

Prevention of Underage Drinking: *Logic Model Documentation*

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The Logic Models here are a work in progress; no Logic Model is ever complete or final. The goal of this Logic Model is to document the best available research evidence as well as identify gaps or areas in our understanding which need further study or replication in future research. These documents are presented freely for the use of prevention researchers and prevention practitioners, and can be downloaded and reprinted as desired.

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Table of Contents

I.	<i>Definition.....</i>	<i>I</i>
	<i>Measurement of the Problem.....</i>	<i>I</i>
II.	<i>Logic Model of Underage Drinking Prevention.....</i>	<i>3</i>
III.	<i>Documentation of Intermediate Variables, Relationships, and Prevention Strategies.....</i>	<i>5</i>
	<i>Drinking Beliefs.....</i>	<i>6</i>
	<i>Family Influence.....</i>	<i>13</i>
	<i>School Influence.....</i>	<i>16</i>
	<i>Peer Influence.....</i>	<i>20</i>
	<i>Drinking Context.....</i>	<i>22</i>
	<i>Retail Availability of Alcohol to Youth.....</i>	<i>25</i>
	<i>Social Availability of Alcohol to Youth.....</i>	<i>34</i>
	<i>Price.....</i>	<i>40</i>
	<i>Visible Enforcement.....</i>	<i>44</i>
	<i>Underage Drinking Laws.....</i>	<i>53</i>
	<i>Community Norms about Youth Drinking.....</i>	<i>58</i>
	<i>Alcohol Promotion.....</i>	<i>61</i>
IV.	<i>References.....</i>	<i>71</i>

I. Definition

Underage Drinking refers to any use of alcohol by persons under the legal drinking age of 21. Consumption and/or purchase of alcohol by persons under the age of 21 is illegal in all 50 states and the District of Columbia. According to the NIAAA Alcohol Policy Information System (APIS) while all 50 States and DC prohibit underage possession, only 30 prohibit consumption and 47 prohibit purchase.

Justification: Alcohol led to 3,170 deaths and 2.6 million other harmful events among underage drinkers in the US in 2001. Underage drinking is associated with a host of problems, including traffic crashes and fatalities, unwanted and risky sex, pregnancy, and intentional injury. It is estimated that underage drinking costs America as much as \$61.5 billion each year. Studies have shown that youth who begin drinking at an early age are at a 3-5 fold increased risk of problem drinking later in life.

Measurement of the Problem

Recommended Indicator/Measure 1: Current use of alcohol by persons under the age of 21 years

Definition: Percent of persons aged 12 and older reporting any use of alcohol within the past 30 days and past year.

Data Source: National Survey on Drug Use and Health (NSDUH), Substance Abuse and Mental Health Services Administration (SAMHSA), U.S. Department of Health and Human Services (DHHS).

Frequency: Annual and past 30-day use

Geographic Levels: National and State

Demographic Categories: Age, gender, ethnicity, socio-economic status

Strengths: NSDUH is the only national source that currently provides prevalence of use estimates for both adolescents and adults for every state.

Limitations: State-level estimates for most states are based on relatively small samples. Although augmented by model-based estimation procedures, estimates for specific age groups have relatively low precision (i.e., large confidence intervals). The estimates are provided directly by SAMHSA and raw data that could be used for alternative calculations (e.g., demographic subgroups) are not available. The estimates are subject to bias due to self-report and non-response (refusal/no answer).

Recommended Indicator/Measure 2: Current use of alcohol by high school students

Definition: Percent of students in grades 9 through 12 reporting any use of alcohol within the past 30 days

Data Source: Youth Risk Behavior Surveillance System (YRBSS), Centers for Disease Control and Prevention (CDC)

Frequency: Biennial

Geographic Levels: National and State

Demographic Categories: Grade Level, age, Gender, Race/Ethnicity

Strengths: YRBSS estimates are typically based on larger samples than the National Survey on Drug Use and Health, and can be further broken down by grade level, gender, and race/ethnicity. Some states also collect YRBSS data for individual communities or school districts, which can be compared with their state-level data.

Limitations: As of 2003, weighted representative samples were available for only 32 states. Not all states participate, and some participating states do not provide representative samples. YRBSS is a school-based survey, so students who have dropped out of school are not represented. It is also subject to bias due to self-report, non-coverage (refusal by selected schools to participate), and non-response (refusal/no answer). Estimates for some subgroups may have relatively low precision (i.e., large confidence intervals).

Recommended Indicator/Measure 3: Current use of alcohol by persons under the age of 21.

Definition: Percent of persons under the age of 21 who used alcohol in the past year and in the past 30 days.

Data Source: Behavioral Risk Factor Surveillance System (BRFSS), Centers for Disease Control and Prevention (CDC)

Frequency: Annual

Geographic Levels: National and State

Demographic Categories: Age, Gender, and Race/Ethnicity

Strengths: BRFSS provides prevalence estimates of adult use for every state. State-level estimates are typically based on larger samples than the National Survey on Drug Use and Health and may be further broken down by age, gender, and race/ethnicity.

Limitations: BRFSS is a telephone survey subject to potential bias due to self-report, non-coverage (households without phones), and non-response (refusal/no answer). Estimates for subgroups may have relatively low precision (i.e., large confidence intervals).

II. Logic Model of Underage Drinking Prevention

A Logic Model is a combination of (a) a causal model which shows the key intermediate variables in a system of relationships to explain a specific outcome (in this case, underage drinking) and (b) the relationship of variables to the outcome or to other variables which have been actually affected via purposeful prevention interventions. This logic model is a public health approach, concerned primarily with underage drinking and associated alcohol-related problems. As such, this model emphasizes variables, relationships, and prevention effects at the population level or the community-wide level.

(a) Causal Relationships: Figure 1 is first a general causal model for underage drinking based upon existing research and/or theory. The figure shows key intermediate variables which research has identified as being empirically associated with underage drinking and alcohol-related problems as well as to other intermediate variables in the model. Most of these variables have sufficient strength of association with either underage drinking, alcohol-related problems, or other key variables to be included as shown in the documentation which follows. All such intermediate variables are shown with a least one solid line. A few of the variables have a theoretical rationale for inclusion but currently no empirical research to confirm and are shown with dotted lines.

(b) Prevention Effects: As a Logic Model of Underage Drinking Prevention, Figure 1 also shows the relative strength of evidence of tested prevention strategies in reducing underage drinking and/or alcohol-related harms at the population level or other key intermediate variables which have demonstrated effect on population level outcomes. These are indicated by solid lines. If the outcomes or effects from specific prevention strategies or programs are limited to the specific group served or involved in the program, then this is considered less significant in the Logic Model than achieving a population level outcome. If there is no evidence of effect on either population level underage drinking, alcohol-related problems or other key intermediate variables nor on target group variables, then this is indicated by a thin line.

Figure 1-- 9-6-2007

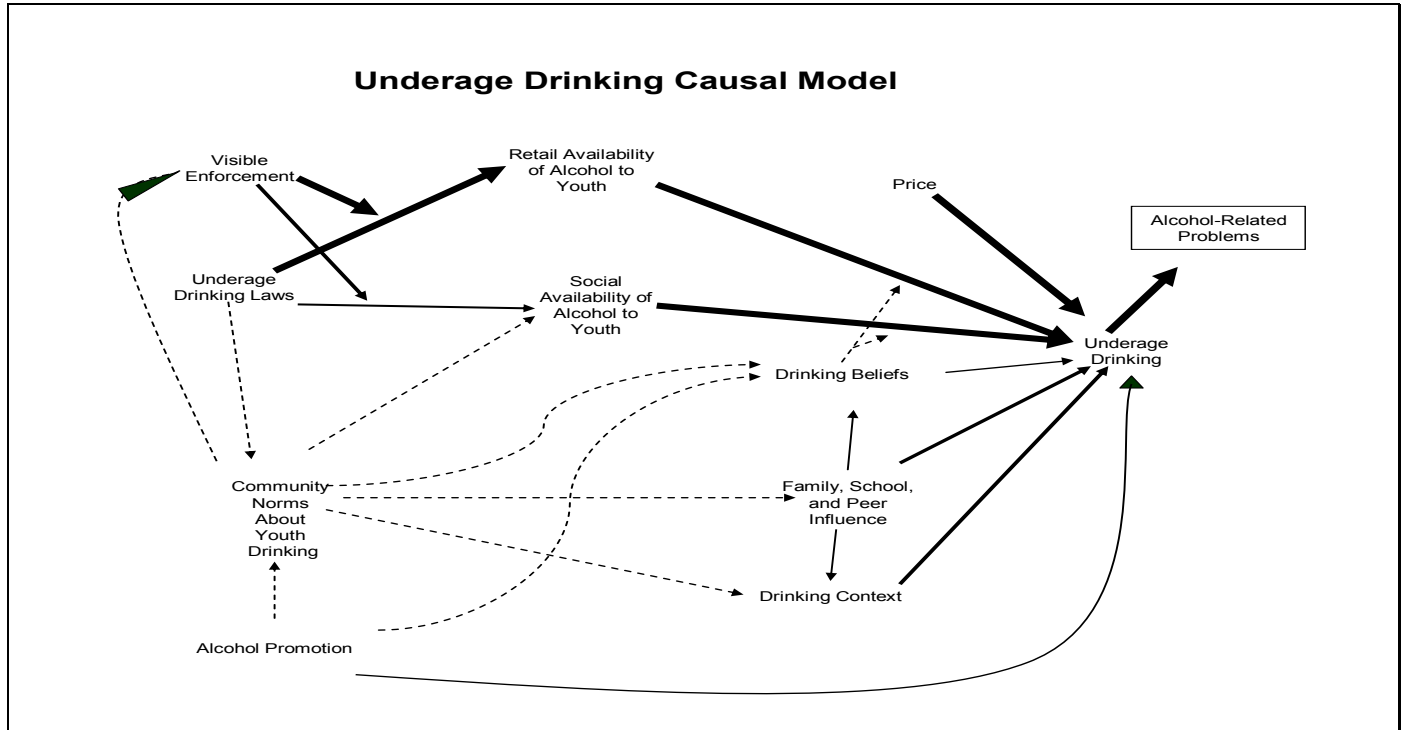
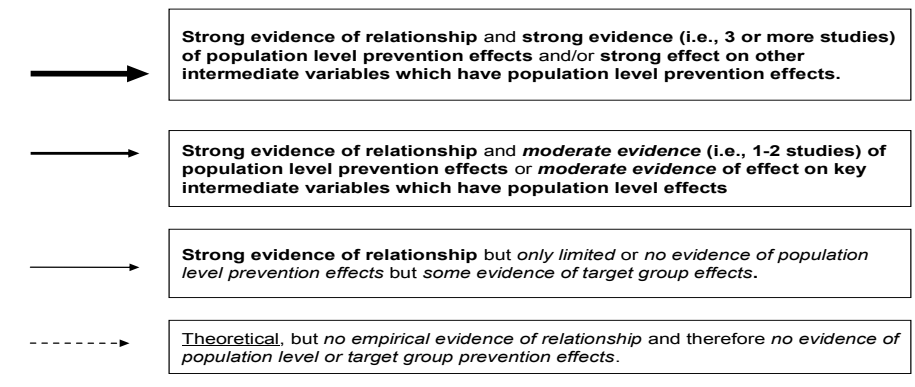


Figure 1-- Legend: Strength of (a) Evidence of relationship to underage drinking and (b) Evidence of Population-Level Effect on Underage Drinking, Alcohol-related Problems or Other Key Intermediate Variables Resulting from Prevention Interventions



III. Documentation of Intermediate Variables, Relationships, and Prevention Strategies

Section III provides documentation for each of the elements (problems, intermediate variables, relationships, and strategies) for the causal model presented in Section II. For each intermediate variable, the following subsections headings (in bold) will be used:

Conceptual Definition—This is the definition of each intermediate variable as a hypothetical or theoretical construct. The conceptual definition provides a rationale as to why this intermediate variable is included in this causal model.

Measurement—This section provides operational definitions for the intermediate variable, that is alternative methods, techniques, tools, approaches, etc. to measure this variable and to develop valid and reliable indicators. Data sources may be surveys, archival data, or other sources.

Relationship of the Intermediate Variable to the Problem—This subsection is a Summary of the Research evidence of the relationship of the intermediate variable to the specific ATOD problem being addressed by the logic model. Emphasis will be given to published research in scientific journals. In some cases, no direct empirical evidence may exist for the intermediate-variable-to-ATOD-Problem relationship. In such a situation, the relationship can be presented in theoretical terms, i.e., reasoned argument, based upon other research evidence which can be generalized to this case or situation.

Relationship of the Intermediate Variable to Other Variables—This subsection is a Summary of the Research evidence of the relationship of the intermediate variable being documented to important outcomes as shown in the logic model. In this summary, each relationship discussed will focus on the assumed relationship of interest for prevention, for example, Price → Drinking but not Drinking (as demand) → Price. Reciprocal relationships, however, will be discussed in the documentation of that other variable. For example, drinking (demand for alcohol) and its influence on price will be discussed under Drinking.

Strategies—This subsection will present the research evidence concerning strategies, interventions, policies, programs, etc. which have been shown capable of affecting this intermediate variable. Evidence that purposeful changes in the intermediate variable can affect the ATOD problem and evidence of effects on other intermediate variables will also be summarized or cited. Limitations of the research evidence about effects will also be noted, for example, if important concerns exist about generalizability to other situations, populations, or settings or selection biases exist for the population in which the effects were observed. When no research evidence exists of an effect from prevention strategies, this will be noted. In many cases, the research evidence which demonstrates a causal or mediating influence of one intermediate variable to the ATOD problem or to other variables in the causal model will come from purposeful prevention efforts and will already be noted in previous subsections.

Drinking Beliefs

Conceptual Definition

Drinking Beliefs included in the model refer to five of the most proximal correlates of underage drinking behavior: alcohol attitudes, alcohol expectancies, normative beliefs, subjective availability, and resistance/refusal efficacy beliefs. Inclusion of these variables is grounded in such theoretical approaches as cognitive social learning theory (e.g., Bandura, 1977, 1986, 1997), problem behavior theory (e.g., Jessor, Donovan, & Costa, 1991), the DOMAIN model of drug use (e.g., Newcomb & Bentler, 1988), and current reformulations of the Theory of Planned Behavior (Ajzen, 1989, 2001; Fishbein et al., 2002, Fishbein, Hennessy, Yzer, & Douglas, 2003).

Alcohol attitudes refer to overall affective evaluations of drinking (e.g., wrong-not wrong; good-bad; pleasant-unpleasant) by an individual. Alcohol attitudes are hypothesized to mediate the effects of alcohol expectancies and normative beliefs on drinking behaviors.

Alcohol expectancies refer to perceptions of perceived risk and the *perceived personal* likelihood of positive and negative consequences of drinking and heavy drinking. Thus they are the cognitive representations of anticipated rewards and costs associated with drinking behaviors.

Alcohol normative beliefs refer to perceptions of the approval or disapproval of drinking by significant others (prescriptive norms) and the extent to which these others drink themselves (descriptive norms).

Subjective alcohol availability refers to the perceived ease or difficulty of obtaining alcohol overall and from specific social and commercial sources and to the frequency of use of these sources.

Refusal/resistance efficacy beliefs refer to perceptions of one's own ability to resist peer pressure to drink and offers to drink. These beliefs also include perceptions of how easy or difficult it would be to avoid situations in which youth drinking occurs.

Measurement

The five elements are summarized below:

Drinking Beliefs	Measures
Alcohol attitudes	Personal evaluations of alcohol use and heavy drinking. Source: Student Survey.
Alcohol expectancies	Perceived likelihood of positive and negative personal consequences of drinking. Perceived risks and benefits of alcohol use and heavy drinking. Source: Student Survey.
Normative beliefs	Perceived level of alcohol use by same-age peers, friends and parents; perceived level of approval/disapproval of alcohol use by same-age peers, friends and parents. Source: Student Survey.
Subjective alcohol availability	How easy or difficult it would be to get alcohol from various social and commercial sources (e.g., grocery store, friends, strangers). Source: Student Survey.
Refusal/resistance efficacy beliefs	Perceived ability to resist peer pressures or peer offers to drink. Ability to avoid situations in which alcohol is consumed. Source: Student Survey.

Youth Surveys--Drinking Beliefs: Attitudes Toward Alcohol Use. Typical alcohol attitude items ask young people how wrong they think it is for someone their age to drink beer, wine, or hard liquor or how “good” or “bad” drinking is. Such items show excellent convergent validity and are highly predictive of drinking, heavy drinking, and drinking intentions among youth (e.g., Grube & Morgan, 1990a; Hampson, Andrews, Barckley, & Severson, 2006, Trafimow, Brown, Grace, Thompson, & Sheeran, 2002).

Youth Surveys--Alcohol Expectancies. Alcohol expectancies are measured with items focusing on perceived personal consequences of drinking. Specifically, respondents are asked how likely or unlikely they think it is that a series of consequences would happen to them personally if they were to have 3 or more drinks. Examples of such expectancy items can be found in the PIRE/OJJDP Youth Survey (AE-1a-q). The items focus on both *negative expectancies* (e.g., get into trouble with parents), and *positive expectancies* (e.g., have fun, make me feel relaxed, make me feel more outgoing or friendly). These items are presented on 4-point scales (*very likely--not at all likely*). They form two primary scales (positive expectancies and negative expectancies) that are modestly correlated ($r \approx -.19$) and independently predict drinking and changes in drinking over time. In previous studies (e.g., Grube, Chen, Madden, & Morgan, 1995; Chen, Grube, & Madden, 1994) these scales have shown good internal reliability ($\alpha s \approx .79-.83$). More general items relating to perceived risk ask how much respondents think people risk harming themselves (physically or in other ways) if they drink alcoholic beverages.

Youth Surveys-- Normative Beliefs. Survey items can include measures of *descriptive norms* (i.e., perceived levels of alcohol use by others) and *prescriptive norms* (i.e., perceived level of approval or disapproval of alcohol use by others). Item D1j in the Oregon Healthy Teens (OHT) survey asks students to indicate how many of their four best friends have tried beer, wine, or liquor when their parents didn’t know about it in the past year. Five possible responses range from “none” to “4.” Item D2a asks students if any of their siblings have ever drunk beer, wine, or hard liquor (yes/no). These items can be supplemented with several items adapted from the PIRE/OJJDP Youth Survey (CN-1a,b,f), which ask how often they think their parents, friends, and same-age peers have had at least one whole alcoholic beverage in the past 12 months.

Prescriptive Norms. Item C4a in the OHT asks students how wrong their parents feel it would be for them to drink beer, wine, or liquor regularly with four possible responses ranging from “very wrong” to “not wrong at all.” This item can be supplemented with several items adapted from the PIRE/OJJDP Youth Survey (CN-2d,e,f), which ask respondents how much they think other people (best friend, other good friends, other people your age you know) would disapprove or approve if they have three or four whole drinks. Analyses of PIRE/OJJDP Youth Survey data with several large samples of adolescents indicate that these multi-item scale measures of descriptive and prescriptive norms are internally reliable ($\alpha \geq .70$) and moderately to strongly associated with past-30-day alcohol use and heavy drinking measures (Grube, Keefe, & Stewart, 1999).

Youth Surveys-- Subjective Alcohol Availability refers to an overall perception of how easy or difficult alcohol is to obtain through retail and social sources. Oregon Healthy Teens (OHT) survey items E10a-h ask students to indicate how easy or difficult they think it would be to get alcohol (beer, wine, or hard liquor) from various sources, including grocery stores, convenience stores, friends 21 or older, friends under 21, a parent, a brother or sister, through the internet, or from home without permission. Four possible responses to each item range from “very easy” to “very hard.” The internal consistency of this 8-item scale is good ($\alpha = .80$) and it is significantly associated with past-30-day alcohol use ($r = .41$) and heavy drinking ($r = .40$). An additional item from the PIRE/OJJDP Youth Survey (AV-3) regarding how easy or difficult it would be to get alcohol from a stranger over the age of 21 can be added to these items. Although they are correlated, two scales are derived from these items representing ease of using social and retail sources of alcohol, respectively. Overall subjective alcohol availability can be measured with a set of items asking how easy or difficult it would be to get (a) coolers or fruit-flavored alcoholic beverages (alcopops), (b) beer, (c) wine, and (d) liquor. These items can be summed into an overall measure. Recent studies indicate that subjective availability is related to drinking behaviors among youth and, moreover, is itself affected by actual availability at the community-level (Dent, Grube, & Biglan, 2005; Paschall, Grube, Black, & Ringwalt, 2007b).

Youth Surveys--Refusal/resistance efficacy beliefs refer to perceptions of one’s own ability to resist drinking, refuse drink offers, and resist direct pressure to drink. The Drinking Refusal Self-Efficacy Questionnaire (Lee & Oei, 1993; Oei, Hasking, & Young, 2005; Young, Hasking, Oei, & Loveday, 2007) measures these beliefs. The Drinking Refusal Self-Efficacy Questionnaire--Revised Adolescent Version (DRSEQ-RA) also designed to assess an individual's belief in their ability to resist drinking alcohol consists of three factors reflecting social pressure refusal self-efficacy, opportunistic refusal self-efficacy and emotional relief refusal self-efficacy. The three factor structure has been confirmed using confirmatory factor analysis. All three factors are negatively correlated with both frequency and volume of alcohol consumption with drinkers reporting lower drinking refusal self-efficacy than non-drinkers.

Relationship of the Intermediate Variable to the Problem

Alcohol attitudes on underage drinking—Both longitudinal and cross-sectional research shows that attitudes predict drinking such that drinking increases as attitudes become more favorable (e.g., Grube & Morgan, 1990a, 1990b, 1994; Hampson et al., 2006; Trafimow et al., 2002).

Alcohol Expectancies—More favorable expectancies (lower negative and higher positive) are hypothesized to increase drinking. Research has consistently shown that alcohol expectancies are related to drinking in the anticipated ways in both cross-sectional and longitudinal analyses and may mediate more distal risk factors (e.g., Chen et al., 1994; Darkes, Greenbaum, & Goldman, 2004; Grube & Agostinelli, 1999; Grube, Ames, & Delaney, 1994; Grube et al., 1995; Henderson, Goldman, Coover, & Carnevalla, 1994).

Normative beliefs—Previous research has demonstrated that normative beliefs, and especially perceptions of friends' drinking, are strong predictors of alcohol consumption and of changes in alcohol consumption over time (Ames & Grube, 1999; Grube & Morgan, 1990a; 1990b; Grube, Morgan, & McGree, 1986; Morgan & Grube, 1991). Youth with normative beliefs that are supportive of drinking may place fewer limits on their drinking behavior and take greater risks when drinking than those with more conservative drinking beliefs. Peers may also place direct pressure on some youth to drink or drink heavily or may be sources for alcohol, providing opportunities to drink. Additionally, peers may also reinforce expectations that alcohol makes one attractive, powerful, and mature.

