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The relationship between the US state alcohol policy environment and individuals' experience of secondhand effects: alcohol harms due to others' drinking

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Abstract

Introduction: Although restrictive state alcohol policy environments are protective for individuals' binge drinking, research is sparse on the effect of alcohol policies on alcohol's harms to others (AHTO). We examined the lagged associations between efficacy of US state alcohol policies and number of harms from others' drinking one year later.

Methods: Individuals with AHTO data in a nationally-representative sample of US adults (analytic sample $n = 26,744$) that pooled the 2000, 2005, 2010, 2015 National Alcohol Surveys and a 2015 National Alcohol's Harm to Others Survey were linked with prior-year state-policy measures. We used two measures from the Alcohol Policy Scale (APS)—effectiveness in reducing a) binge drinking and b) impaired driving, based on experts' efficacy judgments regarding 29 state alcohol policies. Three 12-month AHTO measures (due to another drinker) were experiencing: a) either family/marriage difficulties or financial troubles; b) being assaulted or vandalized; c) passenger with drunk driver or traffic accident. Multi-level models accounting for clustering within states and stratified by age groups (< 40 vs ≥ 40) examined associations between the APS and AHTO measures, controlling for individual covariates (gender, race, education, employment and marital status, family problem-drinking history) of the victim.

Results: Only for those aged < 40 , the lagged APS-binge drinking and APS-impaired driving scores were each inversely associated with aggression-related harms and, separately, with drunk driving-related harm from someone else's drinking ($ps < .05$ to $< .01$). Family/financial harms were not associated with APS scores for either age group. Composite AHTO measures (any of 3 harm-types) also were inversely associated with stronger state alcohol policy environments ($ps < .05$ to $< .01$).

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Conclusions: State alcohol policies may be effective in reducing, to a meaningful degree, aggression-related harms and vehicular hazards due to other drinkers, but mainly in those under 40.

Keywords

Binge drinking; Alcohol impairment; Alcohol externalities; Surveys; Policy

INTRODUCTION

In the United States (US), although alcohol is the only commodity mentioned in the Constitution (in the 18th and 23rd Amendments), and there are federal regulations including labeling, purity and excise taxation, authority to regulate sales and consumption is conferred on the individual states, and so it is at this state level that alcohol policies capable of affecting alcohol consumption levels and associated problems largely operate (Johnson, 2016). On the state level, there are numerous elements of alcohol policy that directly regulate markets and potentially affect both heavy drinking and alcohol-related problems. States, for example, have alcohol beverage control agencies (ABCs) that typically license on- and off-premise alcohol outlets, and generally adjudicate and enforce various alcohol laws (National Highway Traffic Safety Administration, 2005), as do other State departments in a number of instances. However, it should be noted that because of “local option,” to varying degrees municipal and county alcohol regulations are also relevant (although here ignored).

For years, studies have documented effects of individual state alcohol control policies (e.g., alcohol taxation) on numerous alcohol problems such as alcohol-impaired driving (Wagenaar and Farrell, 1988), youth drinking (Carpenter et al., 2007), underage fatal crashes (Scherer et al., 2015), and binge drinking in college (Nelson et al., 2005). As Room (1990) noted early on:

“From a policy perspective, the effects of alcohol controls on rates of health and social problems is arguably more important than the effects on consumption levels. The rates of various alcohol-related problems—alcohol-related traffic casualties, cirrhosis deaths, violent crime rates—are often affected by alcohol controls. The effect of price and availability controls on rates of alcohol-related problems is often stronger than the effects on consumption levels. This suggests that some alcohol controls may have an especially strong effect on vulnerable subpopulations (e.g., those at risk of death from cirrhosis) or may push consumption into less risky locales or forms.” (Room, 1990, p 70).

For some time now efforts have been underway to characterize the state alcohol policy environment and to create a broad-based indicator of the strength of a state’s alcohol control measures across a range of specific measures (Erickson et al., 2014). Earlier efforts of this sort across European countries (Karlsson and Österberg, 2001), as well as a larger swath of international countries (Brand et al., 2007; Cook et al., 2014; Mosher, 1982), are also noteworthy. In this paper we are working with the result of a major effort to develop composite Alcohol Policy Scores (APSS) for each of the 50 US states and the District of

Columbia (DC). The APS characterizes the strength of 29 relatively distinct alcohol policy elements that an expert panel deemed effective for reducing binge drinking, also evaluating the extent to which each was implemented in an enforceable way in a given state (Naimi et al., 2014). Based on combining these assessments, the resultant APS composite state-level alcohol policy environment measure has good face validity by including legislation in five major policy subdomains: physical availability of alcohol, underage drinking, drinking driving, social host or dram shop laws, and alcohol pricing. An increasing number of studies involving the APS scores, that together enhance its validity, have been accomplished (Hadland et al., 2015; Nelson et al., 2013; Xuan et al., 2015a; Xuan et al., 2015c). Extending the focus beyond alcohol binges and related problems, a second version of the APS measure that emphasizes policies expected to affect alcohol-impaired driving also has been developed (Xuan et al., 2015b), and it also is used here.

It remains true today that the majority of studies of alcohol's harms have focused on the individual drinker's problems, for example how their alcohol intake is associated with numerous diseases (Greenfield, 2001) and on the drinker's risks for morbidity and mortality (Greenfield and Martinez, 2017; Rehm et al., 2006; Rehm et al., 2009). Similarly, effects of alcohol policies have usually been framed in terms of reductions in these outcomes among the drinkers themselves (Parry et al., 2011; Rehm and Greenfield, 2008; Shield et al., 2015). Yet heavy consumption and binge drinking adversely affect not only the drinker, but also other people around the drinker, with harms to these collaterals (alcohol's secondhand effects or externalities) remaining understudied (Greenfield et al., 2009), especially in the US. However, work on secondhand harms in the US has recently intensified, supported by grants on alcohol's harms to others (AHTO) from the National Institute on Alcohol Abuse and Alcoholism (NIAAA) (Greenfield et al., 2016; Kaplan et al., 2017). Our team has previously found evidence that experiencing secondhand harms of others' drinking is associated with individual's support for strengthening alcohol controls (Greenfield et al., 2014; Greenfield et al., 2007; Karriker-Jaffe et al., 2018a). In the present study, the focus is upon the potential for stronger state alcohol policies in the US to reduce the victimization of people by other heavy drinkers, i.e., to lower the extent of secondhand harms due to someone else's drinking.

