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Scientific Evidence for Developing a Logic Model on Underage Drinking

A Reference Guide for Community Environmental Prevention

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Scientific Evidence for Developing a Logic Model on Underage Drinking: A Reference Guide for Community Environmental Prevention

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This reference guide is part of a series of community guides and manuals entitled :

Guides for States and Communities in Support of Environmental Prevention

The guides and manuals provide instructions to assist States in supporting communities in full implementing and evaluating the effects of environmental prevention strategies focused on alcohol, tobacco and other drug problems. The guides in this series include the following:

- Guide to Strategic Planning of Environmental Prevention Using a Logic Model
- Scientific Evidence for Developing a Local Logic Model On Alcohol-Related Motor Vehicle Crashes: *A Reference Guide for Community Environmental Prevention*
- Scientific Evidence for Developing a Local Logic Model On Underage Drinking: *A Reference Guide for Community Environmental Prevention*
- Collecting Data in Support of a Local Strategic Plan Using a Logic Model: *A Guide for States in Support of Environmental Prevention*
- Using Archival Data to Develop Local Alcohol, Tobacco, and Other Drug Problem Indicators: *Reference Guide for Community Environmental Prevention*
- Creating a Local Prevention Data Storage and Retrieval System: *Guide in Support of a Local Management Information System for Environmental Prevention based upon a Logic Model*

Implementation and Operation of a Local Strategic Plan for Environmental Prevention: *Guide in Support of a Logic Model*

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Executive Summary

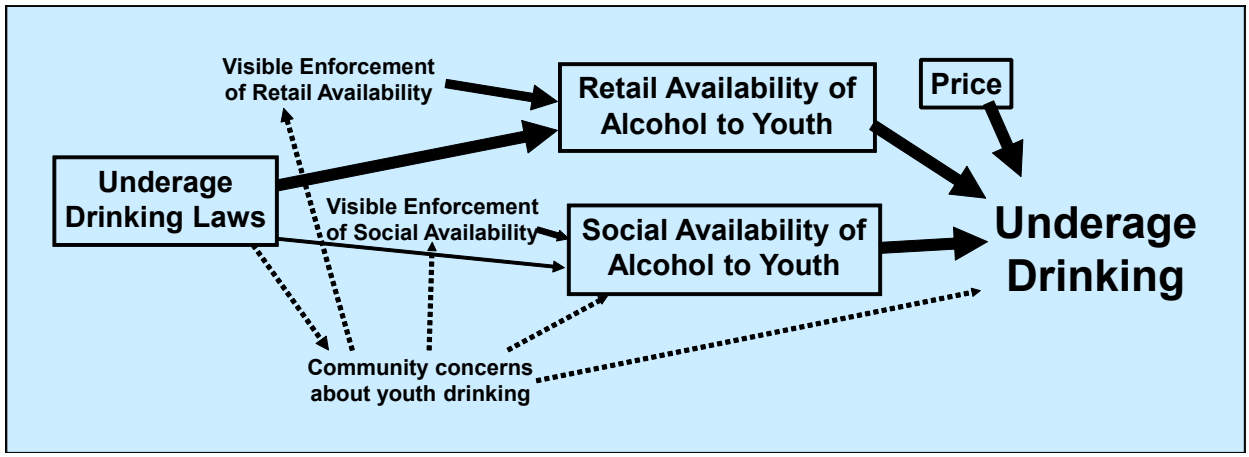
A major concern for communities is the use of alcohol and drugs by young people and related problems, including traffic crashes and fatalities, unwanted and risky sex, pregnancy, and intentional injury. Therefore, in an effort to keep youth safe, the reduction of alcohol use by youth is a primary goal of prevention. That outcome can be achieved by environmental prevention strategies.

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

For a local environmental prevention effort that wishes to reduce underage drinking, the best science must be utilized. To be highly effective, those factors that science has shown to be most related to underage drinking at the population level should be addressed. Here, such factors are defined as *intermediate variables* that research has demonstrated as significant contributors to drinking by youth.

This executive summary supports local strategic environmental prevention planning using a logic model. The purpose is to identify those intermediate variables and strategies that have the potential to be effective in any community environmental prevention effort to reduce underage drinking and related harms.

The figure below identifies the key intermediate variables involved in underage drinking as identified by science. In this figure, **Underage Drinking Laws** are associated with **Underage Drinking** through the intermediate variables of **Retail Availability of Alcohol to Youth** and **Social Availability of Alcohol to Youth**. In other words, as alcohol is more available to youth, the risk of underage drinking increases, along with alcohol-related problems.



The strength of the relationship between an intermediate variable and Underage Drinking or between intermediate variables is shown by the prominence of the arrows.

Strong Relationship: Strong evidence of relationship based on three or more studies of population level prevention effects; and/or strong effect on other intermediate variables that have population level prevention effects.

Moderate Relationship: Strong evidence of the relationship based on one or two studies of population level prevention effects; and/or evidence of moderate effect on other intermediate variables that have population level prevention effects.

Minor Relationship: Evidence of the relationship with only limited or no evidence of population level prevention effects but some evidence of target group effects.

Logical Relationship: Theoretical, but no empirical evidence of relationship and/or no evidence of population level prevention effect or only target group prevention effects.

Each intermediate variable is described briefly here including scientific evidence about its contribution to underage drinking and relationships with other intermediate variables. A summary of published scientific research concerning the variables and strategies can be seen in the complete guide entitled: *Scientific Evidence for Developing a Logic Model on Underage Drinking: A Reference Guide for Community Environmental Prevention*.

Intermediate Variable: Price

Price 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.

Most studies have focused on the relation between taxation or price and alcohol consumption and related problems among youth (Grossman, Chaloupka, Saffer, & Laixuthai, 1994). 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.

More recent studies suggest that the relations between taxes on alcohol and alcohol consumption and problems may have weakened in recent years in the United States, possibly because of the implementation of the age 21 Minimum Legal Drinking Age (MLDA) and other alcohol policies (Young & Likens, 2000).

Intermediate Variable: Retail Availability of Alcohol to Youth

Retail availability refers to the ease of physical access to alcohol through commercial sources. Such 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 the community. **Retail Availability of Alcohol to Youth** has a strong relationship to **Underage Drinking** and

therefore with alcohol-related problems. Further, **Retail Availability of Alcohol to Youth** is directly related to **Underage Drinking Laws** and **Visible Enforcement of Retail Availability** of such laws.

Intermediate Variable: Visible Enforcement of Retail Availability

Visible enforcement refers to enforcing policies to decrease retail availability as well as youth use of alcohol through threat of sanctions including arrest, prosecution, and punishment. **Visible Enforcement of Retail Availability** is strongly related to **Retail Availability of Alcohol to Youth**. Although no scientific evidence exists, the model assumes that **Community Concerns about Youth Drinking** has an effect on **Visible Enforcement of Retail and Social Availability** if it supports an emphasis on local enforcement.

Intermediate Variable: Social Availability of Alcohol to Youth

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. **Social Availability,** along with **Retail Availability** and **Price** have strong relationships to **Underage Drinking**. **Social Availability of Alcohol to Youth** is directly affected by **Visible Enforcement of Social Availability**, **Underage Drinking Laws** and **Community Concerns about Youth Drinking**.

Intermediate Variable: Visible Enforcement of Social Availability

Enforcement refers to enforcing policies to decrease social availability as well as youth use of alcohol through threat of sanctions. **Visible Enforcement of Social Availability** is moderately related to **Social Availability of Alcohol to Youth**. Although no scientific evidence exists, the model assumes that **Community Norms about Youth Drinking** has an effect on **Visible Enforcement of Social Availability** if it supports an emphasis on local enforcement.

Intermediate Variable: Underage Drinking Laws

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 in statute. **Underage Drinking Laws** strongly affect **Retail Availability of Alcohol to Youth** and moderately affect **Social Availability of Alcohol to Youth**. In addition, there is a theoretical relationship of influence to **Community Concerns about Youth Drinking**.

Intermediate Variable: Community Concern about Youth Drinking

Community Concern about Youth Drinking refers to the level of local approval or disapproval of youth drinking by adults other than their parents in the broader community. While there is no scientific evidence of the relationship of **Community Concern about Youth Drinking** to the level of **Underage Drinking** at the population level, experience with real communities suggests that that **Underage Drinking Laws** affect **Community Concerns about Youth Drinking** that in turn has an effect

on **Visible Enforcement OF RETAIL AVAILABILITY** and **VISIBLE ENFORCEMENT OF SOCIAL Availability** TO YOUTH.

As the table below shows, environmental prevention strategies exist that have been shown by science to effect or have the potential to effect one or more of these intermediate variables. Each strategy is coded according to existing evidence of effects.

The relative strength of a strategy's effects on **Underage Drinking,** intermediate variables, and/or youthful alcohol-related problems is indicated by the number of stars given:

★★★ **Strong effect** (3 or more studies demonstrating effect)

★★ **Moderate effect** (1-2 studies demonstrating effect)

★ **Weak** (3 or more studies) **or Unknown effect** (insufficient research to date)

Summary of Underage Drinking Intermediate Variables and Related Strategies

INTERMEDIATE VARIABLES	STRATEGIES
Price	Excise Taxes on Alcohol *** Restrictions on Price Promotions and Alcohol Discounts *
Retail Availability of Alcohol to Youth	Minimum Drinking Age *** Types of Retail Outlets *** State Retail Monopolies *** Densities or Concentrations of Retail Outlets *** Hours and Days of Sale *** Responsible Beverage Service Programs *** Lower Levels of Alcohol in Beverages ** Interlock Devices *** Checking IDs ** Legal (Tort) Liability Concerning Alcohol Sales & Service to Youth ** Controls on Licenses to Sell Alcohol *
Visible Enforcement of Retail Availability	Compliance Checks ** Punishment and Sanctions ** License Suspension/Revocation ***
Social Availability of Alcohol to Youth	Curfews for Youth * Social Host Liability * Restricting Access to Alcohol at Social Events * Drinking Locations and Possession of Alcohol **
Visible Enforcement of Social Availability	Party Patrols * Reducing Social and Third Party Access to Alcohol * Keg Registration** Social Host Ordinance*
Community Concerns about Youth Drinking	Community Coalitions **

The strategies listed are ones with most potential for effect. Communities are encouraged to select the strategies with the highest number of stars. Communities will also recognize those strategies that are already in operation in the community. Each strategy is briefly described below according to the strength of effect on **Underage Drinking**. Refer to the complete guide (Scientific Evidence for Developing a Local Logic Model On Underage Drinking: A Reference Guide for Community Environmental Prevention) for more detailed information.

This Executive Summary provides recommendations for including key intermediate variables and prevention strategies in developing a local strategic plan utilizing a logic model. See Babor, et al. (2010) for a summary of environmental policy research.

At least three community trials have demonstrated the effectiveness of utilizing these key intermediate variables and strategies to reduce underage drinking and related harm, including Community Trials (Holder, et al., 2000), Sacramento Neighborhood Alcohol Prevention Project (Treno, et al., 2007), and Communities Mobilizing for Change on Alcohol (Wagenaar, et al., 2005). Also see Babor, et al (2010) for a summary of research evidence on policy and environmental prevention.

Strategies for Intervening in Underage Drinking

STRATEGIES WITH A STRONG EFFECT ***	
Densities or Concentrations of Retail Outlets	Managing the number of retail outlets in terms of population densities (number of outlets per person) or geographic densities (number of outlets per mile of roadway) through licensing policies.
Excise Taxes on Alcohol	Policy that increases the excise taxes on alcohol influences consumption through the increase in price.
Hours and Days of Sale	Changes in licensing provisions of on-premise or off-premise outlets that substantially modify hours of service can have a significant effect on drinking and related problems.
Interlock Devices	Automobile ignition interlock devices that prevent vehicle from starting until the driver passes a breath test.
License Suspension/Revocation	The sanction of suspending or revoking a license as a result of drunk driving or other underage drinking offenses.
Minimum Drinking Age	Increasing the legal age for purchase and consumption of alcohol to age 21 to reduce alcohol sales, use and problems among youth.
Responsible Beverage Service Programs	The prevention of alcohol service to youth and to intoxicated patrons through requiring clerks or servers to check IDs and recognize false IDs and through implementation of alcohol servicing policies in licensed establishments.
State Retail Monopolies	Government ownership of alcohol sales outlets in the interest of public order and public health through reduction of the number of outlets, limiting the hours of sales and removing the private profit motive for increasing sales.
Types of Retail Outlets	Written policies regarding the sales of alcoholic beverages to youth in both off-premise and on-premise retail outlets; off-premise outlets are particularly important sources of alcohol for underage persons.

