

# **Public Policies and Adolescent Behavior and Problems**

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## I. Introduction to Adolescent Problems of Public Health Concern

While there are a number of behaviors and events which are considered undesired or socially disruptive for adolescents including poor school performance, anti-social behavior including vandalism and sex, this paper is focused on those problems or events which directly result in physical serious harm or death to the adolescent or to others caused by an adolescent. Examples of such health and personal safety events include:

- Traffic crashes including those which produce injury and fatality in which an adolescent was a driver or passenger or pedestrian.
- Homicide—The purposeful death of a youth at the hands of another or a purposeful death caused by a young person
- Suicide—The purposeful death of a youth at their own hands
- Assault or victimization—Intentional injury or bodily harm to a young person caused by another.
- Non traffic and unintentional injury and fatality—Any injury requiring medical care or the death of an adolescent which does not involve a motor vehicle nor is intentional, including drug or alcohol overdose .
- HIV or Hepatitis C infection—HIV infection in a young person
- Sexually Transmitted Diseases—An infection obtained through sexual contact.

According to the latest data from U.S. Department of Health and Human Services, Health Resources and Services Administration, Maternal and Child Health Bureau (U.S. Department of Health and Human Services, 2009) in 2006, there were 13,739 deaths among adolescents aged 15-19 years, a rate of 64.4 per 100,000. The rate for males was higher than that for females (90.7 versus 36.8 per 100,000). Injury has a death rate of 35.0 per 100,000 which is over three times the rate for homicide (9.3 per 100,000) followed by suicide (9.3 per 100,000), suicide (7.4), in contrast to malignant neoplasms (3.5 per 100,000), and heart disease (2.3 per 100,000).

Unintentional injury remains the leading cause of death (31.3 per 100,000) among adolescents and accounted for nearly half of all adolescent deaths among adolescents. Within this general category of injury-related deaths, motor vehicle traffic was the leading cause of mortality among 15- to 19-year-olds (27.1 per 100,000) in 2006, and represented almost half (45%) of injury-related deaths among adolescents. Alcohol is a significant factor in these deaths and almost one-third of adolescent drivers killed in crashes had been drinking. The second and third leading causes of death among adolescents aged 15-19 years were homicide and suicide, with rates of 10.8 and 7.3 per 100,000 or 17 and 11 percent of deaths within this age group. Firearms are the cause of 26% of fatal injury followed by poisoning, suffocation, and drowning.

Early, unprotected sex among young persons can have negative consequences. Birth rates among adolescents aged 15-19 years decreased annually during 1991--2005 but increased during 2005-2007, from 40.5 live births per 1,000 females in 2005 to 42.5 in 2007. The annual rate of AIDS diagnoses reported among males aged 15-19 years has nearly doubled in the past 10 years, from 1.3 cases per 100,000 population in 1997 to 2.5 cases in 2006. Many of these problems are associated or even directly caused by substance use including use of illicit or inappropriate use of

prescribed medication or drinking. Thus substance use becomes a major factor of concern in effective prevention of adolescent problems.

This paper will focus on policy and environmental approaches to reducing adolescent health and safety problems. A policy is a rule, regulation, or law that affects the social, economic, or geographic environment affecting behavior. The rationale for policies as a means to reduce adolescent problems is that effective policies exist which have shown to reduce the opportunities and incentives to engage in problem behaviors and as a result such behaviors occur less frequently. Policies that alter community environment for problem behavior are an essential component of efforts to prevent youth problems. The evidence of population-level or public health effects from policy approaches to prevention, as will be shown below, is substantial

## **II. Evidence of effectiveness for Public Policy approaches.**

What is known about specific public policies and their effectiveness in reducing adolescent problems at the population level? For convenience, public policy approaches directed at reducing substance use and abuse can be grouped into: (a) retail price and economic availability, and (b) physical availability including both retail and social access to abuseable products as well as environmental restrictions and opportunities. Policies affecting cost are relevant to influencing use or heavy use of substance abuse and other adolescent behaviors such as violence or condom use. There are other policies which seek to reduce problems through environmental changes and opportunities. Examples of public policies with public health and safety intention include: retail prices (related to excise taxes) on tobacco, alcohol and illicit drugs (related to supply and enforcement), retail availability of tobacco and alcohol; social access to alcohol and tobacco including legal age of retail purchase for alcohol and tobacco; retail and, age eligibility for driving licensing; the legal limit for Blood Alcohol Concentration (BAC) for driving. Other policy approaches include environmental strategies to reducing violence to and involving adolescents; condom distribution and access to contraceptive services; curfew laws; and public housing and local zoning including physical alteration of environment to reduce violence and vandalism.

### **Substance Abuse including use of tobacco, alcohol, and illicit drugs.**

Economists assess the effect of price on use of any good (or service) in terms of *price elasticity*. Price elasticity refers to the percent change in consumption expected for a unit change in price. Zero elasticity would mean no change in demand as price changes.

**Retail Price of Tobacco--** Although price is affected by other considerations as well, it most easily indexed to or measured as level of taxation on tobacco and alcohol (Young & Bielinska-Kwapisz, 2003). Chaloupka, Tauras, and Grossman (1997) concluded that a conservative estimate of the effect of cigarette prices on adolescent price elasticity is -1.0, i.e., for every percent increase in price there is corresponding percent decrease in adolescent use. Typically price elasticity is greater for adolescents than for adults (Lewit & Coate, 1982). The total price elasticity was -0.6 (-0.4 for taking up chewing and -0.2 for amount consumed). Meier and Licari (1997) found that increases in state taxes were effective in reducing cigarette use while federal tax increases were more effective due to cross-border private import of cigarettes. Chaloupka and Pacula (2000) analyzing the 1994 Monitoring the Future Study surveys of students in grades 8, 10, and 12 found that males were significantly more responsive to price than females and black males were more responsive to price than any other group. They concluded that increases

in price reduce the number of new smokers as well as the rate at which teens who already smoke use tobacco. Chaloupka, et al (2002) used tobacco company documents to clear evidence on the impact of cigarette prices on cigarette smoking, i.e., taxes and other price increases produced significant reductions in smoking especially among adolescents. Cawley, Markowitz and Tauras (2006) found a relationship between adolescent obesity, smoking initiation, and cigarette prices. Summary: In short tobacco prices are directly related to adolescent smoking levels and as prices increase, smoking among this age group decreases.