Here we use data from a cross-sectional survey series involving five national probability surveys spanning years 2000 to 2015, together with the APS measures. Although we cannot establish causality per se, we study the association of the state alcohol policy environment (assessed via the APS one year prior to the survey interviews) and three measures of alcohol's harms to others (AHTO). The lag was chosen to modestly strengthen one aspect of a causal interpretation, temporal ordering, by characterizing the state policy environment at 12-months prior to a survey respondent's report of secondhand harms. The three AHTO measures are each made up of a pair of conceptually-related items from a 6-item AHTO scale included in all the surveys. Each assesses harm from the victim's perspective due to (or attributed to) someone else's drinking during the prior 12 months. Two items assess problems experienced mainly within the family and from intimate others (marital/family problems or financial troubles) (Karriker-Jaffe and Greenfield, 2014); two assess issues stemming from aggressive drinkers (being pushed, hit or assaulted, or having property vandalized) (Karriker-Jaffe and Greenfield, 2014) and the last two are attributed to drivers

under the influence of alcohol with whom the respondent was a passenger, or who caused a traffic accident (Greenfield et al., 2015; Karriker-Jaffe et al., 2017). All these items were measured for a 12-month timeframe (which technically follows the APS measures of state alcohol policies assessed in the prior year).

Prior US studies of experiencing both any AHTO, and various specific harm types, have shown strong associations with age such that individuals in their 20s and 30s experienced significantly more secondhand harms from alcohol than older people (Nayak, et al., in press). Informed by these studies, we reasoned that the state policy environment might be expected to show greater associations with AHTOs among those under 40 compared to those 40 and older, where AHTOs are relatively scarce.

Thus, in summary, our research question is how the strength of the state alcohol policy environment, measured a year before the surveyed individuals' reports, is associated with these current secondhand effects of others' drinking. We reasoned that since it has been shown that similarly lagged APS scores are associated with state binge drinking prevalence (Naimi et al., 2014) and individuals' binge drinking (Xuan et al., 2015a), it is likely that the lagged APS measures would also predict experiences of alcohol's harms to others, which generally are believed to involve *heavy* drinking by others. In this collaborative study, as in prior work, our models controlled for a range of individual covariates, including the victim's demographic characteristics often been found to be associated with exposures to harms from other drinkers (Fillmore, 1985; Greenfield et al., 2016; Kaplan et al., 2017; Karriker-Jaffe et al., 2017) and especially age group (Nayak, et al., in press). We included one state-level variable—per capita extent of policing in a given state jurisdiction (taken as an exogenous measure of overall law enforcement).

MATERIALS AND METHODS

Sample and Data

Data from the last four National Alcohol Surveys (NASs) conducted in 2000, 2005, 2010, and 2015, and the 2015 National Alcohol's Harms to Others Survey (NAHTOS) were pooled to reflect a nationally-representative sample of U.S. adults ages 18 or older (N=32,401; analytic sample n=26,744 with any of the three pairwise harms variables). The surveys were conducted by Temple University's Institute of Survey Research, Philadelphia PA (2000); DataStat, Inc. of Ann Arbor, MI (2005); and ICF Macro, Inc., of Fairfax VA (2010 and 2015), using very similar methodology involving computer-assisted telephone interviews (CATI), based on list-assisted random-digit dialed (RDD) sampling. All surveys oversampled Black/African American and Hispanic/Latino participants, with interviews conducted in Spanish when necessary or requested. The 2000, 2005 and 2010 NASs also oversampled 13 low-population states yielding a minimum of 50 (2000 and 2005), and 40 (2010) cases per state (with most state samples being very much larger). For the combined analytic sample the minimum state sample was 116 and the average state sample was 479. The 2015 NAS and NAHTOS used a dual-frame (landline/mobile) RDD sampling method to include respondents who completed the interview via mobile phone. For the period between 2000 and 2010, when relying on landline-based samples only, below 5% (2000), 10% (2005) and about 25% (2010) of the population would not have been reached by landline

telephones, while the dual-frame (landline plus mobile phone) sampling strategy in both 2015 surveys (NAS and NAHTOS) is estimated to have provided coverage of 97.5% of the US households (Blumberg and Luke, 2013). Survey cooperation rates for the surveys were estimated to be 58% (2000 NAS), 56% (2005 NAS), 52%, (2010 NAS), and 60% (2015 NAS and 2015 NAHTOS). The Institutional Review Board of the Public Health Institute, Oakland, CA approved the informed consent procedures and protocols of all surveys. Individual cases in each survey dataset were linked with state APS scores for the prior year as described below.

Measures

Alcohol's Harms to Others (AHTO) Outcomes—Six AHTO items in these surveys, all due to someone else's drinking, were initially developed by the World Health Organization's Study of Community Response to Alcohol-Related Problems (Rootman and Moser, 1984), then incorporated into Fillmore's (1985) seminal "social victims of drinking" survey of the city of Berkeley, California. Subsequently they were used in the 1989 Canadian Alcohol and Other Drug Survey (Eliany et al., 1992). AHTO items in our surveys followed a transition instruction: "Now let me ask you some questions about various problems that can occur because of someone else's drinking." Items asked whether the participant had ever experienced each harm from someone else's drinking (e.g., "Have you ever had your house, car or property vandalized by someone who had been drinking?"), and then, if affirmed: "did this happen in the last 12 months?" (In the 2015 surveys, some items were *only* asked for the 12 month period, and all analyses here focus on the 12-month experience of AHTO.) Items include: family problems or marital difficulties; financial trouble; being pushed, hit or assaulted; having home, car or property vandalized; been a passenger with a driver who had had too much to drink; and traffic accident you were involved in (all due to someone else's drinking). Following Karriker-Jaffe and Greenfield (2014), the six AHTO items were combined into three pairs of items to indicate experiencing at least one of the two conceptually and empirically linked harms as follows: 1) aggression-related harms (physical assault or property vandalism; $r = .26, p < .001$); 2) family/marital problems or financial trouble due to someone else's drinking ($r = .31, p < .001$); and 3) harms related to another's drunk driving (passenger with impaired driver or traffic accident due to another's drinking). Note that in 2015 both family/marital problems and financial troubles were usually attributed to heavy drinking by a partner or family member (Karriker-Jaffe et al., 2017). Though the driving-related pair have a low correlation ($r = .06, p < .01$), this is primarily due to the low 12-month rate of accidents due to another drunk driver (a harm) and the higher prevalence of riding with a drunk driver (technically risking harm rather than being harmed).