STRATEGIES WITH A MODERATE EFFECT **	
Checking IDs	Policies and training to clerks and servers of alcohol retail on-premise or off-premise to recognize false or fake age identification cards, frequently used by underage persons.
Community Coalitions	Formation of a coalition of persons with interest and concern about underage drinking to actively change the policy and normative community environment regarding youth access to alcohol.
Compliance Checks	Systematic checking by law enforcement of whether a licensed establishment actually sells alcohol to underage persons or "underage looking persons".
Drinking Locations and Possession of Alcohol	Laws and policies about public drinking or intoxication that specify locations where drinking cannot occur, such as parks, recreational locations, beaches, lakes, or the workplace.
Keg Registration	Policy requiring that the purchaser's identity is tagged with the number of a beer keg holding the purchaser responsible if access is provided to underage persons.
Legal (Tort) Liability Concerning Alcohol Sales & Service to Youth	Legal and administrative regulations that hold persons or establishments responsible for alcohol-involved harm as the result of the sale or service of alcohol to youth or for the social provision of alcohol to youth. Liability may involve civil penalties and financial compensation.
Lower Levels of Alcohol in Beverages	Retail availability of low-alcohol content drinks at social events.
Punishment and Sanctions	Various forms of punishments for underage drinking violations including fines, community service, and loss of driver's license that vary across states and municipalities.
STRATEGIES WITH A WEAK OR UNKNOWN EFFECT *	
Controls on Licenses to Sell Alcohol	Alcohol control agencies check the credentials of those seeking licenses to sell alcoholic beverages including the minimum age of alcohol sellers, criminal records, etc.
Curfews for Youth	Policy that establishes a time when children and young people below certain ages must be home thus reducing the availability of alcohol to youth through social sources.
Party Patrols	A local enforcement strategy in which police arrive at a social event held in a home, outdoor area or other public location in which alcohol is being served to check the age identification of party participants.
Reducing Social and Third Party Access to Alcohol	Priorities recommended by the US Department of Justice Office of Juvenile Justice and Delinquency Prevention including "shoulder taps" and compliance checks.
Restricting Access to Alcohol at Social Events	Policies that prevent underage access to alcohol at parties or other social events on or off college campuses, including banning beer kegs and prohibiting home deliveries of large quantities of alcohol.

Restrictions on Price Promotions and Alcohol Discounts	Regulation or restriction of "happy hours" and other price promotions of alcohol especially in on-premise outlets by individual outlets, campuses, local communities, or the state.
Social Host Liability	Adults who provide alcohol to a minor in a social setting can be sued through civil action for damages or injury caused by that minor person.
Social Host Ordinance	A local ordinance that establishes either a civil or criminal offense for a person who provides alcohol to persons under 21 years of age and that enables law enforcement to cite the host of the party or who owns or controls the property where the party occurs

References

Babor, Thomas, et al. (2010), *Alcohol: No Ordinary Commodity: Research and Public Policy*, Second Edition, Substantially Revised. New York: Oxford University Press.

Grossman, M., Chaloupka, F. J., Saffer, H., & Laixuthai, A. (1994). Effects of alcohol price policy on youth: A summary of economic research. *Journal of Research on Adolescence*, 4(2), 347-364.

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Wagenaar, A. C., Toomey, T. L., & Erickson, D. J. (2005c). Preventing youth access to alcohol: Outcomes from a multi-community time-series trial. *Addiction*, 100(3), 335-345.

Young, D. J., & Likens, T. W. (2000). Alcohol regulation and auto fatalities. *International Review of Law and Economics*, 20, 107-126.

I. Introduction

A major concern for communities is the use of alcohol and drugs by young people and related problems, including traffic crashes and fatalities, unwanted and risky sex, pregnancy, and intentional injury. Therefore, in an effort to keep youth safe, the reduction of alcohol use by youth is a primary goal of prevention. That outcome can be achieved by environmental prevention strategies.

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

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 three- to five-fold increased risk of problem drinking later in life.

This document is designed for state and local community practitioners and managers in selecting and committing to strategic actions to reduce problems related to drinking by youth who are under the legal age for drinking or possession of alcohol. The purpose of this document is to provide a summary of the scientific evidence about key intermediate variables and intervention strategies regarding underage drinking. It is designed to answer the question:

> What do state and local prevention professionals need to know in order to select one or more effective strategies to address the problem of underage drinking and to plan its accomplishment?

This document is a companion to the guides for building a community logic model and for selecting the measures to gauge success. As described in the *Guide to Strategic Planning for Environmental Prevention Using a Logic Model*, a logic model is a practical means for selecting, planning, implementing and evaluating environmental and population-base prevention strategies. See that document for definitions, selecting the prevention goal(s), building the local logic model, and using this document to select intervention strategies.

II. Underage Drinking: The Logic Model

Underage Drinking refers to any use of alcohol by persons under the legal drinking age of 21.

The basic causal model of underage drinking is:

Underage Drinking Laws → Availability of Alcohol to Youth → Underage Drinking

In this model, **Underage Drinking Laws** are associated with **Underage Drinking** through the intermediate variable **Availability of Alcohol to Youth**. In other words, as alcohol is more available to youth, the risk of underage drinking increases, along with alcohol-related problems.

Scientific research has shown that the only way a community can effectively reduce underage drinking and associated problems is to impact the intermediate variables involved.

Intervention strategies do not affect underage drinking or related problems directly. However, such strategies can alter intermediate variables. Measuring changes in intermediate variables as a result of such strategies is essential to evaluation and environmental prevention monitoring by the local community.

Intermediate variables are factors that directly or in combination impact outcomes.

Intervention strategies aare used to change intermediate variables in order to reduce alcohol, tobacco and other drug problems.

A community can address a number of intermediate variables to affect underage drinking. Key intermediate variables (having a strong effect on underage drinking) include:

- **Underage Drinking related to:**
  - Retail Availability of Alcohol to Youth
  - Social Availability of Alcohol to Youth
  - Price
- **Retail Availability of Alcohol to Youth related to:**
  - Underage Drinking Laws
  - Visible Enforcement of Retail Sales
- **Social Availability of Alcohol to Youth related to:**
  - Underage Drinking Laws

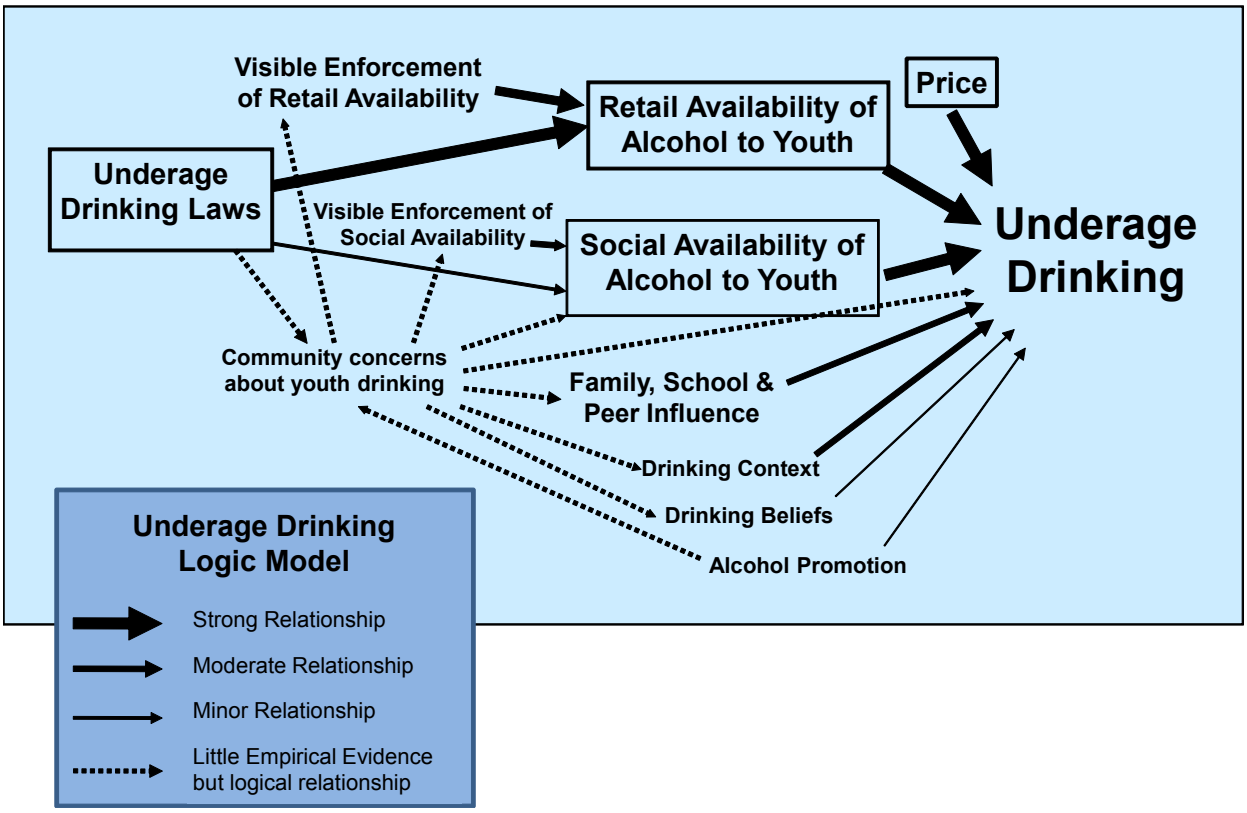
– Visible Enforcement of Social Availability

Other intermediate variables (having moderate or minor effects on underage drinking) include:

- Community concerns about youth drinking
- Family, school and peer influence
- Drinking beliefs
- Drinking context
- Alcohol promotion

Scientific studies demonstrate how these variables interact to produce the problem and provide evidence of intervention strategies that affect the overall outcome of reducing underage drinking and associated problems.[1] Figure 1 illustrates the relationships among these intermediate variables as confirmed by science.

Figure 1. Underage Drinking Logic Model



As shown in figure 1, the strength of the relationship between an intermediate variable and Underage Drinking or between intermediate variables is indicated in the logic model by the prominence of the arrows. The level of strength is based on scientific evidence of those relationships and of the

1. A full discussion of the research can be found at www.pire.org, go to the right hand column under Featured Websites and select Logic Models for the Prevention of Alcohol, Tobacco and Other Drug Problems. Scroll down to find links to documents on these topics.

population level effects on Underage Drinking, alcohol-related problems or other key Intermediate Variables resulting from environmental prevention interventions.

Strong Relationship: Strong evidence of relationship based on three or more studies of population level prevention effects; and/or strong effect on other intermediate variables that have population level prevention effects.

Moderate Relationship: Strong evidence of the relationship based on one or two studies of population level prevention effects; and/or evidence of moderate effect on other intermediate variables that have population level prevention effects.

Minor Relationship: Evidence of the relationship with only limited or no evidence of population level prevention effects but some evidence of target group effects.

Logical Relationship: Theoretical, but no empirical evidence of relationship and/or no evidence of population level prevention effect or only target group prevention effects.

This guide is further organized into two sections. Chapter III summarizes the scientific evidence about the intermediate variables and relationships among the intermediate variables. Chapter IV summarizes the prevention interventions strategies and their effectiveness in reducing underage drinking and associated problems.