**Retail Price of Alcohol**--Alcohol like tobacco is a specially taxed product at both the federal and state levels such that the retail price of alcohol can be changed through excise tax changes. Chaloupka, Grossman, and Saffer (2002) found that the real prices of alcoholic beverages (i.e., the prices after accounting for the effects of inflation) have declined significantly such that between 1975 and 1990, the real price of distilled spirits fell by 32 percent, wine by 28 percent, and beer by 20 percent. Coate and Grossman (1988) found in early research that as the price of beer went up, the frequency of adolescent beer consumption went down. Other studies have found similar relationships (Grossman & Chaloupka, 1997; Grossman, Chaloupka, Saffer, & Laixuthai, 1995; Grossman, Coate, & Arluck, 1987).

As with tobacco, price effects are greater for young people than adults. Adolescents who drink weekly or are heavy drinkers (typically defined as five or more drinks per occasion) have more sensitivity to price other youth (Coate & Grossman, 1988). In general adolescents simply have less disposable income than other ages and thus less ability to purchase alcohol. Grossman, Chaloupka, Saffer, & Laixuthai, (1994) and Laixuthai & Chaloupka, (1993) estimated that increasing taxation on alcohol in the US to keep pace with inflation would lead to a 19% reduction in heavy drinking by youth and a 6% reduction in high risk drinking (Substantial reductions in drinking and driving and alcohol-related traffic fatalities also have been associated with price or tax increases across all beverage (Saffer & Grossman, 1987a). It has been specifically estimated that increasing the price of beer (typically the preferred beverage of youth) to keep pace with inflation would reduce youth drinking by 9% and heavy drinking by 20% (Laixuthai & Chaloupka, 1993). 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. Increased price appear to reduce drinking and driving among youth more than among adults (Chaloupka, Saffer, & Grossman, 1993). Kenkel (1993) estimated that a 10% increase in alcohol price would result in 13% less drinking and driving among young men and over 21% among young women. Dee (1999) and Dee and Evans (2001) reported that price increases would reduce motor vehicle accident fatalities among 18-20 year olds. Examining State data from 1971-1985, Chesson, Harrison, and Kassler (2000) reported that a \$1.00 alcohol tax increase would reduce gonorrhea rates by 2.1%. Markowitz, Kaestner, and Grossman, (2005) found association with youth risky sexual behavior and alcohol prices.

Since alcohol acts as a psychoactive substance, heavy drinking can increase the risk of violent injury or death as either a victim or perpetrator. Sorenson and Berk (2001) after accounting for potential confounders in the base population found that beer sales and handgun sales in California (from 1972 through 1999) generally predicted homicides one year particularly among young men and that reducing beer sales and handguns sold could reduce the number of homicides. A number of studies have examined the impact of the price of alcoholic beverages

on crime and suggest that increasing alcohol costs would reduce both violent and nonviolent crime, including damaging property, getting into fights, being a perpetrator of sexual assault, and abusing a child. Cook and Moore (1993) analyzed annual state-level data on violent crime rates and concluded that higher beer taxes could lead to significant reductions in rapes and robberies but would do little to reduce homicides and assaults. Grossman and Markowitz (1999, 2001) examined the effect of beer price on violence among students from 191 colleges and universities from 29 states and found that higher price for beer was associated lower incidences of: (1) getting into trouble with police or college authorities, (2) damaging property, (3) fighting or arguing and (4) being taken advantage of or taking advantage of someone sexually. The principal finding is that the incidence of each of these four acts of violence is inversely related to the price of beer in the state in which the student attends college. Markowitz (2001) concluding that higher beer taxes would reduce the likelihood of teens engaging in physical fights. Markowitz (2000a) found that higher beer taxes lead to a lower incidence of assault, but not rape or robbery and could also lead to lower probabilities of alcohol- or drug-involved assault. Markowitz and Grossman (2000) concluded that an increase in the price of alcohol will lead to a reduction in the incidence of violence as well as increased illegal drug prices and reduced alcohol availability could reduce the incidence of child abuse. Several studies have used individual level data to examine the effects of alcohol consumption and related prices on various violence-related behaviors including child abuse (Markowitz and Grossman, 1998), and spousal abuse (Markowitz, 2000).

**Retail Price and Illegal Drug Use**—Although illegal, retail price of illegal drugs also affects the demand. Pacula, Grossman, Chaloupka, O'Malley, and Johnston (2001) estimated that the price elasticity for use of marijuana in the last thirty days ranged from  $-0.002$  to  $-0.69$  such that a 10% increase in the cost of marijuana could produce as much as a 6.9% decrease in the number of youth who used in the last month. Other studies have also found that an increase in price yields decreased use of marijuana (De Simone & Farrelly, 2001) and (Pacula & Chaloupka, 2001), cocaine (Caulkins, 1995), and heroin (Saffer & Chaloupka, 1999). The underlying assumption for law enforcement is that it will reduce supplies and costs to suppliers and thus increase retail prices. However, massive increases in drug enforcement during the past two decades in the United States have not had the expected effect, i.e., prices for cocaine and heroin have fallen substantially without an evident decrease in demand (Caulkins, Reuter, & Taylor, 2006). Rydell and Everingham (1994) concluded, employing a series of mathematical models, that supply costs increase as producers replace seized product and assets, compensate drug traffickers for the risk of arrest and imprisonment, and devote resources to avoiding seizures and arrests.

However, as drug researchers have noted (Caulkins & Reuter, 2006); Reuter, 2001), retail drug markets are influenced by factors such as addiction, product illegality, and the role of violence. They point out that prohibition plus some modest but nontrivial level of enforcement can drive up drug prices beyond what they would be if drugs were legal. Summary: Efforts to increase the price of illicit drugs through interdiction would appear to affect their use, although it is not clear that this will affect drug abuse. In that adolescents have less disposable funds than other age groups, the potential price effects for illicit drugs could be more significant for youth.

### **Affecting Physical and Social Availability of Tobacco, Alcohol, and Illicit Drugs**

In addition to economic availability, the physical availability of potentially abusable products is important to prevention. Adolescent use of a product is more likely to occur when tobacco, alcohol, illicit drugs, and guns and the means to engage them are easily available. Examples of environmental strategies affecting availability include studies of heroin (Stimson & Oppenheimer, 1984) and tobacco (Harrison et al., 2000; Bauer, et al, 2002 Forster, et al 2003).

**Tobacco Retail Access**-- In the U.S., despite the fact that sales to those under 18 are illegal in all 50 states and in the District of Columbia, most youths say they can easily obtain cigarettes (Cummings, Sciandra, Pechacek, Orlandi, & Lynn, 1992; Jason, et al., 1991; and Forster, Hourigan, and McGovern (1992). Landrine, Klonoff, and Reina-Patton (2000) found that tobacco sales to minors in California communities decreased significantly after increased enforcement. Rigotti and colleagues (1997) found similar results in a Massachusetts study. Biglan, et al., (2000) evaluated a strategy in which retail clerks who refused to sell tobacco were given gift certificates and public recognition to clerks who refused to sell to minors such that sales rates declined from 57% at baseline to 22%, and increased retailer compliance with age identification for underage tobacco sales not only reduced tobacco sales to minors and youth smoking, but also underage drinking.