State Alcohol Policy Measures—The Alcohol Policy Scale (APS) was used to assess the strength of the state-level alcohol policy environments. The APS encompasses 29 policies in five policy domains: physical availability of alcohol (outlet density, alcohol beverage control agency, hours of sale restriction, local option, days of sale restriction, state monopoly, and keg registration); underage drinking (minimum legal drinking age, prohibition of providing alcohol to minors, and prohibition of false identification for purchasing alcohol); drinking driving (blood alcohol concentration 0.08 per se,

administrative license revocation, graduated driver's license, roadside sobriety checkpoints, zero tolerance, under-age 'use-lose' driving privilege, open container prohibited in motor vehicle, and ignition interlock laws); social host or dram shop laws (prohibition of sales to intoxicated persons, dram shop, social host laws [businesses that sell or serve alcohol can be held liable for damages to or by patrons, while private social hosts serving adults or minors can be held liable for infractions by intoxicated guests in states with such laws], minimum age of server, house party laws, and responsible beverage service training); and alcohol pricing (alcohol taxation, wholesale price restriction and retail price restriction) (Nelson et al., 2015). In addition to the Alcohol Policy Information System (National Institute on Alcohol Abuse and Alcoholism), which was the primary source for 13 of the 29 policies, 18 additional data sources were used to collect and code data about alcohol policies and their key provisions in all 50 states and Washington, DC. APS data were assembled for years 1999 to 2014 (Naimi et al., 2014).

Two APS measures were used in the current study. *APS-binge drinking* aggregated the ratings of all 29 policies in reducing binge drinking based on a panel of 10 experts' ratings of efficacy and implementation of state alcohol policies for reducing drinking among underage youth and reducing binge drinking among adults. *APS-impaired driving* aggregated the efficacy of eight policies intended to reduce drinking driving, reflecting expert judgement about state alcohol policies that would reduce alcohol-impaired driving among adults and youth. Implementation of each policy typically involves consideration of each policy's statutory design (such as provisions making the policy broadly applicable, effective, and enforceable). Efficacy and implementation were combined in the score, based on assistance from a panel of policy experts (Naimi et al., 2014; Xuan et al., 2015a; Xuan et al., 2015c). Further details on the APS are provided in Naimi et al. (2014). The APS scores demonstrated good construct validity to predict lower odds of binge drinking and alcohol-impaired driving among adults (Naimi et al., 2014; Xuan et al., 2015a; Xuan et al., 2015b) and youth drinking (Xuan et al., 2015c). Figure 1 provides a summary by state of the APS-Binge drinking score averaged over the years, since between-state variation (mean Standard Deviation = 8.54, APS range: 25.6 for South Dakota to 60.1 for Oklahoma) is greater than yearly variation within states (mean *SD* = 1.87, *SD* range: 0.42 for Florida to 4.11 for Nevada).

Each raw APS score was divided by the maximum possible score and multiplied by 100 to rescale it within a theoretical range from 0% to 100%. Higher APS scores denote a stronger state alcohol policy environment (Naimi et al., 2014; Xuan et al., 2015a). (For interpretability of coefficients we divided resultant state APS scores by 10.) The two APS scores were attached to the survey participants' records using the APS data from the year prior to the date the participant completed the survey. (For the 2000 NAS only, some participants completed the survey in 1999, so the APS data for these individuals was from the same year as their survey completion.)

Individual Survey and State-level Characteristics—Personal and demographic characteristics included as controls in multivariate analyses were respondent's gender, since, descriptively, men have higher rates of aggression- and driving-related harms than women, and vice versa for family/financial harms; age group (18–29, 30–39, 40–49, 50–59, vs. 60

as reference), because of already noted age differences; race (Black, Hispanic, Asian or Pacific Islander, American Indian, and others, *vs.* White), where certain differences have been seen (Nayak, et al., in press); marital status (married/cohabitating, never married, with a combined category as reference—separated, divorced, widowed); below the federal poverty level *vs.* not in poverty (based on a combination of family income and number of family members in the household); educational level (high school graduation, some college education, college or higher degree *vs.* less than high school education); employment status (unemployed and individuals out of the formal work force including students, homemakers, retired persons, and the disabled, *vs.* full- or part-time employed)—for all of which relationships with AHTOs have been repeatedly observed. Family history of alcohol problems during childhood or having a blood relative who had alcohol problems was added to characterize an upbringing that appears to impart a vulnerability to exposure to AHTO as an adult (Kaplan, et al., 2018; Karriker-Jaffe, et al., 2018a; Nayak, et al., in press).

A state-level covariate, number of police officers per capita for each state, also was introduced as a control. This was used as a proxy for policy enforcement—a dimension only partially captured by the APS and which might confound the relationship between lagged state APS scores and individual-level AHTO measures. (Although ‘enforceability’ was one of the APS statutory design features judged by experts, this is distinct from actual state enforcement levels.)

Statistical Analysis

Because of the nested data structure with individuals located within states and administration of surveys in each state across multiple years, we fitted a series of multi-level random intercept models that allow prediction of variability in AHTO outcomes across states and survey years. Results from the multi-level models reported in the tables show the change in odds of having the specific AHTO outcome (of the 3 measures) associated with an increase of 10 units in the respective APS (0–100) index, adjusting for the above-stated individual-level covariates and state-level policing covariate. As noted earlier, some AHTO outcomes might be experienced more often by those under age 40, and thus more amenable to effects of the state policy environment. Consequently, first we examined population models with interaction terms for age < 40 x APS score, finding trends toward significance for Aggression-related harms and Any of 3 harms by APS-Binge, and stronger interactions for the same two AHTO outcomes (Aggression, $p=.05$; Any of 3 harms, $p < .05$) by APS-Impairment score. Therefore, to examine whether APS-AHTO associations might differ by age more closely, we stratified the analyses by the participant’s age (younger than 40 years *vs.* 40 and older). This choice was also informed by prior research showing a higher risk of a number of AHTOs among the younger groups (Greenfield, 2014). With the exception of the univariate analysis performed to reveal sample characteristics, all analyses were conducted using the survey estimation procedure of STATA version 14 (StataCorp., 2015). We estimated all models without accounting for the respondent’s (potential victim’s) own drinking. The main rationale for this decision is that restrictive policies can reduce harms from others by reducing heavy drinking of one or both parties involved, since AHTO is inherently transactional (Room et al., 2010), so that controlling individual’s drinking could ‘adjust away’ some of the potential policy influences on AHTO.