Table 1. Definition of Intermediate Variables

INTERMEDIATE VARIABLE	DEFINITION
Underage Drinking	Any use of alcohol by persons under the legal drinking age of 21.
Retail Availability of Alcohol to Youth	The ease of physical access to alcohol through commercial sources.
Price	The retail price or direct monetary costs of a product.
Social Availability of Alcohol to Youth	Access to alcohol through "social sources" including receiving, stealing, or buying substances from friends, relatives, and strangers.
Underage Drinking Laws	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.
Visible Enforcement of Retail Availability	Enforcement of official policies to decrease retail availability as well as youth use of alcohol through threat of sanctions such as arrest, prosecution and punishment.
Visible Enforcement of Social Availability	Enforcement of policies and existing ordinance(s) concerning providing or making alcohol available to underage persons in social situations, as well as youth use of alcohol, through threat of sanctions such as arrest, prosecution and punishment.
Community Concerns about Youth Drinking	The level of local approval or disapproval of youth drinking by adults in the broader community.
Family, School and Peer Influence	Social sources of influence over the acquisition of knowledge, attitudes, and values about substance use by youth.

INTERMEDIATE VARIABLE	DEFINITION
Drinking Beliefs	Correlates of underage drinking behavior – alcohol attitudes, alcohol expectancies, normative beliefs, subjective availability and resistance/refusal efficacy beliefs.
Drinking Context	Where one drinks, with whom on drinks, and when one drinks.
Alcohol Promotion	Retail attempts to increase demand through advertising and promotion of alcohol products.

III. Intermediate Variables

Each intermediate variable is described in this chapter including scientific evidence about its function within the logic model and relationships with other variables. Intervention strategies and their effects are described in the next chapter.

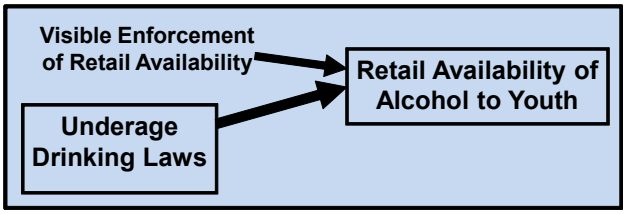
A. Intermediate Variable: Retail Availability of Alcohol to Youth

Retail availability refers to the ease of physical access to alcohol through commercial sources. Such 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 the community.

In general, when retail alcohol is inexpensive, 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 to alcohol by underage persons. Retail 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.

The logic model shows that **Retail Availability of Alcohol to Youth** has a strong relationship to **Underage Drinking** and therefore with alcohol-related problems. Further, **Retail Availability of Alcohol to Youth** is directly related to **Underage Drinking Laws and Visible Enforcement of Retail Availability** of such laws.



While the evidence from studies of overall consumption and alcohol-related problems provides convincing evidence of their relationship to the level of retail availability, there are fewer studies that 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).

Commercial outlets were the second most important source of alcohol for high school students (Wagenaar et al., 1996). Purchase surveys reveal that anywhere from 30 percent to 90 percent of outlets will sell alcohol to underage buyers, depending upon their geographical location (Forster et al., 1994; 1995; Preusser & Williams, 1992; Grube, 1997b). Such results are also found in the ORI Oregon Healthy Teens survey that found that commercial sources were used by 26 percent of 8th grade drinkers and 30 percent of 11th grader drinkers.

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). Similarly, evidence shows that outlet density was positively associated with frequency of underage drinking and driving and riding with drinking drivers (Treno, Grube, and Martin, 2003).

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 percent of the outlets approached. Purchase rates were highest at convenience (38 percent) and grocery (36 percent) stores but were relatively low (14 percent) 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 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.

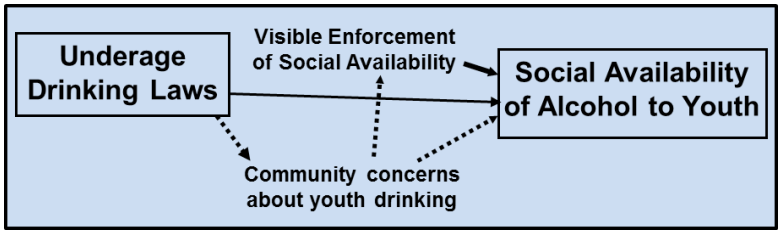
In a recent study of college students, individual binge drinking was independently associated with community patterns of alcohol availability, policy enforcement, and control (Weitzman, Chen, & Subramanian, 2005). Specifically, students exposed to high levels of alcohol availability were at higher risk 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).

Alcohol sales rate is positively related to students' use of commercial alcohol sources and perceived alcohol availability, but is not directly associated with use of social alcohol sources and drinking behaviors (Paschall et al., 2007b). Additional analyses indicated stronger associations between drinking behaviors and use of social alcohol sources relative to other predictors. An indirect association between the alcohol sales rate and alcohol use behaviors was supported, concluding 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 drink-

ing than use of commercial alcohol sources and perceived ease of obtaining alcohol (Paschall et al., 2007b).

B. Intermediate Variable: Social Availability of Alcohol to Youth

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.



The logic model shows that **Social Availability,** along with **Retail Availability** and **Price** has strong relationships to **Underage Drinking**. **Social Availability of Alcohol to Youth** is directly affected by **Visible Enforcement of Social Availability**, **Underage Drinking Laws** and **Community Concerns about Youth Drinking**.

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). The major source of alcohol for high school students is at parties where older adolescents or young adults introduce their younger peers to drinking (Wagenaar et al., 1996). In the same study 70 percent of 8th grade drinkers and 73 percent of 11th grade 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 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 (Toomey, Fabian, Erickson, & Lenk, 2007). In contrast, only 8 percent of the general adult population entering alcohol establishments was 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 percent of 6th graders, 56 percent of 9th graders, and 60 percent 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.

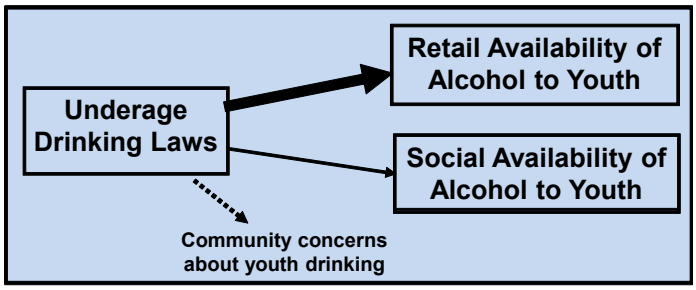
Further focus groups have also indicated that underage youth typically procure alcohol from commercial sources and adults, or at parties where parents and other adults are not present (Jones-Webb et al., 1997a; Wagenaar et al., 1993). Beer is the primary beverage of choice of the underage and a major source of beer is a social event 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).

C. Intermediate Variable: Underage Drinking Laws

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 in statute.

The logic model shows that **Underage Drinking Laws** strongly affect **Retail Availability of Alcohol to Youth** and moderately affects **Social Availability of Alcohol to Youth**. In addition, there is a theoretical relationship to **Community Concerns about Youth Drinking**.



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.

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. There is 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 (U.S. General Accounting Office, 1987). 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 from recent studies show 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).

The minimum legal drinking age affected self-reported alcohol use among young people and reduced traffic crashes (O'Malley and Wagenaar, 1991). Further, the effect on car crashes continued well after young people reached the legal drinking age. 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).

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).

An analysis of 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 showed lower problem levels among adolescents when the drinking age was higher (Wagenaar and Toomey, 2002). Additional scientific evidence suggests that higher minimum purchase age has also reduced non-traffic injuries (Jones, Pieper, & Robertson, 1992; Birckmayer & Hemenway, 1999).

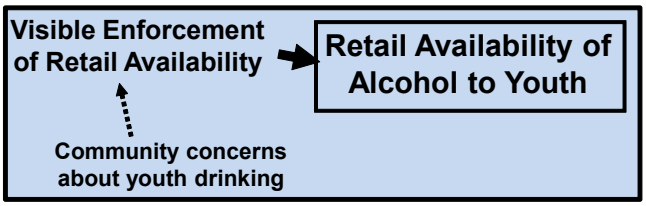
Compared to a wide range of other programs and efforts to reduce drinking among high school students, college students and other teenagers, increasing the legal age for purchase and consumption of alcohol to 21 appears to have been the most effective strategy. It is clear, however, that the benefits of a higher drinking age are only realized if the law is enforced. Enactment and enforcement of MIP laws and sales laws appears to decrease purchase.

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 to 90 percent 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 percent to 40 percent, especially when combined with media and other community and policy activities (Grube, 1997b; Wagenaar et al., 2000a).

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.

D. Intermediate Variable: Visible Enforcement of Retail Availability

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.



In the logic model, **Visible Enforcement of Retail Availability** is strongly related to **Retail Availability of Alcohol to Youth.** Although no scientific evidence exists, the model assumes that **Community Concern about Youth Drinking** has an effect on **Visible Enforcement of Retail Availability** if it supports an emphasis on local enforcement.

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.

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.

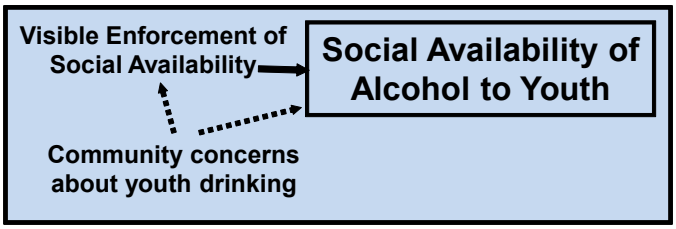
The review of published research concerning minimum drinking age and youth consumption by Wagenaar and Toomey (2002) found a significant inverse relationship between the legal age and alcohol consumption. However, the limited degree to which age 21 policies have been implemented is also shown in several 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 are 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.

Even with minimum drinking age limits, minors can often purchase alcohol with little difficulty. Increasing visible 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 percent to 40 percent, 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 percent. In a study in New Orleans, enforcement of underage sales laws increased compliance with alcohol sales laws from 11 percent to 39 percent (Scribner & Cohen, 2001). The greatest gains in compliance occurred among those retailers who had been cited (51 percent), but substantial gains were also seen for those not cited (35 percent).

E. Intermediate Variable: Visible Enforcement of Social Availability

This specific form of local enforcement is directed to reducing the drinking of underage persons. In practice, such enforcement can have a number of potential strategies for reducing social availability as well as possession of alcohol and drinking by minors. Typically there are a variety of sources of alcohol for youth, including family, siblings, peers and other adults who may purchase alcohol on behalf of an underage youth. The purpose of such enforcement is to reduce youth access to alcohol for any of these sources. While a number of enforcement strategies have been proposed, such as shoulder taps or enforcement of third party purchases of alcohol for underage youth, party patrols or keg registration, for example, need more extensive controlled testing and evaluation. However, such strategies have the potential to be effective as part of policy efforts to reduce physical availability of alcohol. For example, there is consistent evidence that the restrictions on handguns can be a means to reduce violence including social violence.



In the logic model, **Visible Enforcement of Social Availability** is moderately related to **Social Availability of Alcohol to Youth**. Although no scientific evidence exists, the model assumes that **Community Concern about Youth Drinking** has an effect on **Social Availability of Alcohol to Youth** and on **Visible Enforcement of Social Availability** if it supports an emphasis on local enforcement.

The relationship of **Visible Enforcement of Social Availability** of alcohol to youth to **Underage Drinking** is not as well documented as retail availability. 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 (Dent, Grube, and Biglan, 2005). The negative interaction between use of parent sources (with or without permission) for drinking and driving does appear to be reduced in stricter

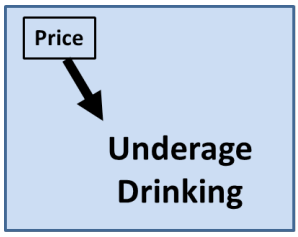
MIP-enforced communities below already infrequent overall levels, perhaps because of the wider message it sends parents regarding the unacceptability of providing alcohol to their children, especially if they are going to be driving or riding in vehicles. Beer consumption as the primary beverage of choice 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 (Cohen et al., 2001).