Subjective Alcohol Availability—Studies considering subjective availability show that as perceived ease of obtaining alcohol increases, quantity and frequency of drinking also increase among adolescents (e.g., Abbey, Scott, & Smith, 1993; Ames & Grube, 1999; Morgan & Grube, 1994). Thus, 95% of 12th graders, 85% of 10th graders, and 68% of 8th graders who participated in the 2002 Monitoring the Future (MTF) survey reported that it is “fairly easy” or “very easy” to get alcohol (Johnston, O'Malley, & Bachman, 2002). Research indicates that measures of alcohol availability are moderately correlated with alcohol consumption (Grube & Morgan, 1990a; Maddahian, Newcomb, & Bentler, 1986; Morgan & Grube, 1994; O'Malley & Wagenaar, 1991).

Resistance/refusal efficacy beliefs. Research indicates that resistance/refusal efficacy beliefs are negatively correlated with frequency and quantity of alcohol consumption and with risky drinking (Lee & Oei, 1993; Oei et al., 2005; Young et al., 2007). Moreover, these efficacy beliefs may contribute to drinking independently of expectancies and other beliefs. Thus, drinking refusal self-efficacy may have broader application in understanding drinking behaviors among youth.

Relationship of the Intermediate Variable to Other Variables

Drinking Beliefs (Subjective Availability) to Retail Availability and Social Availability. Perceived alcohol availability has been especially associated with alcohol consumption for males. Subjective alcohol availability may influence consumption in two ways. First, actual availability of alcohol provides greater opportunities for adolescents to drink. When alcohol is readily available, adolescents simply consume more of it. Second, actual alcohol availability may influence adolescent drinking by both shaping perceptions of availability (subjective availability) and shaping adolescent normative expectations about appropriate drinking behavior and expectations about consequences. In other words, as a result of ease with which alcohol can be obtained, some youth may believe that drinking is expected and subsequently drink more heavily. It is important to keep in mind, however, that subjective availability is a perception and thus may not be entirely congruent with actual physical availability. Perceived ease of obtaining alcohol may influence drinking and, in turn, may itself be influenced by drinking through self-serving biases or through increased knowledge of sources of alcohol resulting from drinking experiences.

Strategies

School Educational Approaches Alone. Traditionally, alcohol prevention for adolescents has focused on changing drinking beliefs through school-based education. Although some educational programs have been found to be moderately effective in reducing youth drinking or delaying onset of drinking (Donaldson, Piccinin, Graham, & Hansen, 1995; Griffin, Botvin, & Nichols, 2004; Hecht, Graham, & Elek, 2006; Shope, Copeland, Kamp, & Lang, 1999; Taylor, Graham, Cumsille, & Hansen, 2000), others have been found to be less effective, effect sizes are small, and demonstrated long-term effects are rare (Bell, Ellickson, & Harrison, 1993; Ennett et al., 1994a; Ennett, Tobler, Ringwalt, & Flewelling, 1994b). Methodological issues have also limited much of the available research (Gandhi, Murphy-Graham, Petrosino, Chrismer, & Weiss, 2007; Gorman, 1998). Meta analyses suggest that interactive and peer-lead delivery methods, social influence and life skills models, and programs that focus on norms, commitment not to use, and intentions not to use may be most effective (Cuijpers, 2002). Findings across programs and studies, however, are inconsistent, making conclusions difficult (Skara & Sussman, 2003). School-based education cannot provide a complete answer to the problem of drinking by young people. In part, this limitation arises because young people are immersed in a broader social context in which alcohol is readily available and glamorized (Mauss, Hopkins, Weisheit, & Kearney, 1988).

School Educational Approaches with Community Elements. Adding community elements to school education may increase the effectiveness of school-based programs (Cuijpers, 2002). Project Northland (Perry et al., 1996), a school educational program which included components targeting sixth graders with family take-home assignments, has led to substantial reductions (19-46%) in alcohol use among younger adolescents in rural Minnesota. More recently, the effectiveness of a cross-cultural adaptation of the home-based component of Project Northland, the Slick Tracey Home Team Program, was examined in a randomized controlled trial among sixth grade school students in Chicago (Komro et al., 2006). Despite high participation rates across the sample of diverse, inner city, low-income youth, results were mixed. The program produced significant between-group effects on only two of the six belief and behavioral factors associated with the onset of alcohol use. In its second phase Project Northland included environmental strategies such as stimulating local policies requiring responsible beverage service (RBS) for on- and off-premise alcohol establishments, and implementing a gold-card system with local merchants to give discounts to students who pledged to remain alcohol- and drug-free (Veblen-Mortenson et al., 1999). Project Northland's effects cannot be attributed with confidence to the environmental strategies implemented. Because few high school students obtain alcohol in licensed on-premise outlets, this strategy has limited potential as a significant barrier against drinking by middle school students. Furthermore, no information was reported about level of actual RBS implementation or level of enforcement (Veblen-Mortenson et al., 1999) and Project Northland also reported nothing concerning police enforcement of sales to underage persons, which has been shown to be essential in reducing alcohol access (Grube, 1997a, 1997b).

Social Norms Education or Marketing: In addition to school-based education, media and public educational approaches are also used in an attempt to modify alcohol norms beliefs. There is some evidence that media interventions, especially social norms marketing or campaigns, can affect drinking beliefs and behaviors among young people (DeJong et al., 2006).

Other studies are less optimistic. Social Norms approaches have been popular in college and university alcohol prevention; however, the evidence of both (a) effectiveness of these approaches in reducing positive norms about drinking and (b) reducing drinking, especially heavy drinking among underage students as a direct result of changed norms about drinking, is limited. Campo, et al, (Campo et al., 2003) studied the effects of misperceptions of friends' and typical college students' drinking on college student drinking and found that drinking is related to perceptions of friends' drinking as suggested by the theory of planned behavior, which emphasizes subjective as opposed to social norms as promoted in Social Norms Marketing. In a study of a social norms program on a large university campus, Polonec, Major, and Atwood (2006) found that the overwhelming majority of students (72.6%) did not believe the norms message that most students on campus had "0 to 4" drinks when they partied. Additionally, when students' perceptions of their friends' drinking behavior was held constant, the correlation between their own drinking and that of "most other" students dropped from a significant 0.37 to a nonsignificant 0.09., again suggesting that group or social network norms are more influential on students' own drinking behavior than are estimates of the campus drinking norm. Weschler et al. (2003) in a national study of college students and the utilization of social norm prevention programs did not find a positive effect of this strategy on college students.

Campo and Cameron (2006) analyzed college students' processing of alcohol social norms messages, related effects on normative judgments, attitudes toward their own behaviors, and perception of undergraduate attitudes using expectancy violation theories and social norms marketing. After social norms message exposure, the majority moved their normative judgments toward the norms messages. However, those most likely to develop healthier attitudes drank more than those who developed healthier attitudes, consistent with psychological reactance to the messages. The authors concluded that the effects of social norms campaigns on those at greatest risk for increased alcohol consumption could lead to increased risk for such participants and that social norms programs should be utilized cautiously. In a second paper, Cameron and Campo (2006) sociodemographics, normative perceptions, and individual attitudes on consumption of alcohol and tobacco use as well as exercise. They found that for all three behaviors, the variable accounting for the greatest variance was whether or not the individual liked participating in that particular behavior. The authors concluded that predicted (or desired) attitudinal and behavioral effects from social norms approaches may not be found when applied across diverse health behaviors.

The theory of normative social behavior (TNSB; Rimal & Real, 2005) posits that the associations between norms and behavior should take into account important moderating influences such as group identity and outcome expectancies. For example, in a recent cross-sectional survey of college students, Real and Rimal (2007) found that peer communication about alcohol (i.e., frequency of alcohol discussions over the past 2 weeks and "normally") moderated the relationship between descriptive norms and alcohol consumption. That is, the relationship between descriptive norms and drinking was stronger among those who engaged in extensive peer discussion as compared to those who did not. Such a moderating effect, however, was not found for intentions to drink.

Counter-advertising commonly is used to balance the effects that alcohol advertising may have on alcohol consumption and alcohol-related problems. Such measures can take the form of print

or broadcast advertisements (e.g., public service announcements [PSAs]) as well as product warning labels. See discussion of strategies under Promotion and Advertising.

Summary

Alcohol attitudes, expectancies, normative beliefs, and subjective availability have all been associated with drinking by youth and with changes in drinking by youth over time. Many social-psychological models of drinking assume that other environmental and personal influences on drinking are mediated through these beliefs. Interventions can target these beliefs directly (e.g., normative education, media) or indirectly by addressing the environmental factors (e.g., physical availability, enforcement of minor in possession laws) that underlie them. More comprehensive approaches to prevention have considerable promise for addressing the problems associated with adolescent drinking by changing the larger community environment in which youth live. In particular, such strategies can be used to reduce alcohol retail and social availability, drinking by increasing the personal costs associated with it, and communicate norms to young people about the unacceptability of their drinking and to adults about the unacceptability of providing alcohol to them.

Family Influence

Conceptual Definition

Youth acquire knowledge, attitudes, and values about a variety of issues, including substance use, through a gradual and intricate process of assimilating information from numerous social sources. Primary among these sources is the family context in which a young person develops. A variety of family factors have been identified as influencing young people's behavior, including parents' norms for appropriate behavior and their family management practices (such as supervision/monitoring, family rules, and discipline).

Measurement

Park et al. (2000) provide measures for various parenting constructs/family influences including parents' norms, family management, and family conflict.

Parents' norms—sixteen parents items and one child self-report item were combined for a measure of parents' norms against substance use (e.g., How wrong would it be for children who are the same age as your child to drink alcohol?). The child item correlated .20, on average, with the parent items. (Average alpha reliability over the four data collection points was .68.)

Family management—eighteen parent and three child self-report items were combined for a measure of proactive family management. Items assessed parents' vigilance in the monitoring of their child (e.g., In the course of a day, how often do you know where this child is?), parents' consistent discipline practices (e.g., How often do you discipline this child for something at one time, and then at other times not discipline him or her for the same thing?), and establishment of clear family rules (e.g., The rules in my family are clear) (average alpha = .71).

Relationship of the Intermediate Variable to the Problem

Many studies examining environmental factors related to youth drinking have focused on peer and parental influence (Baumrind, 1985, 1991; Brook, Brook, Gordon, Whiteman, & Cohen, 1990; Chassin, Pillow, Curran, Molina, & Barrera, 1993; Downs, 1987; Dishion & Loeber, 1985). These studies have shown that parents and peers influence youth drinking even after controlling for numerous individual-level characteristics.

Studies of family-focused interventions designed to improve parenting practices (e.g., communicate clear norms against substance use, proactively manage families, reduce family conflict, etc.) have shown positive outcomes in terms of substance use and specifically youth alcohol consumption which suggests that family process factors have relevance to youth drinking. Compared to control group participants, youth in family intervention groups have reported lower levels of initiation of substance use both in middle school and high school (Bauman et al., 2002; Dishion, Kavanagh, Schneiger, Nelson, & Kaufman, 2002; Park et al., 2000; Spoth, Lopez Reyes, Redmond, & Shin, 1999a; Spoth, Redmond, & Lepper, 1999b; Spoth, Redmond, & Shin, 2001; Spoth, Redmond, Trudeau, & Shin, 2002). Research on specific interventions is discussed below in the strategies section.

Parental monitoring and supervision are critical for drug abuse prevention. These skills can be enhanced with training on rule-setting; techniques for monitoring activities; praise for appropriate behavior; and moderate, consistent discipline that enforces defined family rules (Kosterman, Hawkins, Haggerty, Spoth, & Redmond, 2001). Drug education and information for parents or caregivers reinforces what children are learning about the harmful effects of drugs and opens opportunities for family discussions about the abuse of legal and illegal substances (Bauman et al., 2001). Brief, family-focused interventions for the general population can positively change specific parenting behavior that can reduce later risks of drug abuse (Spoth et al., 2002). Family-based prevention programs should enhance family bonding and relationships and include parenting skills; practice in developing, discussing, and enforcing family policies on substance abuse; and training in drug education and information (Ashery, Robertson, & Kumpfer, 1998).

Relationship of the Intermediate Variable to Other Variables

Family influence to drinking beliefs--Families are a central socializing context where children may learn about alcohol and develop drinking behaviors, alcohol expectancies, and other drinking beliefs such that changes in family processes (e.g., applying clear family rules about drinking) can decrease drinking in adolescence and may delay initiation of drinking (Guo, Hawkins, Hill, & Abbott, 2001; van der Vorst, Engels, Meeus, Dekovic, & Van Leeuwe, 2005; van der Vorst, Engels, Meeus, & Dekovic, 2006a; van der Vorst, Engels, Meeus, & Dekovic, 2006b; Jackson, Henriksen, & Dickinson, 1999). On the other hand, findings regarding frequency of communication more generally about alcohol issues are mixed. In some cases such communication has been found to be *positively* associated with alcohol consumption of adolescents, possibly because it is reactive (van der Vorst et al., 2006a). In other cases no relation has been found (Jackson et al., 1999). The likelihood of alcohol use is significantly greater among children who perceive no parental monitoring of alcohol use or have been allowed by parents to have a drink with alcohol at home which suggests a parental influence on youthful drinking beliefs (Jackson et al., 1999). Good attachment or bonding between parents and their children does **not** appear to prevent adolescents from drinking once other factors are taken into account (van der Vorst et al., 2006b).

Family influence on Context--It is reasonable to believe that there exists some influence of parents on the context of drinking by adolescents, e.g., with parents or especially at home supervised by parents. Parents who sponsor and organize drinking parties for underage persons are communicating that underage drinking is accepted if it is undertaken with the context of the home or an adult supervised setting. However, research on this specific relationship (in contrast to actual drinking influence and the beliefs of adolescents) has not been reported.

Strategies

Family Education Programs. Family programs are designed to affect the specific families and thus children who participate in the program. They are not designed to change the behavior of children from families not enrolled in the training programs. Family programs attempt to help parents improve their skills to explicitly establish family norms for behavior; manage their families with clear communication, monitor and enforce family norms, and manage and reduce family conflict. Several family-based programs have been effective in delaying initiation to alcohol use and reducing quantity-frequency of drinking among youth, including the Adolescent

Transition Program (Dishion et al., 2002), Strengthening Families Program (Spoth et al., 1999a, 1999b, 2001; Spoth & Redmond, 2002), and Preparing for the Drug Free Years (Park et al., 2000). A trial of the Preparing for the Drug Free Years, for example, showed that the program significantly reduced the growth of alcohol use and improved parent norms regarding adolescent alcohol use over time. At a 3½-year follow-up, 65% in the control group versus 52% in the Preparing for the Drug Free Years group reported that they had initiated alcohol use, 42% versus 32% reported having been drunk, and 40% versus 24% said they had used alcohol in the past month. Similarly, analyses of initiation indices suggest a pattern of increasing differences between the intervention and control groups in the Strengthening Families program through the 10th-grade follow up assessment. Specifically, there was a significantly lower rate of increase in alcohol initiation through the 10th-grade follow-up assessment for students in the program, relative to those in the control group (Spoth et al., 2001). These findings are consistent with the results of analyses of earlier waves of data (Spoth et al., 1999a; 1999b). Such programs may also reinforce and increase the effectiveness of other interventions. Data from a randomized trial on the Strengthening Families Program, for example, indicate that adolescents receiving the Strengthening Families Program + Life Skills Training intervention reported lower initiation of alcohol use than adolescents in either the control and Life Skills Training -only groups (Spoth et al., 2002). At the follow-up 2.5 years after baseline (Spoth, Randall, Shin, & Redmond, 2005), growth of substance initiation was significantly slower for the SFP + LST group compared to the LST-only and control groups; however, the difference in adjusted mean scores was only marginally significant for SPF + LST versus control groups. In terms of weekly drunkenness, observed rates of growth of weekly drunkenness for both intervention conditions were found to be lower than that of the control condition, but only marginally; adjusted mean scores for the SFP + LST group were found to be significantly lower from the control group. No differences between the three groups were found for regular alcohol use in either growth analyses or point-in-time analyses. The practical question for such intensive family training is whether (a) the level of youth reported reduction in “any drinking” and “binge or high volume drinking” is practically significant to justify an investment in the program and (b) whether the effects achieved are generalizable to the larger community population of youth or only limited to the participating families? Spoth and Redmond (2002) have noted that there has been limited investigation of family participation in preventive interventions from general populations. They point out that families in eligible general populations can differ to a significant degree in intervention preferences and beliefs that influence their motivation to engage in interventions or in intervention evaluations. Further they point out that stable family member characteristics, such as internalizing/externalizing problems, have not been predictive of family participation or engagement. While educational level has been predictive of engagement, the differences between participants and nonparticipations have “tended to be small” according to Spoth and Redmond (Spoth & Redmond, 2002). The generalizability of parental training effects into general populations which account for the self-selection bias of participating families has not been reported in published research.

School Influence

Conceptual Definition

The influence of school can encompass both the physical and social environment of the institution. The formal school environment is largely governed by adult teachers and administrations. One of the expressions of this formal environment is school policy concerning drinking/intoxication at school or possession of alcohol on school grounds or at school functions.

Measurement

Perceived attachment or bonding to school has been a primary variable used to describe potential for school influence. It has been measured with survey items that ask about liking of school, importance of doing well in school, participation in school activities, aspirations, and grades. Typical items are available in the *Guide to Conducting Youth Surveys* (Office of Juvenile Justice and Delinquency Prevention, 1999). Scales based on these items have good internal consistency and are known to correlate moderately and negatively with adolescent drinking, smoking, and drug use. Perceptions of the school context, norms, and atmosphere can also be measured through survey items aggregated to the school-level. Rules and policies can be measured directly through content analyses or surveys of principals and school administrators.

Relationship of the Intermediate Variable to the Problem

Many studies have shown that school bonding is related to alcohol use. Generally, closer bonding to school and greater connectedness to school are associated with lower levels of alcohol use at the individual level (e.g., Bond et al., 2007; Catalano, Haggerty, Oesterle, Fleming, & Hawkins, 2004; Hawkins et al., 1997; Henry, Swaim, & Slater, 2005). A recent study showed that regardless of a student's own level of school attachment, students who attend schools where the pupils overall tend to be well attached to school are less likely to use alcohol (Henry & Slater, 2007). In addition, they also have lower intentions to use alcohol, perceive that fewer of their peers at school use alcohol, and more strongly hold aspirations that are inconsistent with alcohol use. It should be noted that all of this research addressed school influence based upon individual self-report, not population level effects.

Relationship of the Intermediate Variable to Other Variables

School Influence to Drinking Beliefs--Students who are poorly bonded to school are less likely to believe that substance impedes future goals (Henry et al., 2005). However, early alcohol initiation is related to a higher level of alcohol misuse at age 17-18 and may mediate the effects of school bonding (Hawkins et al., 1997). School bonding or connectedness reported by students has been shown to be related to positive classroom management, tolerant disciplinary policies, and small school size (McNeely, Nonnemaker, & Blum, 2002).

School Influence to Drinking Context—The drawing, Figure 1, contains a line which suggests a potential influence by the school on drinking context. However, that relationship has not been confirmed via empirical research. The solid line in the drawing reflects the documented relationship of school bonding to individual self reported drinking but not to drinking context per se.

Strategies

School Policies and Violations-- School policies are formal regulations which provide for sanctions against youth for the possession of alcohol on school property. The penalties are usually a part of school policies which ban or provide restrictions for possession or provision of alcohol on school property. Many schools are adopting zero-tolerance policies. These policies mandate predetermined consequences or punishments for specific serious student infractions. A large majority (87 percent) of public schools report having zero-tolerance policies for alcohol violations (Heaviside, Rowand, Williams, & Farris, 1998, March). Such policies are popular among schools such that nearly half of elementary, middle/junior high, and senior high schools in the U.S. have explicit policies prohibiting alcohol use on campus and at school functions and, in some cases, any possession of alcohol by students (Modzeleski, Small, & Kann, 1999). When alcohol policies are violated, a common response is suspension or expulsion, a response that may be dictated by state law (see, e.g., HAW. REV. STAT. § 302A-1134.6 [2002]). Gottfredson and colleagues (2000) conducted a national survey of school principals, which among other things asked about principals' responses to undesirable behavior. Gary Gottfredson, (Gottfredson Associates, Inc., personal communication, October 9, 2002) calculated the rates of suspension and expulsion exclusively for alcohol infractions and found some consistency across grade levels. According to elementary school principals surveyed, for alcohol policy violations, 65.4 percent of the principals reported that their students are automatically suspended or expelled, while 24.2 percent of the principals said their students receive a hearing, but this hearing usually results in suspension or expulsion. For middle schools, 74 percent of the principals said that when alcohol policy violations occur, students violating the policies are automatically suspended or expelled, and another 23 percent of the principals said their students are usually suspended or expelled after a hearing. Finally, for high school, 67.5 percent of the principals surveyed said students violating alcohol policies are automatically suspended or expelled, and another 24 percent are usually suspended or expelled after a hearing for an alcohol policy violation. Thus, suspension or expulsion is the dominant response to alcohol violations regardless of grade level.

Other studies that have not focused exclusively on alcohol use report similar findings. Heaviside et al. (Heaviside et al., 1998, March) asked principals to report the number of expulsions, transfers to alternative schools, and out-of-school suspensions lasting five or more days for possession, distribution, or use of alcohol, drugs, and tobacco. They found that 27 percent of all school principals surveyed reported taking a total of about 170,000 disciplinary actions for these offenses, and of these actions, 62 percent of the disciplinary actions were out-of-school suspensions lasting five days or longer, 20 percent were transfers to alternative schools or programs, and 18 percent were expulsions. Clearly, suspension was the most common response to substance-related problems in schools. Other responses to violations of school alcohol policy include involving law enforcement in some way. For example, in some states, school officials either may or must inform local law enforcement of such violations. Studies have not been conducted of the effectiveness of this approach.

Alcohol Policies at Universities--Universities have similar policies prohibiting alcohol in school facilities, prohibiting use by underage students, or restricting alcohol advertising on campus (Wechsler, Kuo, Lee, & Dowdall, 2000). Grimes and Swisher (1989) found that students report such policies are barriers to drinking, but there are few controlled evaluations of such policies.

Odo, McQuiller, and Stretsky (1999) in a study of newly enacted policy that prohibited alcohol in all university affiliated living residences (i.e., dorms, fraternities, sororities) found that such policies were associated with reduced prevalence of drinking in the affected residences, but not with the frequency of heavy drinking. A case study of a campus prohibition on underage drinking or possession of alcohol, public consumption, and use of kegs reported positive findings; however, because it lacked a control or comparison condition, it is not possible to accept the findings unconditionally (Cohen & Rogers, 1997). These studies provide promising but incomplete evidence of the potential for such administrative policies to reduce underage drinking.