Using the Stata post-estimation procedure, we computed the intraclass correlation coefficients to evaluate whether significant variations in the AHTO outcomes could be attributed to differences in the level-2 variable, state (Robson and Pevalin, 2016). Although no evidence of a significant variation due to the level-2 variable was found for any of the models, we decided to retain the multi-level modeling approach with a random intercept, although recognizing this might not be a significant improvement over logistic regression modeling.

RESULTS

Sample Characteristics and Prevalence of AHTO

Table 1 shows the demographic characteristics of the weighted sample (with unweighted *ns*). As often true of US telephone household surveys, females (57% unweighted; 53% weighted) were somewhat overrepresented. Because of oversampling, Black and Latino/Hispanic subsamples are relatively well represented: Black (19% unweighted; 11% weighted) and Hispanic (19% unweighted, 13% weighted). Whites were over half of the sample (57% unweighted; 70% weighted), with small numbers of other racial/ethnic minorities like American Indians and Asian/Pacific Islanders. About 32% (38% weighted) of the sample were younger than 40. Slightly less than 60% (38% weighted) attended college or received college or advanced degrees. Slightly more than 20% (19% weighted) had family incomes below the federal poverty level for the number of dependents in the household. A majority of the sample (57% unweighted; 61% weighted) were employed, 52% (61% weighted) were married or living with a partner, and a slight majority (51% weighted) lived with a family member who was a problem drinker when growing up or had a blood relative with alcohol problems.

Prevalence of Harms and Harm Variables

Table 2 provides the 12-month prevalence of each of the six types of harms attributed to others' drinking, including the three 2-item harm variables (coded as either one affirmed). Having been a passenger with a drunk driver was the most common (5.1%), followed by family problems or marriage difficulties (4.0%). Financial trouble (1.5%) and traffic accident (0.5%) were much less common than other types of harms. Overall, about 11.2% of U.S. adults reported experiencing at least one of the pair of harms in any of the three harm areas, for which prevalences were between 5.3% (driving-related harms) and 4.4% Family/Financial, with Aggression-related harms intermediate (4.9%), each pair involving one higher and one lower prevalence item (see Table 2).

Relationship of Harms to State Policy Environment

Table 3 summarizes the results of the multi-level logistic regression models to examine the associations of each APS policy environment measure with the three AHTO outcome variables (and the composites for "any of 3 harm-types" and "any of 6 harms"), in each case adjusting for individual- and state-level covariates. Table 3 summarizes results for APS-Binge drinking and APS-Impaired driving measures, based on fully adjusted models.

In the full sample (Table 3), the APS-Binge drinking policy measure was not associated with any of the AHTO outcomes. Conversely in the full population, APS-Impaired driving policy environment attained significance for driving-related harm (adjusted odds ratio [aOR] = 0.901, $p < .05$) and 'any of 3 harm-types' (aOR = 0.931, $p < .05$) implying from 7% decrease in any of the harms for a 10% increase in policy restrictiveness. When analyses were stratified by age, for individuals younger than 40 years (and not for those 40 and older), both the APS measures (i.e., APS-Binge drinking and APS-Impaired driving policy environment measures) were significantly and inversely associated with two of the AHTO outcome variables. APS-Binge drinking was inversely associated with aggression-related harm (aOR = 0.840, $p < .05$) and driving-related harm (aOR = 0.847, $p < .05$), indicating about a 16% decrease in the odds of these types of harms associated with each 10 percentage point increase in the APS-Binge score. APS-Binge drinking was also inversely associated with the any-of-3-harm-types outcome (aOR = 0.875, $p < .05$) for the younger age group. Similar associations were found among those under 40 for relationships between APS-Impaired driving and aggression-related harms (aOR = 0.812, $p < .01$), driving-related harms (aOR = 0.835, $p < .05$), and any of 3 harm-types (aOR = 0.840, $p < .01$). Neither of the APS measures was significantly associated with family/financial harm. As a sensitivity analysis (results not shown), when we limited analyses to those married or living with a partner, of the AHTO outcomes, only aggression-related harms were significantly associated with APS-binge scores ($p < .05$) and only for those under age 40.

Finally, to provide further details, Table 4 shows summary results (aORs and 95% CIs) with all included covariates. The table provides the models examining the relationship between APS-Binge drinking (first 2 columns) and APS-Impaired driving (last 2 columns) for aggression-related harms (as the dependent variable). This allows us to note the personal characteristics of the reporting person that influence the risks of being victimized by being pushed, hit or assaulted, or having property vandalized, by some other drinker. Males are more likely than females to experience aggression from other drinkers ($p < .0001$), as are, equally strongly, those below the poverty line ($p < .0001$). Those with a college or higher degree are less likely to experience such aggression, as are those who are married or living together ($p < .0001$). Those who had family members during childhood or blood relatives with alcohol problems are much more likely to be victimized by aggression by other drinkers ($p < .0001$). Both APS policy environment scores are quite clearly associated with aggression-related harms from other drinkers, but the state's overall policing rate does not appear to affect this relationship.

DISCUSSION

Results indicate that more restrictive state alcohol policy environments are inversely associated with aggression- and drink-driving-related harms experienced due to others' drinking, after adjusting for a large number of individual-level covariates and state policing rate. The APS-Impaired driving score resulted in somewhat stronger associations with AHTO than the APS-Binge drinking score among those under age 40. As noted in Results, the magnitude of the association implies that for each 10 point increase in policy restrictiveness (assessed by the APS), the odds of experiencing these harms is reduced by approximately 16%. The summary of APS-Binge drinking mean scores by state in Figure 1

provides a way of judging the practical impact. The magnitude of association is comparable to AHTOs expected owing to differences in the policy environments between several adjacent states, e.g., North Dakota (APS-binge mean across years = 33.7) and Minnesota (42.3); Wisconsin (31.2) and Illinois (42.6); and Montana (30.9) and Idaho (42.4). How policies affect social norms regarding drinking is a matter for further study. We note that riding with a driver who has had too much to drink (considerably more common than alcohol related traffic accidents) is more often reported by younger men and likely to involve acquaintances. Family or marital harms or financial troubles from someone else's drinking were not found to be significantly associated with either state policy environment measure. This suggests that either additional specific family-focused policies or interventions may be needed to address these important harms, which are mainly owing to problem drinking of intimates (partners or family members). These contrast with the other two types of harms (aggression- and driving-related harms), which are more often attributed to less intimate friends or strangers (Karriker-Jaffe et al., 2017).