A recently concluded prevention trial in Oregon found that the intensity of local law enforcement including citations and warnings for alcohol possession, providing/selling alcohol to minors, etc. had a statistically significant dampening effect on both current use of alcohol and binge drinking among local youth. Researchers also found statistically significant effects for increased youth perceptions about the likelihood of enforcement in addition to youth ability to obtain alcohol from various sources. Overall, there was less drinking and less acquisition of alcohol in communities that had a high number of citations issued. The findings from this study support a conclusion that a high level of enforcement serves to reduce underage drinking regardless of the source of alcohol (Private communication from authors of an "in press" publication, 2011).

F. Intermediate Variable: Price

Price 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.

In the logic model, **Price** is strongly related to **Underage Drinking**, but does not interact with any other variable.



Most studies have focused on the relation between taxation or price and alcohol consumption and related problems among youth (Grossman, Chaloupka, Saffer, & Laixuthai, 1994). 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.

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 Minimum Legal Drinking Age (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.

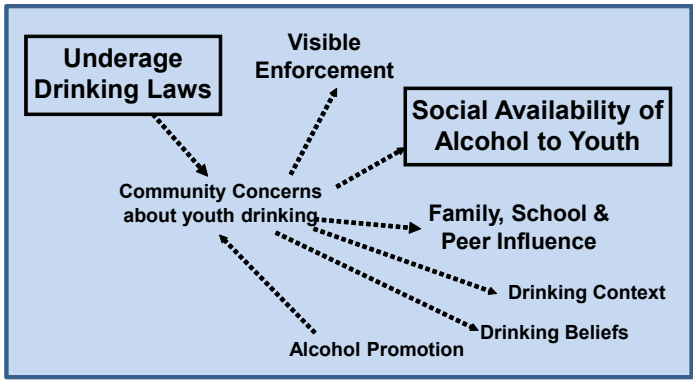
Similarly, a study showed that raising either MLDA or beer taxes in isolation led to fewer youth traffic fatalities (Ponicki, Gruenewald, & LaScala, 2007). A given change in price, however, caused a larger proportional change in fatalities when the MLDA was low than when it was high. Thus, a 10 percent increase in price was estimated to reduce traffic fatalities among youth by 3.1 percent if the legal drinking age were 18, but only by 1.9 percent if the legal drinking age were 21.

Therefore, 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).

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, such as, lower prices may signal greater acceptance of drinking.

G. Intermediate Variable: Community Concerns about Youth Drinking

Community Concerns 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 are influenced by perceptions of youth drinking by these others.



In the logic model, all relationships with **Community Concerns about Youth Drinking** are based in theory only. While there is no scientific evidence of the relationships or of population or target group prevention effects, logically these variables are related. The model proposes that **Underage Drinking Laws** and **Alcohol Promotion** affect community concerns. Further, the model proposes that **Community Concerns about Youth Drinking** has an effect on **Visible Enforcement** of both **Social Availability and Retail Availability,** on **Social Availability of Alcohol to Youth,** on **Family/School/Peer Influence,** on **Drinking Beliefs**, and on **Drinking Context**.

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).

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 concerns, there is limited research on the specific empirical relationship of overall community concerns about drinking in general and to the level of underage drinking. Thus it is reasonable to think about community concerns 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 concerns 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 concerns 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 (Wagenaar et al., 2000a; Holder and Treno, 1997).

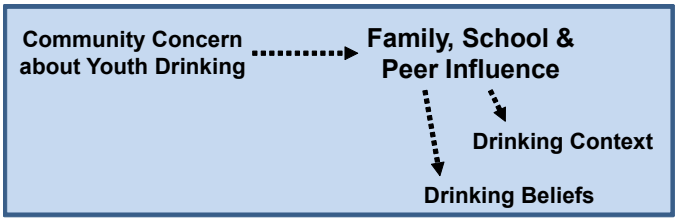
Community concerns can either support or hinder enforcement of underage drinking and possession laws (Little & Bishop, 1998). Parents can plead with law enforcement officials, prosecutors, or judges to be lenient with their child to avoid a permanent record, arguing, "We did this when we were young" (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 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.

It could be hypothesized that community concerns that are less supportive of underage drinking will be related to lower social availability of alcohol due to increased enforcement or restrictions on social drinking opportunities. Likewise, it can be theoretically postulated that community concerns 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. Further, it is postulated that community concerns that are less accepting of underage drinking will be related to stricter school policies and more consistent enforcement of these school policies. However, there is no empirical evidence of their effects of norms to social policies or youth drinking directly.

H. Intermediate Variable: Family, School and Peer Influence

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 including family, school and peers.

In the logic model, **Family, School and Peer Influence** is moderately related to **Underage Drinking**. Some evidence indicates that it has limited effect on **Drinking Beliefs** and **Drinking Context**. Theoretically, it is affected by **Community Concerns about Youth Drinking**.



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).

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).

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).

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.

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.

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.

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).

The potential influence by the school on drinking context has not been confirmed via empirical research.

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).

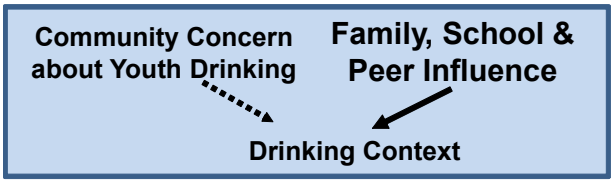
Many studies have addressed the relations between perceived peer drinking and approval of drinking and alcohol consumption (Baumrind, 1985, 1991; Brook et al., 1990; Chassin et al., 1993; Downs, 1987; Dishion & Loeber, 1985). These studies routinely have shown that young people who report (perceive) 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.

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).

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.

I. Intermediate Variable: Drinking Context

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.



The logic model shows that **Drinking Context** has a moderate effect on **Underage Drinking** due to evidence of effect on population level prevention. **Family, School and Peer Influence** is shown to have a minor effect on **Drinking Context**. In addition, **Community Concerns about Youth Drinking** theoretically affects it as described in a previous section.

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 patron-

ized 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.

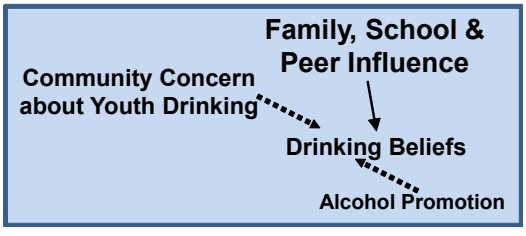
Parties and dates/socializing were the most common occasions associated with last heavy drinking event (Clapp, Shillington, and Segars, 2000). These events were almost evenly split between public (42.2 percent bars and restaurants) and private (43.1 percent homes) contexts. In their most recent binge 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 percent) 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.

J. Intermediate Variable: Drinking Beliefs

The logic model shows that **Drinking Beliefs** has a minor relationship to **Underage Drinking**, meaning there is some evidence of effect on the target group. The model proposes that **Family/School/Peer Influence** has a minor effect on **Drinking Beliefs** and that it is theoretically affected by **Community Concerns about Youth Drinking** and **Alcohol Promotion**.



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.

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).

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, Coovert, & Carnevalla, 1994).

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.

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 percent of 12th graders, 85 percent of 10th graders, and 68 percent 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).

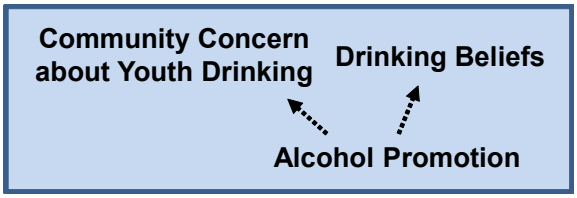
Research indicates that **resistance/refusal efficacy beliefs** are negatively correlated with frequency and quantity of alcohol consumption and with risky drinking (Lee & Oei, 1993; Oei et al., 2005; Young et al., 2007). Moreover, these efficacy beliefs may contribute to drinking independently of expectancies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

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.

K. Intermediate Variable: Alcohol Promotion

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.

In the logic model, **Alcohol Promotion** has a minor effect on **Underage Drinking** based on limited evidence of target group effects. The model proposes that this variable has a logical relationship to **Community Concerns about Youth Drinking** and to **Drinking Beliefs**.



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. 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.[1]

1. See http://www.ftc.gov/reports/alcohol/appendixb.htm

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.

A wide array of aalternative 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-logoed 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.

A research study of exposure to alcohol advertising on television and radio, in magazines and on the Internet by youth (aged 12–20 years) and adult (21 years and older) in the United States. The research shows that alcohol companies have placed significant amounts of advertising where youth are more likely per capita to be exposed to it than adults (Jernigen, Ostroff, and Ross, 2005). These data are updated in Center for Alcohol Marketing and Youth (2007). A review of published research on advertising and promotion of alcohol concludes that there is a link between advertising and young people's drinking knowledge, attitudes and behavior (Hastings, Anderson, Cooke, and Gordon, 2005).

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 percent. 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 percent (Snyder, Milici, Slater, Sun, and Strizhakova, 2006).

Research suggests that there is high recall of alcohol advertising among youth (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).

An analysis of 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, 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 (Kuo, Weschler, Greenberg, and Lee, 2003). 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 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 (Pasch et al., 2007).

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). Policies 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 (such as California Wine Institute, 2005), campaigning to remove specific advertising (such as Woodruff, 1996), and advocating restricted hours for television ads or locations of billboards, such as away from schools. Other initiatives involve working with scriptwriters to give a more balanced portrayal of drinking in the mass media (Wallack et al., 1993), seeking to curtail association between child-oriented events and advertising (such as Halloween and beer paraphernalia), and enacting warning messages and counter-advertising campaigns (Giesbrecht et al., 1998; Greenfield, Graves & Kaskutas, 1999).

The relationship between exposure to different forms of alcohol advertising and subsequent drinking among US adolescents revealed that for 7th grade non-drinkers, exposure to in-store beer displays predicted drinking onset by grade 9; for 7th grade drinkers, exposure to magazines with alcohol advertisements and to beer concession stands at sports or music events predicted frequency of grade 9 drinking (Ellickson, Collins, Hambarsoomians, and McCaffrey, 2005). These research findings are reflected in sales information that 74 percent of all beer sales in the U.S. are in retail establishments, led by convenience stores and gas stations and that young adults (aged 2127) are most likely to purchase beer in package and convenience stores (Miller Brewing Company, 1997) and that 75 percent of teens shop at convenience or convenience/gas stores weekly (Point of Purchase Advertising Institute, 1992).

Using supermarket scanner data from 64 market areas across the United States over 5 years, researchers 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 (Bray, Loomis, and Engelen, 2007).

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 (Grube and Wallack, 1994). Expectancies related to the effects of alcohol and intentions to drink can also be influenced by advertising. For example, 5th and 6th grade students exposed to television commercials had more positive expectations of the consequences of drinking (Lipsitz, Brake, Vincent, and Winters, 1993). Among pre-adolescents, 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 that drink, and their expectancies that drinking brings rewards (Austin and Meili, 1994).

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, studies have found small, but statistically significant, relations between television viewing and alcohol-related beliefs and behaviors (Tucker, 1985; Neuendorf, 1985; Robinson, Chen, & Killen, 1998; Coulson, Moran, and Nelson, 2001; Larivière, Larue, & Chalfant, 2000).

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 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 (Bahk, 2001; Kulick & Rosenberg, 2001). 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; Lipsitz et al., 1993). Laboratory studies of alcohol advertising effects, however, can be criticized (See Atkin, 1995; Grube, 1995, Grube, 2004; Lastovicka, 1995; Thorson, 1995).

Alcohol promotion may undermine existing community concerns about alcohol or set new norms. However, there is little direct empirical evidence of this relation.