Doubeni, et al (2008) after a four-year longitudinal study of adolescents and found that, perceived accessibility increased smoking initiation among nonsmokers and regular smoking among all participants in a dose-response fashion as well as increasing the risk for smoking progression among initiators. Slater, et al (2007) used national Monitoring the Future school survey data and measures of cigarette point-of-sale advertising, promotions, prices, and placement and found that higher levels of advertising, lower cigarette prices, and greater availability of cigarette promotions were associated with smoking uptake. There is little research to evaluate if punishment alone for possession of tobacco will reduce adolescent use. One experimental study showed that combining the enforcement of possession laws and access reduction efforts leads to a significant reduction in adolescent smoking (Jason, et al., 1999).

School Policies Concerning Tobacco--School policies to restrict smoking among adolescent enrolled in public schools have some empirical support. Pentz et al. (1989) examined the impact of school smoking policies on more than 4,000 adolescents in 23 schools in California found that schools with smoking policies had significantly lower smoking rates than did schools with fewer policies. Similarly, Elder et al. (1996) evaluated 96 schools in four states and reported that implementation and enforcement of school policies to a crucial part of a school-based intervention.

**Tobacco Social Access**-- Forster, et al., (2003) analyzed results from adolescents in 29 Minnesota communities (grades 8, 9, and 10, ages 13–16 years) found that social provision and acquisition of cigarettes among teens are widespread, i.e., . almost 90% of youth had obtained a cigarette from, and about 75% of them had provided cigarettes to, another teen in the prior month. Daily smokers provided to more teens and provided more often than those who smoked less than daily. Daily smokers also reported having more social sources, both teens and adults, than lighter smokers, and were more likely to have both bought from and sold cigarettes to other teens. Fichtenberg and Glantz (2002) in completing a meta-analysis of studies of the effects of retail access reduction efforts on the prevalence of adolescent smoking did not find that retail

access reduction led to fewer young people smoking with the implication that reducing adolescent smoking requires constricting the flow of cigarettes to youth from such social sources as well as from commercial outlets.

**Alcohol Retail Access--** Retail availability includes on-premise outlets, such as bars or restaurants, as well as off-premise outlets such as grocery stores, liquor stores, or other retail outlets licensed to sell alcohol within their community. In general, when retail alcohol is cheap, convenient, and easily accessible, people drink more and the rates of alcohol problems are higher (Kelley- Baker, et al., 2000; Todd, Gruenewald, Grube, Remer, & Banerjee, 2006).

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 of their own statute. Wagenaar and Toomey (2002) analyzed 57 published studies that assessed the effects of changes in the legal minimum drinking age on indicators of consumption and harm related to drinking from 1960 to 1999 and concluded that increasing the legal age appears to have been the most effective strategy for reducing drinking and drinking problems among high school students, college students, and other youth of any other prevention strategy. Similarly, increasing the drinking age from 18 resulted in a 13.8% decrease in frequency of 30-day alcohol consumption. An analysis of state-level data in the U.S. found that raising the MLDA to 21 years reduced alcohol-related crashes among youth by as much as 19% (Voas, Tippetts, & Fell, 2003). Similarly, the MLDA of 21 in the U.S. has been associated with 47% decrease in fatal crashes involving young drivers with BACs  $\geq 0.08\%$  and a 40% decrease in such crashes involving young drivers with BACs  $\geq 0.01\%$  (Dang, 2008). Conversely, a review of research indicated that the trend to decrease the MLDA in the U.S. from 21 to 18 years during the 1970s was associated with a 7% increase in traffic fatalities for the affected age groups (Cook, 2007). Other studies have provided similar findings (Carpenter and Dobkin 2007, Carpenter et al. 2007 and Voas et al. 2003). The U.S. National Highway Traffic Safety Administration (NHTSA) has estimated that a drinking age of 21 reduced traffic fatalities for underage persons by 846 deaths in 1997 and prevented a total of 17,359 deaths since 1975.

Enforcement of Underage Drinking and Purchase Laws--Despite higher minimum drinking age laws, young people can and do purchase alcohol (e.g., Forster et al., 1994, 1995; Paschall et al., 2007a). Studies show that anywhere from 30%-90% of outlets will sell to a minor, depending on geographical location. Such sales result from low and inconsistent levels of enforcement, especially when there is little community support for underage alcohol sales enforcement (Wagenaar & Wolfson, 1994, 1995). Even moderate increases in enforcement can reduce sales of alcohol to minors by as much as 35% to 40%, especially when combined with media and other community and policy activities (Grube, 1997b; Wagenaar et al., 2000a). In a study in New Orleans, enforcement of underage sales laws increased compliance with alcohol sales laws from 11% to 39% (Scribner & Cohen, 2001). The greatest gains in compliance occurred among those retailers who had been cited (51%), but substantial gains were also seen for those not cited (35%). Dent, et al, (2005) 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. 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). Paschall et al. (2007b) found that the alcohol sales rate was positively related to students' use of commercial alcohol sources and perceived alcohol availability, but was not directly associated with use of social alcohol sources and drinking behaviors. The authors concluded that use of social alcohol sources is more strongly related to underage drinking than use of commercial alcohol sources and perceived ease of obtaining alcohol.

Compliance Checks—Compliance checks are the systematic checking by law enforcement of whether a licensed establishment actually sales alcohol to underage persons or “underage looking persons”. Studies indicate regular compliance checks substantially reduce illegal alcohol sales (Grube, 1997b; Preusser et al., 1994). 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).

Legal (Tort) Liability Concerning Alcohol Sales and Service to Youth-- Selling or serving alcohol to persons under the legal drinking age can also be grounds for liability in many states 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 found that imposing legal liability on commercial services resulted in reduced fatality rates for those drivers 15 to 20, controlling for other dependent variables.