It has been known since Fillmore's (1985) classic study, and repeatedly found (Greenfield et al., 2009) that victim's heavy drinking increases the odds of being harmed by another drinker. Many of the APS variables are directly related to deterring binge drinking or drinking driving should affect both the victim's and the other's drinking, thus potentially reducing likelihood of harms at both sides of the inherently interactional process that generates AHTO (Karriker-Jaffe et al., 2018b; Room et al., 2010). For this reason we elected *not* to control for the victim's own drinking in the multilevel analyses. However, sensitivity analyses including the victim's volume of consumption in the models (results not shown) did not greatly change the findings presented here.

Regarding the age-stratified analyses, many of those who are 40 and over will have 'matured out' of heavy drinking themselves, and will be less likely to place themselves in situations involving heavy-drinking others. It is therefore not surprising that associations between the alcohol policy environment measures and aggressive or driving-related harms from other drinkers were limited to those under 40. Indeed, in the population as a whole, the only finding was for the APS-Impaired driving policy score, where states' stronger alcohol policies were associated with lower rates of drink driving harms and 'any of 3 harm-types' ($p < .05$), albeit not very strongly, as seen in the confidence intervals. Even these results appears to derive mostly from the strength of the relationship with those under age 40 ($p < .01$). Younger persons are at particular risk for violence and injuries (Macdonald et al., 1999), and AHTO (Greenfield et al., 2015). Additionally, injury and violence constitute a larger fraction of mortality and morbidity in young age groups, so the findings related to aggression- and driving-related AHTO in younger populations seem both consistent with the prior literature (Cherpitel et al., 2013; Cherpitel and Ye, 2010; Cherpitel et al., 2012; Eustace and Wei, 2010) and particularly important for public health. We note that the younger adults classification (age < 40) used includes those in their 30s where marital and family problems, which are much more often experienced by women than men, are also quite prevalent. Therefore, it is not for the lower base rate of these harms, per se, that no relationship between the APS measures and family or financial problems was observed. We have argued elsewhere that "targeted mental health interventions for people living with heavy-drinking partners or who have family members with alcohol problems may be warranted, and

outreach into low-income communities also may help reduce the impact of AHTO.” (Karriker-Jaffe et al., 2017, p 440.).

There are a number of limitations in this research, perhaps the main one being that AHTO are based on survey self-reports and thus inherently subjective, including the attribution that they were caused by another’s alcohol use. The APS policy environment scores, while they did show some variation across time, varied much more between states (as seen in Figure 1 for APS-Binge drinking Scores). Nevertheless, as noted in the introduction, plausible relationships with the AHTO variables used here have been reported for the US, including the relationship with poorer mental health and quality of life, suggesting the reported secondhand effects are meaningful. The careful development of the APS policy environment variables and their validation in regard to a range of individual outcomes also argues for their utility. Causality cannot be attributed to the state policy environment-AHTO relationships found. It is possible, certainly, that in enacting strong alcohol laws, the voters and policy makers may be responding to more problematic drinking norms and resulting harms, but if so, one might expect *more* secondhand alcohol harms would be associated with stronger measures, the opposite of the findings presented here. Our results (excepting for family-centered problems) instead are consistent with the possibility that stronger and more effective alcohol measures enacted by states may lead to, and at a minimum are significantly associated with, *fewer* secondhand drinking harms, adjusting for numerous covariates.

CONCLUSIONS

One may conclude that for adults under age 40, more restrictive state alcohol policies, as assessed by the states’ alcohol policy scale scores for the year before the individual was surveyed, is associated with lower self-reported rates of aggression-related and driving-related harms from someone else’s drinking. These findings add to and extend the considerable published work suggesting that the alcohol policy environment can influence an individual’s own binge drinking and alcohol-related problems such as drunk driving, other factors equal. Our results suggest that aggression-related victimization and vehicular hazards stemming from other people’s heavy drinking (but not family, marital or financial harms due to others’ drinking) may be reduced by the strength of a state’s alcohol policy environment, to a meaningful degree, adjusting for numerous personal characteristics, but mainly for those under 40. Although the temporal lag between policy and behavior meets one desideratum for a causal interpretation, these results fall short of causal, because they are based on cross-sectional and self-report data. However, it is plausible that a causal relationship lies under our associational findings.