IV. Intervention Strategies for Underage Drinking

This chapter provides information on each of the intervention strategies that have been studied in relation to underage drinking. Each of the strategies is described indicating the intermediate variable(s) it affects and a brief description of the scientific evidence of its effects. The relative strength of a strategy's effects on Underage Drinking and alcohol-related problems is indicated by the number of stars given:

★★★ **Strong effect** (3 or more studies demonstrating effect)

★★ **Moderate effect** (1-2 studies demonstrating effect)

★ **Weak** (3 or more studies) **or Unknown effect** (insufficient research to date)

This chapter is organized by the intermediate variables of the logic model as shown in table 2 of the listing of the intervention strategies for each intermediate variable. Note that a strategy may have an effect on more than one intermediate variable.

Table 2. Summary of Underage Drinking Intermediate Variables and Related Strategies

INTERMEDIATE VARIABLES	STRATEGIES
Underage Drinking Laws	Minimum Drinking Age *** Zero-Tolerance Laws *** Alcohol Law Possession ** Lowering BAC Limits for All Drivers (Per se) *** Administrative License Revocation *** Driver License Age Restrictions *** Graduated Licenses ** License Suspension/Revocation *** Legal (Tort) Liability Concerning Alcohol Sales & Service to Youth **

INTERMEDIATE VARIABLES	STRATEGIES
Retail Availability of Alcohol to Youth	Minimum Drinking Age *** Types of Retail Outlets *** State Retail Monopolies *** Densities or Concentrations of Retail Outlets *** Hours and Days of Sale *** Minimum Purchase Age Law Enforcement *** Responsible Beverage Service Programs *** Restrictions on Price Promotions and Alcohol Discounts * Community Comprehensive Safety Strategies *** Lower Levels of Alcohol in Beverages ** Interlock Devices *** Checking IDs ** Legal (Tort) Liability Concerning Alcohol Sales & Service to Youth ** Controls on Licenses to Sell Alcohol *
Visible Enforcement of Retail Availability	Legal (Tort) Liability Concerning Alcohol Sales & Service to Youth ** Compliance Checks *** Punishment and Sanctions ** License Suspension/Revocation *** Controls on Licenses to Sell Alcohol *
Social Availability of Alcohol to Youth	Curfews for Youth * Social Host Liability * Restricting Access to Alcohol at Social Events * Drinking Locations and Possession of Alcohol ** Interlock Devices *** Punishment and Sanctions **
Visible Enforcement of Social Availability	Party Patrols * Reducing Social and Third Party Access to Alcohol * Keg Registration** Social Host Ordinance* Social Host Liability * Drinking Locations and Possession of Alcohol **
Price	Excise Taxes on Alcohol *** Costs of Tobacco and Marijuana * Restrictions on Price Promotions and Alcohol Discounts *
Community Concerns about Youth Drinking	Community Coalitions *
Family, School and Peer Influence	Prevention and Education Programs ** Family Education Programs * School Policies and Violations * Alcohol Policies at Schools and Universities * Life Skills Training **

INTERMEDIATE VARIABLES	STRATEGIES
Drinking Beliefs	School Educational Approaches Alone * School Educational Approaches with Community Elements ** Social Norms Education or Marketing *
Drinking Context	See other variables
Alcohol Promotion	Advertising Restrictions * Warning Labels * Lower Levels of Alcohol in Beverages ** Mass Media Counter-Advertising Campaigns ** Billboard Bans of Alcohol Advertising *

A. Intervention Strategies for Underage Drinking Laws

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:

- The minimum drinking age and its enforcement.
- Zero tolerance or graduated licensing.
- Enforcement of sales of alcohol to underage persons, especially using compliance checks about retail sales of alcohol to underage persons.

These strategies and others are described in this section and in Intervention Strategies for Visible Enforcement below.

★★★ Strategy: Minimum Drinking Age

Intermediate Variable(s): Underage Drinking Laws; Retail Availability of Alcohol to Youth

Description: Increasing the legal age for purchase and consumption of alcohol to age 21 and therefore reduces alcohol sales, use, and problems among young people.

Scientific Evidence: In the most comprehensive review to date, an analysis of 78 measures of all identified published studies on the drinking age from 1960 to 1999, a total of 132 documents, conclude that, compared to a wide range of education 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 (Wagenaar and Toomey, 2002), including 45 percent showed that a higher legal drinking age was associated with reduced alcohol consumption among youth.

In 57 published studies that assessed the effects of changes in the legal minimum drinking age on over 100 crash outcome measures (e.g. fatal crashes, drink-driving crashes, self-reported driving after drinking), more than 50 percent indicated that raising the drinking age reduced crashes and lower-

ing the age raised the crash rate. The studies showed a statistically significant effect of changing the drinking age on vehicle crashes (Wagenaar & Toomey, 2002).

A review of 32 published research studies both before and after the minimum drinking age law changed found solid scientific evidence that increasing the minimum age for purchasing alcohol reduced the number of alcohol-involved traffic crashes for those younger than 21 (U.S. General Accounting Office, 1987).

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).

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 DUI. The result of implementation of a minimum drinking age of 21 years in New York State showed a 70 percent decrease in self-reported alcohol purchases by 19- and 20-year-olds (Yu, Varone & Shacket, 1997).

The minimum age affected self-reported alcohol use among young people and reduced traffic crashes and the effect on vehicle crashes continued well after young people reached the legal drinking age (O'Malley & Wagenaar, 1991).

Implementation of the uniform minimum legal drinking age of 21 in the United States reduced the overall prevalence of drinking and driving (Klepp, Schmid & Mirray, 1996).

Raising the minimum legal drinking age from 18 to 21 decreased single vehicle nighttime (SVN) crashes involving young drivers from 11 percent to 16 percent at all levels of crash severity (Saffer & Grossman, 1987a, b; Wagenaar, 1981, 1986b; Wagenaar & Maybee, 1986a).

Data from all 50 states and the District of Columbia for the years 1982 through 1997, showed that enactment of age 21 as the minimum drinking age law was responsible for a 19 percent 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 period (Voas et al., 1999).

★★★ Strategy: Zero-Tolerance Laws

Intermediate Variable(s): Underage Drinking Laws

Description: Lower blood alcohol concentration (BAC) limits for underage drivers and/or 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 BACs). Zero-tolerance laws also commonly invoke other penalties such as automatic license revocation.

Scientific Evidence: An analysis of the effect of zero-tolerance laws in the first 12 states enacting them showed a 20 percent relative reduction in the proportion of single vehicle nighttime (SVN) fatal crashes among drivers younger than 21, compared with nearby states that did not pass zero-tolerance laws (Hingson et al., 1994; Martin & Andreasson, 1996).

A review of six studies on the effect of zero-tolerance laws showed a reduction in injuries and crashes attributed to youthful drivers (Zwerling & Jones, 1999).

A study of all 50 states and the District of Columbia in the United States demonstrated a net decrease of 24 percent in the number of young drivers with positive BACs that resulted from implementation of zero-tolerance laws (Voas et al., 1999).

A 19 percent reduction in self-reported driving after any drinking and a 24 percent reduction in driving after five or more drinks was found using *Monitoring the Future (MTF)* survey data from 30 states (Wagenaar, O'Malley, & LaFond, in press).

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, 1999; Hingson et al., 1995). 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).

★★ Strategy: Alcohol Law Possession

Intermediate Variable(s): Underage Drinking Laws

Description: Another strategy used to reduce drinking among minors involves issuing penalties to youth themselves for possessing alcohol.

Scientific Evidence: Consistent enforcement of MPA laws, combined with penalties for possession, has been found to reduce alcohol-related crashes (Preusser & Williams, 1992).

★★★ Strategy: Lowering BAC Limits for All Drivers (Per se Laws)

Intermediate Variable(s): Underage Drinking Laws

Description: P*er se* laws— a specific BAC level (usually .05 or .08) at which a driver is considered legally impaired and can be arrested (Andenaes, 1988). The BAC can be measured by taking a blood sample from a driver or via an analysis of the exhaled breath. The invention of the breathalyser and other portable devices for collecting samples of drivers' breaths, combined with *per se* legislation, revolutionized law enforcement of drinking and driving.

All USA states have longstanding laws prohibiting driving while impaired by alcohol. The U.S. Congress included a provision in the Fiscal Year 2001 Department of Transportation and Related Agencies Appropriations Act 213 requiring states and territories to implement .08 BAC laws by October 1, 2003 or risk losing federal highway construction funds. Certain policies depend upon laws that clearly define drinking and driving with a BAC at or higher than a prescribed level for the whole population (e.g., .08 or .05) or for young drivers (usually zero or .02).

Scientific Evidence: Lowering the permissible BAC levels for adults to .08 in all states (Shults et al., 2001).

Reducing the legal BAC limit to .05 (Howat, Sleet, & Smith, 1991; National Committee on Injury Prevention and Control, 1989).

Strong evidence of the general deterrent influence of these *per se* laws although the effects tend to be temporary. The deterrent effect gradually wears off as drivers realize that their chances of detection are in fact not very high (Ross, 1982).

Internationally, lower BAC limits produced positive results consistently (Bartl and Esberger, 2000; Norström, 1997; Henstridge et al., 1997; Kloeden and McLean, 1994).

Effects in USA are mostly positive, long-term, and cost-effective (Mann et al., 2001).

Making motorists *uncertain* about the real risk of detection may paradoxically be the key to cost-effective deterrence (Homel, 1988; Nagin, 1998).

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).

★★★ Strategy: Administrative License Revocation

Intermediate Variable(s): Underage Drinking Laws

Description: Authorities can suspend licenses quickly and closer in time to the actual offense without a court hearing. Administrative suspension can occur in 40 of the 50 states in the USA. 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.

Scientific Evidence: Promptly suspending the driver's licenses of people who drive while intoxicated (DeJong & Hingson, 1998).

General deterrence and reduction in drinking-and-driving accidents (Ross, 1992; McKnight & Voas, 2001).

An average 5 percent reduction in alcohol-related crashes and 26 percent reduction in fatal crashes (a meta-analysis of 46 studies by Zobeck and Williams, 1994).

Benefit-to-cost ratio of $11 per dollar invested when violators receive a 6-month license suspension (Miller et al., 1998b).

Recidivism is lower for offenders receiving longer periods of suspension (Homel, 1981) and higher for offenders with no license suspension (McKnight & Voas, 2001; Peck, Sadler & Perrine, 1985; Ross, 1992).

While suspended, up to three-quarters of drivers continue to drive though less often and more cautious (Ross & Gonzales, 1988).

These laws were associated with a 5 to 9 percent 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).

★★★ Strategy: Driver License Age Restrictions

Intermediate Variable(s): Underage Drinking Laws

Description: Delay of legal driving to age 17 and/or night time curfews for teenage drivers.

Scientific Evidence:

- Between 65 and 85 percent reductions in 16-year-old driver fatal crashes (Williams, 1985; Williams, Karpf, and Zador, 1983).
- Reductions between 25 percent and 69 percent in crash rates for 16 year old drivers in states with curfew laws compared to those without such laws (Williams, 1985; Preusser, Williams, Zador, & Blomberg, 1984).

★★ Strategy: Graduated Licenses

Intermediate Variable(s): Underage Drinking Laws

Description: Graduated licensing places special limits on new or young drivers. For example it restricts nighttime driving and/or prohibits driving with other adolescents.

Scientific Evidence: A graduated licensing program in Connecticut led to a 14 percent net reduction in crash involvement among the youngest drivers (Ulmer, Ferguson, Williams, & Preusser, 2000).

Similarly, in New Zealand, a 23 percent 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 percent reduction in self-reported drinking and driving was found following the introduction of graduated licensing (Mann et al., 1997).

A 27 percent 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 percent), but still statistically significant.

★★★ Strategy: License Suspension/Revocation

Intermediate Variable(s): Underage Drinking Laws; Visible Enforcement of Retail Availability

Description: Sanction of suspending or revoking a license.

Scientific Evidence: Combining alcohol treatment with either license restriction or suspension is associated with the lowest DUI recidivism rates when comparing alcohol treatment, driver's license actions, and jail terms (An analysis of all drivers with a California license convicted of DUI during 1990 and 1991, DeYoung, 1997).

