The Puzzle of Adolescent Substance Initiation

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Abstract

This paper reports the first-year results of a two-year study exploring whether a Multi-Attribute Utility (MAU) model that includes a new momentary salience parameter can predict smoking and alcohol use among an ethnically diverse Southern California sample of 2,789 7th graders. The model allows detailed investigation of the role that perceptions regarding ten anticipated consequences of substance use (e.g., being more popular, feeling more relaxed, contracting a devastating illness in the future) play in the decision to initiate substance use. The student was asked about either alcohol or tobacco, but not both. Students self-reported their views regarding the consequences, along with a history of their usage, on a paper-and-pencil questionnaire administered in either a traditional classroom setting or a simulated party setting. While most students had not initiated usage at this time, those who had already begun smoking had significantly higher MAUs than nonsmokers, but there was no difference for alcohol usage. The manipulation of setting had no effect.

Introduction

The persistence of tobacco and alcohol use in an era when the harmful effects of these habits are well known constitutes a major puzzle for researchers. It has been established that differential knowledge regarding the connections between usage and adverse health outcomes is not the critical determinant of whether an adolescent chooses to initiate smoking (Romer & Jamieson, 2001; Slovic, 2000). Can we understand the choice to take up a dangerous habit as the product of a rational process, one in which the user decides that benefits outweigh costs (Gerrard, Gibbons, Benthin, & Hessling, 1996; Millstein & Halpern-Felsher, 2002)? Or is initiation simply governed by passion rather than logic (Abelson, 1963)?

Many behavioral theories propose that people consider both positive and negative consequences of proposed actions in determining what behaviors they will try to change. These include Self-Regulation Theory (Kanfer, 1970), The Health Belief Model (Rosenstock, 1974), The Theory of Reasoned Action (Fishbein & Ajzen, 1975), Protection-Motivation Theory (Maddux & Rogers, 1983), The Theory of Planned Behavior (Ajzen, 1991), and Social-Cognitive Theory (Bandura, 1994). These theories tend to focus on the risks of dangerous behaviors and the rewards of preventive behaviors, rather than considering all of the consequences that might attach to each possible course of action. They vary in how they incorporate additional constructs beyond consequences and in the quantity of research they have spawned. All have a high degree of plausibility, but predictions are tested conceptually rather than at the level of algebraic detail.

Instead, we propose a quantitatively specific Multi-Attribute Utility (MAU) model based on Edwards' (1954) classic presentation of subjective expected utility, with the goal being to predict which individuals within a cohort of young nonusers will eventually take up tobacco or

alcohol use. That is, we hypothesize an association between individual MAU and initiation. Although similar approaches have been tried previously, results have been disappointing. Recent reviews summarizing those results have concluded that utility judgments were only weakly to moderately associated with drug use.

Many researchers have applied elements of utility models to the use of smoking and alcohol. Recent reviews have been provided by Cho, Keller, & Cooper (1999) and by Kuther (2002). Smoking is affected by both positive and negative consequences (e.g., Chassin, Presson, Bensenberg, Corty, Olshavsky, & Sherman, 1981; Copeland & Brandon, 2000; Wetter et al., 1994). Similarly, expectancies about the effects of alcohol play an important role in both initiation and maintenance (e.g., Jones, Corbin, & Fromme, 2001; Leigh & Stacy, 1993; Stein, Goldman, & Del Boca, 2000). Expectancies held by adolescents before they begin to drink predict the onset of both drinking and problem drinking over a subsequent 12-month span (Christiansen, Smith, Roehling, & Goldman, 1989), and even the extent of use nine years later (Stacy, Newcomb, & Bentler, 1991). However, these studies did not actually calculate utilities; instead, they demonstrated that key variables in the utility formulation were associated with substance use.

In contrast, Bauman (1980; Bauman, Fisher, Bryan, & Chenoweth, 1984; Bauman, Fisher, Bryan, & Chenoweth, 1985) conducted studies that provided model components relevant to the prediction of future drug use among adolescents. Bauman's ambition was much the same as ours, namely to combine the impact of consequences in a unifying formula, and then to see if the computational results predicted future usage. However, his success in predicting usage was rather limited. Bauman's approach has not been pursued much by others, and his own recent work has not employed a utility model.

We believe Bauman's success in predicting was limited by redundancy among the items in his list of consequences, which produces overweighting of consequences that happen to be represented more often in the list. von Winterfeldt and Edwards (1986) recognized the need for the list of consequences to be both exhaustive and to consist of independent items. In the present study, we provided a list of conceptually independent consequences for the respondent to evaluate.