Densities of retail outlets--Restricting the number of places where alcohol can be sold has been widely used to reduce consumption and thus alcohol-related problems. In general, this has been accomplished using the state licensing apparatus, with limitations either formally legislated or emerging through individual licensing decisions. Studies have used shorter time-periods and smaller geographic units to undertake cross-sectional time-series analyses, finding significant relationships between outlet density and violence rates over time (Gruenewald and Remer 2006, Livingston 2008a). A study by Cohen et al. (2006), which explored the effect of the same reduction in outlets in Los Angeles on rates of gonorrhea, found significant reductions in areas where liquor stores had been closed. A longitudinal study from California (Freisthler and Weiss 2008) provides evidence that greater alcohol outlet density is related to higher child maltreatment rates, with annual changes in outlet numbers over four years across 58 counties significantly related to county-level referrals to child protection. Other studies have found significant positive relations between outlet densities, drinking and driving (Gruenewald, Johnson, & Treno, 2002; Treno, Grube, & Martin, 2003), car crashes (Scribner, MacKinnon, & Dwyer, 1994). Alcohol outlet density was found to be related to both perceived ease of access to alcohol and to consumption among youth in 50 zip codes in California (Treno, Ponicki, Remer, & Gruenewald, 2008). There is consistent evidence that outlet density is related to rates of heavy episodic drinking by youths and young adults (Livingston et al. 2008; Weitzman et al. 2003, Huckle et al. 2008, Kypri, et al. 2008, Scribner et al. 2008). Outlet density surrounding college campuses where a significant percentage of students are underage is related heavy drinking and frequent drinking but also with drinking-related problems this population (Weitzman, Folkman, Folkman, & Wechsler, 2003). Treno, Grube, and Martin (2003) similarly found evidence that outlet density

was positively associated with frequency of underage drinking and driving and riding with drinking drivers.

Hours and days of Alcohol Sale--Restricting the days and times of alcohol sale reduces opportunities (and availability) for purchasing alcohol. A recent review of studies on the effects of changes in hours of sale included 48 relevant studies from 8 countries across four decades with a wide variety of research designs (Stockwell and Chikritzhs, 2009). The authors concluded that, based upon controlled studies, the evidence supports the expectation that changes in hours of sale will be associated with changes in alcohol-involved harms. A few studies have analyses restricted hours of sales and young people including Baker *et al.* (2000) who found that temporary bans on the sale of alcohol from midnight Friday through 10 am Monday (because of federal elections in Mexico) reduced cross-border drinking by young Americans from 14-25 age typically. In particular, the early closing on Friday night was associated with a 34% net reduction in the number of persons with BACs of 0.08% or higher based upon breath tests. Voas *et al.* (2007) found that after bar closing hours in Juarez, Mexico were changed from 5 am to 2 am, the number of adolescents and young adult American pedestrians returning with BAC of 0.08% or higher from Juarez at 3 am or later was reduced by 89%.

Retail Monopoly of Alcohol Sales--Retail alcohol monopolies are a public policy means to reduce drinking. 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). Miller Snowden, Birckmayer, and Hendrie (2006) found that underage drinking rates including heavy drinking as well as youth-involved traffic crashes were lower in states which had retail sale monopolies controlling for other factors.

On Premise Sales or Service of alcohol to Adolescents--For bars, restaurants, and pubs, Responsible Beverage Service (RBS) are to prevent alcohol service to minors and intoxicated patrons and to intervene so that intoxicated patrons do not drive and can also be used for alcohol outlets which sell alcohol for consumption elsewhere. RBS has been shown to reduce incidents of violence surrounding outlets (e.g., 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). However, voluntary clerk and manager training in off license establishments appears to have a negligible effect on sales to minors above and beyond the effects of increased enforcement (Wagenaar, Harwood, Silianoff, & Toomey, 2005a).

Controls on Who is Selling Alcohol-- The minimum age of alcohol sellers which is set in some countries could affect the extent to which underage sales might occur; i.e., younger persons finding themselves less able to distinguish underage from of-age buyers and being more willing to sell to underage buyers (Treno, Gruenewald, Alaniz, Freisthler, and Remer (2000) ).

Summary: 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. Grube and Nygaard (2001; 2005) found based on accumulated scientific evidence from more than one controlled study that the most effective public policies to reduce the retail alcohol availability to youth and associated problems appear to be (a) the minimum drinking age and its enforcement, (b) zero tolerance or graduated licensing, and (c) enforcement of sales of alcohol to underage persons, especially using compliance checks about retail sales of alcohol to underage persons.

**Social Access to Alcohol--** 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). See Harrison et al., 2000; Schwartz et al., 1998. Wagenaar et al. (1996). Erickson, Toomey, & Wagenaar, 2001). In this case there is an enhanced effect of social context, party, and low cost per drink of alcohol.

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

Social Host Liability--Under social host liability, adults who provide alcohol to a minor or serve intoxicated adults in social settings can be sued through civil action, for damages or injury caused by that minor or intoxicated adult (Grube & Nygaard, 2005). 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). Although social host liability may send a powerful message, that message must be effectively disseminated before it can have a deterrent effect.

Third Party Provision of Alcohol to Youth—Adults or young adults of legal age can purchase alcohol on behalf of an underage person who approaches a stranger outside of an alcohol establishment and asks this person to purchase alcohol for him or her. Toomey, Fabian, Erickson, & Lenk, (2007) found that 19 percent of young males over the age of 21 were willing to purchase alcohol for youth who appeared to be underage when "shoulder-tapped" outside of a convenience or liquor store. Shoulder tap enforcement 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 to determine if the person agrees to this purchase and is thus arrested. While a potentially promising strategy to reduce third party sources of alcohol to minors that has not been seriously tested in replicated controlled studies.

Party Patrols--Party patrols use law enforcement officers to (a) enforce laws prohibiting adult provision of alcohol to minors and underage drinking at private parties and (b) disrupt one of the

highest risk settings for alcohol availability and misuse, i.e., private drinking parties by conducting weekend patrols of areas known to be regular drinking locations. There is limited empirical evidence of effectiveness. One example, occurred in Oregon where a local community implemented a weekend drunk driving and party patrol program. An unpublished evaluation of this program revealed that arrests of youth for possession of alcohol increased from 60 to 1,000 individuals in one year (with a corresponding decrease of 35 percent in underage drunk driving accidents. (Little & Bishop, 1998; Radecki, 1995).

Keg Registration-- Beer consumption as the primary beverage of choice of underage drinkers was found to be a potential factor in underage drinking alcohol-related harm, especially traffic fatalities (Cohen, Mason, & Scribner, 2001). Beer kegs are often a main source of alcohol at teenage parties. Without keg tagging, there is no way to trace who purchased the keg and be held accountable for breaking the law. Wagenaar et al (2005a) found that most states have 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. However 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.

School Alcohol Policy--School alcohol policy is another area where increasing the certainty of detection and punishment has been tried. About 45% of elementary, middle/junior high, and senior high schools in the US 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). Although students report that school policies are a deterrent to drinking (Grimes & Swisher, 1989). Formal evaluations of such policies are rare.

*Summary:* Such approaches as shoulder taps, party patrols or keg registration need more extensive controlled testing and evaluation, although on the surface such strategies have the potential to be effective. While strategies with a similar theoretical basis have been shown to be effective, there is little controlled studies of such approaches for alcohol.