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REFERENCES

- Blumberg SJ, Luke JV (2013) Wireless substitution: early release of estimates from the National Health Interview Survey, January–6 2013 [Accessed: 2014-11-05 Archived by WebCite® at <http://www.webcitation.org/6TrfExrB6>], pp 19 National Center for Health Statistics, Hyattsville, MD.
- Brand DA, Saisana M, Rynn LA, Pennoni F, Lowenfels AB (2007) Comparative analysis of alcohol control policies in 30 countries. *PLoS Med* 4(4):e151. [PubMed: 17455992]
- Carpenter CS, Kloska DD, O'Malley P, Johnston L (2007) Alcohol control policies and youth alcohol consumption: evidence from 28 years of Monitoring the Future. *B E J Econom Anal Policy* 7(1):1–21.
- Cherpitel CJ, Borges G, Giesbrecht N, Monteiro M, Stockwell T eds (2013) *Prevention of Alcohol-Related Injuries in the Americas: From evidence to policy action*. Pan American Health Organization, Washington, DC.
- Cherpitel CJ, Ye Y (2010) Alcohol and violence-related injuries among emergency room patients in an international perspective. *J Am Psychiatr Nurses Assoc* 16(4):227–235. [PubMed: 20824198]
- Cherpitel CJ, Ye Y, Bond J, Room R, Borges G (2012) Attribution of alcohol to violence-related injury: self and other's drinking in the event. *J Stu Alcohol Drugs* 73(2):227–284.
- Cook WK, Bond J, Greenfield TK (2014) Are alcohol policies associated with alcohol consumption in low- and middle-income countries? *Addiction* 109(7):1081–1090. [PubMed: 24716508]
- Eliany M, Giesbrecht N, Nelson M, Wellman B, Wortley S (1992) *Alcohol and Other Drug Use by Canadians: A national alcohol and other drugs survey (1989) technical report*. The Unit, Ottawa.
- Erickson DJ, Lenk KM, Toomey TL, Nelson TF, Jones-Webb R, Mosher JF (2014) Measuring the Strength of State-level Alcohol Control Policies. *World Med Health Policy* 6(3):171–186. [PubMed: 25574422]
- Eustace D, Wei H (2010) The role of driver age and gender in motor vehicle fatal crashes. *Journal of Transportation Safety and Security* 2(1):28–44.
- Fillmore KM (1985) The social victims of drinking. *Br J Addict* 80(3):307–314. [PubMed: 3864482]
- Greenfield TK (2001) Individual risk of alcohol-related disease and problems, in *International Handbook of Alcohol Problems and Dependence*, Heather N, Peters TJ, Stockwell T eds, pp 413–437. John Wiley, New York.
- Greenfield TK (2014) Heavy alcohol consumption, drinking contexts, norms and harms among young adults in the U.S., in *Lifestyles & Drinking Patterns among Young Adults*. 3 5, European Parliament, Brussels, Belgium.
- Greenfield TK, Karriker-Jaffe KJ, Giesbrecht N, Kerr WC, Ye Y, Bond J (2014) Second-hand drinking may increase support for alcohol policies: new results from the 2010 National Alcohol Survey. *Drug Alcohol Rev* 33(3):259–267. [PubMed: 24761758]
- Greenfield TK, Karriker-Jaffe KJ, Kaplan LM, Kerr WC, Wilsnack SC (2015) Trends in Alcohol's Harms to Others (AHTO) and co-occurrence of family-related AHTO: the four US National Alcohol Surveys 2000 to 2015. *Subst Abuse* 9(Suppl. 2):23–31. [PubMed: 26549971]
- Greenfield TK, Karriker-Jaffe KJ, Kerr WC, Ye Y, Kaplan LM (2016) Those harmed by others' drinking in the US population are more depressed and distressed. *Drug Alcohol Rev* 35:22–29. [PubMed: 26382188]
- Greenfield TK, Martinez P (2017) Alcohol as a risk factor for chronic disease: raising awareness and policy options, in *Preventing Alcohol-Related Problems: Evidence and community-based initiatives*, Giesbrecht N, Bosma LMeds, pp 33–50. APHA Press, Washington, DC.
- Greenfield TK, Ye Y, Giesbrecht N (2007) Alcohol policy opinions in the United States over a 15-year period of dynamic per capita consumption changes: implications for today's public health practice. *Contemp Drug Probl* 34(4):649–680.
- Greenfield TK, Ye Y, Kerr W, Bond J, Rehm J, Giesbrecht N (2009) Externalities from alcohol consumption in the 2005 US National Alcohol Survey: implications for policy. *Int J Environ Res Public Health* 6(12):3205–3224. [PubMed: 20049257]
- Hadland SE, Xuan Z, Blanchette JG, Heeren TC, Swahn MH, Naimi TS (2015) Alcohol policies and alcoholic cirrhosis mortality in the United States. *Prev Chronic Dis* 12(10):E117. [PubMed: 26203815]

- Johnson RB (2016) Alcohol Beverage Control: The basics for new state alcohol regulators [Accessed: 2016-07-13 http://webcache.googleusercontent.com/search?q=cache:qhe886apjmAJ:www.centerforalcoholpolicy.org/wpcontent/uploads/2015/06/Alcohol_Beverage_Control_Basics.pdf+&cd=1&hl=en&ct=clnk&gl=us], pp 5 Center for Alcohol Policy, Alexandria, VA.
- Kaplan LM, Karriker-Jaffe KJ, Greenfield TK (2017) Drinking context and alcohol's harm from others among men and women in the 2010 U.S. National Alcohol Survey. *J Subst Use* 22(4):412–418. [PubMed: 28757805]
- Kaplan LM, Greenfield TK, Karriker-Jaffe KJ (2018) Examination of associations between early life victimisation and alcohol's harm from others. *Drug Alcohol Rev* 37:365–374. [PubMed: 28833744]
- Karlsson T, Österberg E (2001) A scale of formal alcohol control policy in 15 European countries. *Nordisk Alkohol Nark* 18(English suppl.):117–128.
- Karriker-Jaffe KJ, Greenfield TK (2014) Gender differences in associations of neighbourhood disadvantage with alcohol's harms to others: a cross-sectional study from the USA. *Drug Alcohol Rev* 33(3):296–303. [PubMed: 24612367]
- Karriker-Jaffe KJ, Greenfield TK, Kaplan LM (2017) Distress and alcohol-related harms from intimates, friends and strangers. *J Subst Use* 22(4):434–441. [PubMed: 28757806]
- Karriker-Jaffe KJ, Li L, Greenfield TK (2018a) Estimating mental health impacts of alcohol's harms from other drinkers: using propensity scoring methods with national cross-sectional data from the United States. *Addiction* 113(10):1826–1839. [PubMed: 29893009]
- Karriker-Jaffe KJ, Room R, Giesbrecht N, Greenfield TK (2018b) Alcohol's harm to others: Opportunities and challenges in a public health framework. *J Stu Alcohol Drugs* 79(2):239–243.
- Macdonald S, Wells S, Giesbrecht N, Cherpitel CJ (1999) Demographic and substance use factors related to violent and accidental injuries: results from an emergency room study. *Drug Alcohol Depend* 55(1–2):53–61. [PubMed: 10402149]
- Mosher JF (1982) The International Study of Alcohol Control Experiences (ISACE): summary of the final report, in *Legislative Approaches to Prevention of Alcohol-related Problems: An inter-American workshop*, Institute of Medicine ed, pp 213–218, 222. National Academy Press, Washington, DC.
- Naimi TS, Blanchette J, Nelson TF, Nguyen T, Oussayef N, Heeren TC, Gruenewald P, Mosher J, Xuan Z (2014) A new scale of the U.S. alcohol policy environment and its relationship to binge drinking. *Am J Prev Med* 46(1):10–16. [PubMed: 24355666]
- National Highway Traffic Safety Administration (2005) The role of alcohol beverage control agencies in the enforcement and adjudication of alcohol laws (DOT HS 809877) [Accessed: 2017-04-24 Archived by WebCite® at <http://www.webcitation.org/6py6mFQFv>], pp 32 US Department of Transportation, Washington, DC.
- National Institute on Alcohol Abuse and Alcoholism Alcohol Policy Information System (APIS) [<https://alcoholpolicy.niaaa.nih.gov>], Bethesda, MD.
- Nayak MB, Patterson D, Wilsnack SC, Karriker-Jaffe KJ, Greenfield TK (in press) Alcohol's secondhand harms in the U.S.: new data on prevalence and risk factors. *J Stu Alcohol Drugs*.
- Nelson TF, Naimi TS, Brewer RD, Wechsler H (2005) The state sets the rate: the relationship among state-specific college binge drinking, state binge drinking rates, and selected state alcohol control policies. *Am J Public Health* 95(3):441–446. [PubMed: 15727974]
- Nelson TF, Xuan Z, Babor TF, Brewer RD, Chaloupka FJ, Gruenewald PJ, Holder H, Klitzner M, Mosher JF, Ramirez RL, Reynolds R, Toomey TL, Churchill V, Naimi TS (2013) Efficacy and the strength of evidence of U.S. alcohol control policies. *Am J Prev Med* 45(1):19–28. [PubMed: 23790985]
- Nelson TF, Xuan Z, Blanchette JG, Heeren TC, Naimi TS (2015) Patterns of change in implementation of state alcohol control policies in the United States, 1999–2011. *Addiction* 110(1):59–68. [PubMed: 25138287]
- Parry CD, Patra J, Rehm J (2011) Alcohol consumption and non-communicable diseases: epidemiology and policy implications. *Addiction* 106(10):1718–1724. [PubMed: 21819471]