In sum, the vast majority of elementary and secondary schools have alcohol-related policies and the majority of schools have adopted zero tolerance policies. When alcohol violations are detected, suspension and expulsion are the typical responses. However, it is presently unknown what effect, if any, school sanctions have on the prevalence of underage drinking either at the individual or school population levels, whether schools are an appropriate venue for addressing this behavior, or, when compared to other possible venues, whether schools are better, worse, or equally effective in deterring or modifying this behavior.

Although the research on the topic is limited, there are some inferences that can be drawn about efforts to deter underage drinking. For example, all states and a number of municipalities have some type of prohibition against youth drinking, although these prohibitions vary from state to state. The nature and severity of the sanctions associated with violations of these prohibitions vary considerably across jurisdictions. It is also apparent that for a variety of reasons, enforcement of these laws is relatively sporadic and inconsistent. In addition, although all schools in this country have an alcohol policy, these policies also vary considerably.

A number of sanctions are being applied by a range of agents in conjunction with underage alcohol offenses. Fines and community service are common sanctions imposed by the legal system for underage drinking violations. Diversion programs continue to grow in popularity. Schools are likely to respond to alcohol policy violations with suspension or expulsion. Unfortunately, little is known about the effectiveness of these responses, and their imposition appears to be rarely guided by supporting empirical evidence regarding their effectiveness.

There does seem to be a general consensus that if sanctions are used, they should be just one part of a constellation of responses to underage drinking violations. Researchers and advocates are calling for comprehensive approaches to underage drinking that involve the youth, their families, and their communities. Teen courts, for example, have adopted this position. Evaluation of the effectiveness of teen courts specifically in conjunction with alcohol-related offenses is needed to test this hypothesis. The suggestion also has been made that sanctions should be aimed at helping youth rather than simply punishing them for alcohol violations.

In addition, it is important to recognize that sanctions will not be equally effective for all youth. Sanctions are often used as a blunt instrument of the courts, virtually ignoring developmental differences among adolescents. However, a sanction (e.g., a fine of \$100) that is perceived as particularly onerous by one youth and thus serves as an effective deterrent may be seen as trivial or as an inconvenience by another youth. In general, studies generally have failed to consider the

developmental level, gender, ethnicity, and geographic location of the youth, all of which may be important considerations (PIRE, 1999; U.S. Department of Health and Human Services, 2001). *In summary, there is no evaluation of the effects of these policies or suspension on population level underage drinking or associated problems.*

Peer Influence

Conceptual Definition

Peer influence can be conceptualized as including modeling of drinking behaviors, direct peer pressure to drink, and providing opportunities to drink and obtain alcohol. Generally a distinction can be made between descriptive norms (how many peers drink) and prescriptive norms (how approving of drinking peers are).

Measurement

Measures of peer drinking and approval of drinking can be obtained through surveys. These measures can be either aggregated at the level of school or community or considered at the individual level.

Relationship of the Intermediate Variable to the Problem

Many studies have addressed the relations between perceived peer drinking and approval of drinking and alcohol consumption (Baumrind, 1985, 1991; Brook et al., 1990; Chassin et al., 1993; Downs, 1987; Dishion & Loeber, 1985). These studies routinely have shown that young people who report (perceive) more peer drinking and peer approval of drinking are more likely to drink and drink heavy and frequently, even after controlling for numerous individual-level characteristics. Many fewer studies have investigated the relations between actual peer behavior and beliefs and drinking among young people. As has been noted, youth may over-estimate drinking and approval of drinking among peers and this may, in itself, be a risk factor.

Relationship of the Intermediate Variable to Other Variables

Peer Influence to Drinking Beliefs--It is assumed that actual levels of peer drinking and approval of drinking are related to normative beliefs and alcohol expectancies in predictable ways: greater peer drinking and approval are hypothesized to be related to more favorable beliefs about drinking. In addition, it can be postulated that peers influence the drinking context by establishing the acceptability of drinking at the moment and within specific settings, e.g., in cars, at parties, or in recreational areas. See Clapp, Shillington & Segars (2000).

Peer Influence to Drinking Context.—It is reasonable to postulate this relationship since adolescent drinkers who are influenced by peers to drink are also likely influenced by the context or setting in which drinking occurs. When peer groups involve drinking, this is often related to the setting such as in isolated areas away from adult supervision or within the privacy of a home without adult supervision or with parent permission. While the research on these relationships is limited, the influence of context on underage drinking suggests (See Drinking Context) suggests that such settings are influenced by peers. See Clapp, Shillington, and Segars (2000). It is this research which supports the thin solid line connecting Family, Peer, and School Influence to Drinking Context.

Strategies

Most commonly, peer influences are addressed through programs that focus specifically on resistance skills or more generally on life skills. Life Skills Training or LST (Botvin & Griffin, 2002; Botvin, 2000) is typical of such interventions. LST is a universal preventive intervention program based on social/cognitive learning theory (Bandura, 1977, 1986, 1997) and problem behavior theory (Jessor & Jessor, 1977). The primary goals of LST are to promote skill development (such as social resistance, self-management, and general social skills) and to provide a knowledge base concerning substance use. These skills moderate or reduce susceptibility to social influences (Epstein & Botvin, 2002; Epstein, Zhou, Bang, & Botvin, 2007). Skill development is accomplished through five curriculum components: a *cognitive component*, designed to present information concerning the consequences, prevalence rates, and social acceptability of substance use; a *self-improvement component* related to self-image improvement; a *decision-making component* containing decision-making strategies; a *coping with anxiety component* designed to recognize anxiety-inducing situations and to rehearse strategies to cope with anxiety; and a *social skills training component* including communication, overcoming shyness, boy–girl relationships, assertive skills, and substance use resistance skills (Botvin, 2000; Botvin & Griffin, 2002; Botvin & Kantor, 2000). The LST intervention has shown positive effects among urban and minority populations (Botvin, Griffin, Diaz, & Ifill-Williams, 2001) and in a rural Midwestern population (Spoth et al., 2002). There were strong positive correlations between initial levels of expectancies and refusal intentions; there also were strong negative correlations between initial levels of expectancies and refusal intentions and substance initiation. Other studies have shown significant reductions in both drug and polydrug use for groups that received the LST program relative to controls, with up to 44% fewer drug users and 66% fewer polydrug (tobacco, alcohol, and marijuana) users in those groups (Botvin, Baker, Dusenbury, Botvin, & Diaz, 1995).. Another study examined the effectiveness of the LST prevention program in reducing heavy episodic drinking in a sample of minority, inner-city, middle-school students (Botvin et al., 2001). Rates of binge drinking were compared among youth who received the program beginning in the 7th grade and a control group that did not. The prevention program reduced the prevalence of binge drinking by as much as 50% at the 1-year and 2-year follow-up assessments. There were also significant positive effects on drinking knowledge, pro-drinking attitudes, and peer drinking norms.

Drinking Context

Conceptual Definition

Although there is no standard definition for drinking context, it can be conceptualized as where one drinks, with whom one is drinking, and when one drinks. Others have suggested adding, “why one drinks” to this definition. When consumption is high, contextual risk or protective factors might be even more important. The identification of such characteristics has the potential for developing prevention policies and programs.

Measurement

Clapp, Shillington, and Segars (2000) have measured contextual factors associated with binge drinking events over the past 14 days by asking college-age respondents a series of detailed questions concerning the last heavy drinking event they engaged in within the past 2 weeks. Questions included in this series focused on (a) the total number of drinks consumed during the occasion, (b) the day of the week of the occasion and the starting and ending time for the event (duration of event). (c) the social purpose of the event (party, date/socializing), (d) the number of the people at the event, (e) the composition of the drinking group (partner, roommates, college friends, non-college friends, family members, and coworkers), (f) the location of the event (bar/restaurant, private home), (g) risk factors associated with the event (played drinking games, illicit drugs available, alcohol served to all, several people intoxicated), and (h) factors associated with the event (food served, nonalcoholic beverages available, bartender served drinks). Other recent studies on drinking context (e.g., Walker, Waiters, Grube, & Chen, 2005) simply ask location of drinking.

Relationship of the Intermediate Variable to the Problem

The context of drinking has been demonstrated to be related to drinking and especially heavy consumption. Kraft (1982) examined alcohol consumption patterns, related problems, and contexts of drinking at one east coast university in the late 1970s. He reported that respondents tended to drink with friends, on weekends, and at parties most frequently. The heaviest drinkers often patronized bars as well. With the increase in frequency of attendance at parties or bars, there was also an increase in the frequency of self-reported problem behaviors, such as driving drunk, academic problems, belligerence, job-related problems, vandalism, and trouble with authorities. Kraft (1982) reported that female college students drank more often at parties and in bars than in any other contexts.

Clapp, Shillington, and Segars (2000) found that parties and dates/socializing were the most common occasions associated with last heavy drinking event. These events were almost evenly split between public (42.2% bars and restaurants) and private (43.1% homes) contexts. In their most recent binge drinking event, students most often drank with friends (either from school or not) and their partner/spouse. Most events had food and nonalcoholic beverages available, and over a quarter of the events had illicit drugs available. Slightly less than half (47.3%) of the events resulted in some self-reported problem to the drinker. Overall, public and private contexts seemed to be equally “wet,” with females drinking slightly more in public settings than they do

in private settings. In public settings, having food present, college friends present or a bartender serve all alcohol strongly protected against alcohol-related problems.

A more recent study of underage drinking and driving showed that white males, older adolescents, those who had a driver license, and those who drove more often were more likely to report drinking alcohol in the past year (Walker, Treno, Grube, & Light, 2003). Heavy episodic drinking and drinking in cars increased both drinking and driving (DUI) and riding with drinking drivers (RWDD) among underage adolescents. Drinking in restaurants also increased DUI. The effects of overall alcohol consumption on DUI were entirely mediated through heavy episodic drinking and drinking in restaurants and cars. Alcohol consumption had both direct and indirect effects on RWDD. With the exception of being Latino and frequency of driving, the effects of the background variables on RWDD were all entirely mediated through alcohol consumption. Heavy drinking and drinking in specific locations thus appeared to be important unique predictors of both DUI and RWDD. The authors suggested that prevention programs and policies aimed at underage drinking should focus on developing more effective responsible beverage service programs, increasing compliance with laws limiting alcohol sales to youth, and enforcing graduated driver licensing and zero tolerance laws.

Drinking behavior and drinking consequences may vary by location several reasons. First, different policies or controls may exist at different locations, thus regulating the availability and distribution of alcohol. Second, the likelihood of friends and servers intervening may vary in different locations such as private homes, bars, restaurants, and parks. Collins and Frey (1992) found that college freshmen were more likely to report stopping a friend from driving after drinking in public places such as a bar or party than at work or at a private residence.

Relationship of the Intermediate Variable to Other Variables (none specified in model)

Strategies

There are a number of strategies that target the drinking context for alcohol.

Social Availability and Context—Since youth who drive, often supply alcohol to others in the context of motor vehicles, therefore regular and highly visible enforcement of drinking and driving can affect social supply such as the provision of alcohol to youth at parties. Therefore relevant strategies can be reviewed in the Social Availability section.

Retail Availability-- Alcohol retail outlets such as bars, restaurants, and pubs can be affected (sometimes threatened) by highly visible enforcement of their alcohol service practices. See strategies in the Retail Enforcement section.

Drinking and Driving Enforcement--Extensive and visible drink drive enforcement such as Random Breath Testing can alter the drinking context, e.g., for over serving customers as well as decisions by youth to drink in conjunction with drinking.. See strategies in Retail Availability section.

Zero Tolerance Laws—These laws concerning lower BAC limits for youth drivers or even possession of alcohol in a motor vehicle whether one is the driver or not, when enforced, can

result in loss of driving license (a personally prized possession) for both drinking and drinking and driving. Such a threat of the loss of one's drivers license for possession of alcohol or even for drinking can alter youth motivation to seek alcohol and reduce alternative forms of alcohol supply. See Zero Tolerance Policies in Retail Availability section.

Retail Availability of Alcohol to Youth

Conceptual Definition

Retail availability refers to the ease of physical access to alcohol through commercial sources. This availability includes on-premise outlets, such as bars or restaurants, as well as off-premise outlets such as grocery stores, liquor stores, or other retail outlets licensed to sell alcohol within their community. In general, when retail alcohol is cheap, convenient, and easily accessible, people drink more and the rates of alcohol problems are higher. Conversely, when alcohol is more expensive (e.g., through taxes), less convenient (e.g., fewer retail outlets), and less accessible (e.g., restrictions on drinking age), people generally drink less and problem rates are lower. Availability in this document refers to overall level of access by underage persons to alcohol. Availability can refer to the presence and density of alcohol outlets and the frequency of use of specific commercial sources of alcohol (e.g., markets, liquor stores) by young people.

Measurement

Retail availability—This variable can be measured in a number of ways which reflect the accessibility of alcohol to the general drinking population as well as specific level of access for underage persons, e.g., levels of compliance with state sales laws by alcohol merchants. Retail availability of alcohol can be measured by (a) Retailer Compliance with Licensing Laws, (b) Retail Sales Availability, (c) Hours and Days of Sale, and (d) Alcohol Outlet Density (distance to a retail outlet).

Retailer Compliance with Licensing Laws -- Compliance Checks—This variable is measured as the percentage of times an underage person or a youthful looking person who would appear to be under 21 years old is able to purchase alcohol without having to show age identification. Compliance Checks are a direct documentation of the level of retail availability of alcohol to underage youth. While not intended for enforcement, compliance checks are efforts to test if underage persons can purchase alcohol from licensed alcohol outlets. While police compliance checks use an actual underage person and cite or arrest a clerk or store manager when a purchase is consummated, most research-based compliance surveys utilize persons over 21 years of age who have been judged to appear underage (Grube, 1997b; OJJDP, 1999). Alcohol sales compliance rates (%) in any community, based on alcohol purchase surveys or compliance checks conducted, can be a direct measure of retail availability to underage persons.

Retail Sales Availability--Sources of Alcohol. The actual sources of alcohol as self reported by adolescents provides a means to measure retail sales availability. Frequency of getting alcohol from various sources in the past 30 days (e.g., grocery store, friend, stranger). Source: Student Survey. OHT items E8a-k ask students how many times during the past 30 days they obtained alcohol (beer, wine, or hard liquor) from various sources, including grocery stores, convenience stores, drug stores, gas stations, friends 21 or older, friends under 21, a parent, a brother or sister, through the internet, from home without permission, or by using a fake ID. Eight possible responses range from “none” to “15 or more times.” Item E9 asks students how often in the past 30 days any store or gas station refused to sell them alcohol, with eight possible responses including “I did not try to buy alcohol,” and then ranging from “none” to “6 or more times” (rs >

.12). These items will be supplemented with items adapted from the PIRE/OJJDP Youth Survey (SP-2a-i) regarding places/settings where students may have consumed alcohol in the past 30 days, including parties.

Hours and Days of Sale. This variable is typically measured via specific hours of alcohol sales by type of outlet (off premise or on premise) each day or the specific days of sale (independent of the specific day of the week or the total hours of sale each week, i.e., the total hours of sales across all seven days in the week).

Outlet density. Outlet density is another potential measure of alcohol availability. Density is measured as the number of alcohol outlets per capita population or per roadway mile. Measures of outlet density represent the physical availability of alcohol by outlet type which can be measured over a metric scale representing use of space, i.e., the number of bars, restaurants, grocery stores, and liquor stores per kilometer of a defined area. Measurements in terms of outlets per geographical unit better reflect a consumer's ease or difficulty in obtaining alcohol. Analyses of fixed geographical units are interrelated, possess a good bit of spatial interdependence, and thus require specialized statistical analyses. See Gruenewald and Ponicki (1995a; 1995b); Gruenewald et al. (1996); and Gruenewald, Ponicki, and Mitchell (1995).

Relationship of the Intermediate Variable to the Problem

While the evidence from studies of overall consumption and alcohol-related problems provides convincing evidence of a relationship to level of retail availability, there are fewer studies which have specifically investigated changes in retail availability on the drinking of underage persons. In the studies that have focused on youth, aspects of retail availability such as privatization, hours and days of alcohol sales, and outlet density have been associated with changes in alcohol sales to underage youth, shifts in beverage choice to more readily accessible alcoholic beverage types, and drinking behavior (Kelley Baker, Johnson, Voas, & Lange, 2000; Todd, Gruenewald, Grube, Remer, & Banerjee, 2006; Valli, 1998). Among college students—many of whom are under the legal drinking age—outlet density surrounding college campuses has been found to correlate not only with heavy drinking and frequent drinking, but also with drinking-related problems (Weitzman, Folkman, Folkman, & Wechsler, 2003). Treno, Grube, and Martin (2003) similarly found evidence that outlet density was positively associated with frequency of underage drinking and driving and riding with drinking drivers. A recent study found that perceived compliance and enforcement of underage drinking laws at the community-level was inversely related to individual heavy drinking, drinking at school, and drinking and driving and to use of commercial sources for alcohol by adolescents (Dent et al., 2005). Similarly, compliance rates as determined by alcohol purchase surveys have been found to be inversely related to frequency of use of commercial sources for alcohol by minors (Paschall et al., 2007a). In another study, random alcohol purchase surveys (N = 385) were conducted in 45 Oregon communities in 2005. Youthful buyers were able to purchase alcohol at 34% of the outlets approached. Purchase rates were highest at convenience (38%) and grocery (36%) stores but were relatively low (14%) at other types of outlets (e.g., liquor and drug stores). Alcohol purchases were less likely at stores that were participating in the Oregon Liquor Control Commission's Responsible Vendor Program (RVP), when salesclerks asked the decoys for their IDs, and at stores with a posted underage alcohol sale warning sign. Alcohol purchases were also inversely related to the number of

salesclerks present in a store, but were not related to salesclerks' age and gender. Findings of this study suggest that more frequent compliance checks by law enforcement agents should target convenience and grocery stores, and owners of off-premise outlets should develop policies and require training of all salesclerks to ensure reliable checks of young-looking patron IDs, and should post underage alcohol sales warning signs in clear view of patrons. In a recent study of college students, individual binge drinking was independently associated with community patterns of alcohol availability, policy enforcement, and control (Weitzman, Chen, & Subramanian, 2005). Specifically, students exposed to high levels of alcohol availability were at higher risk binge drinking than youth where availability was low. Conversely, students exposed to strongly enforced alcohol policy environments were less likely to binge than youth in areas with less strongly enforced policies. Similarly, students who attend colleges in states that have more restrictions on underage drinking, high volume consumption, and sales of alcoholic beverages, and devote more resources to enforcing drunk driving laws, report less drinking and driving (Wechsler et al., 2003).

Paschall et al. (2007b) examined whether compliance with underage sales laws by licensed retail establishments is related to underage use of commercial and social alcohol sources, perceived ease of obtaining alcohol, and alcohol use. They found that the alcohol sales rate was positively related to students' use of commercial alcohol sources and perceived alcohol availability, but was not directly associated with use of social alcohol sources and drinking behaviors. Additional analyses indicated stronger associations between drinking behaviors and use of social alcohol sources relative to other predictors. These analyses also provided support for an indirect association between the alcohol sales rate and alcohol use behaviors. Paschall et al. (2007b) concluded that compliance with underage alcohol sales laws by licensed retail establishments may affect underage alcohol use indirectly, through its effect on underage use of commercial alcohol sources and perceived ease of obtaining alcohol. However, use of social alcohol sources is more strongly related to underage drinking than use of commercial alcohol sources and perceived ease of obtaining alcohol.

Relationship of the Intermediate Variable to Other Variables (None specified in model)

It is assumed that level of retail availability of alcohol to underage persons affects their use of alcohol sources and thus subjective (self assessed) alcohol availability. Enforcement of minor in possession laws (MIP) can influence alcohol-related expectancies regarding the likelihood of being apprehended attempting to purchase alcohol. However, while possible there is no empirical evidence to support this relationship in the model.

Strategies

Strategies designed to affect access to alcohol from retail sources are not always targeted specifically at young or underage drinkers but have the potential to limit the retail availability of alcohol to all drinkers including youth. These strategies typically increase the opportunity cost to the drinker, e.g., the cost in time and money to actually obtain alcohol from retail sources.

Retail Monopoly of Alcohol Sales --Studies examining policy movements from state monopolization of alcohol sales to privatization generally find an increase in overall

consumption following privatization (Holder & Wagenaar, 1990; Wagenaar & Holder, 1995), but rarely report on consumption by young people. In one of the few studies focusing on youth, Valli (1998) describes the effects on drinking among 13- to 17-year-olds in a Finnish township, when medium strength beer was made available in grocery stores as opposed to being available only in state monopoly stores. The results show that age limits were observed less strictly and that the beverage of choice among girls changed from wine to medium strength beer. Minors could purchase alcohol more easily than when sales had been restricted to state stores and drinking among 13 to 17-year-olds increased. Alternatively, elimination of a private profit interest typically facilitates the enforcement of rules against selling to minors or the already intoxicated (Her, Giesbrecht, Room, & Rehm, 1999). A recent study Miller Snowden, Birckmayer, and Hendrie (2006) found that underage drinking rates including heavy drinking as well as youth-involved traffic crashes were lower in states which had retail sale monopolies controlling for other factors.

Outlet Density Restrictions--Studies find significant relations between outlet densities and alcohol consumption, violence, drinking and driving, and car crashes (e.g., Gruenewald, Johnson, & Treno, 2002). In a study focusing on youth (Treno et al., 2003) found that on- and off-license outlet density was positively related to frequency of driving after drinking and riding with drinking divers among 16 to 20-year-old youth. Outlet density surrounding college campuses has also been found to correlate with heavy drinking, frequent drinking, and drinking-related problems among students (Weitzman et al., 2003). Such studies of outlet density are cross-sectional, however, and the causal nature of the relations between outlet density and alcohol consumption and problems among youth is an open question.

In a longitudinal study, Todd, Grube, and Gruenewald (2005, June) examined the effects of neighborhood characteristics (socioeconomic status, alcohol outlet density) on availability of alcohol and drinking among adolescents. Average household (HH) income was positively related to ease of obtaining alcohol from parents and negatively related to ease of purchase without ID. Density of alcohol-licensed restaurants was positively related to ease of obtaining alcohol from someone over 21 and ease of purchase without ID. Past year drinking status at Wave 2 was positively related to density of alcohol-licensed restaurants but negatively related to density of off-premise alcohol outlets (e.g., liquor stores). Similarly, among Wave 1 never drinkers who participated in Wave 2, preliminary longitudinal analyses indicate that change in lifetime drinking status (from never drinker to ever drinker) was positively related to household income and density of alcohol-licensed restaurants but negatively related to density of off-premise alcohol outlets. Counter to expectations, preliminary findings indicate that underage alcohol use and growth in use appears to be negatively related to density of off-premise alcohol outlets.

