" cigarette ad in 1993 were significantly more likely to smoke 3 years later (OR = 1.82; 95% CI 1.04–3.20). Those who owned or were willing to use a promotional item like a Camel brand jacket were even more likely to smoke 3 years later (OR = 2.89; 95% CI 1.47–5.68). These studies controlled statistically for peer and parental influences, making it unlikely that these influences caused the relationship between exposure and later smoking.

Nevertheless, experts working for the tobacco industry [7] argued that these relationships could arise with no influence from the ads. Specifically, they argued that parents and peers were the main influences on youth smoking and that, if youth were interested in cigarette ads and subsequently started smoking, it was likely because social influences interested youth in advertising and smoking. Conceivably, these influences could extend outside the window of data collection in the studies cited and thus be partially or fully responsible for the relationships researchers discovered. Strictly speaking, we cannot eliminate this possibility unless we show definitively that exposure influences the tendency to smoke. This can occur only by manipulating exposure experimentally. In the case of youth smoking initiation, such evidence exists.

Experimental Evaluation of the Impact of Cigarette Marketing

Experimental design can and has addressed the issue of confounding variables (e.g., parental and peer influence). By randomly assigning some adolescents to cigarette ad exposure and others to no exposure, it is possible to determine if advertising affects smoking motivation, while holding all other variables constant. If youth exposed to ads develop favorable attitudes toward smokers and smoking and express greater intentions to smoke than those not exposed to ads, we can be confident that the exposure affected their motivation. Randomization controlled for all other possible influences, including prior exposure to advertising.

The NCI chapter [5] reviewed five studies of the impact of marketing exposure and well-established precursors of adolescent smoking: their ratings of positive and negative qualities of adolescent smokers, their perceptions of how many adolescents smoke, their attitudes toward smoking, and their intentions to smoke. The review concluded, "Experimental studies show that even brief exposure to tobacco advertising influences adolescents' attitudes and perceptions about smoking and smokers, and adolescents' intentions to smoke (p. 280)."

Recently, several experimental evaluations have assessed the impact of cigarette pack features on motivation of adolescents to smoke. In work for the Australian government, the first author identified 23 studies in which adolescents or young adults viewed cigarette packs that varied in (1) having brand logos and company designs or plain packs, and (2) having or not having health warnings. The findings indicated that branded packs influence young people to believe the brand will help fulfill their psychological needs. Moodie et al. [8] found that, compared with plain packs, branded packs influence youth to believe the brand's smoker will succeed socially.

This evidence demonstrates a link between advertising exposure and smoking initiation. In 1998, most United States (U.S.) states and the major tobacco companies reached the Master Settlement Agreement (MSA), which resolved state lawsuits to recover billions of dollars in costs associated with treating smoking-related illnesses. The Agreement included policies to restrict advertising. These policies include prohibiting cartoon characters, restricting advertising via billboards and in magazines that reach large numbers of youth, and limiting sporting events sponsorship [9].

Electronic Cigarette Marketing and Youth Vaping

Youth use of Electronic Nicotine Delivery Systems (ENDS, electronic cigarettes, e-cigarettes) has increased rapidly since they entered the U.S. market a decade ago. By 2014, youth use of e-cigarettes surpassed that of any other tobacco product [10]. Although there are no studies on the health effects of long-term ENDS use, nicotine is addictive and harmful to adolescent brain development. With the adolescent brain not yet fully developed, nicotine exposure can disrupt the growth of brain circuits that control attention and learning and can have lasting effects, such as impulse control issues and mood disorders [11]. Beyond these risks [12], youth who use e-cigarettes will likely smoke tobacco in the future or co-use e-cigarettes with other substances [13, 14]. They are more willing to use combustible cigarettes compared to those who had never used any tobacco [15].

Thanks to experimental research demonstrating the effects of exposure to cigarette marketing on youth, regulations now limit marketing of combustible tobacco products. However, e-cigarette marketing currently has no restrictions, mostly because there is little experimental research on this advertising [16].

Youth routinely encounter e-cigarette marketing via retail outlets, online, in newspapers and magazines, on TV, and in the movies [17]. Overall, e-cigarette advertising tripled between 2011 and 2012 as “big tobacco” entered the market [18]. A small body of research has studied the impact of e-cigarette advertising on adolescents but is mostly correlational and/or cross-sectional. Overall, this research finds that exposure to e-cigarette ads via the Internet is associated with more favorable perceptions of e-cigarettes, increased intentions to use, and higher levels of actual use, while exposure via retail outlets is associated with favorable perceptions and higher levels of actual use [19].

