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Vulnerability to alcohol-related problems: a policy brief with implications for the regulation of alcohol marketing

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ABSTRACT

Background and Aims The concern that alcohol advertising can have detrimental effects on vulnerable viewers has prompted the development of codes of responsible advertising practices. This paper evaluates critically the concept of vulnerability as it applies to (1) susceptibility to alcohol-related harm and (2) susceptibility to the effects of marketing, and describes its implications for the regulation of alcohol marketing. **Method** We describe the findings of key published studies, review papers and expert reports to determine whether these two types of vulnerability apply to population groups defined by (1) age and developmental history; (2) personality characteristics; (3) family history of alcoholism; (4) female sex and pregnancy risk; and (5) history of alcohol dependence and recovery status. **Results** Developmental theory and research suggest that groups defined by younger age, incomplete neurocognitive development and a history of alcohol dependence may be particularly vulnerable because of the disproportionate harm they experience from alcohol and their increased susceptibility to alcohol marketing. Children may be more susceptible to media imagery because they do not have the ability to compensate for biases in advertising portrayals and glamorized media imagery. **Conclusion** Young people and people with a history of alcohol dependence appear to be especially vulnerable to alcohol marketing, warranting the development of new content and exposure guidelines focused on protecting those groups to improve current self-regulation codes promoted by the alcohol industry. If adequate protections cannot be implemented through this mechanism, statutory regulations should be considered.

Keywords Adolescents, advertising, alcohol, children, cue-reactivity, marketing, regulation, sex and gender, vulnerability.

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INTRODUCTION

From a public health perspective, vulnerability denotes susceptibility to poor health or illness, which can be manifested through physical, mental and social health outcomes. Although definitions of vulnerability vary [1,2], for the purposes of this review, two forms of vulnerability are considered: (1) susceptibility to alcohol-related harm and (2) susceptibility to the effects of marketing.

Age and pregnancy status are recognized in the responsible marketing codes adopted by the alcohol and marketing industries as vulnerability characteristics. Some self-regulated alcohol marketing codes, for example, prohibit the use of actors who are or appear to be under the legal purchase age, presumably to protect youth from exposure to role models of the same age. Similarly, some codes prohibit the depiction of pregnant women.

Increased vulnerability to the harmful effects of alcohol and alcohol marketing may also be defined by a variety of

personal attributes and individual difference factors, such as a family history of alcohol dependence, certain personality characteristics and disorders as well as psychiatric syndromes such as alcohol dependence, which may make former drinkers more likely to experience alcohol craving in response to alcohol marketing.

In addition to being vulnerable to the effects of alcohol, some populations (e.g. children) may be especially vulnerable to the effects of alcohol marketing (e.g. [3]). For example, young children may be more susceptible to media imagery because they do not have the ability to compensate for biases in advertising portrayals and glamorized media imagery. For this reason, child advocates [4] and business ethicists [1] question the ethics of marketing practices targeted to children because it is considered unfair to take advantage of groups who cannot defend themselves.

The purpose of this paper is to evaluate critically the concept of vulnerability as it applies to the marketing of alcohol products to populations defined by five types of

personal and social characteristics: (1) age and developmental history; (2) personality characteristics; (3) family history of alcoholism; (4) female sex and pregnancy risk; and (5) drinking history and alcohol dependence.

AGE AND DEVELOPMENTAL HISTORY

Children and adolescents satisfy both criteria for a vulnerable population. Evidence shows that the architecture of the brain changes significantly and predictably during adolescence. During childhood, the volume of gray matter in the cortex increases and then declines, with the maximum gray matter volume occurring during early adolescence [5]. The decline in the volume of grey matter is accompanied by a flourish of axonal growth and refinement of cortical connections. Superfluous neurons are pruned and the structure of the adult brain gradually takes shape. This winnowing of neurons is influenced by, among other factors, the adolescent's interactions with and experiences in the outside world.

Behavioral controls, judgement and the capacity to postpone gratification do not develop fully until the grey matter of the prefrontal cortex and its connections are well established, which is completed in the mid-20s [6]. This process contrasts with the development of the limbic system, which occurs at a much earlier age. It has been hypothesized that risky impulsive behaviors result from the dissociation in development between the limbic system and the prefrontal cortex, rendering adolescents particularly prone to risky behavior such as binge drinking [7]. This may explain why alcohol-related risky behavior resulting in injury, accidents, crime and harm to others is common at this age.