Paschall et al. (2007a) examined characteristics of off-premise alcohol outlets that may affect alcohol sales to youth. Random alcohol purchase surveys were conducted in 45 Oregon communities using underage-looking decoys who were 21 years old but did not carry IDs. These decoys were able to purchase alcohol at 34% of the outlets. Purchase rates were highest at convenience (38%) and grocery (36%) stores but were relatively low (14%) at other types of outlets (e.g., liquor and drug stores). Alcohol purchases were also inversely related to the number of salesclerks present in a store, but were not related to salesclerks' age and gender. Paschall et al. (2007a) concluded that more frequent compliance checks by law enforcement agents should

target convenience and grocery stores, and owners of off-premise outlets should require training of all salesclerks to ensure reliable checks of young-looking patron IDs, and should post underage alcohol sales warning signs in clear view of patrons.

Restrictions on Hours and Days of Alcohol Sales--Quite a large number of studies have indicated that changing either hours or days of alcohol sale can affect alcohol-related crashes and other violent events related to alcohol take place (e.g., Smith, 1988; Ligon & Thyer, 1993). A number of studies have investigated the effects of changing hours of sale on alcohol consumption and problems. In general, greater restrictions have been associated with decreases in drinking and drinking problems. Smith (1988), for example, found that the introduction of Sunday alcohol sales in the city of Brisbane, Australia, was related to casualty and reported property damage traffic crashes. However, these results are not unequivocal, as these effects could be contaminated by other trend effects on Sunday sales and non-equivalent distribution of crashes over days of the week (see Gruenewald, 1991). A recent study (Duailibi et al., 2007, in press) investigated the effects of limiting the hours of sale of alcoholic drinks on violence against women and homicides in the Brazilian city of Diadema. The study found that a policy prohibiting on-premises alcohol sales after 11 pm led to a decrease of almost 9 murders a month. Assaults against women also decreased but this impact was not significant in models that controlled for underlying trends.

In one of the few studies focusing on youth, Kelley-Baker, Johnson, Voas, and Lange (2000) found that temporary bans on the sales of alcohol from midnight Friday through 10:00 AM Monday because of federal elections reduced cross-border drinking in Mexico by young Americans. In particular, early closings on Friday night were associated with a 35% reduction in the number of pedestrians crossing the border with blood alcohol concentrations (BAC) of 0.08 percent or higher, based upon breathalyzer testing at the border. In sum, it appears that changes in licensing provisions that substantially reduce hours of service can have a significant impact on drinking and drinking-related problems overall. The evidence that such changes affect young people is more limited as most evaluations have focused on the total drinking population.

Responsible Beverage Service (RBS)--The focus of RBS programs is to prevent alcohol service to minors and intoxicated patrons and to intervene so that intoxicated patrons do not drive. Efforts to promote RBS consist of the implementation of a combination of outlet policies (e.g., requiring clerks or servers to check identification for all customers appearing to be under the age of 30, cutting off service to intoxicated patrons, limiting sales of pitchers of alcohol, promoting alcohol-free drinks and food, and eliminating last call announcements) and training in their implementation (e.g., teaching clerks and servers to recognize altered or false identification, training servers to recognize intoxicated patrons and deny service). RBS can be implemented at both on-license and off-license establishments. Such programs have been shown to be effective in some circumstances. Thus, RBS has been found to reduce the number of intoxicated patrons leaving a bar, car crashes, sales to intoxicated patrons, sales to minors, and incidents of violence surrounding outlets (e.g., Wallin, Norstrom, & Andreasson, 2003). Voluntary programs appear to be less effective than mandatory programs or programs using incentives such as reduced liability. How RBS is implemented and what elements are included in a particular program may be an important determinant of its effectiveness. Policy development and implementation within outlets may be more important than server training in determining RBS effectiveness.

Whether RBS interventions can reduce minors' use of alcohol is less clear. Establishments with firm and clear policies (e.g., checking ID for all patrons who appear under the age of 30) and a system for monitoring staff compliance are less likely to sell alcohol to minors (Wolfson et al., 1996a; 1996b). However, voluntary clerk and manager training in off license establishments appears to have a negligible effect on sales to minors above and beyond the effects of increased enforcement (Grube, 1997b; Wagenaar, Harwood, Silianoff, & Toomey, 2005a). Similarly, a study in Australia found that, even after training, age was rarely checked in bars, although decreases in the number of intoxicated patrons were observed (Lang, Stockwell, Rydon, & Beel, 1996, 1998). In one study, RBS training was associated with an increase in self-reported checking of identification by servers (Buka & Birdthistle, 1999). Overall, however, establishing definite alcohol serving policies in each licensed establishment has the potential to reduce sales of alcohol to youth and overall problematic consumption of alcohol.

Compliance of Off-Premise Outlets—Off-premise outlets are important sources of alcohol for underage persons (Harrison, Fulkerson, & Park, 2000; Preusser, Ferguson, Williams, & Farmer, 1995; Schwartz, Farrow, Banks, & Giesel, 1998; Wagenaar et al., 1996). Such outlets are not often operating with written sales policies and, in some cases, these outlets actually benefit economically from sales of alcohol to youth. Purchase surveys show that anywhere from 30% to 90% of outlets sell to underage buyers, depending upon geographical location (e.g., Forster et al., 1994; Forster, Murray, Wolfson, & Wagenaar, 1995; Preusser & Williams, 1992; Grube, 1997b). Voluntary clerk and manager training in off license establishments appears to have a negligible effect on sales to minors without visible and consistent enforcement. Wagenaar et al. (Wagenaar, Harwood, Toomey, Denk, & Zander, 2000a; Wagenaar & Wolfson, 1994) evaluated a community organizing intervention (Communities Mobilizing for Change on Alcohol --CMCA) that was designed to bring about change in policies regarding access to alcohol by those under 21. Through numerous contacts with groups and organizations that might affect policies, practices, and norms for minors' access to alcohol, a strategy team was created in each community to lead efforts to bring about change (Wagenaar, Gehan, Jones-Webb, Toomey, & Forster, 1999). Through media advocacy they increased coverage of alcohol issues in the community. The strategy teams implemented quite a variety of activities to reduce access. They included steps to get alcohol merchants not to sell to young people, increased enforcement of laws regarding underage sales, changes in community events to make alcohol less readily available to young people, the prevention of underage drinking parties at hotels, information provided to parents, and alternative sentencing for youth who violated drinking laws. The specific activities varied across communities. CMCA was evaluated in a randomized trial in which 15 Minnesota and Wisconsin communities were randomly assigned to receive or not receive the program. The CMCA communities had lower levels of sales of alcohol to minors in their retail outlets (effect size = 1.18, $p < .05$) and had marginally lower sales to minors at bars and restaurants (effect size = 0.32, $p < .08$). Phone surveys of 18 to 20 year olds indicated that they were less likely to try to buy alcohol ($p = .06$) and that they were less likely to provide alcohol to others ($p = .01$). The proportion of 18 to 20 year olds who reported drinking in the past 30 days lower in intervention communities ($p = .07$). However, the prevalence of heavy drinking in this age group was not affected. And, there were no significant effects on the drinking behavior of 12th graders (who were surveyed in school). Arrests of 18 to 20 year olds for driving under the influence of alcohol declined significantly more in CMCA communities than in control

communities (Wagenaar, Murray, & Toomey, 2000b). The difference for 15 to 17 year olds approached significance.

The Community Trials Project (Holder & Treno, 1997) tested a five-component community intervention to reduce alcohol-related harm among people of all ages. It sought to reduce the primary sources of acute injury and harm related to alcohol: drunken-driving injuries and fatalities, injuries and deaths related to violence, and drownings, burns and falls. The effects of the program were evaluated by comparing three communities that received the intervention with matched comparisons communities. Communities were selected that had a population over 100,000 and were not bedroom communities. Their alcohol problem indicators were about equal to the state average. Each community was racially diverse, with 40% or more minority group members. The Community Trials fielded five intervention components: (1) a "Media and Mobilization" component to develop community organization and support for the goals and strategies of the project and to utilize local news to increase public support of environmental strategies; (2) a "Responsible Beverage Service" component to reduce service to intoxicated patrons at bars and restaurants; (3) a "Sales to Youth" component to reduce underage access; (4) a "Drinking And Driving" component to increase local enforcement of driving while intoxicated laws; and (5) an "Access" component to reduce the availability of alcohol. Each of these interventions was shown to affect its target in the communities in which it was implemented.

Of particular interest is the *Underage Drinking* Component (Grube, 1997b), which comprised three intervention strategies: enforcement of underage sales laws, off-premise retail clerk training and policy development for off-premise establishments, and media advocacy. Increased underage sales enforcement activities were implemented by the local police in each community. This research demonstrated that police are willing to undertake a range of enforcement activities, including compliance checks, when given modest encouragement from the community (Grube, 1997b; Holder et al., 2000). In particular, the project was able to increase the number of outlets visited in compliance checks in three experimental communities from fewer than 10 to over 60 per quarter. The evaluation of the effects of these activities using decoy buyers showed that randomly selected outlets in the experimental sites were about equally as likely as those in comparison sites to sell alcohol to an apparent minor on pretest. On posttest, experimental community outlets were about half as likely to sell alcohol to an apparent minor as those in comparison sites. Thus, not only was it possible to enlist local law enforcement to increase enforcement of underage sales laws, but these increased enforcement activities led to significant declines in sales to minors. Overall, off-premise outlets in experimental communities were half as likely to sell alcohol to minors as in the comparison sites. This was the joint result of special training of clerks and managers to conduct age identification checks, the development of effective off-premise outlet policies, and, especially, the threat of enforcement of lawsuits against sales to minors (Grube, 1997b).

Treno, Gruenewald, Lee, and Remer (2007) reported the results of the Sacramento Neighborhood Alcohol Prevention Project (SNAPP). SNAPP set as its goal the reduction of alcohol access, drinking, and related problems in two low-income, predominantly ethnic minority neighborhoods, focusing on individuals between the ages 15 and 29, an age group identified with high rates of alcohol-involved problems. Two neighborhoods in Sacramento were selected to be the intervention sites because they were economically and ethnically diverse and

had high rates of crime and other drinking-related problems. The quasi-experimental design of the study took a “phased” approach to program implementation and statistical examination of outcome data. Outcome-related data were collected in the intervention sites as well as in the Sacramento community at large. Five project interventions included a mobilization component to support the overall project, a community awareness component, a responsible beverage-service component, an underage-access law enforcement component, and an intoxicated-patron law enforcement component. Archival data were collected to measure and evaluate study outcomes and to provide background and demographic information for the study. Overall, they found significant ($p < .05$) reductions in assaults as reported by police, aggregate emergency medical services (EMS) outcomes, EMS assaults, and EMS motor vehicle accidents. Results from the Sacramento Neighborhood Alcohol Prevention Project demonstrate the potential effectiveness of neighborhood-based interventions in the reduction of alcohol-related problems such as assaults, motor vehicle crashes, and sale of alcohol to minors.

Lower Levels of Alcohol in Beverages--Noval and Nilsson (1984) found that total alcohol consumption in Sweden was substantially higher when medium-strength beer could be purchased in grocery stores between 1965 and 1977, rather than only in state monopoly stores. Few studies of the specific effects of reduced-alcohol beverages on young people have been conducted. Geller, Kalsher, and Clark (1991) found that students attending a fraternity party where only low-alcohol content drinks were served consumed the same number of drinks but had a lower blood alcohol concentration (BAC) than did students at parties where regular alcohol content beer and mixed drinks were served. The findings demonstrate the potential interaction between retail availability (low absolute alcohol drinks) with social availability (social events).

Controls on Who is Selling Alcohol--Alcohol control agencies typically spend a considerable part of their time checking the credentials of those seeking licenses to sell alcoholic beverages. Typically, there is a concern to keep those with criminal records or associations out of the trade. The minimum age of alcohol sellers which is set in some countries could affect the extent to which underage sales might occur; i.e., younger persons finding themselves less able to distinguish underage from of-age buyers and being more willing to sell to underage buyers. Treno, Gruenewald, Alaniz, Freisthler, and Remer (2000, June 24-29) report that among a community-based sample of alcohol establishments, off-premise sales were more likely from younger than older sales people. In places where there is a minimum legal drinking age, there is likely to be some sort of informal market to serve underage drinkers. There have, however, been no evaluations of minimum age-of-seller restrictions.

Use of False ID to Obtain Alcohol--Underage persons can obtain alcohol from retail sources using false or fake age identification cards. For example, a survey was conducted among high school juniors and seniors and college students under age 21 in New York and Pennsylvania. New York has generally weak laws on purchase of alcohol by persons under legal age, while Pennsylvania has generally strong laws and state controlled liquor stores. In comparison with high school respondents in Pennsylvania, more high school students in New York reported that they drank, drank more often, and obtained alcohol from underage friends. More attempts to purchase alcohol at bars, liquor stores, and other outlets were reported by New York high school and college students. Preusser et al. (1995) found nearly 60% of New York college student respondents reported using false, borrowed, altered, or counterfeit identification to purchase

alcohol, compared with 37 percent in Pennsylvania. They also found that nearly 30% of New York high school students reported the use of false identification to purchase alcohol compared with 14 percent in Pennsylvania. Schwartz et al. (1998) found that fifteen percent of high school students, 14 percent of college freshmen, and 24 percent of youth reporting also using illegal drugs said they were able to purchase beer by the case with borrowed, altered, or fake ID. A number of suggestions concerning means to reduce the effective use of illegal identification in alcohol sales to minors include universal checking of ID for all alcohol customers, use of two view or hologram photos on a drivers' license, and requiring two or more different ID cards at the point of purchase, and as described below increased enforcement against stores that fail to identify underage customers.

Summary: Certainly, greater minimum legal drinking ages reduce alcohol sales, use, and problems among young people. In the most comprehensive review to date, Wagenaar and Toomey (2002) analyzed all identified published studies on the drinking age from 1960 to 1999, a total of 132 documents. Their analysis of the evidence led them to conclude that, compared to a wide range of other programs and efforts to reduce drinking among high school students, college students, and other teenagers, increasing the legal age for purchase and consumption of alcohol to 21 appears to have been the most effective strategy. The U.S. National Highway Traffic Safety Administration (NHTSA) estimated that a drinking age of 21 reduced traffic fatalities by 846 deaths in 1997 and prevented a total of 17,359 deaths since 1975 (NHTSA, 1997). Grube and Nygaard (2001; 2005) concluded that for young people policy strategies can be used to reduce alcohol availability, deter drinking by increasing the personal costs associated with it, and communicate norms to young people about the unacceptability of their drinking and to adults about the unacceptability of providing alcohol to them. Less strength of evidence is available concerning reductions in numbers of outlets or outlet densities, and reductions in hours or days of sale which do have the potential to reduce levels of alcohol consumption and alcohol-related problems. Based on the available scientific evidence from more than one controlled study, currently the most effective public policies to reduce the retail and social alcohol availability to youth and associated problems appear to be (a) the minimum drinking age and its enforcement, (b) zero tolerance or graduated licensing, and (c) enforcement of sales of alcohol to underage persons, especially using compliance checks about retail sales of alcohol to underage persons.

Social Availability of Alcohol to Youth

Conceptual Definition

Social availability is the access to alcohol through “social sources” including receiving, stealing, or buying substances from friends, relatives, and strangers. Adolescents, and especially younger adolescents, often obtain alcohol from a variety of non-commercial sources. A substantial portion of alcohol obtained by underage persons is from social sources (friends, parties, homes, etc.) and other persons who purchase alcohol and provide it to underage persons (both persons themselves under the legal purchase age and persons who themselves are of legal age).

Measurement

Sources of alcohol-- Frequency of getting alcohol from various sources in the past 30 days (e.g., grocery store, friend, stranger). Source: Student Survey.

For example, the Oregon Healthy Teens (OHT) survey items E8a-k ask students how many times during the past 30 days they obtained alcohol (beer, wine, or hard liquor) from various sources, including grocery stores, convenience stores, drug stores, gas stations, friends 21 or older, friends under 21, a parent, a brother or sister, through the internet, from home without permission, or by using a fake ID. Eight possible responses range from “none” to “15 or more times.” Item E9 asks students how often in the past 30 days any store or gas station refused to sell them alcohol, with eight possible responses including “I did not try to buy alcohol,” and then ranging from “none” to “6 or more times” ($r_s > .12$). These items will can be supplemented with items adapted from the PIRE/OJJDP Youth Survey (SP-2a-i) regarding places/settings where students may have consumed alcohol in the past 30 days, including parties.

Relationship of the Intermediate Variable to the Problem

Parties, friends, and adult purchasers are the most common sources of alcohol among adolescents (Harrison et al., 2000; Preusser et al., 1995; Schwartz et al., 1998; Wagenaar et al., 1996). Young people secure alcohol from a variety of commercial and social sources. Research indicates that parties, friends, and adult purchasers are the most common sources of alcohol among adolescents (Harrison et al., 2000; Preusser et al., 1995; Schwartz et al., 1998. Wagenaar et al. (1996) found that parties, where older adolescents or young adults introduce their younger peers to drinking, constitute the major source of alcohol for high school students. In this same study, commercial outlets were the second most important source of alcohol. Purchase surveys reveal that anywhere from 30% to 90% of outlets will sell alcohol to underage buyers, depending upon their geographical location (e.g., Forster et al., 1994; 1995; Preusser & Williams, 1992; Grube, 1997b). Such results are also found in the ORI Oregon Healthy Teens survey which found that commercial sources were used by 26% of 8th grade drinkers and 30% of 11th grader drinkers. In the same study 70% of 8th grader drinkers and 73% of 11th grader drinkers reported using social sources, predominately adult and underage friends. These sources include parents, parents of friends, friends, acquaintances, co-workers, siblings, and even strangers.

"Shoulder-tapping" occurs when an underage person approaches a stranger outside of an alcohol establishment and asks this person to purchase alcohol for him or her. A recent study (Toomey, Fabian, Erickson, & Lenk, 2007) found that 19 percent of young males over the age of 21 were willing to purchase alcohol for youth who appeared to be underage when "shoulder-tapped" outside of a convenience or liquor store. In contrast, only 8 percent of the general adult population entering alcohol establishments were willing to purchase the alcohol. Researchers conducted two waves of shoulder-tap requests outside of 219 randomly selected convenience or liquor stores in both urban and suburban areas. Requesters were young adults (4 females, 1 male) aged 21 years or older who appeared to be 18 to 20 years old. Requesters explained that they did not have their identification with them, and asked the adults to purchase a six-pack of beer for them. During wave one, requesters conducted 102 attempts, with the requester approaching the first adult entering the store alone. During wave two, requesters conducted 102 attempts, approaching the first male entering the store alone who appeared to be 21 to 30 years old. The study also found that adults approached at a city convenience or liquor store rather than one located in a suburb were nine times more likely to make the purchase.

A major opportunity that underage drinkers use to gain access to alcohol is at parties. In one study, 32% of 6th graders, 56% of 9th graders, and 60% of 12th graders reported obtaining alcohol at parties (Harrison et al., 2000). Underage drinking parties frequently involve large groups and are commonly held in a home, an outdoor area, or other location such as a hotel room. Further focus groups have also indicated that underage youth typically procure alcohol from commercial sources and adults, or at parties where parents and other adults are not present (Jones-Webb et al., 1997a; Wagenaar et al., 1993). Beer is the primary beverage of choice of the underage and a major source of beer is a social events where beer is available via a beer key (social events where beer is available via a beer keg (Erickson, Toomey, & Wagenaar, 2001). In this case there is an enhanced effect of social context, party, and low cost per drink of alcohol.

Given the fact that young people use multiple sources for alcohol, social availability is a significant means for underage youth to obtain access to alcohol beyond commercial access. This includes social availability through friends, at parties, and from strangers (Holder, 1994).

Relationship of the Intermediate Variable to Other Variables (None specified in model)

Strategies

Curfews for Youth. Curfews establish a time when children and young people below certain ages must be home. While this policy was not initially considered an alcohol-problem prevention strategy, research has shown positive effects. The strategy is one of reducing the availability of alcohol to youth through social sources as well as reducing the convenience of obtaining alcohol at gatherings of youth. In those states that established such curfews, alcohol-involved traffic crashes for young people below the curfew age have declined (Preusser, Williams, Zador, & Blomberg, 1984; Williams, Lund, & Preusser, 1984).

Social Host Liability. Under social host liability, adults who provide alcohol to a minor or serve intoxicated adults in social settings can be sued through civil action, for damages or injury caused by that minor or intoxicated adult (Grube & Nygaard, 2005). There is very little research

on the effectiveness of social host liability laws and what evidence exists is conflicting. In one study in the US, social host liability laws were associated with decreases in alcohol-related traffic fatalities among adults, but not among minors (Whetten-Goldstein, Sloan, Stout, & Liang, 2000). Social host statutes were not related to single vehicle nighttime crashes for either group. In a second study, social host liability laws were associated with decreases in reported heavy drinking and in decreases in drinking and driving by lighter drinkers (Stout, Sloan, Liang, & Davies, 2000). They had no effect on drinking and driving by heavier drinkers. The conflicting findings may reflect the lack of a comprehensive program that insures that social hosts are aware of their potential liability. Although social host liability may send a powerful message, that message must be effectively disseminated before it can have a deterrent effect.