These studies are insufficient to inform regulations of e-cigarette marketing. As the tobacco industry has argued about conventional cigarettes, the relationships between advertising exposure and e-cigarette use could also be due to parental and peer influence, which could lead youth to smoke (or vape) and become interested simultaneously in the advertising. Currently, only a few researchers have studied the impact of e-cigarette advertising [20], and they found exposure to ads affected motivation to use the product. To date, no published experimental studies have examined two methods that reach many youth and effectively influenced youth to smoke conventional cigarettes: point-of-sale and product packaging and design.

Alcohol Marketing and Youth Drinking

Like tobacco, alcohol can harm health and wellbeing, particularly if abused. The risks of alcohol abuse for adults multiply many times if they begin drinking before ages 14 or 15 [21]. When youth begin drinking that young, they face elevated risks for later educational problems, diminished work capacity, injury, disease, and premature death [22]. Excess alcohol consumption accounts for about 4700 annual deaths among underage drinkers [23].

The most significant regulations on alcohol marketing to youth are voluntary. Specifically, voluntary self-regulatory codes require that at least 70% of the members of the audience for each ad be 21 or older. In the first half of 2011 (the most recent data available), 93.1% of alcohol ad placements met the 70% standard [24]. This indicates that alcohol companies are not meeting their voluntary standards and, even if they were, many youth still encounter alcohol advertising. A recent review found high levels of youth exposure and high awareness of alcohol advertising in television, radio, print, and digital forms [25]. Other evidence indicates that exposure to alcohol ads among underage viewers (ages 18–20) grew faster than among any adult age group between 2005 and 2011 [26]. A recent study found that, between 2001 and 2009, youth exposure to television alcohol advertising increased by 71% [27]. Finally, researchers found increased alcohol advertising targeting youth through social media and the Internet [28]. This marketing reaps substantial rewards for the alcohol industry; researchers estimate that the combined market value of illegal underage drinking and adult problem drinking accounted for 37.5–48.8% of consumer alcohol expenditures [29].

Existing research suggests that exposure to alcohol advertising may influence intentions to drink and actual drinking [30]. This evidence indicates a significant link between youth's brand-specific exposure to TV advertising and youth consumption of the same brand of alcohol during the past 30 days [31]. Additional research links the amount of television viewing with the degree of alcohol consumption later [32]. As with e-cigarette advertising, little of this research is experimental, thus limiting policymakers' ability to draw causal inferences.

Opioid Marketing

The pharmaceutical industry has produced and marketed medications of great benefit to humanity, despite some harmful marketing practices, such as aggressive marketing of opioids for pain relief in the face of rising overdoses [33]. Over 63,000 overdose deaths occurred in 2016 in the U.S. due to opioid consumption [34].

Purdue Pharma, the maker of OxyContin, paid $75 million after 5000 patients complained they had become addicted to the drug. Two executives pled guilty to federal charges of intentionally defrauding and misleading the public. They paid $35 million in fines, and the company paid $600 million [35].

The marketing practices in this case differ somewhat from the other examples. For cigarettes, e-cigarettes, and alcohol, the practices mostly involved direct appeals

to potential customers. But with opioid use, the most important practices involved efforts of Purdue Pharma and other pharmaceutical companies to influence physician prescribing [36]. It is nonetheless possible to conduct experimental evaluations of the impact of these practices on public health.

What types of experimental studies would show definitively the harm of these practices? One could randomly assign physicians to a condition designed to influence their greater use of opioids or to no such influence. The dependent variables would include the number of patients for whom they prescribe opioids and the number of pills they prescribe. A better study might assess the impact of an intervention to influence physicians to prescribe fewer opioids. An even more efficient and informative study might assess the impact of a policy change affecting their prescriptions. For example, a healthcare provider might implement policies that are more restrictive in some of its clinics and not in others, in either a randomized or an interrupted time series design.

Standards for Assessing the Harmfulness of Marketing

Based on the evidence reviewed above, the U.S. and numerous other countries have significantly curtailed cigarette marketing; other countries have surpassed U.S. restrictions. In Australia, tobacco companies must market cigarettes in plain packs with extensive, graphic health warnings. The country has prohibited tobacco product displays. A study of the impact of restrictions in the United Kingdom, Canada, Australia, and the U.S. found that restrictions produced "significant reductions in smokers' reported awareness of prosmoking cues [37]." A study of 22 Organization for Economic Cooperation and Development (OECD) countries [38] found that comprehensive restrictions on tobacco advertising reduce tobacco consumption, but partial restrictions do not.