Brain structures subserving socio-emotional processing are very prominent at this time, and may constitute targets for advertising, especially on social media, that emphasize bonding with friends and identification with a particular product. In late adolescence the adolescent boy or girl becomes acutely self-aware, and the judgement of peers and 'fitting in' are paramount. Because of this, alcohol may fit into the social awareness paradigm, which confers adaptive benefits as well as hazards [8].

Cross-sectional studies have shown that there are significant differences in the brain structure and function of adolescents who drink heavily and those who do not [9]. Although the dilemma of cause and effect has yet to be clarified fully, overall, heavy drinking during adolescence has been associated with lower cognitive ability and abnormal brain development. Alcohol also appears to affect the ability of young people to control their emotions and behaviors, which could lead to long-term academic, occupational and social functioning problems. Early onset of very heavy drinking is thought to increase the likelihood of developing alcohol disorders later in life, due potentially

to lasting effects on brain function [7]. Although more research is needed in this area, the existing evidence is sufficient to raise serious concern [10].

Developmental theory and research suggest strongly that young children may be more susceptible to media imagery because they do not have the ability to compensate for biases in advertising portrayals and glamorized media imagery (e.g. [3]). This view is supported by research showing that prior to the age of 8 years most children do not possess the necessary cognitive skills to differentiate commercial advertising from other sources of information [11,12]. Even older children and adolescents who understand the purpose of advertising may not act regularly on that knowledge because they lack the ability to weigh long-term health consequences of alcohol consumption against short-term rewards [13].

Specific to alcohol, a study examining adolescents' age perceptions of characters in several beer commercials [14] found that 40% of respondents perceived at least one underage person in the advertisements; 19% of the rated commercials contained characters perceived to be underage users or intended users of alcohol, and younger adolescents were more inclined to perceive underage characters as users of the product. In a reciprocal relationship, young people who have initiated alcohol use earlier than their peers may be more vulnerable to the effects of alcohol marketing. One study found that underage drinkers tend to be more adept than same-age non-drinkers at recognizing and identifying alcohol product brand imagery in television advertisements [15], and a separate study determined that young adults (aged 18–21 years) who drink heavily perceive heavier drinking by characters portrayed in alcohol advertisements and are less likely to label this drinking as excessive [16].

PERSONALITY CHARACTERISTICS AND OTHER INDIVIDUAL DIFFERENCE FACTORS

Personality disorders (e.g. attention deficit hyperactivity disorder and conduct disorder) and personality traits such as sensation-seeking and impulsiveness have been linked to early onset of drinking and progression to alcohol dependence [17]. There is also evidence of an association between high reward sensitivity and hazardous drinking [18,19]. Several of these personality characteristics, particularly sensation-seeking, have been implicated in a variety of other problem behaviors, such as illicit drug use, risky driving, driving while intoxicated and high-risk sexual activity.

Such individuals may be particularly susceptible to role models who exhibit deviant behaviors, portrayed sometimes in alcohol advertisements as well as movies that contain alcohol product placements. Despite the consistent

association of these characteristics with early onset of drinking and with later alcohol abuse (e.g. [20]), it is not possible at this time to specify the nature of the vulnerability with sufficient diagnostic accuracy to include it as a target of marketing controls.

FAMILY HISTORY OF ALCOHOL DEPENDENCE

Adult children of alcoholics meet one of the proposed criteria of a vulnerable population. They are uniquely susceptible to alcohol use. Parental problem drinking is a significant health risk to children and adolescents [21]. Children of parents who drink excessively are more likely to have substance use disorders, engage in criminal behavior and have severe psychiatric disorders, including suicidal ideation, depression and psychological disturbances. In addition to genetics, parental modeling has been identified as a primary mechanism that increases the risk of early-onset adolescent drinking in children whose parents display heavy alcohol consumption patterns [22]. In a longitudinal study that followed children from 1st to 8th grade, parental alcohol use was a significant risk factor for a female child's intention to drink [23].