Implementing compulsory blood alcohol testing when traffic crashes result in injury (National Committee on Injury Prevention and Control, 1989).

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.

★★ Strategy: Legal (Tort) Liability Concerning Alcohol Sales and Service to Youth

Intermediate Variable(s): Underage Drinking Laws; Retail Availability of Alcohol to Youth; Visible Enforcement of Retail Availability

Description: Liability and administrative regulations are strategies that 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 sales and service establishes civil penalties, usually some form of a fine or liability for civil suit, for those who are found responsible for specific types of alcohol-involved harm, including providing alcohol to minors (see discussion by Sloan et al., 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). Further, 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. Most states require that the individual who is held liable must be old enough to consume alcohol. Thus a legal age third party, not the minor, is held liable for underage legal action. Therefore, even if a licensed establishment's sales and service of alcohol to a minor may be an illegal sale, the minor cannot establish the statutory cause of action (Matthew Bender & Co., *Liquor law Liability,* Ref. 14-401, Pub. 498).

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.

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.

Scientific Evidence: An analysis of traffic fatalities across all states of the effect of tort liability on commercial servers for selling alcohol to underage drinkers showed a reduction of fatality rates for drivers aged 15 to 20 over time and states (Sloan et al., 2000).\

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 (Mosher, 1984; 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).

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.

B. Intervention Strategies for Retail Availability of Alcohol to Youth

As described above under Intervention Strategies for Underage Drinking Laws, currently the most effective public policies to reduce the retail and social alcohol availability to youth and associated problems appear to be:

- The minimum drinking age and its enforcement.
- Zero tolerance or graduated licensing.
- Enforcement of sales of alcohol to underage persons, especially using compliance checks about retail sales of alcohol to underage persons.

Otherwise, strategies designed to affect access to alcohol from retail sources are not always targeted specifically at young or underage drinkers. However, they are included here as they have the potential to limit the retail availability of alcohol to all drinkers including youth.

★★★ Strategy: Types of Retail Outlets

Intermediate Variable(s): Retail Availability of Alcohol to Youth

Description: As described under the intermediate variable, Retail Availability, whether in a formal or an informal market, alcoholic beverages are sold to retail customers in two forms: one is for consumption elsewhere (off-premise) and the other form is "on-premise" retail outlets. See the description there for more information on these forms. 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 polices and, in some cases, these outlets actually benefit economically from sales of alcohol to youth. Purchase surveys show that anywhere from 30 percent to 90 percent 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).

Scientific Evidence: 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, Harwood, Toomey, Denk, & Zander, 2000a; Wagenaar & Wolfson, 1994).

For off-premise outlets, a major policy decision has been whether (and which kinds of) alcoholic beverages can be sold in conjunction with other goods, and which other goods. When Finland changed in 1968 from selling beer only in government monopoly stores to selling it also in grocery stores, alcohol consumption rose by 50 percent in the next year, and alcohol problem rates also shot up (Bruun, Edwards, & Lumio, 1975). This practical impediment can be easily overcome if purchases of alcohol are combined with other routine life activities e.g. shopping for other goods (Abbey, Scott & Smith, 1993).

★★★ Strategy: State Retail Monopolies

Intermediate Variable(s): Retail Availability of Alcohol to Youth

Description: One form of retail alcohol regulation retail outlets is for the government to monopolize ownership of one or more types. The idea of government ownership of alcohol sales outlets in the interest of public order or public health first arose around 1850. A government monopoly typically greatly reduced the number of outlets, limited the hours of operation for sales, and removed the private profit motive for increasing sales.

Scientific Evidence: Studies examining policy changes 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.

One of the few studies focusing on youth 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. Results show that age limits were observed less strictly in grocery stores and that the beverage of choice among girls changed from wine to medium strength beer. Therefore, minors could purchase alcohol more easily than when sales had been restricted to state stores and drinking among 13 to 17-year-olds increased (Valli, 1998).

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).

State retail alcohol monopolies are associated with reduced underage drinking and reduced deaths of impaired drivers aged 20 and younger. In states with a retail monopoly over spirits or wine and spirits, an average of 14.5 percent fewer high school students reported drinking alcohol in the past

30 days and 16.7 percent fewer reported binge drinking in the past 30 days than did high school students in non-monopoly states. Monopolies over both wine and spirits were associated with larger consumption reductions than monopolies over spirits only. Lower consumption rates in the monopoly states, in turn, were associated with a 9.3 percent reduction in the impaired-driving death rate of drivers aged 20 and younger in monopoly states versus non-monopoly states. The analysis suggests that alcohol monopolies prevent 45 impaired-driving deaths each year (Miller, Snowden, Birckmayer & Hendrie, 2006).

★★★ Strategy: Densities or Concentrations of Retail Outlets

Intermediate Variable(s): Retail Availability of Alcohol to Youth

Description: The number of outlets grows in response to population, and outlets are usually established along roadway systems. Outlet counts are either in terms of population densities (numbers of outlets per person) or geographic densities (numbers of outlets per kilometre of roadway). In developed societies, people may easily drive or use public transport to obtain alcohol. The number of outlets may be restricted directly or indirectly through policies that make licenses more difficult to obtain (e.g., by increasing the cost of a license). Several states limit the number of alcohol outlets and control the price of alcohol by maintaining state-run (rather than privately owned) outlets.

Scientific Evidence: Studies find significant relations between outlet densities and alcohol consumption, violence, drinking and driving, and car crashes (Gruenewald, Johnson, & Treno, 2002).

A study focusing on youth 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 (Treno et al., 2003).

Outlet density surrounding college campuses has 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.

A longitudinal study examined the effects of neighborhood characteristics (socioeconomic status and alcohol outlet density) on availability of alcohol and drinking among adolescents. Average household income was positively related to ease of obtaining alcohol from parents and negatively related to ease of purchase without an ID. Density of alcohol-licensed restaurants was positively related to ease of obtaining alcohol from someone over 21 and ease of purchase without ID. 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 (Todd, Grube, and Gruenewald, 2005).

Characteristics of off-premise alcohol outlets that may affect alcohol sales to youth were compared through random alcohol purchase surveys 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 percent of the outlets. Purchase rates were highest at convenience (38 percent) and grocery (36 percent) stores but were relatively low (14 percent) 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. The study concluded that (1) more frequent compliance checks by law enforcement agents should target convenience and grocery stores, (2) owners of off-premise outlets should require training of all salesclerks to ensure reliable checks of young-looking patron IDs, and (3) owners should post underage alcohol sales warning signs in clear view of patrons (Paschall et al., 2007a).

Policy strategies can be used to reduce alcohol availability for young people, 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, all of which do have the potential to reduce levels of alcohol consumption and alcohol-related problems (Grube and Nygaard, 2001; 2005).

The Task Force on Community Preventive Services (2009) of the federal Centers for Disease Control found strong evidence of a positive association between outlet density and excessive alcohol consumption and related harms. As a result they recommended limiting alcohol outlet density through the use of regulatory authority such as licensing and zoning, as a means of reducing heavy drinking and related harms.

Alcohol outlets concentrated in disadvantaged neighborhoods can contribute to adolescent drinking (Truong and Sturm, 2009). Local efforts to reduce underage drinking should utilize environmental interventions in order to curb opportunities for youth to obtain alcohol from commercial sources by tightening licensure, enforcing minimum age drinking laws or other measures.

One of the first studies that examined geographic clustering of underage drinking within neighborhoods found that the greatest on-premise and off-premise alcohol outlet density was associated with youth reports of riding with a drinking driver, making an alcohol purchase attempt and making a successful alcohol purchase attempt (Reboussin, et al., 2011). While youth often receive alcohol from social sources, commercial alcohol access is geographically concentrated within neighborhoods with the greatest off-premise outlet density.

★★★ Strategy: Hours and Days of Sale

Intermediate Variable(s): Retail Availability of Alcohol to Youth

Description: Changes in licensing provisions that substantially modify hours of service can have a significant effect on drinking and drinking-related problems overall. Studies suggest that reduced hours and days of sale can have net effects in reducing overall alcohol consumption and problems levels, with the effects concentrated during the times of closure but not matched by counterbalancing changes at other times of the week. Some states and communities prohibit on-premise or off-premise purchase of alcoholic beverages on Sundays or after a certain evening (not early morning) hour. 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.

Scientific Evidence: 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 (Smith, 1988; Gruenewald, 1991; Ligon & Thyer, 1993; Duailiba et al., 2007, in press).

One of the few studies focusing on youth 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 percent 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 (Kelley-Baker, Johnson, Voas, and Lange, 2000).

A number of studies have indicated that changing either the hours or the days of alcohol sales can redistribute the times at which many alcohol-related crashes and other alcohol-related violent events occur (Smith, 1988; Ligon & Thyer, 1993; Nordlund, 1984, 1985; Hauge & Nordlie, 1984; Österberg & Säilä, 1991).

Using local land-use powers, communities in California often enforce early closing times to keep the closing-time disturbance in the neighborhood to a reasonable hour (Wittman, 1997). Setting closing hours at a time later than local public transport systems run invites unsafe journeys home.

A recent examination of 48 published studies from 8 countries across four decades of the effects of changes in hours of sale showed a wide variety of research designs and mixed findings (Stockwell & Chikritzhs, 2009). Over half of these studies found changes in drinking or alcohol harm following changes in hours of sale. However, only 14 of the 48 studies were published in peer reviewed journals and employed baseline and control observations. A clear majority (79 percent) found that changes in hours of sales affected at least one outcome measure. Acute harms (closely associated in time with drinking events) were most likely to change, while chronic problems such as liver cirrhosis were unlikely to be impacted in the short term. The evidence supports a finding that changes in hours of sale will likely be associated with changes in alcohol-involved harms.

The Task Force on Community Preventive Services (2010) of the Centers for Disease Control found that sufficient strong evidence of the effects of restrictions on hours and days of sale exists to recommend that this strategy be utilized by communities wishing to reduce alcohol related harm.

★★★ Strategy: Minimum Purchase Age Law Enforcement

Intermediate Variable(s): Retail Availability of Alcohol to Youth

Description: Restrictions on retail access to alcohol through the establishment of minimum purchase age (MPA) laws. The minimum drinking/purchase age in all 50 states is 21 years. Similar to laws regarding youth tobacco access, restrictions on youth alcohol access were shown to be effective only with an enforcement component.

Scientific Evidence: Raising the MPA has resulted in decreased alcohol consumption (O'Malley & Wagenaar, 1991; Wagenaar, 1982; Williams & Lillis, 1986; Wagenaar & Toomey, 2002).

An undercover buying operation conducted by the Michigan State Police found that underage purchases were reduced by 73 percent, from 75 percent at baseline to 20 percent by the program's conclusion (Michigan State Police, 1989).

Underage police cadets in Denver were able to purchase 59 percent of the time at baseline, which dropped to 32 percent and 26 percent with increased enforcement (Preusser, Williams, & Weinstein, 1994).

Nationally, however, weak enforcement appears to be more the norm, resulting in youth apparently having readily available access to alcohol (Jones-Webb et al., 1997; Radecki & Strohl, 1991; Wagenaar et al., 1993).

Strategies to limit youth access to alcohol have generally involved some combination of merchant education, community participation and mobilization, and enforcement through compliance checks and penalties for violators (OJJDP, 1999). Multiple component policies that include community participation and enforcement, as well as media publicity, may reduce access by as much as 35 to 40 percent (Grube, 1997; Wagenaar, Murray & Gehan, 2000; Lewis et al., 1996).

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).

Without adequate penalties, attempts to enforce the MPA are greatly reduced (Forster, Murray, Wolfson & Wagenaar, 1995; Wagenaar & Wolfson, 1994).

★★★ Strategy: Responsible Beverage Service Programs

Intermediate Variable(s): Retail Availability of Alcohol to Youth

Description: The focus of RBS programs is to prevent alcohol service to minor and intoxicated patrons and to intervene so 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 (Saltz & Stanghetta, 1997) and off-license establishments (Grube, 1997). 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. 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.