The MAU model for initiation

The key property of an MAU model (Keeney & Raiffa, 1976) is that decisions generate outcomes that can vary across several independent dimensions. For a prescriptive application of the model, the focus is on desired outcomes; a decision analyst may help the decision maker to give proper attention to those objectives. However, in a descriptive application, the model must address concomitant outcomes, some of which are not desired, that the decision maker expects to occur as a result of choosing an option. Thus, the set of anticipated outcomes for an option will usually include both positive and negative consequences. These anticipated consequences determine the initiation decision through the three parameters associated with each of them, reflecting our view that consequences differ in 3 ways:

1. Subjective value (SV), the perceived worth of that consequence, a quantity with either a positive or negative sign
2. Subjective probability (SP), the perceived likelihood that the consequence will occur given the behavioral choice
3. Momentary salience (MS), the importance of that consequence to the adolescent at the moment of decision.

Whenever a moment of decision arises, each of the two options (in the case of initiation, to become a user vs. to remain a non-user) is evaluated using the three parameters in accord with the expression:

$$MAU = \Sigma_j \, SV_j \bullet SP_j \bullet MS_j$$

where *j* indexes the consequences of the decision as seen by the individual. The option with the higher utility, as expressed by the sum of the products across consequences, is chosen. The product of the three parameters for a consequence determines that consequence's contribution to the total utility.

The model is personalized in the parameters attached to each consequence. Consequences can include physical, psychological, and social changes. The number of consequences considered at the moment of decision varies across individuals, and is incorporated into the model via the salience parameter. A consequence with no momentary salience attached to it, or one judged to have no likelihood of occurrence, does not contribute to the sum.

Momentary salience: A new parameter in the model

We have added momentary salience to the MAU formulation. The additional parameter, which was included in Bauman's (1980) formulation but was not in his subsequent applications, provides leverage to incorporate personal and circumstantial elements that are not addressed by worth or likelihood. von Winterfeldt and Edwards (1986) were certainly aware of these elements, but they preferred to describe the extent to which a consequence is valued as its desirability, a combination of value and importance. In prescriptive applications, where the task of the decision analyst is to make certain that important consequences are given due weight in the judgment, regarding utility as the product of likelihood and desirability makes sense. In a descriptive application, however, we regard it as advantageous for the model to be able to capture the case in which a consequence might be desirable or undesirable if the decision maker were to think about

it, but it escapes consideration. Moreover, once the parameters are separated within the formulation, we can localize differences between individuals in either worth or salience. In fact, we suspect that people will generally agree on the worth of a negative health outcome such as lung cancer, but will vary in how important that prospect is to them. So the new formulation can provide additional conceptual insight.

The momentary salience parameter accommodates the intuition that two adolescents may both acknowledge a consequence as positive, such as being popular, and both may think usage will lead to enhanced popularity. However, one of them might already be socially successful and so thinks the consequence is not very important, while the other yearns for more friends and views the consequence as salient. A successful descriptive model must account for the fact that the majority of adolescents do not initiate drug use, even though the values of some of the consequences are likely to be positive for almost everyone during this period. Momentary salience also affords a way to incorporate setting (Sher, 1985; Wall, Thrussell, & Lalonde, 2003) or mood into the model. Under circumstances that favor impulsive thinking, consequences not in immediate view may have reduced salience for some people, especially consequences not expected to occur until the distant future.

In addition, the additional parameter allows the model to avoid attributing omniscience to the decision maker. Simon (1982) speaks of “bounded rationality”, viewing utility models as unrealistically presuming an idealized human who knows all consequences and calculates utilities perfectly. Cognitive frugality (Gigerenzer, Todd, & the ABC Research Group, 1999) is accommodated by the notion that if internal computations are too burdensome, unimportant consequences can be dropped. In the extreme, one may focus upon a single consequence. If someone has never thought about a consequence, then it cannot be assigned any salience. Thus,

the model can account conceptually for decisions that appear impulsive or emotion-based. Affective consequences enter into the model in the same way that other consequences do.

Paramorphic model

Our assumption is that the decision maker does something analogous to the computations specified in the model equation. We do not claim that actual calculations are done. Rather, the calculations are carried out in an "as-if" manner, akin to the calculus required to describe the trajectory of a ball thrown by a quarterback or the path toward moving prey followed by a predator (Pennings, 2003). Hoffman (1960) refers to this kind of model as "paramorphic", conveying the idea of structural similarity. Using the model does not mean that we presume mathematical competence on the part of the youth whose behavior is described mathematically.