A longitudinal study on the intergenerational transmission of alcoholism found that the effect of higher levels of maternal drinking and current paternal alcohol use disorders on childhood onset of drinking was mediated by disclosure of negative alcohol experiences [24]. That is, greater disclosures were associated with earlier alcohol initiation among children. Moreover, positive and negative alcohol expectancies in children are influenced by parental alcohol expectancies, with adoption of expectancies apparent by age 12 [25].

There is insufficient evidence to suggest that adult children of alcoholics either are or are not vulnerable to alcohol marketing. One study found no differences in perceptions between participants who did and who did not have a family history of alcohol problems [16]. No other studies were located on this topic.

WOMEN AT RISK FOR AN ALCOHOL-EXPOSED PREGNANCY

A woman is at risk for an alcohol-exposed pregnancy (AEP) if, in the last month, she (1) drank alcohol; (2) had vaginal intercourse with a male; and (3) did not use contraception [26]. Current research is insufficient to determine if these women should be considered a vulnerable population. There are two primary health concerns regarding alcohol use in this population. First, harm to the woman must be taken into consideration. Women typically have increased vulnerability to alcohol-related harm because of lower body weight, smaller liver capacity

to metabolize alcohol and a higher proportion of body fat [27]. A recent meta-analysis that included 23 prospective studies of nearly 500 000 participants concluded that moderate and heavy drinking women may have an increased risk of mortality compared to moderate and heavy drinking men [28], while the risk of liver cirrhosis was higher among women compared to men with the same level of alcohol consumption in a separate meta-analysis [29]. Alcohol use is also a risk factor for breast cancer, with some studies showing risk beginning at one to two drinks per day [30–32].

Secondly, alcohol consumption during pregnancy must be considered. Women who drink while pregnant risk giving birth to a child with physical, learning and behavioral problems, including fetal alcohol spectrum disorder (FASD) [33–39]. Alcohol can disrupt fetal development at any stage of pregnancy, including the early stages before a woman may know she is pregnant. Studies confining exposure to early gestation have concluded that facial malformations representative of FASD result from ethanol exposure during the embryonic period, specifically the first 3–8 weeks of gestation [40]. Other studies have documented decreased height (length) and weight that persist into young adulthood [41], increased rates of spontaneous abortion [42], increased craniofacial abnormalities [43,44], psychiatric disorders as young adults [34] and neurobehavioral deficits [45–49]. Although studies focusing on low to moderate alcohol consumption during pregnancy have shown inconsistent results [50], the public health and medical community generally recommends that women abstain from drinking alcohol during pregnancy.

High rates of alcohol use during pregnancy have been reported in the United States (17.9%), the Russian Federation (51.9%) and Barcelona, Spain (45%), with binge drinking rates of 2.7 and 20.2% reported in the United States and Russian Federation, respectively [51–53]. In the Western Cape of South Africa, 43% of women reported alcohol consumption during pregnancy [54] and rates of FAS documented in one such community are the highest in the world: 65.2–74.2 per 1000 children in the first-grade population [55]. An analysis of 865 meconium samples from pregnant women in Uruguay revealed that 47.3% were positive for alcohol, while only 35% disclosed drinking while pregnant [56]. These findings suggest that many pregnant women are not following medical advice not to consume alcohol during pregnancy, if they receive any advice at all.

The issue is compounded further by high rates of unintended pregnancies, during which a woman may expose her developing fetus to alcohol unintentionally before recognition of pregnancy. Using multiple data sources to estimate the incidence of all live births, abortions and miscarriages for all major geographic regions, a study by

Sedgh, Singh & Hussain [57] found that 85 million of the 213 million pregnancies (40%) that occurred world-wide in 2012 were unintended. In Latin America and the Caribbean, the rate was 56%. While 42% of unintended pregnancies in Latin America and the Caribbean end in induced abortion, and 39% in North America, more than a quarter of all live births are from unintended pregnancies.