- Rehm J, Greenfield TK (2008) Public alcohol policy: current directions and new opportunities. *Clin Pharmacol Ther* 83(4):640–643. [PubMed: 18305457]
- Rehm J, Greenfield TK, Kerr WC (2006) Patterns of drinking and mortality from different diseases – an overview. *Contemp Drug Probl* 33(2):205–235.
- Rehm J, Mathers C, Popova S, Thavorncharoensap M, Teerawattananon Y, Patra J (2009) Global burden of disease and injury and economic cost attributable to alcohol use and alcohol-use disorders. *Lancet* 373(9682):2223–2233. [PubMed: 19560604]
- Robson K, Pevalin D (2016) *Multilevel Modeling in Plain Language*. SAGE Publishing, Thousand Oaks, CA.
- Room R (1990) Thinking about alcohol controls, in *Controversies in the Addictions Field*, vol 1, Engs RCed, pp 68–75. Kendall-Hunt, Dubuque, IA.
- Room R, Ferris J, Laslett A-M, Livingston M, Mugavin J, Wilkinson C (2010) The drinker's effect on the social environment: a conceptual framework for studying alcohol's harm to others. *Int J Environ Res Public Health* 7(4):1855–1871. [PubMed: 20617064]
- Rootman I, Moser J (1984) Community response to alcohol-related problems. World Health Organization.
- Scherer M, Fell JC, Thomas S, Voas RB (2015) Effects of dram shop, responsible beverage service training, and state alcohol control laws on underage drinking driver fatal crash ratios. *Traffic Inj Prev* 16(Suppl. 2):S59–S65. [PubMed: 26436244]
- Shield KD, Monteiro M, Roerecke M, Smith B, Rehm J (2015) Alcohol consumption and burden of disease in the Americas in 2012: implications for alcohol policy. *Rev Panam Salud Publica* 38(6): 442–449. [PubMed: 27440091]
- Stata Statistical Software: Release 14.0. College Station, TX: Stata Corporation; 2015.
- Wagenaar AC, Farrell S (1988) Alcohol beverage control policies: their role in preventing alcohol-impaired driving (presented December 14–16), in *Surgeon General's Workshop on Drunk Driving: Background papers*, pp 1–14. U.S. Department of Health and Human Services, Washington, DC.
- Xuan Z, Blanchette J, Nelson TF, Heeren T, Oussayef N, Naimi TS (2015a) The alcohol policy environment and policy subgroups as predictors of binge drinking measures among US adults. *Am J Public Health* 105(4):816–822. [PubMed: 25122017]
- Xuan Z, Blanchette JG, Nelson TF, Heeren TC, Nguyen TH, Naimi TS (2015b) Alcohol policies and impaired driving in the United States: effects of driving- vs. drinking-oriented policies. *Int J Alcohol Drug Res* 4(2):119–130. [PubMed: 26925185]
- Xuan Z, Blanchette JG, Nelson TF, Nguyen TH, Hadland SE, Oussayef NL, Heeren TC, Naimi TS (2015c) Youth drinking in the United States: relationships with alcohol policies and adult drinking. *Pediatrics* 136(1):18–57. [PubMed: 26034246]

Figure Title:

Summary of time-averaged APS-Binge Drinking scores by state, 1999–2014. Darker shades, representing lower scores, correspond to less restrictive state alcohol policies.

Table 1.Sample Characteristics (n; weighted percentage) ^a

Characteristics	n (%)
<u>All</u>	26,744 (100.0)
<u>Gender</u>	
Female	15,513 (52.6)
Male	11,231 (47.5)
<u>Age</u>	
18–29	3,846 (19.3)
30–39	4,189 (18.6)
40–49	4,810 (19.2)
50–59	4,961 (18.4)
60 or older	8,440 (24.6)
<u>Race</u>	
Asian Pacific Islander	521 (2.9)
Black	5,312 (11.0)
White	15,296 (69.5)
Hispanic	4,904 (13.0)
American Indian	379 (2.2)
Others	332 (1.5)
<u>Educational level</u>	
Less than high school	3,504 (13.5)
High school graduation	7,454 (28.7)
Some college education	6,925 (29.4)
College or advanced degree	8,741 (28.4)
<u>Employment status</u>	
Employed	14,815 (60.6)
Unemployed	1,480 (5.6)
Other ^b	10,358 (33.8)
<u>Family income</u>	
Below Federal Poverty Level	4,981 (18.7)
Federal Poverty level or higher	21,763 (81.3)
<u>Marital Status</u>	
Married/living with partner	13,837 (60.8)
Divorced/separated/widowed	7,881 (20.4)
Never married	6,02 (18.9)
Family history of alcohol problems	13,067 (52.0)
Drinking volume (12-month mean drinks; standard deviation)	184.26 (4.70)

^a Analytic sample with any pairwise Alcohol's Harms to Others Data^b Individuals out of the formal work force including students, homemakers, retired persons, and the disabled.