Scientific Evidence: Training of servers and changing the establishment's serving policies effectively reduce service to obviously intoxicated customers, which reduces in number of intoxicated patrons leaving a bar and the number of violent incidents surrounding on-premise outlets (Wallin, Norstrom & Andreasson, 2003).

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).

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 train-

ing, 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).

Server training is most effective when coupled with a change in actual serving policy and practices of a bar or restaurant (Saltz and Hennessy, 1990b; Saltz, 1988; Saltz et al., 1987b).

Establishments with firm and clearly stated policies (e.g., that all patrons who appear younger than 30 must have their IDs checked), coupled with a system for monitoring staff compliance, are less likely to sell alcohol to minors (Wolfson et al., 1996a; Wolfson et al., 1996b).

Some studies, however, showed interventions had little influence (Grube, 1997; Lange, Stockwell, Rydon, & Beel, 1996, 1998). See Rydon & Stockwell, 1997, for a summary of RBS strategies for licensed establishments.

A qualitative analysis of 23 state RBS laws determined that RBS legislation was weak across all states overall. Although some states were strong in one or two of the RBS components, almost all states were weak in at least one component (Mosher, Toomey, Good, Harwood & Wagenaar, 2002)

Factors other than server training can also influence serving practices in licensed establishments, such as enforcement of existing ABC laws (Lange et al., 1998), server liability (or dram shop) laws (Buka & Birdthistle, 1999), high-profile server liability cases (Buka & Birdthistle, 1999), and community coalitions to encourage responsible serving practices. These factors can influence the degree of management support for server training and improvements in serving practices, essential for changing server behavior (Wolfson et al., 1996b).

Currently, 47 states and the District of Columbia prohibit sales to obviously intoxicated persons (Florida, Nevada, and Wyoming are the only exceptions). Despite these laws, alcohol sales to obviously intoxicated patrons in on-premise establishments, such as bars, continue to occur 58 to 85 percent of the time. These laws are often not enforced by the police and are ignored by bar and liquor store owners (Toomey et al., 2004).

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 (Wallin, Norstrom, & Andreasson, 2003).

★ Strategy: Restrictions on Price Promotions and Alcohol Discounts

Intermediate Variable(s): Retail Availability of Alcohol to Youth; Price

Description: Regulation or restriction of "happy hours" and other price promotions of alcohol (e.g., two drinks for the price of one, women drink for free), especially in on-premise outlets (i.e., bars and restaurants). 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.

Scientific Evidence: Babor, Mendelson, Greenberg, and Kuehnle (1978) found that happy hours were associated with higher consumption among both light and heavy drinkers.

Although this is a reasonable strategy, there is no research on its effectiveness.

★★★ Strategy: Community Comprehensive Safety Strategies

Intermediate Variable(s): Retail Availability of Alcohol to Youth

Description: Multifaceted local safety programs that typically mix DUI enforcement and general public information and awareness with enforcement of speeding and seatbelt laws. Programs might include a task force of city departments implementing activities such as media campaigns, business information programs, speeding and drunk-driving awareness days, speed watch telephone hotlines, police training, high-school peer-led education, Students Against Drunk Driving chapters, and college prevention programs.

Scientific Evidence: Multifaceted community-based approaches to alcohol control and DUI prevention (Holder et al., 2000; DeJong & Hingson, 1998).

A 25 percent greater decline in fatal crashes in 6 communities in Massachusetts compared to the rest of the state, including a 42 percent reduction in fatal automobile crashes, a 47 percent reduction in the number of fatally injured drivers who were positive for alcohol, an 8 percent decline in 16- to 25-year-old crash injuries, a decline in self-reported driving after drinking (specifically among youth), as well as observed speeding. The greatest fatal and injury crash reductions occurred in the 16 to 25-year-old age group (Hingson et al., 1996).

The Community Trials Project tested a five-component community intervention to reduce alcohol-related harm among people of all ages. The Community Trials fielded five intervention components: (1) a "Media and Mobilization" component to develop community organization and support; (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 (Holder & Treno, 1997).

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 experi-

mental 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).

The Sacramento Neighborhood Alcohol Prevention Project (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. 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. Using archival data, significant reductions were found in assaults as reported by police, aggregate emergency medical services (EMS) outcomes, EMS assaults, and EMS motor vehicle accidents. Results from SNAPP 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 (Treno, Gruenewald, Lee, and Remer, 2007).

A community organizing intervention (Communities Mobilizing for Change on Alcohol --CMCA) was designed to bring about change in policies regarding access to alcohol by those under 21. A strategy team was created in each community through numerous contacts with groups and organizations that might affect policies, practices, and norms for minors' access to alcohol to implement a variety of activities to reduce access and increased media coverage of alcohol issues in the community (Wagenaar, Gehan, Jones-Webb, Toomey, & Forster, 1999). 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 of 15 Minnesota and Wisconsin communities. The CMCA communities had lower levels of sales of alcohol to minors in their retail and had marginally lower sales to minors at bars and restaurants. Phone surveys of 18 to 20 year olds indicated that they were less likely to try to buy alcohol and that they were less likely to provide alcohol to others. The proportion of 18 to 20 year olds who reported drinking in the past 30 days lower in intervention communities. 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).

★★ Strategy: Lower Levels of Alcohol in Beverages

Intermediate Variable(s): Retail Availability of Alcohol to Youth; Alcohol Promotion

Description: Few studies of the specific effects of reduced-alcohol beverages on young people have been conducted

Scientific Evidence: 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 (Noval and Nilsson, 1984).

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) (Geller, Kalsher, and Clark, 1991).

★★★ Strategy: Interlock Devices

Intermediate Variable(s): Retail Availability of Alcohol to Youth; Social Availability of Alcohol to Youth

Description: Automobile ignition interlock devices that prevent a vehicle from starting until the driver passes a breath test.

Scientific Evidence: Devices are very effective for many alcohol-impaired offenders (An analysis of 8 studies, McKnight & Voas, 2001).

Effects limited to the period of the court order unless combined with treatment within a case management framework to deal with the underlying problems (DeYoung, Tashima, & Maston, 2005; Marques & Voas, 1995, 1998, 2005).

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.

★★ Strategy: Checking IDs

Intermediate Variable(s): Retail Availability of Alcohol to Youth

Description: Underage persons can obtain alcohol from retail sources using false or fake age identification cards.

Scientific Evidence: 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. Nearly 60 percent 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 percent of New York high school students reported the use of false identification to purchase alcohol compared with 14 percent in Pennsylvania (Preusser et al., 1995).

Fifteen percent of high school students, 14 percent of college freshmen, and 24 percent of youth reporting using illegal drugs said they were able to purchase beer by the case with borrowed, altered,

or fake IDs. 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 increased enforcement against stores that fail to identify underage customers (Schwartz et al., 1998).

★ Strategy: Controls on Licenses to Sell Alcohol

Intermediate Variable(s): Retail Availability of Alcohol to Youth; Visible Enforcement of Retail Availability

Description: 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 that 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.

Scientific Evidence: 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 (Treno, Gruenewald, Alaniz, Freisthler, and Remer, 2000).

C. Intervention Strategies for Visible Enforcement of Retail Sales

Communities with high levels of visible enforcement of retail sales of alcohol tend 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 (Dent, Grube, and Biglan, 2005).

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 strategies of Underage Drinking Laws can be achieved in practice.

★★★ Strategy: Compliance Checks

Intermediate Variable(s): Visible Enforcement of Retail Availability

Description: The systematic checking by law enforcement of whether a licensed establishment actually sales alcohol to underage persons or "underage looking persons".

Scientific Evidence: 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 percent 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 percent of outlets were compliant. Two months after the intervention, the level of compliance had increased to 39.9 percent. At 8 months after the intervention, there was a residual level of compliance even without any further media coverage.

★★ Strategy: Punishment and Sanctions

Intermediate Variable(s): Visible Enforcement of Retail Availability; Social Availability of Alcohol to Youth

Description: Includes various forms of punishments including fines, community service, and loss of driver's license. 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. While 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).

Scientific Evidence:

- 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).

- 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).

- 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, and 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.

- In summary, there is no evaluation of the effects of these policies or suspension on population level underage drinking or associated problems.

D. Intervention Strategies for Social Availability of Alcohol for Youth

The following additional strategies are designed to affect access to alcohol for youth from social sources. In summary, approaches such 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 are 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 heron (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).

★ Strategy: Curfews for Youth

Intermediate Variable(s): Social Availability of Alcohol to Youth

Description: 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.

Scientific Evidence: 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).

★ Strategy: Social Host Liability

Intermediate Variable(s): Social Availability of Alcohol to Youth; Visible Enforcement of Social Availability

Description: 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).

Scientific Evidence:

- 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.

★ Strategy: Restricting Access to Alcohol at Social Events

Intermediate Variable(s): Social Availability of Alcohol to Youth

Description: 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.

Scientific Evidence: 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.

★★ Strategy: Drinking Locations and Possession of Alcohol

Intermediate Variable(s): Social Availability of Alcohol to Youth; Visible Enforcement of Social Availability

Description: 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.

Scientific Evidence: 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.

E. Intervention Strategies for Visible Enforcement of Social Availability

The purpose of visible enforcement is to reduce social access to alcohol as well as to reduce possession of alcohol and drinking by minors. Access to alcohol includes family, siblings, peers and other adults who may purchase alcohol on behalf of an underage youth. While a number of enforcement strategies have been proposed, more extensive controlled testing and evaluation is needed. However, such strategies have the potential to be effective as part of policy efforts to reduce physical availability of alcohol.

As indicated under Visible Enforcement of Retail Availability, the bottom line is that no strategy to affect the social availability 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.

★ Strategy: Party Patrols

Intermediate Variable(s): Visible Enforcement of Social Availability

Description: 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. 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 concerns 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.

Scientific Evidence:

- 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.

- 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).

- Party Intervention Patrols were conducted in Pierce County, Washington between April 2010 and May 2011 as a strategy to reduce underage drinking (Cunningham, 2011). This approach combined the arrest of youth in possession of alcohol with a counseling session conducted by a chemical dependency professional that included screening to assess the risk level of alcohol and other drug use and a brief intervention. Additionally, parents or other responsible adults of arrested youth participated in a parent-to-parent meeting, similar to a brief intervention and received a packet of resources from trained parent volunteers. Evidence found included: (1) The Party Intervention Patrols increased the youth perceptions of potential harm if they drank alcohol regularly, (2) youth beliefs that "it is wrong for someone their age to drink alcohol regularly", and (3) a belief that "youth would be caught if they drank alcohol". Additionally, youth reported in follow-up interviews that they had not gone to parties after the Party Intervention Patrols or had reduced the number of parties they attended and reduced the amount of alcohol they drank when they did go to a party. Parents reported (1) increased supervision of their children's behavior in the future by monitoring the amount of alcohol in their home and by keeping track of where their children were when not at home, and (2) increased talking with their children about the legal and health risks of underage drinking.

★ Strategy: Reducing Social and Third Party Access to Alcohol

Intermediate Variable(s): Visible Enforcement of Social Availability

Description: 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 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. 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.

Scientific Evidence:

- The study of 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 (Toomey et al., 2007).
- "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.

★★ Strategy: Keg Registration

Intermediate Variable(s): Visible Enforcement of Social Availability

Description: 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.

Scientific Evidence: 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).

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 percent 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 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 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.

A cross-sectional analysis of the effects of state keg registration laws found the simple existence of a keg registration law was not associated with per capita beer consumption, the prevalence of adolescent binge drinking, and the prevalence of adolescents who drove after drinking or rode in cars whose drivers had done so (Ringwalt & Paschall, 2010). However, if stringency and comprehensiveness of a state level keg registration law was controlled for, a moderate negative association occurred with problem outcomes; that is, the more comprehensive the keg law, the more likely it was to have an effect on alcohol-related harms for youth.