Little research has been conducted to determine if women, particularly those at risk for an AEP, are susceptible to alcohol marketing. In a study of US college students, women perceived greater alcohol consumption by the main characters in three of five alcohol advertisements viewed [16]. A study utilizing street interviews determined that men and women describe beer, wine and spirits in different ways [58]. However, the first study did not link gender with other behavior patterns and the second study did not attempt to show that different perceptions of alcohol marketing indicates susceptibility to the marketing message. Therefore, while alcohol consumption poses significant risks to a fetus and may pose increased risk to women, it is premature to consider this subset of women vulnerable in terms of alcohol marketing messages.

HISTORY OF HEAVY DRINKING AND SUSCEPTIBILITY TO RELAPSE IN RECOVERING ALCOHOLICS

Evidence supports defining alcoholics and other heavy drinkers as a vulnerable population. Long-term excessive use of alcohol has been linked to liver disease, heart disease, cancer, learning and memory problems, mental health problems and social problems [59]. The World Health Organization estimates that more than 3 million deaths per year globally are attributable to the harmful use of alcohol [60].

Some studies have shown that heavy or problem drinkers respond differently in response to alcohol cues than light or social drinkers on measures of psychophysiology [61,62], attentional bias [63,64], cognitive processing [65], urges to drink [19,66] and positive affect [63,67]. In one experiment, 'moderate social drinkers' exposed to alcohol advertisements in magazines showed increases in skin conductance to a significantly greater extent than did 'light social drinkers' [68].

Alcohol-related images in cue-reactivity studies have been found to increase craving or urges to drink in heavy alcohol users compared to 'neutral' or control cues [69,70,66,67,71]. This may occur because heavy alcohol users are subject to attentional biases [72]. Individuals whose goal is to consume alcohol are easily distracted by alcohol-related stimuli and will either dismiss or pay significantly less attention to non-alcohol-related cues. The degree of attentional bias an individual exhibits is associated positively with drinking status, with heavy drinkers

having significantly greater biases than non-drinkers or social drinkers, and there is evidence to suggest that attentional bias plays a causal role in triggering alcohol use in relapse and in maintaining alcohol dependence [73–75]. Moreover, craving and alcohol-related attentional bias may create a positive feedback loop whereby alcohol-related stimuli become more salient as cravings increase and cravings increase as greater attention is paid to alcohol-related stimuli [73].

Using functional neuroimaging as a tool to understand reactivity to alcohol-related cues, a meta-analysis identified greater neural activation after exposure to alcohol-related stimuli in heavy alcohol users in the ventral striatum and ventral anterior cingulate cortex [76]. Activity in the ventral striatum was correlated positively with severity of dependence, amount of drinking, impaired control and magnitude of craving. In another study [77], teenagers with alcohol use disorders showed greater brain activation to pictures of alcoholic beverages than control youths, predominantly in areas linked to reward, desire and positive affect. The degree of brain response was highest in youths who reported greater desire to drink and who consumed alcohol more frequently.

Importantly, cue-reactivity is predictive of alcohol consumption and relapse after treatment in alcoholics [78]. For example, participants in an alcohol treatment program who exhibited increased cue-elicited alcohol craving had higher odds of relapse [79], and among alcoholics undergoing in-patient treatment 8–10% of the variance in alcohol consumption after discharge was explained by the desire to drink after cue-reactivity sessions [80].

IMPLICATIONS FOR THE REGULATION OF ALCOHOL MARKETING

What moral responsibilities do marketers of alcoholic beverages have when they consider marketing to vulnerable groups? Do both types of vulnerability need to be present for protection to be afforded, or would the first type be a sufficient criterion? These are some of the questions this essay has attempted to answer. Table 1 provides a box score summary to the evidence for two types of vulnerability in five groups of drinkers. The table indicates that both types of vulnerability are present in at least two groups.

The risks of alcohol consumption in young people are well recognized and are reflected in various forms of 'permitted age' legislation around the world, including regulations and industry self-regulations on exposure of children and adolescents to alcohol marketing. It is now clear that these prohibitions are based soundly on a demonstrable biological vulnerability that shows that the brain is not biologically mature until early adult life.

Many cultures have established laws about the age at which young people are permitted to drink or be served

Table 1 Evidence for two types of vulnerability in five groups of drinkers.