Restricting Access to Alcohol at Social Events--This strategy involves restricting the flow of alcohol at parties and other events on and off college campuses to reduce overall social availability of alcohol. Policies for preventing underage access to alcohol at parties can also be used to decrease the amount of drinking among older students. Overlapping community policies include banning beer kegs and prohibiting home deliveries of large quantities of alcohol. Overlapping policies for campus events include limiting the quantity of alcohol per person and monitoring or serving alcohol rather than allowing self-service. At one fraternity party, Geller and Kalsher (1990) found that attendees who obtained beer through self-service consumed more beer than those who got alcohol from a bartender. Event and party planners could also be required to serve food and offer a large selection of alcohol-free beverages. Another strategy is to serve low-alcohol content beverages (see below)

Strategies for Reducing Social and Third Party Access to Alcohol—As described previously a substantial portion of alcohol obtained by underage persons is from social sources (friends, parties, homes, etc.) and other persons who purchase alcohol and provide it to underage persons (both persons themselves under the legal purchase age and persons who themselves are of legal age). The study by Toomey et al. (2007) concerning the willingness of males of legal purchase age to obtain alcohol for underage persons confirms that efforts to limit alcohol access from these sources most likely remains a significant challenge for youth drinking prevention

The Office of Juvenile Justice and Delinquency Prevention, U.S. Department of Justice, has created a guide for reducing alcohol access by youth (OJJDP, 1999). The highest priorities recommended by OJJDP is a compendium of environmental strategies including "shoulder taps" and Compliance Checks (described previously). Shoulder taps occur when an underage person asks another person to purchase alcohol on their behalf. These are common means by which adolescents obtain alcohol (e.g., Jones-Webb et al., 1997a, 1997b; Smart, Adlaf, & Walsh, 1996; Wagenaar et al., 1993, 1996), in part because young people believe it to be less risky than purchasing alcohol themselves. Underage persons themselves are breaking the law through this purchase, even if they do not consume the alcohol. Adults of legal purchase age are also breaking the law by purposefully purchasing alcohol for a young person. Shoulder tap interventions occur when an underage person or a person who appears to be underage age, stand outside a licensed alcohol outlet and approach an older person to request that he/she purchase alcohol for them. In such cases, the potential buyer may be offered a small "fee" for making this purchase. If the older person actually makes the alcohol purchase and gives it to the youth, then they can be arrested or cited by the police. These "shoulder tap" interventions are a recommended strategy to directly reduce third party alcohol transactions by enforcing laws prohibiting the provision of

alcohol to minors (NHTSA, 1997; Stewart, 1999). The utilization of strategies addressing shoulder taps is a potentially promising strategy to reduce third party sources of alcohol to minors that has not been seriously tested in replicated controlled studies.

Party Patrols--Another major way that underage drinkers gain access to alcohol is at parties (e.g., Wagenaar et al., 1993). Party patrols are a local enforcement strategy in which police arrive at a social event in which alcohol is being served and check the age identifications of party participants. Underage drinking parties frequently involve large groups and are commonly held in a home, an outdoor area, or other public location such as a hotel room. Party patrols are a recommended strategy to address underage drinking parties (Little & Bishop, 1998; Stewart, 1999). Parties are frequently cited as one of the settings at highest risk for youth alcohol consumption and related problems, and have been linked to impaired driving, sexual assaults, violence, property damage, and to the initiation of alcohol use of younger adolescents by older adolescents (Mayer, Forster, Murray, & Wagenaar, 1998; Schwartz & Little, 1997; Wagenaar et al., 1993). Decreased sales to older minors, in turn, are expected to reduce availability of alcohol to younger adolescents.

Without these special patrols law enforcement agencies sometimes do not have enough manpower to thoroughly investigate underage drinking parties. They cannot always trace who provided the alcohol or other drugs to minors. One example of a specific utilization of strong local enforcement of provision of alcohol to underage persons is in Omaha, Nebraska. Under local ordinance, anyone who provides or procures alcohol for minors is committing a Class I misdemeanor, punishable by up to one year in jail, up to a \$1,000 fine, or both. PRIDE-Omaha, Inc. is assisting law enforcement agencies in conducting the MIP Party Patrols. Funding for the patrols is provided through special grants from the local drug prevention coalition.

Party patrols involve police entering locations where parties are in progress. The police can use noise or nuisance ordinances as a basis for entering a party to observe if underage drinking is taking place. In party patrol strategies, police are enlisted, as a part of their regular patrol duties, to routinely: (a) enter premises where parties that may involve underage drinking are underway, (b) respond to complaints from the public about noisy teenage parties where alcohol use is suspected, and (c) check, as part of regular weekend patrols, open areas and other venues where teen parties are known to occur. When underage drinking is discovered, the drinkers can be cited as well as the person who supplied the alcohol. Even when it is not possible to cite the person who supplied the alcohol, awareness of increased police activity in this regard can act as a deterrent and can express community norms regarding the unacceptability of providing alcohol to minors. As with other environmental interventions, public awareness and media attention is important to increase the deterrence effect of this strategy. There is some evidence that this technique is effective. Oregon implemented a weekend drunk driving and party patrol program that has law enforcement officers working with schools to identify in advance the anticipated location of teen parties, which the officers then patrol. An unpublished evaluation of this program revealed that arrests of youth for possession of alcohol increased from 60 to 1,000 individuals in one year (with a corresponding decrease of 35 percent in underage drunk driving accidents) (Little & Bishop, 1998; Radecki, 1995).

Keg Registration-- Beer consumption as the primary beverage of choice of underage drinkers was found to be a potential factor in underage drinking alcohol-related harm, especially traffic fatalities (Cohen, Mason, & Scribner, 2001). Beer kegs are often a main source of alcohol at teenage parties and may encourage drinking greater quantities of beer, increasing the risk of driving under the influence of alcohol and other alcohol-related problems. When police arrive at underage keg parties, people often scatter. Without keg tagging, there is no way to trace who purchased the keg.

As a result beer key registration is one strategy directed at social events where beer can be provided without restrictions. Keg registration laws require the purchaser of a keg of beer to complete a form that links their name to a number on the keg. In this way, if a beer keg is present in a drinking setting where young people are consuming alcohol, then the person who purchased the keg can be identified and held responsible. For example, in Billings, Montana, a keg registration ordinance was passed by the City Council in June, 2002. A year-long process to get the ordinance passed was led by a group called Montanans United Saving Lives. The ordinance requires permanent marking on each keg that identifies where and when it was purchased (Webb, 2002). A different form of keg registration was passed in Madison, Wisconsin, in December, 2001. The City Council passed an ordinance that requires keg delivery rentals to be made in person at the store. The purchaser must show two forms of ID at the store and be present at the delivery address to sign a receipt upon delivery. Records of all keg purchases are required to be kept by the stores for two years. None of the liquor store owners expressed opposition to the new regulations, stating that the new law does not interfere with regular business operations (Spaetti, 2001).

Specifically, public opinion surveys find that over 60% of the population support laws that require beer keg registration, and as of January 1, 2007, 29 states had enacted keg registration laws. In a different approach to regulating kegs, Utah bans kegs altogether. Some jurisdictions collect information that may aid law enforcement efforts such as the location where the keg is to be consumed and the tag number of the vehicle in which the keg is transported. Some jurisdictions also require retailers to provide warning information at the time of purchase about laws prohibiting service to minors and/or other laws related to the purchase or possession of the keg.

Keg registration is seen primarily as a tool for prosecuting adults who supply alcohol to young people at parties and even establishments which rent filler beer kegs to underage persons (Hammond, 1991). Keg registration laws have become increasingly popular in local communities in the U.S. Wagenaar, O'Malley, and LaFond (2001) examined existing beer keg registration policies in all states to determine core conceptual dimensions of the laws, test procedures to increase reliability of keg policy coding, and describe variations in existing policies. They found no controlled studies of the effects of keg registration laws which might include measurement of rates of keg sales, bottled beer sales, beer consumption, intoxication among teens and teen parties, or frequency of disturbance calls to police, as well as more direct measures of teen consumption of keg beer. Wagenaar et al (2005a) found that most state alcohol control agency rvey respondents noted very low levels of enforcement of extant keg registration laws and high levels of leniency in imposing penalties.

Keg registration laws are associated with a significant decrease in traffic fatalities. Cohen et al. (2001) found that the presence of a local keg registration law was associated with lower alcohol fatality rates ($r = -.288$ $p < 0.004$) as a part of a composite score for level of alcohol regulation. There are no controlled longitudinal studies of the passage of a beer keg registration and its specific effects on alcohol-involved traffic crashes by underage persons or other alcohol problems.

Restrictions on Drinking Locations and Possession of Alcohol. Specifying locations where drinking cannot occur is a policy that has been implemented with laws about public drinking and/or public intoxication, as well as those prohibiting drinking in parks or recreational locations, or at the workplace. These restrictions have real potential for affecting the drinking of youth since youth often prefer recreational venues for drinking, e.g., public parks, beaches, lakes, etc. and limiting drinking in such locations also holds the potential for reducing social access of alcohol provided by others. Discussions of these types of interventions are contained in Giesbrecht and Douglas (1990) and "Communities Mobilize to Rescue the Parks" (1991). These policies have been employed in a number of forms throughout the world, but have not been systematically evaluated for the specific effects on access to alcohol by underage persons.

Such approaches as shoulder taps, party patrols or keg registration need more extensive controlled testing and evaluation, although on the surface such strategies have the potential to be effective. While strategies with a similar theoretical basis have been shown to be effective, we do not have evidence from controlled trials for alcohol. For example, there is consistent evidence that the restrictions on handguns is a means to reduce violence including social violence (Kleck & Patterson, 1993; Lester, 1993; Lester & Clarke, 1991; Leenaars, 2007). Examples of control strategies affecting social availability include studies of heroin (Stimson & Oppenheimer, 1984) and tobacco (Harrison et al., 2000; Bauer, Johnson, Hopkins, & Brooks, 2000; Forster, Chen, Blaine, Perry, & Toomey, 2003; Bauer et al., 2000). A general foundation for local control of potential risks to public health and safety is provided by Ashe, Jernigan, Kline, and Galaz (2003). The bottom line is that no strategy to affect the supply side of alcohol for youth will be consistently effective unless applied in practice and enforced. This enforcement is largely dependent upon the will and desire of states and communities to support such application and enforcement. Without consistent enforcement, little of the potential of the above strategies can be achieved in practice.

Price

Conceptual Definition

Price as used here simply refers to the retail price or direct monetary costs of a product. Price can be contrasted with the full costs of a product, which also include opportunity costs (e.g., effort or difficulty in finding a product) as well as monetary costs. Alcohol, as are most commodities, is price sensitive. That is, as the price increases, the demand for the alcohol declines and vice versa.

Measurement

Price elasticity refers to the percent change in consumption expected for a unit change in price. Although price is affected by other considerations as well, it most easily indexed to or measured as level of taxation (Young & Bielinska-Kwapisz, 2003).

Relationship of the Intermediate Variable to the Problem

Most studies have focused on the relation between taxation or price and alcohol consumption and related problems among youth (Grossman, Chaloupka, Saffer, & Laixuthai, 1994). It has been estimated that increasing taxation on alcohol in the US to keep pace with inflation would lead to a 19% reduction in heavy drinking by youth and a 6% reduction in high risk drinking (Laixuthai & Chaloupka, 1993). Substantial reductions in drinking and driving and alcohol-related traffic fatalities also have been associated with price or tax increases across all beverage (Saffer & Grossman, 1987a). It has been specifically estimated that increasing the price of beer (typically the preferred beverage of youth) to keep pace with inflation would reduce youth drinking by 9% and heavy drinking by 20% (Laixuthai & Chaloupka, 1993). In contrast to these studies, however, recent research has found no evidence for the effects of taxation and price on alcohol consumption and alcohol-related traffic fatalities, either among youth or in the general population (Dee, 1999; Young & Likens, 2000). Although taxation and price increases may be effective prevention strategies in some cases, price elasticities are moderated by social, environmental, and economic factors. As a result, the price sensitivity of alcohol may vary considerably across time, states, and countries, depending on drinking patterns and attitudes and on the presence of other alcohol policies. Increasing alcohol costs would reduce both violent and nonviolent crime, including damaging property, getting into fights, being a perpetrator of sexual assault, and abusing a child (Grossman & Markowitz, 2001; Markowitz, 2000; Markowitz & Grossman, 2000). Markowitz and Grossman (1998) analyzed data on violence come from the 1976 Physical Violence in American Families survey in the United States and concluded that increasing the tax on beer can reduce violence and that laws designed to make obtaining beer more difficult also may be effective in reducing violence. Ohsfeldt and Morrisey (1997) found that a \$0.25 increase in beer taxes would reduce work-loss days from nonfatal injuries by 4.6 million, at an estimated savings in lost productivity by \$491 million. Examining State data from 1971-1985, Chesson, Harrison, and Kassler (2000) reported that a \$1.00 tax increase would reduce gonorrhea rates by 2.1%. These findings provide indirect support that price level is a factor in heavy or binge drinking and thus problem risks associated with alcohol.

More recent studies suggest that the relations between taxes on alcohol and alcohol consumption and problems may have weakened in recent years in the US, possibly because of the

implementation of the age 21 MLDA and other alcohol policies (Young & Likens, 2000). It recently has been suggested that people respond primarily to changes in the full price of alcohol, including opportunity costs (Trolldal & Ponicki, 2005). As a result, the demand for alcohol should be less sensitive to changes in price where regulation is stricter. Consistent with this hypothesis, it was found that demand for beer and spirits was less price sensitive in states with monopolies on alcohol sales and distribution than in license states where alcohol sales are privatized. Similarly, a study showed that raising either MLDA or beer taxes in isolation led to fewer youth traffic fatalities (Ponicki, Gruenewald, & LaScala, 2007). A given change in price, however, caused a larger proportional change in fatalities when the MLDA was low than when it was high. Thus, a 10% increase in price was estimated to reduce traffic fatalities among youth by 3.1% if the legal drinking age were 18, but only by 1.9% if the legal drinking age were 21. It was concluded that communities with relatively strong existing policies might expect smaller impacts on alcohol-related problems to result from the implementation of new policies than suggested by prior research, whereas communities with weak policies might expect larger benefits. In addition, although tax increases may serve as a means to raise the cost of alcohol, consumers may find means to circumvent such increases. They may switch to cheaper forms of alcohol or to cheaper brands (Treno, Gruenewald, Wood, & Ponicki, 2006).

Relationship of the Intermediate Variable to Other Variables (*none specified in model*)

Little is known about how prices relate to variables in the logic model other than consumption and problems. Conceptually, it is reasonable to assume that differences in price may relate to subjective availability of alcohol, with lower prices being associated with greater perceived availability. Price may also affect expectancies and normative beliefs. In particular, lower prices may signal greater acceptance of drinking.

Strategies

Restrictions on discount pricing and promotions. Several types of policies affect price of alcohol. One type of policy is restrictions on happy hours or price promotions (e.g., two drinks for the price of one, women drink for free). Babor, Mendelson, Greenberg, and Kuehnle (1978) found that happy hours were associated with higher consumption among both light and heavy drinkers. Although not specific to college populations, the study has clear implications for college students; many bars surrounding campuses attract students by promoting drink specials. Restrictions on happy hours can be implemented by individual outlets, campuses (if a licensed establishment is on campus), local communities (if communities are not preempted by state law) and the state. In non-licensed settings on campus where alcohol is served, event planners may want to limit the amount of free alcohol available.

Increasing excise taxes on alcohol is another type of policy that affects price. Using national samples of youth, several studies indicate that raising alcohol excise taxes may have large effects in reducing youth drinking. Higher beer taxes are associated with less frequent drinking among 16- to 21-year olds (Coate & Grossman, 1988; Grossman et al., 1994); effects of tax increases are stronger among frequent and fairly frequent drinkers than among infrequent drinkers which lends support to this strategy as a means to reduce higher risk drinking patterns among youth.

Cook and Moore (1993) found that students who went to high school in states that had higher taxes and higher MLDA were more likely to graduate from college. Using a nationally representative sample of college students, Chaloupka and Wechsler (1996) found that indexing the federal beer tax to the rate of inflation since 1951 could lead to a 15% reduction in drinking participation among underage women, and a 17% and 21% reduction in high-risk drinking among underage women and women over 21, respectively.

Tax increases may influence not only consumption, but also other alcohol-related outcomes, and youth again appear to be more price responsive than adults in terms of these outcomes. For example, increased costs appear to reduce drinking and driving among youth more than among adults (Chaloupka, Saffer, & Grossman, 1993). Kenkel (1993) estimated that a 10% increase in alcohol price would result in 7% less drinking and driving among all men and over 8% among all women. Price effects were even greater among young men and women, however (13% and 21%, respectively). Dee (1999) and Dee and Evans (2001) reported that price increases would reduce motor vehicle accident fatalities among 18-20 year olds.

Manning, Blumberg, and Moulton (1995) reported that moderate drinkers were most price responsive, with a price elasticity of -1.19. They also found that both light and heavy drinkers had elasticities nearly equal to zero. In contrast, Chaloupka, Grossman, Becker, and Murphy (1992) found that a 10% increase in alcohol price would reduce cirrhosis mortality (i.e., reduce consumption among heavy drinkers) by an estimated 8.3% to 12.8%. Cook and Tauchen (1982) reported that a \$1.00 increase in alcohol would reduce cirrhosis mortality by 5.4% to 10.8%.

Effects of tobacco and marijuana as complements to alcohol use—An important empirical question is what the effects of higher prices for alcohol on other substances of abuse, e.g., tobacco or marijuana. Several studies have found that alcohol and tobacco, or marijuana and tobacco, are complements (i.e., use of one results in greater use of the other) (Chaloupka, Grossman, Bickel, & Saffer, 1999; Farrelly, Bray, Zarkin, & Wendling, 2001; Jimenez & Labeaga, 1994). In contrast, however, Goel and Morey (1995) reported that alcohol prices were positively related to cigarette use, implying that cigarettes and liquor are substitutes such that as alcohol price increases, then smoking increases.

Summary

The majority of alcohol price studies find that increases in alcoholic beverage prices are effective in reducing alcohol use. Many of these studies clearly show that these reductions in use are not limited to drinking by light or infrequent drinkers; significant reductions are also seen in heavy and/or frequent drinking and its consequences. In addition, studies that look at drinking by youth generally find even larger effects of taxes and prices than are found for the overall population, suggesting that increases in prices are particularly effective in reducing youth drinking and its consequences. Although a few studies produce contradictory findings, the overall weight of the evidence supporting the effectiveness of alcohol price increases in reducing alcohol use, abuse, and related problems is substantial. Alcohol taxes are thus an attractive instrument of alcohol policy as they can be used to both generate direct revenue and to reduce alcohol-related harms. The most important downside to raising alcohol taxes is the possibility of potential alternatives or substitutions to taxed alcoholic beverages, particularly in terms of illegal smuggling or illegal

in-country alcohol production. The net effects of taxation and price increases, however, are the potential to reduce alcohol use and related problems among underage persons.

Visible Enforcement

Conceptual Definition

Enforcement refers to enforcing policies to decrease retail and social availability as well as youth use of alcohol through threat of sanctions. Official policies might call for arrest, prosecution, and punishment to help reduce alcohol availability and alcohol-related violations. Punishment might include fines to stores that sell alcohol to minors or stiff penalties for drinking and driving. The distinguishing characteristic of the enforcement domain is the reliance on the formal criminal justice system to implement penalties. “Informal enforcement” is also an important complement to formal mechanisms. For example, “informal enforcement” might come in the form of communities being unwilling to patronize stores that sell alcohol to minors.

Measurement

A number of alternative measurement possibilities exist:

Enforcement of youth access/alcohol sales laws—Compliance checks, sometimes called “decoy” or “sting” programs, involve the use of underage buyers working as confederates of law enforcement agents to test alcohol retailers’ practices concerning alcohol sales to minors.

Enforcement of laws prohibiting third-party provision of alcohol to minors—Shoulder tap programs utilize underage adolescents who, working as confederates of local law enforcement, invite adults outside retail outlets to buy alcohol for them, in return for a financial incentive or an offer to share with them some of the alcohol purchased.

Party Patrols Results--Party patrols use law enforcement officers to (a) enforce laws prohibiting adult provision of alcohol to minors and underage drinking at private parties and (b) disrupt one of the highest risk settings for alcohol availability and misuse, i.e., private drinking parties by conducting weekend patrols of areas known to be regular drinking locations. Party patrols increase law enforcement’s responsiveness to reports of teenage drinking parties by community members.

Youth Surveys: Perceived Enforcement of Underage Drinking Laws. In addition to actual enforcement efforts, youths’ perceptions of the risks of detection and punishment for alcohol violations may be measured. Assessments may be obtained of the perceived likelihood of (a) police breaking up a party where youth are drinking, (b) getting caught by police at a party where youth are drinking, (c) getting caught by police when trying to purchase alcohol, and (d) having ID checked when trying to purchase alcohol. Source: Student Survey and the PIRE/OJJDP.

Students can be asked how likely or unlikely it is that (a) they will be asked for their ID if they try to purchase alcohol, (b) they will be caught by police if they try to purchase alcohol, (c) police will break up a party where youth are drinking, and (d) they will be caught by police if they are at a party where youth are drinking. A similar item from the OHT asks students whether a “kid their age” drinking in their neighborhood would get caught by the police (C16g).

Relationship of the Intermediate Variable to the Problem

Visible enforcement against sales to underage persons has been shown to be associated with reductions in such sales (See Grube [1997b] and Wagenaar, Toomey, and Erickson [2005b, 2005c].) Young drinkers may be particularly adept at identifying outlets that continue to sell to minors despite enforcement efforts or may shift to alternative social sources for alcohol. Dent, Grube, and Biglan (2005) found that stronger enforcement of minor in possession laws, as indexed by the student's average perceived level of enforcement in the community, was significantly related to lower levels in the communities' general frequency of use and binge drinking but not levels of drinking in school or drinking and driving/riding with a drinking driver. Community level enforcement of minor in possession laws was a deterrent for individuals' use of commercial sources to drink in school or to drink and drive. It also deterred the use of friends under 21 for binge drinking, use in general, and the use of parent sources for drinking and driving. On the other hand, communities with higher MIP enforcement also tended to have more reliance on taking alcohol from home without permission for binge drinking, use in general, and more frequent use of friends over 21 as a source while driving.

Support for the importance of reducing retail access to alcohol can be obtained from the literature on tobacco control. Most notably, a recent randomized community trial suggests that increasing retailer compliance with age identification for underage tobacco sales not only reduced tobacco sales to minors and youth smoking, but also underage drinking (Biglan, Ary, Smolkowski, Duncan, & Black, 2000). Enforcement of laws prohibiting sales to intoxicated patrons can also be effective. Thus, McKnight and Streff (1994) found a rise in refusals of service to "pseudo-patrons" simulating intoxication, and a decline in the percentage of drunk drivers coming from bars and restaurants following increased enforcement of laws prohibiting sales to intoxicated patrons.

The review of published research concerning minimum drinking age and youth consumption by Wagenaar and Toomey (2002) found a significant inverse relationship between the legal age and alcohol consumption. However, the limited degree to which age 21 policies have been implemented is also shown in several enforcement studies. Such studies have consistently found very low levels of enforcement of the age-21 policy. Enforcement actions against those selling or providing alcohol to minors is particularly rare (Wagenaar & Wolfson, 1994). In general, studies of the effects of increased enforcement show it to be a highly effective means to reduce alcohol sales to minors. Increased enforcement — specifically compliance checks on retail alcohol outlets — typically cuts rates of sales to minors by at least half (Preusser, Williams, & Weinstein, 1994; Lewis et al., 1996; Grube, 1997b). The extent to which visible enforcement of alcohol sales or service to underage persons translates into specific decreases in underage drinking is not as well documented by research studies. However, if lower retail sales to youth are associated with lower consumption, and higher enforcement is associated with lower youth sales, then the association of level of enforcement to youth drinking can be inferred.