★ Strategy: Social Host Ordinance

Intermediate Variable(s): Visible Enforcement of Social Availability

Description: A local ordinance that establishes either a civil or criminal offense for a person who provides alcohol to persons under 21 years of age and enables law enforcement to cite the individual who hosted the party or who owns or controls the property where parties occur. These responsible individuals may include older peers, parents, landowners and tenants. These ordinances are specifically directed at adults who might dismiss the state laws concerning underage drinking, health-related warnings, insist on serving minors, host parties and/or look the other way when others host on their property. The intent is not to seek out and punish adults who are regularly monitoring their children and who take reasonable precautions to prevent their children from hosting underage parties.

Scientific Evidence:

- While social host ordinances have been established in a number of localities across the country, no specific research concerning the effects of such an ordinance on reducing underage social access to alcohol has been undertaken. However, increased visible enforcement of underage drinking in general has been shown to reduce drinking, binge drinking and harm in general. Therefore, there is precedent for the potential of this enforcement strategy to reduce social availability of alcohol.

- 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.

F. Intervention Strategies Regarding Price

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.

★★★ Strategy: Excise Taxes on Alcohol

Intermediate Variable(s): Price

Description: 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. 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.

Scientific Evidence: 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.

Students who went to high school in states that had higher taxes and higher MLDAs were more likely to graduate from college (Cook and Moore, 1993).

Using a nationally representative sample of college students, indexing the federal beer tax to the rate of inflation since 1951 could lead to a 15 percent reduction in drinking participation among underage women, and a 17 percent and 21 percent reduction in high-risk drinking among underage women and women over 21, respectively (Chaloupka and Wechsler, 1996).

Increased costs appear to reduce drinking and driving among youth more than among adults (Chaloupka, Saffer, & Grossman, 1993).

A 10 percent increase in alcohol price is estimated to result in 7 percent less drinking and driving among all men and over 8 percent among all women. Price effects were even greater among young men by 13 percent and young women by 21 percent (Kenkel, 1993).

Price increases would reduce motor vehicle accident fatalities among 18-20 year olds (Dee, 1999; Dee and Evans, 2001).

Increasing taxation on alcohol in the US to keep pace with inflation is estimated to lead to a 19 percent reduction in heavy drinking by youth and a 6 percent 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 beverages (Saffer & Grossman, 1987a). Increasing the price of beer (typically the preferred beverage of youth) to keep pace with inflation is specifically estimated to reduce youth drinking by 9 percent and heavy drinking by 20 percent (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).

★ Strategy: Costs of Tobacco and Marijuana

Intermediate Variable(s): Price

Description: An important empirical question is what the effects of higher prices for alcohol on other substances of abuse, e.g., tobacco or marijuana.

Scientific Evidence: Several studies have found that alcohol and tobacco, or marijuana and tobacco, are complements to the use of alcohol (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, alcohol prices were found to be positively related to cigarette use, implying that cigarettes and liquor are substitutes such that as alcohol price increases, then smoking increases (Goel and Morey, 1995).

G. Intervention Strategies for Community Concerns about Youth Drinking

Strategies directed at community concerns and prevention of underage drinking have primarily been directed at public support of actions to reduce access to alcohol by youth and thus reductions in underage drinking. There are no examples of strategies that have attempted to change the general acceptability of drinking across all ages as a means to reduce underage drinking specifically.

However, the logic model proposes that Community Concerns regarding underage drinking can, 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.

★ Strategy: Community Coalitions

Intermediate Variable(s): Community Concerns about Youth Drinking

Description: Formation of a coalition of persons with interest and concern about underage drinking. Active and mobilized communities have shown clear decreases in alcohol, tobacco and other drug use and changes in perceived norms about substance use, particularly in relation to alcohol-related crashes.

Scientific Evidence:

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 concerns around alcohol issues. Results from the Community Trials Project (Holder & Treno, 1997) indicate that:

- Training in media advocacy can increase coverage of news events generated by local community members including volunteers.
- Increased news coverage can be generated for both electronic (television) and print media.
- Increased news coverage did focus public attention on specific issues in support of prevention components.
- While there are differential audiences/readers for the print (newspaper) and electronic (TV) media, both audiences are affected.

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).

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 percent to 33 percent, compared to a decrease from 45 percent to 36 percent in control sites (Lewis et al., 1996).

H. Intervention Strategies Regarding Family, School and Peer Influence

★★ Strategy: Prevention and Education Programs

Intermediate Variable(s): Family, School and Peer Influence

Description: Many prevention and education programs have been developed to convey information about alcohol (and other drugs) to children and youth. These programs seek to change attitudes and cultivate values that are inconsistent with substance use or (in the case of adults) are inconsistent with responsible use of substances. Strategies designed to shape knowledge, attitudes, and values overlap and are interrelated with strategies designed to change community values. For example, awareness campaigns educate communities and are intended to change community concerns. They also can change an individual's knowledge and attitudes.

Major categories of strategies focus on individual knowledge, attitudes, and values:

- *Prevention programs* – Prevention programs are usually implemented in schools, though they may also be delivered in other settings, such as community centers. They often consist of packaged curricula that include information about substances, resistance skills, and expressions of personal commitment. Short-term effects on consumption.

- *Normative education* – This strategy is based on youth's tendency to overestimate the amount of heavy drinking among their peers. The program uses prominently displayed informational materials to provide accurate information about drinking norms. Limited research shows no effects on consumption or alcohol-related problems

- *Family-oriented programs* – These programs are often operated in schools and community hubs and involve intensive participation in classes and meetings by both parents and children. Limited research shows effects on consumption and related problems

- *Rehabilitative programs for impaired drivers* – Rehabilitative programs are designed in part to change the knowledge and attitudes of individual drivers such that understanding of risks and responsible attitudes and behavior are reestablished. Effects on consumption and impaired driving. 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).

Scientific Evidence:

- Required attendance at an educational program, typically an alcohol education program, can be used as a sanction (PIRE, 1999).
- 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).

★ Strategy: Family Education Programs

Intermediate Variable(s): Family, School and Peer Influence

Description: 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.

Scientific Evidence: 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 percent in the control group versus 52 percent in the Preparing for the Drug Free Years group reported that they had initiated alcohol use, 42 percent versus 32 percent reported having been drunk, and 40 percent versus 24 percent 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? There has been limited investigation of family participation in preventive interventions from general populations and 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 (Spoth and Redmond, 2002). Further 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" (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.

★ Strategy: School Policies and Violations

Intermediate Variable(s): Family, School and Peer Influence

Description: 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. 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.

Scientific Evidence: A large majority (87 percent) of public schools report having zero-tolerance policies for alcohol violations (Heaviside, Rowand, Williams, & Farris, 1998). 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]).

A national survey of school principals asked about their responses to undesirable behavior (Gottfredson et al., 2000). Some consistency across grade levels was found in the rates of suspension and expulsion exclusively for alcohol infractions.

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.

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.

Other studies that have not focused exclusively on alcohol use report similar findings (Heaviside et al., 1998). When asked to report on 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, 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.

★ Strategy: Alcohol Policies at Schools and Universities

Intermediate Variable(s): Family, School and Peer Influence

Description: Schools and university policies are formal regulations that provide for sanctions against youth for the possession of alcohol on school or university property, prohibiting use by underage students, and/or restricting alcohol advertising on campus. The penalties are usually a part of school policies that ban or provide restrictions for possession or provision of alcohol on school property. Such policies are popular among schools, colleges, and universities. Nearly half of the elementary, middle/junior high, and senior high schools in the United States have explicit policies prohibiting

alcohol use on campus and at school functions and, in some cases, prohibiting the possession of alcohol by students (Modzeleski, Small, & Kann, 1999).

Scientific Evidence: Several studies provide promising but incomplete evidence of the potential for such administrative policies to reduce underage drinking (Wechsler, Kuo, Lee & Dowdall, 2000; Grimes & Swisher, 1989; Odo, McQuiller & Stretsky, 1999; Cohen & Rogers, 1997).

Students report such policies are barriers to drinking, but there are few controlled evaluations of such policies (Grimes and Swisher, 1989).

In a study of newly enacted policy that prohibited alcohol in all university affiliated living residences (i.e., dorms, fraternities, and sororities) found that such policies were associated with reduced prevalence of drinking in the affected residences, but not with the frequency of heavy drinking (Odo, McQuiller and Stretsky, 1999).

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).

★★ Strategy: Life Skills Training

Intermediate Variable(s): Family, School and Peer Influence

Description: Most commonly, peer influences are addressed through programs that focus specifically on resistance skills or more generally on life skills.

Scientific Evidence: 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 percent fewer drug users and 66 percent

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 percent 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.

I. Intervention Strategies Regarding Drinking Beliefs

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 non-recursive 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.

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 to communicate norms to young people about the unacceptability of their drinking and to adults about the unacceptability of providing alcohol to them.

★ Strategy: School Educational Approaches Alone

Intermediate Variable(s): Drinking Beliefs

Description: Traditionally, alcohol prevention for adolescents has focused on changing drinking beliefs through school-based education.

Scientific Evidence: 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).

★★ Strategy: School Educational Approaches with Community Elements

Intermediate Variable(s): Drinking Beliefs

Description: Adding community elements to school education may increase the effectiveness of school-based programs (Cuijpers, 2002).

Scientific Evidence:

- Project Northland (Perry et al., 1996), a school educational program that included components targeting sixth graders with family take-home assignments, has led to substantial reductions (19-46 percent) 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).

★ Strategy: Social Norms Education or Marketing

Intermediate Variable(s): Drinking Beliefs

Description: In addition to school-based education, media and public educational approaches are also used in an attempt to modify alcohol norms beliefs.

Scientific Evidence: 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.

A study of the effects of misperceptions of friends' and typical college students' drinking on college student drinking 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 (Campo et al., 2003).

In a study of a social norms program on a large university campus, the overwhelming majority of students (72.6 percent) did not believe the norms message that most students on campus had "0 to 4" drinks when they partied (Polonec, Major and Atwood, 2006). 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 non-significant 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.

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 (Weschler et al., 2003).

An analysis was conducted of college students' procession 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 unhealthier 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 Campo and Cameron (2006).

In a second paper focused on sociodemographics, normative perceptions, and individual attitudes on consumption of alcohol and tobacco use as well as exercise, the authors 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 (Cameron and Campo., (2006).'

The theory of normative social behavior posits that the associations between norms and behavior should take into account important moderating influences such as group identity and outcome expectancies (TNSB; Rimal & Real, 2005). For example, in a recent cross-sectional survey of college students, 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 (Real and Rimal, 2007).

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.

J. Intervention Strategies Regarding Drinking Context

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

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 of Alcohol to Youth section.

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 Availability of Alcohol to Youth section.

Extensive and visible drink drive enforcement can alter the drinking context, such as checking IDs and over serving customers as well as decisions by youth to drive in conjunction with drinking. See strategies in Visible Enforcement of Retail Availability section.

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 driver's 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 Strategy in the Underage Drinking Laws section.

K. Intervention Strategies Regarding Alcohol Promotion

★ Strategy: Advertising Restrictions

Intermediate Variable(s): Alcohol Promotion

Description: 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.

Scientific Evidence: Markowitz and Grossman (1998) concluded that restrictions on alcohol advertising and increases in illegal drug prices have no effects on violence.

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 percent-8 percent (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 percent and one more ban on all alcohol advertising in a media would reduce consumption by about 8 percent.

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 percent decrease in alcohol-related life-years lost, and a partial advertising ban would result in a 4 percent 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.

★ Strategy: Warning Labels

Intermediate Variable(s): Alcohol Promotion

Description: Warning labels on beverage containers constitute another strategy for targeting risky drinking.

Scientific Evidence: 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.

★★ Strategy: Mass Media Counter-Advertising Campaigns

Intermediate Variable(s): Alcohol Promotion

Description: 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).

Scientific Evidence: 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).

★ Strategy: Billboard Bans of Alcohol Advertising

Intermediate Variable(s): Alcohol Promotion

Description: 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.

Scientific Evidence: 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 (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.

V. References

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