**Availability of illicit drugs**--All illicit drugs are retail products which are affected by both supply and demand factors. Illegal sales are accomplished more through social networks, especially for methamphetamine than are cocaine or heroin sales. Methamphetamine dealers are more likely than cocaine and heroin dealers to sell out of single family homes and to sell out of areas with fewer security measures (Rodriguez et al., 2005); (Eck, 1995). Drugs change hands multiple times between import (or production in the case of domestically manufactured drugs) and final sale to the user (Caulkins, 1997a, 1997b). As one moves down through the distribution hierarchy, transaction size gets smaller and the price per unit increases. One implication of the substantial differential between the replacement cost of drugs and their retail value is that law enforcement efforts that remove drugs at the higher levels of the distribution system (where the replacement costs are relatively low) are less damaging to the drug trade than seizures made at the lower levels of the distribution hierarchy (Caulkins & Reuter, 1998). Freisthler et al. (2005) examined the geographic relationships between availability and self-reported drug use. Use of

illegal drugs was significantly positively related to sales of drugs in surrounding geographic areas for both youth (aged 12 to 18) and adults (those 19 years old and older). Interestingly, drug sales within any given area were unrelated to self-reported use among youth and negatively associated with use among adults. Thus, areas of greatest access—at least for adults—are not necessarily the areas of greatest use. Because drug markets are more likely to be located in places immediately adjacent to high drug use areas, prevention efforts may need to be located within different areas of communities to address the issues of sales, use, and related problems.

High-level law enforcement to disrupt drug importation and distribution operations--Efforts to interdict illicit drugs, including methamphetamine, are undertaken at various levels of government. The long-term effects of such interdiction efforts are tempered by several factors including the relatively cheap replacement costs of drugs seized high in the distribution system and the adaptability of drug traffickers to modify their operations and find new supply routes and new sources of drugs.

Civil remedies to disrupt local drug markets--While police crackdowns focus primarily on individuals (i.e., dealers and users), a number of civil remedies use actions targeted at drug selling locations to try to reduce the quantity of drugs sold by making it more difficult for buyers and sellers to engage in the drug trade. A study by Eck and Wartell (Eck & Wartell, 1998) reported the results of a randomized study of abatement actions, with rental properties where drug sales had occurred being assigned to one of three conditions (letter sent to property owners informing them of drug sales and warning of fines or closure of the building if the problem continued; warning letter plus a request for a meeting between police and property owner; no abatement notice). Follow up over the next 30 months indicated that significantly fewer crimes were reported in the two abatement conditions than in the control condition. Another form of civil remedy, code enforcement, involves community groups using enforcement of local building codes, zoning laws, or health codes to pressure property owners to stop drug sales from being conducted inside or in front of residences. Little is known about the effectiveness of code enforcement in reducing drug activity. However, a study by Green-Mazerolle, Roehl, and Kadleck (1998) used a randomized experiment with 100 drug hotspots assigned to traditional police enforcement (surveillance, arrests, and field interrogation) or traditional police enforcement plus civil enforcement (abatement actions and code enforcement). The properties subject to the civil actions showed a decrease in drug sales and a decline in signs of disorder relative to the properties assigned to traditional police enforcement only.

Altering the physical environment to hinder drug selling--Some community groups have used various strategies to alter the physical environment where drug sales are occurring (e.g., boarding up abandoned houses, cutting back shrubbery in parks, improving lighting) to deny drug dealers a safe haven for conducting business. Green (1996) found that not only did a program of code enforcement combined with police crackdowns not lead to displacement effects, it resulted in diffused benefits to the surrounding area. Davis and Lurigio (1996) noted that while displacement is a serious possibility when local retail drug markets are disrupted, it often does not occur or the displaced activities are of a lesser magnitude such that benefits associated with a local intervention may accrue to the surrounding areas.

## **Reducing Impaired Traffic Crashes**

Automobile crashes are one of the leading causes of death for adolescents and they are disproportionately represented in fatal crashes compared to other age drivers. Alcohol-involved (and to an unknown degree, drug-involved) crashes are a major source of adolescent deaths and injuries and thus are conducive to policy strategies to reduce such outcomes.

Drinking and Driving Enforcement Checks--Random Breath Testing (RBT) involves extensive and continuous random stops of drivers who are required to take a breath test to establish their blood alcohol level. Tests of RBT in Australia (Homel, 1986, 1990), Canada (Mercer, 1985) and Great Britain (Ross, 1988a, 1988b) indicate that they reduce car crashes. For example, in Australia, RBT resulted in a 24% reduction in night-time crashes, especially in metropolitan areas (e.g., Cameron, Diamantopolou, Mullan, Dyte, & Gantzer, 1997). A limited version of RBT, called sobriety checkpoints, are often implemented in individual U.S. states under proscribed circumstances. There is evidence that they reduce drinking and driving and related traffic crashes. (Lacey, Jones, & Smith, 1999), (Stuster & Blowers, 1995). No studies have evaluated the effects of these strategies on youth drinking and driving but there is no reason to believe that this age group of drinking drivers would not be affected by such policies.

Zero Tolerance Laws. Zero tolerance laws set lower BAC limits for underage drivers and/or create a risk of loss of license when an underage youth has been found to be drinking, even if the youth was not driving. Usually this limit is set at the minimum that can be reliably detected by breath testing equipment (i.e., .01-.02 blood alcohol level). Zero tolerance laws also commonly invoke other penalties such as automatic license revocation. An analysis of the effect of zero-tolerance laws in the first 12 states enacting them found a 20% relative reduction in the proportion of single vehicle nighttime (SVN) fatal crashes among drivers under 21, compared with nearby states that did not pass zero-tolerance laws (Hingson, Heeren, & Winter, 1994; Martin, Grube, Voas, Baker, & Hingson, 1996). A study of all 50 states and the District of Columbia in the U.S. found a net decrease of 24% in the number of young drivers with positive BACs as a result of the implementation of zero tolerance laws (Voas et al., 1999). Similarly, a 19% reduction in self-reported driving after any drinking and a 24% reduction in driving after five or more drinks was found in 30 states (Wagenaar et al., 2001). Differences in enforcement of zero tolerance laws have been identified as a key issue in understanding why some programs are less successful than others (Ferguson, Fields, & Voas, 2000), as has lack of awareness on the part of young people (Balmforth, 1998; Hingson et al., 1994). Effective enforcement and awareness of the laws among young people have been identified as key factors in the success of zero tolerance laws (Ferguson et al., 2000; Voas, Lange, & Tippetts, 1998). Hingson et al. (1996) in six communities in Massachusetts over a 5-year period found a statistically significant increase in 16- to 19-year-olds' belief that their licenses would be suspended if they were caught drinking and driving and speeders would be stopped by police and fined substantially and that 16- to 19-year-olds were half as likely to report driving after drinking in program communities, and the number of citizen reports of speeding was cut in half.