The standards for determining the harm of marketing cigarettes that have emerged from this work apply to other products. We summarize these standards as follows:

1. There must be clear evidence that the product does harm. In the case of cigarettes, there is little doubt that smoking causes harm. Evidence indicates that other products are harmful, including e-cigarettes, alcohol, and some pharmaceuticals.
2. We must balance the assessment of harm against any possible benefits. Evidence indicates that moderate alcohol consumption has beneficial health effects [38]. One might argue for eliminating alcohol marketing, but because of its benefits, alcohol marketing that will not affect youth use should not be restricted. With cigarettes, it is difficult to see any compensating benefit for its advertising, because marketing even to adults maintains their smoking.
3. There must be empirical evidence, including experimental evidence, showing that specific marketing practices result in harmful use of the product. Absent experimental evidence, regulation opponents will argue, as the tobacco industry did, that the apparent relationship between exposure to marketing and product use arises from other variables that influence attention to ads and product use.

If a product's marketing meets these standards, what regulatory principles should apply? We propose the following:

1. Assessing the total costs of the use of the product (including the number of people sickened, injured, or killed by the product and the resulting costs).
2. Assessing the benefits of the product's use.
3. Assessing the population-attributable risk of the product's marketing on the deleterious outcomes.
4. Ensuring that the civil or criminal penalties or taxation are commensurate with the total cost to society of any harm the product causes.

This last standard deserves further comment. If the cost to a company of engaging in a harmful marketing practice is less than the profits resulting from that practice, it is unlikely that the company will curtail the practice. Fines or other penalties merely become part of the cost of doing business. With the tobacco industry, the profits the companies made through their marketing greatly exceed the costs of smoking's health impact. The companies paid about $100 billion as part of the Master Settlement Agreement in the United States [39]. However, the stock price of the largest cigarette company, Altria, has appreciated beyond 20% per year for 50 years. Tobacco companies' profits grew from $78 billion in 2001 to $117 billion in 2016 [40].

Similarly, despite paying high fines [35], the pharmaceutical industry remains quite profitable. Purdue Pharma paid $600 million in fines for marketing OxyContin with intent to defraud or mislead the public. But the company has posted sales of $35 billion since launching the drug in 1995, with revenues of $3 billion annually in recent years. We cannot give precise estimates of these companies' profits after paying fines, because despite fines, they continue to engage in illegal marketing; the fines have not eliminated the profits their harmful marketing has engendered. The evidence emphasizes the need to measure profits precisely and impose fines that eliminate those profits.

Promoting Public Health Through Research and Policy

Although our market-based economic system promotes innovation and efficiency, it can have deleterious effects when the unrestrained pursuit of profits impedes public health. Marketing harmful products is one particularly important example of this. Experimental research on the role of cigarette marketing has shown that it influenced millions of young people to smoke, thus contributing to a great deal of illness (costs the cigarette companies do not bear). This research provides firm guidelines for setting marketing restrictions. We should apply the same standards to determining when marketing other products harms health. In most cases, the evidence suggests strongly that marketing e-cigarettes, alcohol, and opioids harms health, but we still require experimental demonstrations of the impact of such marketing.

To bring about positive change in public health, we must establish policies requiring an assessment of the harm (and benefits) of product marketing, the profits that accrue to harmful marketing, and fines or other penalties that exceed the profits the marketing produces. Such policy development will be one important advance in basing government policymaking on population health and holding companies accountable for the effects of their practices.

Research that would contribute to making harmful marketing an influential area of public health research would include analyses of the population-attributable risk of various types of marketing for diverse health outcomes. As we hope we have elucidated, experimental assessments of marketing's impact on health are critical. Finally, sufficient evidence justifies similar research into the influence and impact of marketing of unhealthful food, guns, financial instruments, and fossil fuels.

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Compliance with ethical standards

Conflict of interest All of the authors declare no conflicts of interest.

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Mark Van Ryzin has extensive research experience with family and peer influence on problem behavior in adolescence, including high-risk sexual behavior, delinquent peer association, and antisocial behavior and violence. He has published findings from several large-scale randomized controlled trials of prevention and intervention programs, including Multidimensional Treatment Foster Care (MTFC), the Family Check-Up (FCU), and the Second Step anti-bullying program.

Erika Westling is an early career scientist with experience working on several RO1 and R21 grant projects, as a Project Coordinator, Research Associate, and recently as an Associate Scientist and Co-Investigator. She began working at ORI in 1996 as a research assistant in the areas of personality and health. She left in 2001 to pursue her Ph.D. in Social and Health Psychology at the University of California, Los Angeles, and returned to ORI as a project coordinator while completing her dissertation (supported by a SAMHSA dissertation grant).