Table 2.

Prevalence of harms from others' drinking in U.S. adults, overall, under age 40, & 40 plus (past 12 months; weighted percent)

Type of harms	Overall Harms (%)	Overall n	Under Age 40 Harms (%)	Age 40 and Over Harms (%)
Aggression-related harms	4.9	26,731	8.0	3.1
Pushed, hit, or assaulted	3.5	25,470	6.0	2.1
House, car or property vandalized	2.4	25,113	3.8	1.6
Family-related or financial harms	4.4	26,734	6.0	3.5
Family problems/marriage difficulties	4.0	25,472	5.4	3.1
Financial trouble	1.5	25,476	2.0	1.3
Driving-related harms	5.3	25,568	9.0	3.1
Passenger with drunk driver	5.1	25,443	8.6	2.9
Traffic accident due to another drinker	0.5	25,512	0.8	0.3
Any of three harm areas^a	11.2	26,744	16.8	7.8

^a Any harm exposure indicated in each of the paired items composing the 3 harm areas.

Table 3

Summary of multi-level logistic regression models predicting harms due to others' drinking associated with a 10 percentage point increase in the restrictiveness of the state's alcohol policy environment

APS-Binge Drinking^a				
	Aggression-related	Driving-related	Family or financial	Any of three types
	aOR (95% CI)	aOR (95% CI)	aOR (95% CI)	aOR (95% CI)
Overall	0.923 (0.832–1.024)	0.905 (0.818–1.000)	1.012 (0.930–1.100)	0.946 (0.883–1.014)
Ages < 40	0.840 (0.731–0.966)*	0.847 (0.733–0.979)*	1.000 (0.880–1.135)	0.875 (0.784–0.976)*
Ages 40	1.045 (0.927–1.178)	0.973 (0.853–1.111)	1.006 (0.894–1.133)	1.011 (0.931–1.098)

APS-Drinking Driving^a				
	Aggression-related	Driving-related	Family or financial	Any of three types
	aOR (95% CI)	aOR (95% CI)	aOR (95% CI)	aOR (95% CI)
Full Sample	0.905 (0.816–1.004)	0.901 (0.814–0.997)*	0.995 (0.912–1.086)	0.931 (0.867–0.9998)*
Ages < 40	0.812 (0.706–0.934)**	0.835 (0.721–0.966)*	0.971 (0.852–1.106)	0.840 (0.752–0.938)**
Ages 40	1.039 (0.917–1.177)	0.972 (0.848–1.114)	0.997 (0.881–1.128)	1.014 (0.932–1.104)

Note: aOR: adjusted odds ratio, CI: confidence interval

*
p < .05,

**
p < .01 (indicated with **bold text**).

^aAlcohol Policy Scale (APS)—effectiveness in reducing a) binge drinking and b) impaired driving (separate models) based on experts' efficacy judgements regarding 29 state alcohol policies (see Methods). Models adjust for individual-level gender, age group (in population-wide models), race, marital status, family income, educational level, employment status, growing up with a family member or a blood relative who had alcohol problems, and state-level per capita policy officer rate.

Table 4

Random Intercept models predicting aggression-related harms from others' drinking for U.S. adults younger than age 40 from APS scores (adjusting for covariates)

	APS-Binge Drinking ^a			APS-Impaired Driving ^a		
	aOR	95% CI (n=7,603)		aOR	95% CI (n=7,603)	
APS-Binge drinking	0.840	(0.731,	0.966) [*]	--		
APS-Impaired driving	--			0.812	(0.706,	0.934) ^{**}
Male ^b	1.482	(1.244,	1.766) ^{****}	1.479	(1.241,	1.762) ^{****}
Age 30–39 ^c	0.517	(0.427,	0.626) ^{****}	0.517	(0.427,	0.626) ^{****}
<u>Race^d</u>						
Asian/Pacific Islander	0.884	(0.515,	1.515)	0.892	(0.520,	1.529)
Black	0.807	(0.636,	1.026)	0.812	(0.639,	1.032)
Hispanic	0.816	(0.654,	1.019)	0.827	(0.663,	1.033)
American Indian	1.714	(1.027,	2.861) [*]	1.705	(1.021,	2.848) [*]
Other race	1.597	(0.796,	3.202)	1.621	(0.808,	3.250)
<u>Education^e</u>						
High school grad	0.942	(0.720,	1.233)	0.946	(0.723,	1.239)
Some college	1.061	(0.809,	1.391)	1.069	(0.816,	1.402)
College grad/more	0.630	(0.462,	0.858) ^{**}	0.638	(0.468,	0.870) ^{**}
<u>Income < Federal Poverty Level^f</u>	1.712	(1.415,	2.071) ^{****}	1.713	(1.416,	2.073) ^{****}
<u>Employment status^g</u>						
Unemployed	1.118	(0.847,	1.476)	1.129	(0.855,	1.491)
Other ^h	0.812	(0.640,	1.030)	0.814	(0.642,	1.033)
<u>Marital statusⁱ</u>						
Separated/divorced/widowed	1.726	(1.302,	2.286) ^{****}	1.730	(1.305,	2.292) ^{****}
Never married	1.389	(1.142,	2.270) ^{**}	1.394	(1.145,	1.696) ^{**}
Family with alcohol problems ^j	1.907	(1.594,	2.283) ^{****}	1.908	(1.594,	2.284) ^{****}
State police officer per capita rate	1.000	(0.967,	1.035)	1.001	(0.968,	1.035)
Constant	0.114	(0.058,	0.224) ^{****}	0.134	(0.068,	0.265) ^{****}

aOR: adjusted odds ratio, CI: confidence interval

*
p < .05,

**
p < .01,

p < .001,

p < .0001

^aAlcohol Policy Scale (APS)—effectiveness in reducing a) binge drinking and b) impaired driving (separate models), based on experts' efficacy judgements regarding 29 state alcohol policies (see Methods) and using APS in 10 point intervals.

^bFemale as reference

^cAge <30 as reference

^dWhite as reference

^eNot having graduated from high school as reference

^fIncome vis a vis household size Federal Poverty Level as reference

^gEmployed as reference

^hIndividuals out of the formal work force including students, homemakers, retired persons, and the disabled

ⁱSeparated/divorced/widowed as reference

^jNot growing up with a family member or a blood relative with alcohol problems as reference