Administrative License Revocation--Laws permitting the withdrawal of driving privileges without court action have been adopted by 38 states to prevent traffic crashes caused by unsafe driving practices, including driving with a BAC over the legal limit (Hingson et al., 1996). This strategy, which has not been specifically evaluated for effects on youth drinking and driving, is

considered to be especially relevant to youth since the possession of a driving permit is a high status and valuable possession for young people.

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

Automobile Ignition Interlock Devices. --Automobile ignition interlocks are devices that prevent drivers from starting their cars if their blood alcohol level is above a preset limit. This device has been discussed as a potential means to reduce all drinking and driving but has been used in the United States primarily as a means to prevent a multiple drinking and driving offender from starting his/her auto after drinking (Voas, 1988). As the price of these devices comes down, it could be possible to require them in cars that adolescents drive.

Fines and Sanctions for Adolescents-- 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). Finally, many fines go uncollected and there is often no mechanism to collect on the debts. Unfortunately, empirical evidence regarding the effectiveness of fines in deterring underage drinking is lacking (Grube & Nygaard, 2005). Community service is widely viewed as an effective sanction to impose on youth. Wolfson et al. (1995) recommend community service placements in locations where the youth are most likely to see the effects of alcohol abuse. Unfortunately, there is little direct evidence on the effectiveness of community service as a deterrent to underage drinking. 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). Summary--Random breath testing and sobriety checkpoints appear promising for reducing drinking and driving based on studies with the general population, although there is little specific evidence for their effectiveness specifically with young people and the potential to impact both social and retail supply.

### **Restrictions on Advertising and Promotions of Tobacco and Alcohol**

Restrictions on advertising seek to limit exposure to children and teens of those promotions attempting to sell cigarettes and alcohol. In other words, restrictions seek to limit youth's exposure to material designed specifically to persuade consumers to use substances that are illegal for teens to purchase.

Cigarette advertising. Documentation exists that tobacco companies were marketing cigarettes to those under 18 (see for example, Biglan, 2001; Slater, et al. 2007). Wakefield, et al., (2002) found an association between cigarette brand preferred by adolescents and exposure to advertising which was closest to their school. The “master settlement” between the states and the tobacco companies requires that tobacco companies not market to young people while several studies show that they continue to advertise to and reach those under 18 (Chung et al., 2002; King, Siegel, Celebucki, & Connolly, 1998).

Advertising of alcohol-- 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. <http://www.ftc.gov/reports/alcohol/appendixb.htm>. Snyder, et al (2006) found that youth who saw more alcohol advertisements on average drank more (each additional advertisement seen increased the number of drinks consumed by 1% and 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%). Policies that restrict advertising of alcohol to young people could conceivably affect consumption. Survey studies consistently find small but significant relationships between awareness of and liking of alcohol advertising and adolescents' drinking beliefs and behaviors (e.g., Chen, Grube, and Madden 1994; Grube & Wallack, 1994). Saffer and Dhaval (2002) concluded following an analysis of national alcohol consumption related to total advertising expenditures that alcohol advertising bans decrease alcohol consumption and found that one more ban on beer and wine or on spirits would reduce consumption by about 5% and one more ban on all alcohol advertising in a media would reduce consumption y about 8%. In contrast Nelson (2003) using a panel of 45 states for the period 1982–1997, concluded that “bans of advertising do not reduce total alcohol consumption, which partly reflects substitution effects.” Hastings, et al, (2005) reviewed published research on advertising and promotion of alcohol and concluded that while most econometric studies provide little evidence of an aggregate effect on consumption, these studies provide little or no information about the potential specific effect on the drinking of youth and young people.

### **Youth Violence and Crime Using Environmental Policy Strategies**

Adolescent violence and associated injuries and death (often from gun shots) are a major source of morbidity and mortality for youth, either as victims or perpetrators. There is no single obvious environmental factor or interventions which can singularly reduce adolescent injuries or death or violence intention. A public health approach to reducing violence includes: (1) emphasizing the prevention of violence before it occurs; (2) making science integral to identifying effective policies and programs; and (3) integrating the efforts of diverse organizations, communities, and disciplines (Mercy, et al, 1993). A general foundation for local control of potential risks to public health and safety is provided by Ashe et al., (2003).

Access to weapons--Swahn, et al. (2002) used the National Longitudinal Study of Adolescent Health to conclude that 25% of adolescents reported easy access to a gun in the home and almost 30% reported easy access to alcohol in the home. Ten per cent of adolescents reported availability of both alcohol and a gun in their home. Most reported availability of a shotgun (63.0%) followed by a rifle (61.3%), handgun (57.3%), and other gun (16.4%). Blumstein and Cork (1996) attributed the majority of increase in adolescent homicides to handgun carrying

by the young. Brewer, et al (1995) review evidence on various strategies for reducing access to or availability of guns and concluded that laws restricting the sale and purchase of guns have prevented gun-related crime but that the effects of laws that regulated the place and manner of carrying firearms, bans on carrying concealed weapons, and requirement of a Firearm Owner Identification card when carrying a weapon were not conclusive. Birckmayer and Hemenway, (2001) examined the effect of firearm availability on suicide and found that firearm ownership is correlated with suicide rates among 15- to 24-year-olds and 65- to 84-year-olds, but not among 25- to 64-year-olds. Hepburn and Hemenway (2004) reviewed many of the empirical studies which investigate the association of gun availability and homicide victimization and conclude that the overall research suggests that households with firearms are at higher risk for homicide, and there is no net safety beneficial effect of firearm ownership.

Neighborhood Mobility Policies as Interventions—Social policies have been implemented to move low income families from poor neighborhoods to middle class neighborhoods or neighborhoods with less risk. Carlson, et al (2008) studying the general effect of housing vouchers to stimulate geographic mobility concluded that while initial (within 12 months) post-treatment effects on the quality of the neighborhoods in which voucher recipients live showed little improvement, after four years there were statistically significant gains in earnings compared to the comparison group and gains in quarters worked per year. Rosenbaum and De Luca (2000) found that after movement by low-income minority in the Gautreaux program in Chicago which began in 1976 yielded less arrests for young boys has less arrests and convictions for drug offenses while girls actually had increased conviction for crimes. Moving to Opportunity (MTO) which randomly provided rental assistance vouchers to 4,600 low-income families with children living in public housing in order to move to less distressed urban neighborhoods or lower-poverty communities in Baltimore, Boston, Chicago, Los Angeles, and New York between 1994 and 1998. After 5 years families in low-poverty neighborhoods had lower arrests for girls for violent and property crimes while boys had increased arrests for property crimes. There were no effects on delinquency. Feins and Shroder (2005) found that the impact of MTO on personal safety and other improvements for poor families who move to middle-class neighborhoods was significantly different from poor families who do not move and that there was large gains in personal safety for families who moved from their low poverty neighborhoods. Jeanne Brooks-Gunn, et al. (2006) found that MTO produced no significant effects on test scores for any age group among over 5000 children ages 6 to 20 in 2002 who were assessed four to seven years after randomization. Clark (2008, in press) re-examined the data from the MTO program and found no statistically significant difference in the effect between families who move with vouchers and those who move without any assistance and concludes that claims of effects of the MTO program need to be treated with caution.