Relationship of the Intermediate Variable to Other Variables

Enforcement to Retail Availability—Even with minimum drinking age limits, minors can often purchase alcohol with little difficulty. Increasing enforcement against retailers who sell to minors, however, can have an impact. Importantly research shows that even moderate increases in enforcement can reduce sales of alcohol to minors by as much as 35% to 40%, especially when combined with strategic media advocacy and other community and policy activities Grube (1997b) found that enforcement of sales laws coupled with media coverage produced a net reduction in sales to minors of 20 to 25%. In a study in New Orleans, enforcement of underage sales laws increased compliance with alcohol sales laws from 11% to 39% (Scribner & Cohen, 2001). The greatest gains in compliance occurred among those retailers who had been cited (51%), but substantial gains were also seen for those not cited (35%).

Enforcement to Social Availability—The relationship of enforcement of social availability of alcohol to underage persons to underage drinking is not as well documented as retail availability. Dent, Grube, and Biglan (2005) found that higher minor-in-possession (MIP) enforcement in the community can increase the use of taking alcohol from home without permission for binge and general drinking, perhaps because youth simply drink at home if they feel they would be caught outside the home. The negative interaction between use of parent sources (with or without permission) for drinking and driving does appear to be reduced in stricter MIP-enforced communities below already infrequent overall levels, perhaps because of the wider message it sends parents regarding the unacceptability of providing alcohol to their children, especially if they are going to be driving or riding in vehicles. Cohen et al. (2001) concluded that beer consumption as the primary beverage of choice of underage drinkers was found to be a potential factor in traffic fatalities and that existence of a beer keg registration law as part of an overall local approach to restricting alcohol availability was associated with reduced traffic fatalities. See Social Availability.

Strategies

Enforcement of youth access/alcohol sales laws. Dent, Grube, and Biglan (2005) concluded that communities with high levels of enforcement of minimum age of drinking tended to have lower community levels of binge drinking and drinking in general. These effects are consistent with the notion that perceived negative consequences (being caught by the police), if broad and severe enough, could be a deterrent to behavior. Enforcement interacted with source usage. Use of sources under the age of 21 for binge drinking and general alcohol use was curtailed in communities with high enforcement, as could be expected when possession by those under 21 is restricted. Use of commercial sources was also curtailed in communities with high enforcement of minimum age laws for in-school drinking and drinking while driving.

Compliance Checks—Compliance checks are the systematic checking by law enforcement of whether a licensed establishment actually sales alcohol to underage persons or “underage looking persons”. Studies indicate regular compliance checks substantially reduce illegal alcohol sales (Grube, 1997b; Preusser et al., 1994), a result well established in literature on tobacco sales to teens (Difranza, Carlson, & Caisse, 1992; Hinds, 1992; Hoppock & Houston, 1990). Studies of enforcement effects show that enforcement has reduced sales to youth (Preusser et al., 1994;

Lewis et al., 1996; Scribner & Cohen, 2001). There is some evidence that enforcement primarily affects the specific establishments targeted in compliance checks with limited diffusion and that any effects on sales may decay relatively quickly (Wagenaar et al., 2005b, 2005c).

Nationally, however, weak enforcement appears to be more the norm, with the result being that youth appear to have readily available access to alcohol (Jones-Webb et al., 1997b; Radecki & Strohl, 1991; Wagenaar et al., 1993). Forster et al. (1995) reported the results of an enforcement program conducted in 24 communities in Minnesota and Wisconsin. They found that buyers who were 21 years of age but looked underage were successful in buying alcohol about 50% of the time. Off-sale purchases were more successful if the clerks were male and the store was located in a residential area or mall. On-sale buys were more successful if the server looked under age 30, if the firm was a restaurant/bar combination as opposed to bar alone, and if warning signs were posted (likely because signs may have substituted for more substantive merchant educational programs). Wagenaar and Wolfson (1994) found that, without adequate penalties, attempts to reduce underage retail sales were likely to be ineffective. Wagenaar and Wolfson (1994) reported that only 2 of every 1,000 occurrences of underage drinking resulted in arrest.

A recent study in Louisiana, (Cohen, Mason, & Scribner, 2002) used a repeated intervention design of a random sample of off sale alcohol outlets in New Orleans. The intervention was a compliance check carried out by the Louisiana Department of Beverage Control (ABC) and involved the use of “underage looking youth” who ranged from 17 to 22 to attempt to purchase alcohol in licensed outlets. At baseline on, 11.2% of outlets were compliant. Two months after the intervention, the level of compliance had increased to 39.9%. At 8 months after the intervention, there was a residual level of compliance even without any further media coverage.

Random Breath Testing. Random Breath Testing (RBT) involves extensive and continuous random stops of drivers who are required to take a breath test to establish their blood alcohol level. Tests of RBT in Australia (Homel, 1986, 1990), Canada (Mercer, 1985) and Great Britain (Ross, 1988a, 1988b) indicate that they reduce car crashes. For example, in Australia, RBT resulted in a 24% reduction in night-time crashes, especially in metropolitan areas (e.g., Cameron, Cavallo, & Sullivan, 1992; Cameron, Diamantopolou, Mullan, Dyte, & Gantzer, 1997; Drummond, Sullivan, & Cavallo, 1992). Both enforcement and public awareness seem to be needed for the success of these programs. Moore, Barker, Ryan, and McLean (1993) found that males and those aged under 30 years perceived it was unlikely that they would be apprehended for drinking and driving despite RBT programs. However, the perceived likelihood of apprehension increased with exposure to RBT, notably when that exposure was recent. Ross (1982) pointed out that the threat of enforcement, or public expectation that one may be stopped and arrested, has had more influence than actual enforcement. However, increased public expectations of arrest must be reinforced with actual increased enforcement to have sustained effect (Hingson, Howland, & Levenson, 1988; Vingilis & Coulters, 1990; Zador, Lund, Fields, & Weinberg, 1989).

Sobriety checkpoints., A limited version of RBT, sobriety checkpoints, are often implemented in individual U.S. states under proscribed circumstances often involving pre-notification about when and where they will be implemented. Even under these restricted circumstances there is some evidence that they reduce drinking and driving and related traffic crashes. Evaluation of a Tennessee checkpoint program (Lacey, Jones, & Smith, 1999), for example, showed a 20%

decrease in alcohol-related fatal crashes and a 6% reduction in single vehicle nighttime crashes. These effects were observable 21 months after implementation of the program. Similarly, an evaluation of checkpoint programs in four California communities indicated that they decreased alcohol-involved injury and fatal crashes by 9% to 40%, depending upon the community (Stuster & Blowers, 1995). No significant changes were observed in non-alcohol involved crashes or in a comparison community. Surprisingly, the degree of success of the programs was the same regardless of low or high staffing levels or whether mobile units or stationary checkpoints were used. Public awareness and publicity, however, were identified as important mediators of effectiveness. No studies have evaluated the effects of these strategies on youth drinking and driving but there is no reason to believe that this age group of drinking drivers would not be affected by such policies.

Per se Laws. Per se laws specify the blood-alcohol level or concentration at which a driver is considered legally impaired, (i.e., the level at which a driver can be arrested and charged with drinking and driving). The per se level has been declining in Europe, Australia, New Zealand, and North America. Reductions in the allowable levels of driver impairment have been associated with reduced crash levels (Liben, Vingilis, & Blefgen, 1987; Ross, 1982; Zador et al., 1989).

Administrative License Revocation. Laws permitting the withdrawal of driving privileges without court action have been adopted by 38 states to prevent traffic crashes caused by unsafe driving practices, including driving with a BAC over the legal limit (Hingson et al., 1996). These laws were associated with a 5%-9% decline in nighttime fatal crashes in some studies (Hingson, 1993; Zador et al., 1989). License revocation is one type of punishment that has been shown to be effective in reducing repeated incidents of drinking and driving and as a major deterrent to youthful drinkers who drive (Ross & Gilliland, 1991). This strategy, which has not been specifically evaluated for effects on youth drinking and driving, is considered to be especially relevant to youth since the possession of a driving permit is a high status and valuable possession for young people.

Graduated Licenses. Graduated licensing places special limits on new or young drivers. For example it restricts nighttime driving and/or prohibits driving with other adolescents. A graduated licensing program in Connecticut led to a 14% net reduction in crash involvement among the youngest drivers (Ulmer, Ferguson, Williams, & Preusser, 2000). Similarly, in New Zealand, a 23% reduction in car crash injuries among novice drivers was found after implementation of a graduated licensing system (Langley, Wagenaar, & Begg, 1996). In Ontario, Canada, a 25% reduction in self-reported drinking and driving was found following the introduction of graduated licensing (Mann et al., 1997). A 27% reduction in alcohol-related crashes involving new drivers was also found in that province following implementation of the program (Boase & Tasca, 1998). Among the youngest drivers (ages 16-19 years), the reduction in alcohol-related crashes was somewhat smaller (19%), but still statistically significant.

Automobile Ignition Interlock Devices. Automobile ignition interlocks are devices that prevent drivers from starting their cars if their blood alcohol level is above a preset limit. This device has been discussed as a potential means to reduce all drinking and driving but has been used in the United States primarily as a means to prevent a multiple drinking and driving offender from

starting his/her auto after drinking (Voas, 1988). As the price of these devices comes down, it could be possible to require them in cars that adolescents drive.

Random breath testing and sobriety checkpoints appear promising for reducing drinking and driving based on studies with the general population, although there is little available evidence for their effectiveness specifically with young people and the potential to impact both social and retail supply. Relatively large changes in the conditions of sale, such as increasing the form of alcohol availability, or lowering the days and hours of alcohol sale could possibly increase or decrease youth access to alcohol. Similarly, the introduction or legalization of specific beverage types appears to change beverage preferences and possibly increase consumption.

Punishment and Sanctions Law enforcement officials generally believe that fines are not an effective deterrent to underage drinking for several reasons. First, parents often pay these nominal fines for the youth (Wolfson, Wagenaar, & Hornseth, 1995). Second, because the majority of teens are employed, a \$50 fine, for example, is a relatively small amount of money to them (American Savings Education Council, 1999; Teenage Research Unlimited, 2001, January 25). Finally, many fines go uncollected and there is often no mechanism to collect on the debts. Unfortunately, empirical evidence regarding the effectiveness of fines in deterring underage drinking is lacking (Grube & Nygaard, 2005).

Community service is widely viewed as an effective sanction to impose on youth. Wolfson et al. (1995) recommend community service placements in locations where the youth are most likely to see the effects of alcohol abuse. Unfortunately, there is little direct evidence on the effectiveness of community service as a deterrent to underage drinking (NHTSA & NIAAA, 1999, September). In addition, one concern with imposing community service is that many communities lack the resources necessary to coordinate and supervise the community placements (Canadian Cancer Society, 2001, September).

An increasingly common response by legislatures is to suspend or revoke an offender's driver's license (NHTSA & NIAAA, 1999, September). Previously, license suspension and revocation were pursued in the context of drunk driving. However, states have expanded the grounds for which driver's licenses may be suspended or revoked to encompass underage drinking offenses that do not involve the operation of a motor vehicle (Alcohol Policy Information System (APIS), 2007). Law enforcement personnel strongly believe that the possibility of license revocation is an effective deterrent because a driver's license is important to most youth. There is some concern, however, that because the threat of detection of driving without a license is so low, youth will simply drive without a license (Canadian Cancer Society, 2001, September). However, this has not been empirically demonstrated nor has the belief that license revocation is an effective deterrent to underage drinking in general.

Another available sanction is required attendance at an educational program, typically an alcohol education program (PIRE, 1999). These specialized classes are designed to deal with alcohol-related issues and to inform youth of the consequences of their alcohol-related behavior (NHTSA & NIAAA, 1999, September). The effect of such required education programs on the drinking behavior of youth is unknown. It has been suggested, however, that imposing sanctions that are readily, easily, and cheaply applied, such as education, are likely to be more effective than responses such as incarceration (PIRE, 1989). However, it is doubtful whether education alone

will be an effective deterrent given that education-based programs have been ineffective at changing behavior in settings such as school-based substance abuse prevention programs (e.g., Gottfredson, 1997).

Some state laws require that law enforcement and schools collaborate in responding to underage drinking cases (Pacific Institute for Research and Evaluation, 1989). For example, Iowa requires law enforcement officers to notify the school of an alcohol possession violation (IOWA CODE ANN. § 123.47B [2001]). A Montana law specifies that the teen court must notify the school district when a minor is involved in teen court as a result of a substance violation (MONT. CODE ANN. § 41-5-215 [2002]). The impact of this type of collaboration has not been evaluated. However, it is arguable that such an approach provides greater monitoring of the offender and therefore may help to change behavior.

Case dispositions may include commitment to a residential facility (e.g., training schools, camps, ranches) for delinquents or status offenders (NHTSA & NIAAA, 1999, September; OJJDP, 2002). However, commitment to a residential facility is a less commonly used sanction (NHTSA & NIAAA, 1999, September). For example, the OJJDP *Statistical Briefing Book* (OJJDP, 2002) reports that 8 percent of adjudicated liquor law violation cases resulted in placing minors in a residential facility. The deterrent effect of placing youth in a residential facility for underage drinking is unknown.

Incarceration is the most severe form of sanction and appears to be used far less frequently for underage drinking offenses than other sanctions. Unfortunately, as is true of underage drinking sanctions in general, there are no data available on the impact of incarceration on underage drinking, including whether youth are aware that this is a possible sanction and, if they are aware, whether its availability deters this behavior. However, if incarceration is part of the sanctioning response, less severe but certain punishment is likely to have greater long term effects on young drivers (Yu, 2000).

As mentioned earlier, a number of sanctions are available to teen court juries. In addition to those sanctions discussed above, other sanctions include future participation as a teen court juror, in-house detention, writing a letter of apology or an extensive essay, and sanctions targeting the parent(s) of the youth (e.g., parent required to spend one hour a day with the minor) (Johnson & Rosman, 1997). Additional sanctions typically used by JDCs include imposition of or an increase in curfew conditions, an increase in frequency of court contacts, intensive probation, a lecture from the court, a loss of sobriety time, home detention, and a change of school placement (National Council of Juvenile and Family Court Judges, 2001). Although teen court and JDC programs have been subjected to some global evaluations, these various sanctions have not been evaluated and therefore it is unknown what individual deterrent effect they have on underage drinking.

Little has been written about the importance of monitoring compliance, but it appears to be critical for enhancing the deterrent effects of sanctions. In juvenile court, compliance with sanctions is usually monitored by the probation department. Probation (as a form of monitoring compliance) places youth under informal or formal supervision. Also available to courts is intensive probation, which may include biweekly visits, electronic monitoring, and unannounced

visits. Judges have wide-ranging discretion in stipulating the probation conditions (NHTSA & NIAAA, 1999, September). These conditions typically encompass many of the sanctions already discussed. For example, judges may include as a condition of probation the payment of a fine, obtaining an alcohol dependency assessment or periodic testing for alcohol use, attendance at an education program, or community service. A number of conditions can be set simultaneously by the court. Probation provides a mechanism for ensuring that these conditions are satisfied. It can also provide a means to monitor the behavior of the youth, either by regular or sporadic encounters with a probation officer, and to ensure a swift reengagement with the courts should the youth reoffender violate probation.

The effectiveness of probation to deter underage drinking has not been studied (Grube & Nygaard, 2005). Similarly, there have been no evaluations of intensive probation (NHTSA & NIAAA, 1999, September). Obtaining sufficient resources to permit ongoing monitoring of offenders by probation officers historically has been a challenge for the criminal justice system. To the extent that more resources are available to monitor the ongoing behavior of an underage drinker, this approach may have more promise in this context. Also, some youth may be more accustomed to relatively close supervision and the monitoring of their behavior in general and thus be less resistant and more responsive to periodic monitoring by probation officers.

Some communities have responded to underage drinking by making public the names of individuals involved in underage drinking incidents (Wolfson et al., 1995). For example, the Inspector General (1991) reported that Alabama issued press releases listing names of minors arrested for alcohol violations. Similarly, Michigan published the results of vendor sting operations (Inspector General, 1991). No evaluation of this approach has been conducted.

The National Highway Traffic Safety Administration (NHTSA, 1997) recommends parental notification as a response to underage drinking. For example, law enforcement officials may be required to notify a parent when a minor has been cited (i.e., no arrest occurs) for an alcohol-related violation (e.g., MICH. COMP. LAWS ANN. § 436.1703(6) [2002]). This approach has been recommended because it is believed to engage parents in addressing the problem, allows parents to handle the problem at home, and enables them to use disciplinary means that they have found effective and as they see fit, rather than interjecting the courts into an environment with which they are not familiar. No evaluations of this approach have been conducted. Moreover, evaluation of this approach probably would be difficult because the intervention takes place in the home, where outsiders would not know exactly what transpired and where situations would vary considerably from case to case.

One primary difference between JDCs and other types of courts is the emphasis of JDCs on providing incentives for positive behavior change. Incentives include promotion to a subsequent program phase, providing an award or a gift (e.g., a voucher to a local sporting event), issuing a certificate or a token acknowledging the participant's accomplishments, and receiving the judge's praise or the praise of other drug court participants. However, there have been no empirical studies of the effect of these various incentives.

Bonnie (1979) recommends that prior to enacting a law, legislators need to determine the purpose of the law and their desired goals, then craft laws that will enable them to meet those

goals. The purpose of possession, consumption, purchase, and misrepresentation laws is to protect, not punish, youth. Wolfson and Hourigan (1997) argue that it may not have been the intent of legislatures to criminalize underage drinkers (and thereby to establish a permanent criminal record for such youth), but this has been the result. Criminal penalties tend to accomplish deterrence only when punishment is sufficiently swift, certain, and severe (Zimring & Hawkins, 1973). Wolfson and Hourigan (1997) add that the assumption of legislators may have been that the mere existence of underage drinking laws would deter underage drinking and that enforcement and sanctions would not be necessary. However, there is little indication that this has occurred. But for those youth who have been apprehended and successfully prosecuted, the result may be the imposition of a criminal record with long-term implications.

Summary

Although the research is limited, there are some inferences that can be drawn about efforts to deter underage drinking. For example, all states and a number of municipalities have some type of prohibition against youth drinking, although these prohibitions vary from state to state. The nature and severity of the sanctions associated with violations of these prohibitions vary considerably across jurisdictions. It is also apparent that for a variety of reasons, enforcement of these laws is relatively sporadic and inconsistent. In addition, although all schools in this country have an alcohol policy, these policies also vary considerably.

A number of sanctions are being applied by a range of agents in conjunction with underage alcohol offenses. Fines and community service are common sanctions imposed by the legal system for underage drinking violations. Diversion programs continue to grow in popularity. Schools are likely to respond to alcohol policy violations with suspension or expulsion. Unfortunately, little is known about the effectiveness of these responses, and their imposition appears to be rarely guided by supporting empirical evidence regarding their effectiveness.

There does seem to be a general consensus that if sanctions are used, they should be just one part of a constellation of responses to underage drinking violations. Researchers and advocates are calling for comprehensive approaches to underage drinking that involve the youth, their families, and their communities. Teen courts, for example, have adopted this position. Evaluation of the effectiveness of teen courts specifically in conjunction with alcohol-related offenses is needed to test this hypothesis. The suggestion also has been made that sanctions should be aimed at helping youth rather than simply punishing them for alcohol violations. In addition, it is important to recognize that sanctions will not be equally effective for all youth. Sanctions are often used as a blunt instrument of the courts, virtually ignoring developmental differences among adolescents. However, a sanction (e.g., a fine of \$100) that is perceived as particularly onerous by one youth and thus serves as an effective deterrent may be seen as trivial or as an inconvenience by another youth. In general, studies have failed to consider the developmental level, gender, ethnicity, and geographic location of the youth, all of which may be important considerations (PIRE, 1989; USDHHS, 2001).

Underage Drinking Laws

Conceptual Definition

Underage drinking and minor in possession (MIP) laws are the formal rules, regulations, and laws concerning purchase, possession, and use of alcohol by persons under a specifically defined age, uniformly 21 in the United States. States differ on the specific provisions of their own statute.

Measurement

All 50 states and the District of Columbia have a minimum legal drinking or purchase age of 21 and have zero tolerance laws for young drivers. Differences exist, however, in the details of the state laws. Measurement can document differences in either provision of a state law, e.g., whether the law specifies 21 as a “drinking age” or as a “purchase age” or how law is implemented. The Alcohol Policy Information System (APIS), for example, can be used to obtain detailed descriptions of state level laws. Local differences in policy and implementation can be detailed through surveys of local officials.

Relationship of the Intermediate Variable to the Problem

Underage Drinking. One goal of a higher minimum legal drinking age is to reduce alcohol consumption and related harms among youth. In the 1980s, all U.S. states were required to adopt a uniform 21 minimum age for all alcoholic beverages as a requirement for receiving federal highway funds. The U.S. General Accounting Office (US GAO, 1987) reviewed 32 published research studies both before and after the law changed. The GAO concluded that there was sound scientific evidence that increasing the minimum age for purchasing alcohol reduced the number of alcohol-involved traffic crashes for those below the age of 21. These and more recent studies uniformly show that increasing the minimum drinking age significantly decreases self-reported drinking by young people, the number of fatal traffic crashes, and the number of arrests for Driving Under the Influence of Alcohol (DUI).

In the most comprehensive review to date, Wagenaar and Toomey (2002) analyzed all identified published studies on the drinking age from 1960 to 1999, a total of 132 documents. They coded eight key variables for each study. The variables included the jurisdiction (i.e., state or province) studied, specific outcome measures analyzed (e.g., self-reported drinking, car crash fatalities), and whether the study was specific to college student populations. In addition, each study was rated on three indicators of methodological quality. In 48 of the studies they reviewed, the effects of changes in the drinking age on alcohol consumption was examined, using a total of 78 alcohol consumption measures (e.g., sales figures, self-reported drinking). Of the 78 measures 45% showed that a higher legal drinking age was associated with reduced alcohol consumption among youth, while five found that a higher drinking age was associated with greater adolescent consumption.

It is clear, however, that the benefits of a higher drinking age are only realized if the law is enforced. Despite higher minimum drinking age laws, young people can and do purchase alcohol (e.g., Forster et al., 1994, 1995; Paschall et al., 2007a; Preusser & Williams, 1992; Grube, 1997b). Studies show that anywhere from 30%-90% of outlets will sell to a minor, depending on geographical location. Such sales result from low and inconsistent levels of enforcement, especially when there is little community support for underage alcohol sales enforcement (Wagenaar & Wolfson, 1994, 1995). Even moderate increases in enforcement can reduce sales of alcohol to minors by as much as 35% to 40%, especially when combined with media and other community and policy activities (Grube, 1997b; Wagenaar et al., 2000a).