	<i>Susceptibility to alcohol-related harm</i>	<i>Susceptibility to the effects of marketing</i>
Children and adolescents	x	x
Individuals with sensation-seeking and impulsiveness traits	x	?
Adult children of alcoholics	x	
Women at risk for an alcohol exposed pregnancy	x	
Alcoholics and other heavy drinkers	x	x

alcohol. This shows that society has been aware of the dangers attendant on adolescent drinking both to the drinker and to public order. Vulnerability is well recognized, but the biological underpinning of this conventional wisdom adds another dimension to our appreciation of the risks and shows that the brain itself matures later than has been commonly thought. The brain evolves throughout adolescence and into early adult life. The impulsiveness and risk-taking evident in many adolescents, coupled with the relatively late development of critical faculties, has a neurochemical substrate. The architecture and activity of the brain are very malleable over these years, and alcohol can impair successful maturation. This makes the young person uniquely vulnerable to the blandishments of marketing in all its forms. An additional reason for restraint is that the psychoactive effects of alcohol on the immature brain are particularly potent, with damaging consequences to self and others.

Social learning theory [81] provides insights into the link between advertising, purchase behavior, onset of drinking and heavy drinking. In addition to social modeling of drinking behavior and the frequent association of social reinforcement with drinking, learned alcohol expectancies are another factor thought to mediate the relationship between vulnerability factors, alcohol marketing and alcohol-related problems. These expectations have been found to affect the early onset of drinking, behavior during intoxication and the development of alcohol abuse [82]. Other evidence indicates that marketing can affect young people's alcohol expectancies in a way that facilitates positive and negative affect regulation [83].

Beyond groups defined by age and developmental history, one other group—alcoholics—may be particularly vulnerable because of the disproportionate harm they experience from alcohol and their increased susceptibility to alcohol marketing. This group meets the two proposed criteria that define vulnerability for marketing purposes, thereby warranting an expanded definition of vulnerability as it applies to alcohol marketing.

More research is needed to expand the definition to women at risk of an AEP, adult children of alcoholics or other populations based on psychological characteristics. For example, extensive research demonstrates the dangers of alcohol consumption during pregnancy, which was

reiterated in a 1981 US Surgeon General's advisory urging women who are pregnant or who might become pregnant to abstain from alcohol use, and by the US Secretary of Health and Human Services [84], the Centers for Disease Control and the Substance Abuse and Mental Health Services Administration (SAMHSA) [51]. However, there is insufficient evidence to suggest that women who may become pregnant are uniquely susceptible to alcohol marketing, even though non-pregnant women of child-bearing age may benefit from the same protections provided to pregnant women regarding alcohol advertising.

Additional research should include observational and experimental studies. Similar to existing studies on the effects of alcohol marketing exposure, longitudinal cohort studies of youth and adults that are designed specifically to identify vulnerable and potentially vulnerable populations can determine if changes in alcohol consumption and alcohol-related consequences due to marketing exposures are greater in these populations. New experimental research can parallel the cue-exposure research performed on populations of alcoholics and heavy alcohol users. For example, trials can be implemented to determine if vulnerable or potentially vulnerable populations have greater alcohol cravings after exposure to alcohol marketing and if these populations show attentional bias towards such materials.

The populations discussed in this paper are not insignificant. World-wide, 16.0% of the 15+ population were heavy episodic drinkers in 2010 [60]. Historically, one in eight Americans were children of alcoholics [85], and recent evidence suggests that 20% of the Swedish populations have parents with alcohol problems [86]. Moreover, approximately 2 million women in the United States are at risk for an alcohol-exposed pregnancy [26].

In conclusion, this review suggests that new content and exposure guidelines should be drafted to improve current self-regulation codes by expanding them to vulnerable groups of adults. To the extent that both theory and empirical research suggest that populations defined by age and developmental history may be particularly susceptible to alcohol marketing, there are ample grounds for strengthening the protections used in many countries that limit exposure to potentially harmful marketing content, especially in light of evidence showing that industry self-regulation measures

are ineffective in protecting age vulnerable groups from exposure to potentially harmful content [87]. If adequate protections cannot be implemented through this mechanism, then statutory regulation should be considered.

Declaration of interests

None.

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