Crime prevention through environmental design (CPTED)—CPTED is a policy which relies upon changes to the physical environment that are crafted so as to encourage behavior, and thus they deter rather than conclusively "prevent" behavior. This environmental strategy in crime prevention is to change physical settings to make crime harder to commit and easier to detect, e.g., better locks are more resistant to break into a building, entrances can become more readily visible through improved lighting and removal of physical obstacles. Research demonstrates that offenders cannot be literally prevented from committing crimes by using CPTED but that such

environmental changes act as a deterrence to crime. See Crowe (2000). Public spaces are safer and more orderly by improved lighting and a reduction of graffiti or litter, (Kelling & Cole, 1996). Casteel and Peek (2000) reviewed studies of the effects of CPTED approaches to reducing robbery in workplace and found that multi-component approaches of environmental redesign reduced robbery rates from 30 to 84% while single component approaches were not uniformly successful. Welsh and Farrington (2002) systematically reviewed the crime prevention impact of CCTV in 18 evaluations in the United Kingdom and concluded that at least a 5 per cent reduction in recorded crime was reported and half of the studies and that all showed a fall in recorded crime. Unfortunately, there is no current research on the effects of these strategies to reduce crime and violence among adolescents. See review by Eck, J. (2002).

### **Risky Sexual Behavior Using Environmental Strategies**

Access to Condoms and Health care-- Easy Access condoms for adolescents as well as to health care is an environmental strategy to reduce risky sexual behavior and includes free reproductive health care at school or nearby to a school which can provide birth control and HIV-related counseling and some dispense contraceptives as well. Harvey (1994) examined the correlation between consumer prices for condoms and per-capita sales of condoms in 24 social marketing programs to conclude that condom prices must be set very low--well below the equivalent of 1 percent of per-capita gross national product for a year's supply--in order to achieve satisfactory prevalence for condoms in either a family-planning or an AIDS-prevention context. Rotheram-Borus (2000) pointed out that condom distribution policies are controversial due to adult concerns that availability of condoms encourages adolescent sex. Schuster, et al (1998) evaluated a high school condom availability program and found no significant change over time in the percentage of males or females who had ever had vaginal intercourse or who had had vaginal intercourse during the year prior to the survey The percentage of males who reported using condoms every time they engaged in vaginal intercourse during the past year increased significantly, from 37% to 50%, and the percentage of males who reported condom use at recently initiated first vaginal intercourse increased from 65% to 80%. Female adolescents reported no significant change in condom use. Adolescents who had sexual intercourse in the pre-intervention year had no change in condom use following the program initiation, while those who had not engaged in sexual intercourse during the pre-intervention year, reported substantial condom use associated with vaginal intercourse during the following year. The researchers concluded that the condom availability program did not appear to increase sexual activity among adolescents and that there was an apparent higher condom use among males and that such programs may have a particular impact on the least sexually experienced adolescents. Kirby (2001) concluded the such efforts did not increase sexual activity but did not consistently result in decreases in sexual activity and pregnancy rates or with increased contraception.

Blake, et al (2003) is a study of the effects of condom availability on adolescent sexual behavior and the use of condoms in sexual intercourse in Massachusetts found that 30% of sexually active participants in schools with condom availability programs reported having sexual intercourse within the three months preceding the study compared to 35% of sexually active participants in schools without condom availability programs and that 42% of participants in schools with condom availability programs reported ever having had sexual

intercourse compared to 49% of participants in schools without condom availability programs . Of those who were sexually active in schools where condoms were available, 72% reported using condoms at last intercourse compared to 56% of sexually active participants in schools without condom availability programs. Further 85% of sexually active participants in schools with condom availability programs reported using some form of contraception at last intercourse compared to 76% of sexually active participants in schools without condom availability programs . A final issue was whether condom availability actually reduced pregnancy. The researchers found that 12% of sexually active participants in schools with condom availability programs and 12% of sexually active participants in schools without condom availability programs reported ever having been pregnant or having impregnated someone.

### **III. Factors which influence effectiveness.**

Policy strategies make a unique contribution to prevention of adolescent problem behaviors and have a potentially longer effective life than prevention programs requiring annual program funding. Even when the potential effectiveness of a policy decays over time due to lower compliance or lowered regulation or enforcement, policies continue to have some sustaining effect. Policies may also provide more cost-effective approaches to prevent problems than those afforded by school, family, or media-based approaches. For example, policies that reduce adolescents' access to alcohol or tobacco products can be more cost-effective than community-wide educational campaigns to discourage young people from using alcohol or cigarettes or engaging in unprotected sex.

At the same time, environmental strategies have at least two major difficulties. First, they are often controversial and thus politically difficult to implement. Political will and public support are required for such strategies. Second, policy strategies, especially those conducted at the community level, often do not provide the level of immediate public satisfaction and personal reward to program staff that educational or service strategies provide. Environmentally focused policy strategies may not be as attractive to community members, especially volunteers.

In addition, many of the problems faced by adolescents result or are associated with products, behaviors, or processes from which commercial enterprise make profits, e.g., sale of alcohol and tobacco. Thus efforts to restrict or limit access to these products is often opposed by the producers and distributors of such products. As large economic enterprises they have considerable political influence and campaign contributions which can limit the will of national or state elected officials to pass policies which can have potential effects on product sales. This has especially been true for both tobacco and its advertising and promotion as well as for alcohol and retail price increases associated with state and local excise taxes.

While not all policies are built upon regulations or restrictions, local visibility of enforcement or maintenance of policies are essential to effectiveness. As noted above many of the strategies which involve restricting retail or social access of substances for abuse have little or only modest effects without deterrence or a public sense of potential for detection and consequences. Federal as well as state laws, e.g., governing legal tobacco purchase or drinking age, licensing of alcohol outlets, the legal blood alcohol level for drinking and driving, often form the basis for local policies. Local governments, in turn, are responsible for implementing and enforcing these laws.

The relative emphasis that local police departments give to different enforcement policies is an example of key role of local decisions.