There is growing evidence that alcohol availability is positively associated with drinking rates, i.e., the easier alcohol is to obtain, the more alcohol is consumed (Edwards et al., 1994). The best evidence of the effect of alcohol availability on aggregate measures of youth drinking comes from studies of the minimum drinking age in the United States. Minimum drinking ages restrict the legal availability of alcohol to youth. As many states increased their minimum drinking ages to age 21 in the late 1970s and early 1980s, significant decreases in drinking rates and drinking problems such as traffic crashes were observed among 18-20 year olds (O'Malley & Wagenaar, 1991; Wagenaar, 1993). Additional evidence come from recent studies showing compliance and MIP enforcement at the community level are related to youth consumption, problem consumption, and use of commercial sources for alcohol (Dent et al., 2005; Paschall et al., 2007b).

Impaired driving and traffic crashes. O'Malley and Wagenaar (1991) found that the minimum legal drinking age affected self-reported alcohol use among young people and reduced traffic crashes. Indeed the effect on car crashes continued well after young people reached the legal drinking age. Klepp, Schmid, and Murray (1996) found that implementation of the uniform minimum legal drinking age of 21 in the U.S. reduced the overall prevalence of drinking and driving. Saffer and Grossman (1987a, 1987b), Wagenaar (1981, 1986), and Wagenaar and Maybee (1986) indicate that raising the minimum legal drinking age from 18 to 21 years decreased single vehicle nighttime crashes involving young drivers from 11% to 16% at all levels of crash severity. Voas, Tippetts, and Fell (1999), using data from all 50 states and the District of Columbia for the years 1982 through 1997, concluded that the enactment of the uniform age 21 minimum drinking age law was responsible for a 19% net decrease in fatal crashes involving young drinking drivers after controlling for driving exposure, beer consumption, enactment of zero tolerance laws, and other relevant changes in the laws during that time.

Wagenaar and Toomey (2002) found 57 published studies that assessed the effects of changes in the legal minimum drinking age on indicators of drunk-driving and traffic crashes. A total of 102 crash outcome measures were analyzed (e.g., fatal crashes, drink-driving crashes, self-reported driving-after-drinking). Of the 102 analyses, over 50% found that raising the drinking age reduced crashes and lowering it raised the crash rate. Only two found a positive relationship between the legal drinking age and traffic crashes. Of the 95 analyses including comparison groups, more than one half (53%) found a statistically significant effect of changing the drinking age on car crashes. It should be noted that most of these analyses (92%) employed probability samples or a complete census of the relevant population. Overall, the National

Highway Traffic Safety Administration estimates that a drinking age of 21 has prevented nearly 25,000 deaths since 1975 (National Center for Statistics and Analysis, 2007).

Other social/health problems. Wagenaar and Toomey (2002) analyzed 24 published studies that assessed the effects of changes in the legal minimum drinking age on indicators of other health and social problem outcomes such as suicide, homicide, or vandalism. Sixteen of these studies showed lower problem levels among adolescents when the drinking age was higher. When they analyzed the 23 studies of higher methodological quality, they found that 35% showed that a higher minimum drinking age was associated with lower rates of other problems. Additional scientific evidence suggests that higher minimum purchase ages has also reduced non-traffic injuries (Jones, Pieper, & Robertson, 1992; Birckmayer & Hemenway, 1999).

Their analysis of the evidence led them to conclude that, compared to a wide range of other programs and efforts to reduce drinking among high school students, college students, and other teenagers, increasing the legal age for purchase and consumption of alcohol to 21 appears to have been the most effective strategy. It is clear, however, that the benefits of a higher drinking age are only realized if the law is enforced.

Relationship of the Intermediate Variable to Other Variables

Underage Drinking Laws to Retail Availability. Enactment and enforcement of MIP laws and sales laws appears to decrease purchase. For example, Yu, Varone, and Shacket (1997) found a 70% decrease in self-reported alcohol purchase by 19- to 20-year-olds after the implementation of a minimum drinking age of 21 years in New York state.

Underage Drinking Laws to Social Availability. There is much less research on the relationship of underage drinking laws to social availability of alcohol to youth. The strength of the relationship is clearly mediated by level of actual enforcement of this law in social situations. In general, stricter enforcement of MIP laws and laws regarding provision to minors will decrease social access to alcohol by making it more difficult for minors to obtain alcohol from friends, strangers, and other adults. See Visible Enforcement to Social Availability.

Strategies

Legal (Tort) Liability Concerning Alcohol Sales and Service to Youth. Liability and administrative regulations are strategies which have the power of court or legal regulation to hold persons or establishments responsible for sale or service of alcohol to youth and the social provision of alcohol (social hosts) to youth. Tort liability concerning drinking and alcohol sale/service establishes civil penalties, usually some form of a fine or liability for civil suit, to those who are found responsible for specific types of alcohol-involved harm, including providing alcohol to minors. See discussion by Sloan, Stout, Whetten-Goldstein, and Liang (Sloan, Stout, Whetten-Goldstein, & Liang, 2000). Most tort liability provisions and court actions have been directed at licensed establishments for providing alcohol to an underage person. The rationale for establishing third party liability, rather than first party offenders, e.g., drunks or minors, includes a recognition that such parties may lack the ability to make appropriate compliance decisions (Kraakman, 1998), there are fewer third parties to regulate, third parties can be efficient monitors

of alcohol service practices, and commercial sellers are in a better financial position to render compensation. In most states, there exists the requirement that the individual must be of a specific age to be eligible to consume any alcohol which might be sold. Under these statutes, statutory liability exists for a third party, not the minor, to underage legal action. Therefore, even if a licensed establishment's sale/service of alcohol to the minor may be an illegal sale, the minor cannot establish the statutory cause of action (Mathew Bender and Co., 1998).

In a few jurisdictions, tort liability has been extended to social hosts with the rationale that social hosts do possess an ability to monitor the serving of alcohol to minors and their guests' drinking before driving. In some states, such as California, there are strict limits on social host liability but courts are increasingly finding ways around these limits. For example, in 1995 New Hampshire recognized a common-law cause of action for social host liability and a North Carolina court in 1992 recognized a cause of action for a social host who serviced a visibly intoxicated guest. In a 1999 case in Georgia there was a suit against a 16-year-old boy and his parents who served alcohol in their home to a 15-year-old girl. The parents were not held liable since they were not home at the time and there was no evidence that they had previously provided beer to their son or his friends. However, the boy was held liable, even though he himself was a minor, and it was of no consequence that the girl willingly drank the alcohol for under the Georgia legal code the from legal licensed establishments are responsible for the consequences of their own drinking. State legislatures and the courts under dram shop liability have established that providing alcohol to an obviously intoxicated person or in amounts which obviously lead to impairment can be grounds for a civil suit and possible damages. The use of dram shop liability has been advanced as a potential tool to deter sellers and social hosts from irresponsible selling or provision of alcohol. This is discussed in Mosher (1984) and Holder et al. (1993). Much of the research concerning the effects of tort liability in general, and dram shop liability in particular, has focused on intoxicated persons, who subsequently are involved in some type of traffic crash. However, since selling or serving alcohol to persons under the legal drinking age can also be grounds for liability in many states, this also becomes a part of the possible prevention strategies to reduce alcohol service and sales to youth, especially when an intoxicated minor is involved in a traffic crash. In addition, youth are more likely than older people to be driving while impaired by alcohol (Gruenewald et al., 1996).

Tort liability has several features which support its place as a prevention strategy. The argument for tort liability concerning youth drinking is that the threat of possible monetary damage for inflicting harm on another while the youth is impaired by alcohol. If those who provide alcohol to youth subsequently injure others are liable for damages, this can deter, so the argument goes, those who would provide alcohol to youth.

Sloan et al. (2000) analyzed traffic fatalities across all states and examined the potential effect of a number of factors on fatalities over time and across states. They examined in particular the effect of tort liability on commercial servers for selling alcohol to underage drinkers. They found that imposing such tort liability on commercial services resulted in reduced fatality rates for those drivers under 21 years old (actually 15 to 20) controlling for other dependent variables. This is a single cross sectional and time series study which demonstrates the potential of tort liability about selling alcohol to persons under 21 years of age. Even though a single study, the use of data from all 50 states across time increases the strength of the conclusion of the import of the findings. The only issue for replication concerns the selection of other intervening and

explanatory variables not included by these authors. This study did not include a variable for the existence of social host liability.

Zero Tolerance Laws. Zero tolerance laws set lower BAC limits for underage drivers and/or create a risk of loss of license when an underage youth has been found to be drinking, even if the youth was not driving. Usually this limit is set at the minimum that can be reliably detected by breath testing equipment (i.e., .01-.02 blood alcohol level). Zero tolerance laws also commonly invoke other penalties such as automatic license revocation. An analysis of the effect of zero-tolerance laws in the first 12 states enacting them found a 20% relative reduction in the proportion of single vehicle nighttime (SVN) fatal crashes among drivers under 21, compared with nearby states that did not pass zero-tolerance laws (Hingson, Heeren, & Winter, 1994; Martin, Grube, Voas, Baker, & Hingson, 1996). Zwerling and Jones (1999) reviewed six studies of the impact of zero tolerance. All studies showed that the policy reduced injuries and crashes attributed to youthful drivers. In three of the studies, however, the reductions were not statistically significant, possibly because of a lack of statistical power. More recent empirical studies have provided additional evidence for the effectiveness of zero tolerance laws. Thus, a study of all 50 states and the District of Columbia in the U.S. found a net decrease of 24% in the number of young drivers with positive BACs as a result of the implementation of zero tolerance laws (Voas et al., 1999). Similarly, a 19% reduction in self-reported driving after any drinking and a 24% reduction in driving after five or more drinks was found using Monitoring the Future survey data from 30 states (Wagenaar et al., 2001). Differences in enforcement of zero tolerance laws have been identified as a key issue in understanding why some programs are less successful than others (Ferguson, Fields, & Voas, 2000), as has lack of awareness on the part of young people (Balmforth, 1998; Hingson et al., 1994). The use of media campaigns to increase young peoples' awareness of reduced BAC limits and of enforcement efforts can significantly increase the effectiveness of zero tolerance laws (Blomberg, 1992).

Effective enforcement and awareness of the laws among young people have been identified as key factors in the success of zero tolerance laws (Ferguson et al., 2000; Voas, Lange, & Tippetts, 1998). Impediments to the enforcement of these laws include (a) requiring that zero tolerance citations be supported by evidential BAC testing, (b) undue costs to police (e.g., paperwork, time, court appearances), and (c) lack of behavioral cues for stopping young drivers at very low BACs. It has been suggested that the most effective zero tolerance laws include passive breath testing, are implemented in combination with DUI checkpoints or random breath testing, and involve streamlined administrative procedures (Ferguson et al., 2000). Using media to increase young peoples' awareness of reduced BAC limits and of enforcement efforts may also increase the effectiveness of zero tolerance laws.

Community Norms about Youth Drinking

Conceptual Definition

Community Norms refer to level of local approval or disapproval of youth drinking by adults other than their parents in the broader community. Community norms also refer to or be influenced by perceptions of youth drinking by these others.

Norms and values can be defined as informal social rules or proscriptions defining acceptable and unacceptable behavior within a social group, organization or larger community. Norms reflect general attitudes about substance use and societal expectations regarding the levels and types of consumption considered acceptable. What is considered acceptable behavior may vary according to the location (e.g., by country or region within a particular country), occasion (e.g. at a bar, a party or at home) and across demographic subgroups (e.g., by gender, race or ethnicity).

Measurement

Community norms can be measured by asking students about the level of alcohol use by adults other than own parents in their neighborhood and the extent to which these adults would approve or disapprove of drinking by young people. Specifically, C17b from the Oregon Healthy Teens (OHT) survey asks students how wrong adults living in their neighborhood believe it would be for “kids their age” to drink alcohol and CN-5 from the PIRE/OJJDP survey asks how wrong they think these adults believe it is for young people to get drunk (very wrong—not at all wrong). Item C15d from the OHT asks students how many adults (over 21) they have known personally who in the past year have gotten drunk or high, with five possible responses ranging from “none” to “5 or more.”

Community norms can be measured in a variety of ways:

- Youth perceived level of alcohol use by adults they know other than own parents
- Youth perceived approval/disapproval of teen alcohol use by adults they know;
- Youth perceptions of how wrong adults in neighborhood think it is for young people to drink, and
- Youth perceptions of how wrong adults in neighborhood think it is for young people to get drunk. Source: Student Survey.

Relationship of the Intermediate Variable to the Problem

In an early empirical study, Larson and Abu-Baban (1968) found that consumption increases or decreases depending on the extent of norms proscribing drinking or consumption limits. In general, where drinking is more accepted it is natural to assume that drinking (in general) will be more widespread and average consumption is higher. The acceptability of drinking also has an important influence on drinking pattern. For example, the more prominent drinking is in a community, the lower the abstinence rates are likely to be. The percentage of population that abstains is dependent in part on the relative importance of drinking in the community. While underage drinking is certainly influenced by general community norms, there is limited research

on the specific empirical relationship of overall community norms about drinking in general and to the level of underage drinking. Thus it is reasonable to think about community norms in two parts: (a) general acceptability of drinking and (b) the specific acceptability (or concern) about underage or youth drinking. Most surveys of public opinion find high concern about underage drinking and thus support for underage drinking laws (Wagenaar et al., 2000a). It is not clear from empirical research exactly how community norms from the general population about drinking specifically affect underage drinking. That is, are changes in the general acceptability of drinking in a community also related to reduced acceptability of underage drinking?

It is the second aspect of community norms which may be of most import to underage drinking and that is using community concern about underage drinking as a foundation for support of strategies designed to reduce underage drinking. Such support has been frequently noted as a key ingredient of effective community underage drinking prevention. See Wagenaar et al. (2000a) and Holder and Treno (1997).

Relationship of the Intermediate Variable to Other Variables

Community Norms to Law Enforcement Community norms can either support or hinder enforcement of underage drinking and possession laws (Little & Bishop, 1998). Parents can plead with law enforcement officials, prosecutors, or judges to be lenient with their child to avoid a permanent record, arguing, “We did this when we were young” (Wolfson et al., 1995). Similarly, there can be considerable public indifference to underage drinking and related laws (NHTSA & NIAAA, 1999, September). Generally, society may not be concerned with youth drinking at parties, as opposed to youth drinking and driving, presumably because the consequences are perceived to be less serious (Little & Bishop, 1998). Yet in the past decade, there has been much more attention to underage drinking laws and their enforcement, especially at the local level. See Wagenaar et al. (Wagenaar et al., 2000a). The theoretical foundation of this relationship is that when norms are concerned about underage drinking there is greater support for the enforcement of existing laws about youth possession, purchase, and drinking of alcohol.

Community Norms to Social Availability. It can be hypothesized that community norms that are less supportive of underage drinking will be related to lower social availability of alcohol.

Community Norms to Drinking Beliefs & Expectancies It can be theoretically postulated that community norms that are less accepting of underage drinking will be associated with less support of drinking by youth and thus less supportive drinking beliefs by youth.

Community Norms to School Influence. It is postulated that community norms which are less accepting of underage drinking will be related to stricter school policies and more consistent enforcement of these school policies. However, there is little empirical evidence of this effect of norms to social policies.

Strategies

Strategies directed at community norms and prevention of underage drinking have primarily been directed at public support of actions to reduce access of alcohol to youth and thus

reductions in underage drinking. There are no examples of strategies which have attempted to change the general acceptability of drinking across all ages as a means to reduce underage drinking specifically. Thus, it is proposed that community norms regarding underage drinking will, in part, affect the extent to which underage drinking and possession laws and laws regarding provision of alcohol to minors will be implemented and enforced. An evaluation of the Reducing Underage Drinking through coalitions (RUD) project funded ten states for 8 years to form coalitions designed to change the policy and normative environment regarding youth access to alcohol (Wagenaar, Erickson, Harwood, & O'Malley, 2006). Measures included print news media coverage, legislative bills enacted, youth drinking behavior, and youth alcohol-related driving behaviors and traffic crash mortality. Significant differences in slopes between treatment and comparison states were found for several outcome measures, particularly in the more-proximal outcome domains. Across all outcome domains, the pattern of effects was in the direction of positive effects of the RUD coalitions, although for most individual measures the differences were not statistically significant.

Strategic use of media can play a key role in building community norms around alcohol issues. Results from the Community Trials Project (Holder & Treno, 1997) indicate that: (a) training in media advocacy can increase coverage of news events generated by local community members including volunteers, (b) increased news coverage can be generated for both electronic (television) and print media, (c) increased news coverage did focus public attention on specific issues in support of prevention components, (d) while there are differential audiences/readers for the print (newspaper) and electronic (TV) media, both audiences are affected, and (e) media advocacy can be more effective than a paid public information campaign in increasing public awareness of alcohol issues. Community participation and mobilization are important complements to formal enforcement efforts because inadequate community support for such interventions may serve to reduce resources dedicated to enforcement (Wagenaar & Wolfson, 1994, 1995). Lewis et al. (1996) found that enforcement implemented through a community coalition could be just as effective in reducing youth access to alcohol as more traditional enforcement mechanisms. In their study, liquor stores under citizens' surveillance showed a reduction in underage sales, from 83% to 33%, compared to a decrease from 45% to 36% in control sites.

Alcohol Promotion

Conceptual Definition

Retailers attempt to increase demand through the advertising and promotion of their products. The purpose of advertising and promotion is to increase the attractiveness of drinking by creating an image favorable to consumption of these substances. Advertising and promotion are designed to recruit new users and to retain old users. The effects of alcohol advertising and promotion are largely mediated through drinking beliefs, affecting attitudes and individuals' decisions regarding whether to drink, when to drink, and how much to drink. Promotion also influences the cultural and social context of drinking, potentially altering the perceived legitimacy of social drinking, including normalizing drinking and the integration of alcohol use into everyday life.

Measurement

General mass media advertising—this has been measured by (a) amount of dollars paid for general alcohol advertising or (b) the amount of time or space purchased for alcohol advertising. There appears to be no consistent measure of general advertising specifically targeted to youth drinking.

Content Analyses of Advertising—This measurement involving coding the amount (time or inches) of general advertising about alcohol and/or the coding of advertising which is judged (by pre-established criteria) to appeal to youth drinkers. See Strickland, Finn, and Lambert (1982), Finn and Strickland (1982), Austin and Hust (2005), and Grube and Waiters (2005) for information about content coding of alcohol advertising.

Billboard Advertising—the number, placement and size of billboard advertising of alcohol has been used in some communities as a measure of extent of local alcohol advertising. See Pasch, Komro, Perry, Hearst, and Farbakhsh (2007) for information on approaches to documenting the location and content of local billboards involving alcohol where all outdoor advertisements within 1,500 feet of public schools were documented and coded for content and theme.

Point-of-Purchase Advertising or Promotion—Where permitted by regulation, retailers and producers/wholesales place advertising or promotional materials or signs. The presence/absence or placement (at the point of service or sales or at the table in a bar or restaurant) are alternative means to measure advertising which is closely associated with actual sales or service of alcohol.

Relationship of the Intermediate Variable to the Problem

Each year, the alcohol industry in the United States spends more than a billion U.S. dollars on "measured media" advertising, that is, television, radio, print, and outdoor ads. See <http://www.ftc.gov/reports/alcohol/appendixb.htm> The available evidence indicates that more than 300 wine brands, 350 beer brands, and 1,400 distilled spirits brands are marketed in the U.S., but fewer than a quarter of them are advertised through measured media each year.

Promotion of alcohol occurs in many alternative forms of promotion beyond purchased mass media advertising space or time including sponsorship of cultural events, product placements in movies and TV show, point of sale advertising, and price promotions, etc. In its special report to the Federal Trade Commission one alcohol industry member estimated that during the course of a year, its advertising for a single mid-sized brand would reach 88 percent of adults an average frequency of 12 times -- more often in large markets.

While precise figures are not available, special reports to the United States Federal Trade Commission suggest that total expenditures to promote alcohol may be three or more times its expenditures shown in measured media advertising alone. Even for heavily advertised brands, measured media advertising typically accounts for only one third to one half of total promotional expenditures and obviously many alcoholic brands do not use measured media at all. A wide array of alternative forms of alcohol promotion beyond purchased mass advertising used by the industry include:

- sponsorship of cultural, musical, and sporting events;
- Internet advertising;
- point-of-sale materials, including window and interior displays at retail outlets, bars, and restaurants;
- distribution of brand-logged items such as t-shirts, hats, watches, and glassware;
- product placements in movies and TV shows;
- catalogs and other direct mail communications;
- price promotions such as sales, coupons, and rebates; and
- trade promotions directed at wholesalers and retailers.

Jernigen, Ostroff, and Ross (2005) combined occurrence and audience data to calculate youth (aged 12–20 years) and adult (above the United States legal drinking age of 21 years) exposure to alcohol advertising on television and radio, in magazines and on the Internet. Their research in the United States shows that alcohol companies have placed significant amounts of advertising where youth are more likely per capita to be exposed to it than adults. These data are updated in Center for Alcohol Marketing and Youth (2007). This is reflected in the work of Hastings, Anderson, Cooke, and Gordon (2005) who also reviewed the published research on advertising and promotion of alcohol and concluded that most econometric studies provide little evidence of an aggregate effect on consumption, and little or no information about the effect on the drinking of youth and young people. Instead, Hastings et al. (2005) conclude that consumer studies which examine the effect of advertising on subgroups of consumers overcome the deficiency of large macro-studies and do suggest that there is a link between advertising and young people's drinking knowledge, attitudes and behavior.

Markowitz and Grossman (1998) concluded that restrictions on alcohol advertising and increases in illegal drug prices have no effects on violence. Snyder, Milici, Slater, Sun, and Strizhakova (2006) in a study to test whether alcohol advertising expenditures and the degree of exposure to alcohol advertisements affect alcohol consumption by youth found that youth who saw more alcohol advertisements on average drank more (each additional advertisement seen increased the number of drinks consumed by 1% [event rate ratio, 1.01; 95% confidence interval, 1.01-1.02]). The study also found that youth in markets with greater alcohol advertising expenditures drank

more (each additional dollar spent per capita raised the number of drinks consumed by 3% [event rate ratio, 1.03; 95% confidence interval, 1.01-1.05]).

Research suggests that there is high recall of alcohol advertising among youth (e.g., Lieberman & Orlandi, 1987). This is not surprising because many advertisements are of high production value and use a combination of fast action, popular music, provocative imagery and humor. Nevertheless, the association between recall of number of advertisements seen on the one hand, and drinking status or behaviors on the other, does not necessarily signify a causal connection.