Community-action projects are intended to address the total community system and are not naturally limited to a specific target group or service group. To reduce adolescent health and safety problems in the entire community, local leadership is required in designing, implementing, and supporting effective policies. Although local alcohol policy strategies have the greatest potential to be effective when they draw on scientific evidence, many community prevention projects involve interventions that research has indicated are unlikely to reduce the population level of adolescent problems in the community. For example, many communities pursue public education efforts designed to increase adolescent information or produce adolescent attitude change. Such educational strategies are often focused on information alone, and carry the assumption that an informed community will necessarily experience a reduction in adolescent problems. There is no substantial research to support the single effectiveness of such strategies.

What is known about potential unintended or counterintuitive consequences as well as the importance of public support and compliance? One of the challenges faced by policy approaches which are effective in restricting access to substances such as tobacco, alcohol or drugs is the potential substitution across substances, i.e., as access to one substance is limited, then other substances are potentially substituted. For example, 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. An important empirical question is what the effects of higher prices for alcohol on other substances of abuse, e.g., tobacco or marijuana. Several studies have found that alcohol and tobacco, or marijuana and tobacco, are complements (i.e., use of one results in greater use of the other) (Chaloupka, Grossman, Bickel, & Saffer, 1999; Farrelly, Bray, Zarkin, & Wendling, 2001; Jimenez & Labeaga, 1994). In contrast, however, Goel and Morey (1995) reported that alcohol prices were positively related to cigarette use, implying that cigarettes and liquor are substitutes such that as alcohol price increases, then smoking could increase.

Contradictory values and perspectives often exist among public policy makers (especially elected officials) who may be concerned about adolescent problems but oppose policies which regulate or restrict the freedom of adolescents. An additional confounding factor is competing priorities among organizations and public agencies. For example, law enforcement in many cases is the means to introduce deterrence to policies, whether arrests or sanctions are applied for adolescents. Local police can give low priority to enforcing sales of tobacco or alcohol to youth, but give a great deal of attention to illicit drugs which have a much lower frequency of use and risk for adolescents.

One of the strengths of environmental and policy approaches is that they do not require adolescents to carry out risk assessments when engaging in activities which can produce serious health or safety harms, e.g., drinking and driving or access to handguns. Efforts to use logical arguments or provide data about risk to adolescents have demonstrated little effects on adolescent behavioral decisions or certainly less effects than the same information given to

adults. One may observe that adolescents do not believe they will die or even that they are “bullet proof” for harms.

#### **IV. Scientific Research Needs for the future**

Future research should examine whether increasing the costs of undesirable behaviors *and* decreasing the costs of desirable behaviors will influence the frequency of those behaviors and the number of young people who engage in them. For example, decreasing the cost of condoms may increase their use. Decreasing the cost of recreational activities that promote pro-social behavior should increase participation in them. Increasing the cost of weapons should decrease the number of young people who carry them. We need scientific research to confirm these assumptions

Studies of compliance of regulations are essential for policies. Policies to limit teens' access to opportunities for problem behavior or to increase surveillance by youth and adults to lower opportunities for such behavior should examine mechanisms to ensure compliance by those implementing the policy. This means that we must increase our understanding of how implemented policies have increased potential to reduce harm associated with adolescents in general as well as multi-problem behavior by specific youth. Research is needed which regularly evaluates the level and effectiveness of policy compliance and enforcement and possible misuse of policies. Such research should assess effects of policy strategies in terms of their actual reduction of harm. Such monitoring and surveillance will help to discontinue policies that have no effects (other than simply to increase punishment of youth).

Adolescent problem prevention lacks an established source or archive of policy strategies with the potential to reduce adolescent problems. How can a science-based one be built for enabling local and state policy changes and implementation in support of effective prevention strategies which best fit community and/or state needs and cultural context? See Cummings and Orleans, 2009; Holder, 2009; and Hallfors (2009). In this context, specific research needs include:

1. What policy approaches can be utilized to establish minimum prevention standards for all states/provinces and communities but also permit and encourage state and community testing of a mix of strategies for effectiveness as well as most relevant to local conditions?
2. What are alternative evaluation/research designs which states/provinces and communities can utilize to test specific types of strategies or mix of strategies?
3. What is the potential role of geo-spatial analyses in documenting risk environments and evaluating policy effects?
4. What combinations of policy prevention strategies have the best potential to reduce adolescent problems identified via epidemiology not simply by public concerns?
5. What is the relative cost-effectiveness of alternative strategies in reducing problems, i.e., determine the cost effectiveness of major prevention strategies (or mix strategies) in terms of cost to implement compared to level of population problem reductions at the population level?
6. How effective are policies which seek to increase the capacity of local prevention to undertake effective prevention strategies including national, state and local joint prevention investment?
7. What excise taxes on alcohol and tobacco is most effective at the national and state/province levels to achieve minimum prevention effects? Are there minimum threshold price levels for achieving prevention effects?

8. What are the critical factors which retard adoption of science-based strategies and what are barriers to policy strategies including resistance of police and government officials in conducting social surveillance and enforcement ?
9. Of those policy strategies which have been shown to be effective for adults, research is needed to determine the specific effects of such policies (if any) on adolescents. While it is a natural assumption of generalizability from adults effects to adolescents, such assumptions should be tested for adolescents. The research review above notes when there are documented effects for adults but no specific research concerning adolescents.

There are some natural limits and counter forces which must be address or accounted for in conducting scientifically based policy research. As indicated above, there is considerable public concern about adolescent problems and thus public support for policy strategies. However, this public support rests upon existing values in communities and neighborhoods. This is illustrated by differences across states in the existing policies and approaches to adolescent problems. Effective implementation of a public policy can be limited by existing willingness of community leaders to support effective policies. More research is needed to understand this process and how to change this political process when needed.

Adolescent policy research must also account for the "prevention paradox". This paradox suggests that while certain adolescents (such as multi-problem youth) have the highest individual risk of problems, other adolescents who may only be at risk of a single problem account for more total problems, especially those of an acute nature, because there are so many more adolescents compared to multi-problem youth who very often got most news attention. Therefore, a much wider public health perspective for policy research is essential and identification of research priorities are not based upon treatment or health screening or adolescent education alone.

A major conclusions from a review of research evidence concerning effective strategies for preventing adolescent problems including harm to self and to others is that there is no "magic bullet", i.e., a policy (or educational) strategy which by itself reduces adolescent problems. Thus, a single solution to reducing adolescent problems is not available to us, based upon existing research evidence, and frankly common sense. Of the approaches to reducing adolescent problems, policy or environmental approaches have the best potential to impact more adolescences than targeted strategies. This conclusion is based upon the accumulating evidence of population-level effects on adolescent problems from such approaches. Finally, policies, like other universal prevention strategies, can not reduce problems and risky adolescent behaviors to zero. Nonetheless, they provide important ingredients, often overlooked by prevention scientists who focus on prevention interventions with individuals.

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