A longitudinal study in New Zealand examined the association between recall of mass media messages about alcohol at ages 13 and 15 and drinking at age 18 (Connolly, Casswell, Zhang, & Silva, 1994). Among both males and females, consumption of wine and spirits at age 18 was not predicted by recall of commercial advertisements. For males however, the number of advertisements recalled at age 15 was significantly and positively associated with both average and maximum amounts of beer consumed at age 18. For females, the number of advertisements recalled at age 13 was significantly and negatively related to the frequency of beer consumption at age 18. Further analysis indicated that liking advertising at age 18 predicted heavier drinking and more alcohol-related problems at age 21 (Casswell & Zhang, 1998).

Kuo, Weschler, Greenberg, and Lee (2003) provided compelling evidence linking price and promotions to problem drinking among college students. They analyzed the 2001 College Alcohol Study, which surveyed over 10,000 college students, as well as 830 on-premise and 1,684 off-premise venues at 118 colleges. Results showed that low price and heavy advertising and promotional activities were associated with increased heavy drinking among college students and with total number of drinks consumed. Researchers have found that alcohol advertising is disproportionately concentrated in low-income minority neighborhoods (Pasch et al., 2007) One study found that minority neighborhoods in Chicago have on average seven times the number of billboards advertising alcohol as do Caucasian neighborhoods (Hackbarth, Silvestri, & Casper, 1995). The researchers concluded that “Such concentration of alcohol advertising and availability likely translates into increased problems associated with alcohol use in these communities.” A similar observation is found in Alaniz (1998). Pasch et al. (2007) studied the effects of alcohol advertising on billboards and window displays on pre-teens and early teens in the vicinity of 63 Chicago schools. They found that children living in areas with large numbers of alcohol ads on billboards, storefronts, bus stops and elsewhere are more likely to look favorably on drinking and had higher expressed intentions to drink.

Other studies examined the extent of advertising, the times and type of television programming that youth tend to watch and thus the implicit “targeting” of some advertising (Hill & Casswell, 2001). Measures to control advertising have been developed, at times as part of broader campaigns focusing on promotion in general. These efforts include ensuring compliance with reasonably stringent advertising codes of practice (e.g., California Wine Institute, 2005), campaigning to remove specific advertising (e.g., Woodruff, 1996), and advocating restricted hours for television ads or locations of billboards—e.g., away from schools. Other initiatives involve working with scriptwriters to give a more balanced portrayal of drinking in the mass media (Wallack, Dorfman, Jernigan, & Themba, 1993), seeking to curtail association between child-oriented events and advertising (e.g., Halloween and beer paraphernalia), and enacting

warning messages and counter-advertising campaigns (Giesbrecht, Johnson, Anglin, Kavanagh, & Greenfield, 1998; Greenfield, Graves, & Kaskutas, 1999).

Point of Purchase Promotion to Underage Drinking. Although the exact relation is unknown, greater promotion may decrease price by increasing competition. This especially appears to be the case for local advertising. Price may then mediate the effects of promotion on consumption. In a study of college communities, for example, it was found that alcohol specials, promotions, and advertisements were prevalent in the alcohol outlets around the campuses. Low sale prices and frequent promotions and advertisements were associated with higher binge drinking rates (Kuo et al., 2003). Harwood et al. (2003) found that community, neighborhood and private grocery store characteristics were related to beer price; however, only community and store characteristics were predictive of beer promotions. They concluded that pricing and promotion of beer varies systematically by some characteristics of communities, neighborhoods, and stores, but not significantly by the number of young people populating a neighborhood.

Snyder et al. (2006) found that restrictions on point-of-purchase price advertising at liquor stores reduced the probability of drinking and driving among all drinkers and with price advertising, prices may be expected to fall, thereby leading to increases in over all consumption. They found that drinkers who lived in states permitting grocery stores to sell beer and wine had a significantly higher probability of drinking and driving and they concluded that that advertising and availability of alcohol promote drinking.

Ellickson, Collins, Hambarsoomians, and McCaffrey (2005) examined the relationship between exposure to different forms of alcohol advertising and subsequent drinking among US adolescents. They found that for seventh-grade non-drinkers, exposure to in-store beer displays predicted drinking onset by grade 9; for seventh-grade drinkers, exposure to magazines with alcohol advertisements and to beer concession stands at sports or music events predicted frequency of grade 9 drinking. These research findings are reflected in sales information that 74% of all beer sales in the U.S. are in retail establishments, led by convenience stores and gas stations and that young adults (aged 21-27) are most likely to purchase beer in package and convenience stores. (Miller Brewing Company, 1997), and that 75% of teens shop at convenience or convenience/gas stores weekly (Point of Purchase Advertising Institute, 1992).

Bray, Loomis, and Engelen (2007) investigated the association between beer product characteristics (type, package size, and brand name), market-area socioeconomic characteristics, and promoted sales of beer in grocery stores. Using supermarket scanner data from 64 market areas across the United States over 5 years they found that large-volume product containers, such as 144-oz and 288-oz packages, are more likely to be promoted than smaller package sizes. The researchers noted that marketing research has shown in-store merchandising and promotions to substantially increase beer sales and that purchasing large package sizes may increase total consumption.

Relationship of the Intermediate Variable to Other Variables

Alcohol Promotion to Drinking Beliefs and Expectancies--Expectancies related to the effects of alcohol and intentions to drink can also be influenced by advertising. For example, Lipsitz, Brake, Vincent, and Winters (1993) found fifth and sixth grader students exposed to television commercials had more positive expectations of the consequences of drinking. Among pre-adolescents, Austin and Meili (1994) found that children's intentions to drink were predicted by their perception of alcohol-related behavior in the home environment, their interpretation of TV messages, their desire to be like the television characters who drink, and their expectancies that drinking brings rewards. Grube and Wallack (1994) reported that fifth and sixth graders' awareness of beer advertising on television was related to more favorable beliefs about drinking, greater knowledge of brands and slogans, and increased intention to drink as an adult.

Research examining the potential effects of exposure to drinking on television on young people's drinking beliefs and behaviors have concluded that the evidence for the effects of alcohol advertising on drinking beliefs and behaviors is limited at best (e.g., Atkin, 1995; Calfee & Scheraga, 1994; Fisher, 1993; Nelson & Young, 2001; Nelson, 1999). Generally speaking, correlational studies have found small, but statistically significant, relations between television viewing and alcohol-related beliefs and behaviors. Thus, Tucker (1985) found that high school boys who were heavier television viewers drank more than lighter viewers. Similarly, Neuendorf (1985) reported that television viewing was related to beliefs about drinking among 10- to 14-year-old adolescents: Heavier viewers were more likely than lighter viewers to agree that people who drink are happy and you have to drink to have fun at a sporting event. More recently, in a prospective study of 1,533 ninth-grade students, it was found that television viewing was related to initiation of drinking over an 18-month period (Robinson, Chen, & Killen, 1998). Snyder and her colleagues (2006) found that youth in markets with greater alcohol advertising expenditures drank more, with each additional dollar spent per capita raising the number of drinks consumed by 3%. Coulson, Moran, and Nelson (2001) report a series of analyses using quarterly advertising expenditures, taking into account the relative audience reach of different media types. Some significant effects of alcohol advertising were found, although they were quite small. Thus, spirits advertising had a positive effect on spirits consumption one quarter (3 months) later, and a contemporaneous positive effect on wine consumption. Wine advertising, however, had a negative effect on spirits consumption after one quarter and a positive contemporaneous effect on wine consumption. It was concluded that the effects of alcohol advertising on overall consumption were negligible.

Similar results have been reported for advertising expenditures on per capita alcohol consumption in Ontario, Canada (Larivière, Larue, & Chalfant, 2000). Although the results were unstable and varied considerably depending on model specification, they suggested that spirits consumption was positively related to advertising expenditures, whereas beer and wine consumption were negatively related to advertising expenditures. They concluded that advertising effects were subtle, may vary by beverage, and probably affect brand or product allocation, rather than overall consumption. Although significant positive relations were found between TV viewing of alcohol advertising and self-reported involvement in risky behaviors for specific genres (e.g., cartoons), the results were inconsistent across genres and no effect was

found for overall TV viewing. These correlational studies suffer from potentially serious conceptual and methodological problems.

In addition to the correlational studies, the influence of televised portrayals of drinking on young people has been addressed in experimental studies (Kotch, Coulter, & Lipsitz, 1986; Rychtarik, Fairbank, Allen, Foy, & Drabman, 1983). In both of these studies, children who were shown videotaped segments from popular television series containing drinking scenes expressed more favorable attitudes and beliefs about drinking than did children exposed to similar segments without drinking. In one case (Kotch et al., 1986) significant effects were found for boys but not girls, and then only for a few of the measures of alcohol beliefs that were obtained. Although these studies are suggestive, they are problematic. The effects were small and selective, and the experimental situation simply cannot provide a parallel to the real world where exposure occurs more or less regularly over relatively long periods of time. In sum, the available evidence regarding the influence of televised alcohol portrayals on young people is inconclusive, at best.

Studies on the effects on youth of exposure to depictions of drinking in films are rare. In one study (Bahk, 2001), college students were exposed to one of two versions of *A Star Is Born*, one of which depicted negative consequences of drinking for the lead character (e.g., performing poorly at a concert, fighting, dying in a drinking-related crash) and the other with the negative consequences edited out, leaving primarily positive consequences. The results indicated that viewing the positive consequences version, relative to the negative consequences version, led to more favorable attitudes toward drinking and to stronger intentions to drink. The effects were strongest for attitudes toward drinking for tension reduction and amusement and intentions to drink for stress management. In a similar study (Kulick & Rosenberg, 2001), college students were exposed to a series of eight film clips with or without depictions of spirits consumption. Results indicated that participants in the positive portrayal condition had significantly more positive alcohol expectancies compared with controls, although they did not differ significantly from those in the negative portrayals condition. Few studies have investigated the effects of film portrayals of drinking on young adults, adolescents, and children. The findings from these studies are mixed. Although evidence from one study shows that such portrayals can have small effects on drinking attitudes and intentions, the results from the second study are ambiguous.

The results of earlier experimental studies have been mixed with some studies finding no effects (e.g., Kohn, Smart, & Ogborne, 1984; Sobell et al., 1986) and other studies finding small or short-term effects for some study participants (e.g., Kohn & Smart, 1987). Apparently only a single recent study has been published that experimentally manipulated exposure to alcohol advertising (Lipsitz et al., 1993). This study was intended to investigate the effects of television beer advertising on alcohol expectancies among young people who were not yet regular drinkers. Groups of fifth and eighth graders were exposed to videotapes containing five beer commercials, the same five beer commercials plus two anti-drinking public service advertisements, or five soft drink commercials. Results of a memory task indicated that the children paid attention to the advertisements and remembered seeing the beer and soft drink commercials. Despite the attention given to the advertisements, however, neither exposure to the beer advertisements alone nor to the beer advertisements in combination with the anti-drinking PSAs affected scores on the alcohol expectancy scales. The results of these experimental studies offer only very limited evidence that alcohol advertising promotes more favorable drinking beliefs or increases

consumption. Laboratory studies of alcohol advertising effects, however, can be criticized (See Atkin, 1995; Grube, 1995, Grube, 2004; Lastovicka, 1995; Thorson, 1995). First, although laboratory experimental studies can control for extraneous factors and allow for strong causal inferences, they often lack realism. In the typical study, respondents will be exposed to alcohol advertising in an artificial setting (e.g., schoolroom) that does not resemble the natural viewing situation. As a result, it is difficult to draw conclusions about the “real-world” effects of alcohol advertising on beliefs and behaviors based on these laboratory studies. Second, it has been noted that advertisers target specific audiences with particular advertisements which can not necessarily be replicated in experimental conditions (Thorson, 1995).

Alcohol Promotion to Community Norms about Youth Drinking. Alcohol promotion may undermine existing community norms about alcohol or set new norms. However, there is little direct empirical evidence of this relation.

Strategies

Advertising Restrictions. At the aggregate level, a central focus has been on trends in alcohol advertising, per capita consumption and drinking problems. Only a few studies have considered the effects of alcohol advertising restrictions on alcohol consumption or problems. Saffer (1991) investigated the effects of restrictions on broadcast alcohol advertising on alcohol consumption and alcohol problems (liver cirrhosis mortality, motor vehicle fatalities) in 17 European and North American countries. He found that countries with partial restrictions on alcohol advertising had lower alcohol consumption and fewer problems than countries with no restrictions. Countries with complete bans had lower rates than countries with partial restrictions. A reanalysis, however, suggested that there was reverse causation, with those countries experiencing low rates of alcohol problems being more likely to adopt alcohol advertising bans than were countries with high rates of alcohol problems (Young, 1993). A study of alcohol advertising restrictions in 20 countries over 26 years found that moving from no restrictions to partial restrictions or from partial restrictions to total bans reduced alcohol consumption between 5%-8% (Saffer & Dhaval, 2002). Other recent studies have found no effects of advertising bans (Nelson & Young, 2001).

Saffer (2002) completed a review of published research literature on the potential effects of alcohol advertising on consumption and in particular the effects on youth drinking. He concluded that the results of the review suggest that alcohol advertising does increase consumption but that an alcohol advertising ban alone is insufficient to limit all forms of promotion and that a comprehensive ban would receive substantial public support. Saffer and Dhaval (2002) concluded following an analysis of national alcohol consumption related to total advertising expenditures that alcohol advertising bans decrease alcohol consumption. They found that one more ban on beer and wine or on spirits advertising would reduce consumption by about 5% and one more ban on all alcohol advertising in a media would reduce consumption by about 8%. Nelson (2003) used a panel of 45 states for the period 1982–1997. This study analyzes the importance of several restrictive alcohol regulations, including advertising bans for billboards, bans of price advertising, state monopoly control of retail stores, and changes in the minimum legal drinking age. In contrast to previous research, the study allows for substitution among beverages as a response to a regulation that targets a specific beverage. Nelson (2003) concluded

that “bans of advertising do not reduce total alcohol consumption, which partly reflects substitution effects.” Recently, it has been estimated that a total ban on alcohol advertising in the US would result in a 16.4% decrease in alcohol-related life-years lost, and a partial advertising ban would result in a 4% reduction in alcohol-related life-years lost (Hollingworth et al., 2006). Tremblay and Okuyama (2001) conducted an analysis of the potential effect of spirits advertising on the demand for spirits as a result of spirits producers ending their voluntary ban on broadcast advertising. The authors argued that previous conclusions of policy economists that removing this voluntary ban had no effect on alcohol consumption was incorrect because it ignores the fact that advertising restrictions may affect industry competition as well as market demand.

Some natural experiments on partial advertising bans have not provided a sound basis for determining the unique potency of advertising (Montonen, 1996). Studies of partial advertising bans in Canadian provinces (Ogborne & Smart, 1980; Smart & Cutler, 1976) failed to show clear impacts perhaps because advertising from outside the province was not restricted. Other international studies found that bans produced no drop in consumption and that stricter rules did not produce lower rates of drinking (Simpson, Beirness, Mayhew, & Donelson, 1985). In contrast, a major cross-national time-series study of advertising bans implemented in European Community countries during the 1970s showed significant effects, including lower levels of consumption and alcohol-related problems, as indicated by motor vehicle fatality rates (Edwards et al., 1994; Saffer, 1991, 1995, 1998). Apparently no studies have investigated the specific effects of advertising restrictions on drinking or drinking problems among young people. The effects of advertising restrictions on young people’s drinking is best considered an open question.

Warning Labels Warning labels on beverage containers constitute another strategy for targeting risky drinking. The warning label legislation is among the few U.S. federal alcohol policies motivated by public health concerns to be successfully enacted after 20 years of legislative attempts (Kaskutas, 1995). It was enacted in 1988 (P.L. 100-690) and implemented in November 1989. The warning label mandated on all alcohol containers carried a “Government Warning” tag line and alluded to the Surgeon General as the source of the determinations covered. The warnings included: 1) birth defects risks during pregnancy; 2) impairment when driving; 3) impairment when operating machinery; and 4) health problems. Some states also require posted warnings of alcohol risks in establishments that serve or sell alcohol.

An early evaluation of warning labels on alcohol beverage containers in the US found that about one fifth of respondents to a national survey remembered seeing the warnings six months after their introduction (Kaskutas & Greenfield, 1992; Graves, 1993). A study of US adolescents found that there were increases in awareness, exposure to, and memory of the labels after they were implemented, but there were no changes in alcohol use or beliefs about the risks targeted by the warning (MacKinnon, Pentz, & Stacy, 1993).

Self-reported precautionary behaviors have increased including personal caution regarding drinking and driving and drinking during pregnancy (Kaskutas & Greenfield, 1992; Greenfield, 1997; Greenfield & Kaskutas, 1998; Greenfield et al., 1999). No direct impacts of warning labels on alcohol-related problems have been reported. Much of the effect seen is consistent with the intent of Congress to remind the public of certain risks associated with drinking (Greenfield et

al., 1999). An experimental study of college students by Snyder and Blood (1992) involved participants looking at different advertisements for alcoholic products, some with the U.S. Surgeon General's warning and some without. Results showed that the warnings did not increase perceptions of alcohol risk and even made products more attractive to both drinkers and nondrinkers. Conversely, the U.S. Warning Labels Study found that awareness—as indicated by conversations about risks—was greater among the more frequent drinkers, including young adults (Kaskutas & Greenfield, 1997; Greenfield & Kaskutas, 1998).

The effect of warning label exposure on conversations about risks of drinking during pregnancy was seen also among women of childbearing age (Kaskutas, Greenfield, Lee, & Cote, 1998), and not limited to those with high levels of health consciousness (Kaskutas & Greenfield, 1997). Conversely, studies in prenatal clinics yielded little indication that the warning label had little effect on drinking by inner city ethnic minority women (Hankin, Sloan, & Sokol, 1998) so certain groups at particularly high risk may not be expected to be effectively reached. Greenfield and Kaskutas (1998) noted that, while after four or more years, warning label exposure rates may have leveled off, penetration of the warning label has been sufficient to reach numerous heavy drinkers (Greenfield, 1997). The more drinkers handle (open) containers and, especially for men, the more alcohol they purchased, the more likely the more they are to have seen and recalled the label's messages. Thus, warning labels assure that those most involved in drinking will have exposure to health messages. Overall, there is only limited evidence that alcohol beverage warning labels have any discernable effect on problem drinking among young people.

Mass Media Counter-Advertising Campaigns. This intervention involves disseminating information about a product, its effects, or the industry that promotes it, in order to decrease its appeal directly (Stewart, 1997). Counter-advertising can take the form of media literacy efforts to raise public awareness of industry tactics, and a module in community or school prevention programs (e.g., Greenfield & Zimmerman, 1993). There is evidence that synergies are achieved by implementing multi-faceted strategies, such as health messages at the point of purchase signs and public service announcements (PSAs) (Kaskutas & Graves, 1994; Kaskutas et al., 1998).

Billboard Bans of Alcohol Advertising— Billboard advertising, which can also include freestanding signs and signs on buildings, vehicles and other public locations (such as bus placards or subway ads) have been targeted by communities as a prevention strategy to reduce alcohol promotion. Some communities have undertaken the strategy of restricting or limiting the number and/or placement of billboards which contain alcohol advertising (Hackbarth et al., 2001). Such strategies are based upon the potential influence of exposure to positive alcohol messages on intention to drink and actual drinking by underage persons.

Milwaukee Fighting Back's *Erase and Replace Campaign* successfully reduced the number of billboards and signs advertising alcohol in the community. The campaign pressured billboard companies to abide by voluntary advertising guidelines by threatening to advocate for policies that would ban all billboards in the area. Companies complied with voluntary guidelines by agreeing to limit alcohol and tobacco advertising on billboards in Milwaukee County. The San Antonio based Fighting Back "chapter" helped youth organize to replace billboards advertising alcohol with billboards with positive messages. As part of this effort was a billboard "count" that

compared the numbers of billboards in minority neighborhoods with Anglo communities. The target of the effort were two the billboard advertising companies in the city. See Rabago (2000).

A complete handbook for local action on alcohol advertising is found at:

<http://www.faceproject.org/Resources/CommunityActionKits.html> See the University of Minnesota School of Public Health suggested legal ordinance to limit billboards which advertise alcohol: <http://www.epi.umn.edu/alcohol/sample/billbrd.shtm>. as well as the Health Policy Guide: <http://www.healthpolicyguide.org/doc.asp?id=126> and Coalitions against Alcohol and Drug Abuse (CADCA) at: http://www.cspinet.org/booze/Alcohol_Advertising.pdf.

Nelson (2003) as a part of his study of the effect of several restrictive alcohol regulations, included advertising bans for billboards and bans of price advertising. In contrast to previous research, the study allows for substitution among beverages and concluded that “bans of advertising do not reduce total alcohol consumption, which partly reflects substitution effects.” Nelson did not address the effects of advertising bans on underage drinking. There are no studies specifically of the effects of a local ban or restriction on billboard or public advertising of alcohol and underage drinking initiation or drinking level.

Summary

Alcohol portrayals are relatively common on television, in film, and in music and music videos. These portrayals are largely positive or neutral, often associating drinking with positive consequences or desirable attributes. Negative consequences of drinking are rarely portrayed. Only a few studies have investigated the effects of exposure to alcohol portrayals in popular media. With some notable exceptions (e.g., Saffer, 1997), experimental and ecological studies have produced little or no evidence that alcohol advertising affects drinking beliefs, behaviors, or problems among young people. In contrast to experimental and ecological studies, however, survey research studies on alcohol advertising and young people consistently indicate that there are small, but significant, correlations between awareness of and affect toward alcohol advertising and drinking beliefs and behaviors among young people. Children and adolescents who are more aware of and favorably disposed to alcohol advertisements hold more favorable beliefs about drinking, intend to drink more frequently as adults, and drink more frequently and in larger quantities than do other young people. Taken as a whole, the survey studies provide some evidence that alcohol advertising *may* influence drinking beliefs and behaviors among some children and adolescents.

A growing body of research is confirming and extending these findings (cf. Martin et al., 2002). This evidence, however, is far from conclusive. Because of the cross-sectional design of most of the published studies, causal inferences are difficult. Alcohol advertising may predispose young people to drink or the opposite may be true instead. That is, young people who are favorable toward drinking may seek out information about alcohol and thus be more attentive to alcohol advertisements. Although studies using longitudinal data and nonrecursive modeling techniques suggest that responses to advertising affect many drinking behaviors, further research is needed. Longitudinal studies that follow the samples of young people from childhood to late adolescence and that adequately control for past drinking behaviors and predisposition would be particularly useful.

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