Tying together the literature

One of the important by-products of a general theoretical model is unification of a vast empirical literature. Much of the literature on adolescent substance use is data-driven. Researchers have isolated a host of risk factors for tobacco (USDHHS, 1994) and alcohol (Chassin & DeLucia, 1996; Hawkins, Catalano, & Miller, 1992) use. The importance of initiation is underscored by evidence that for both tobacco (Griffin, Botvin, Doyle, Diaz, & Epstein, 1999) and alcohol (Hawkins et al., 1997; Warner & White, 2003), adolescents who use at all while young are much more likely to become heavy users later than those who do not use.

There are many ways to partition people, including genetic variation, differential rates of nicotine and alcohol metabolism, personality characteristics, psychosocial variables, degree of exposure to industry promotion, community- and society-level norms, and demographics, all of which have been shown to have predictive power for drug use. Although these empirical results provide important clues, they do not of themselves explain why an observed risk factor should

manifest itself as a determinant of the behavior. Why, for example, should family functioning or self-image influence whether a youth takes up smoking (Weiss, Garbanati, Tanjasiri, Xie, & Palmer, (2006). Ad-hoc explanations appear in every research report, but we consider it valuable to have a theory whose elements speak directly to the behavior.

By viewing substance initiation as the result of a decision, we utilize an approach that suggests the variables to be investigated. The core construct, the anticipated consequences of initiation, is logically related to the behavior of interest. As a result, the theory appears natural and plausible. The relationship among isolated constructs and findings in the literature can be clarified by expressing the ideas in the language of the MAU model. For example, it has been shown that "meanings of smoking", such as autonomy or weight control, are associated with smoking among adolescents (Spruijt-Metz, 1999). From the present perspective, these "meanings" are consequences with positive value and high momentary salience. Similarly, Slovic (2001) suggests that young smokers focus on trying something new and exciting. In the current language, anticipated affect (Mellers and McGraw, 2001) is a consequence that may have dominating importance at the moment of decision. A consequence such as "Enjoy the buzz" or "Feel less sad" taps into anticipated affect. Temporal discounting, an economic construct, has been adapted to explain a difference in the perspective of substance abusers compared to nonabusers (Bauman, 1980; Vuchinich & Simpson, 1998). More generally, the model suggests translating Babcock's (2006) elegant phrase "adolescent myopia" as the assignment of progressively lower salience to events farther in the future.

Environmental factors, such as the price and accessibility of tobacco and alcohol, affect the ease with which an adolescent can take up usage (Ross, Chaloupka, & Wakefield, 2006). From the decision making perspective, the role of the environment is to provide options from

which the decision maker may choose. The environments adolescents inhabit have generally been created by adults motivated by self-interest. Those who profit from selling a particular option, such as cigarette manufacturers or alcohol distributors, may try to ignore or disguise the negative consequences associated with the option.

Two systems

Kahneman's (2003) distinction between System 1 (impulsive) and System 2 (deliberative) decision making highlights a possibly critical methodological issue. The questionnaire, administered in a classroom setting, encourages deliberative thinking – System 2. The usual instructions emphasize careful reading of the items and due consideration before answering; without this attention, responses might well be meaningless. On the other hand, initiation usually takes place in a much less formal setting, often a noisy social gathering. The social environment is likely to inspire quick, unconsidered thinking – System 1. The adolescent may not even realize that a decision is being made when a cigarette or drink is accepted. As Kahneman (2003) has made clear, insights into one's own intuitive decisions may be quite limited, because the process seems so automatic.

It may well be that parameters elicited when a respondent is employing the different systems are quite different. Our view is that spur-of-the moment and deliberative decisions follow the same model, but may access systematically different components. In particular, while at a party, in System 1 mode, consequences associated with the setting, such as increased popularity or looking cool, might receive greater importance than they would while in System 2 mode. Temporally distant negative consequences, such as diseases of old age, might conversely receive lower importance while in System 1 mode. Some adolescents might make a decision while in System 2, and maintain that policy everywhere, but others might have more labile

parameters. The concern is that parameters estimated while the respondent is employing System 2 thinking to fill out the questionnaire might not predict a behavior that was chosen while using System 1 thinking. So even though the MAU model might be correct, systematically incorrect elicitation would lead to failure to predict initiation.

The distinction between modes has not been appreciated in the literature as a possible limitation on the efficacy of the usual questionnaire methodology in predicting behavior, although it has ancient roots in the well-established difficulty of predicting action from attitude (LaPiere, 1934). However, a few recent studies have highlighted the role of situation specificity in determining alcohol expectancies (Wall, McKee, & Hinson, 2000). McKee, Wall, Hinson, Goldstein, & Bissonnette (2003) found that musical mood induction influenced the first smoking expectancies that came to mind. The most direct evidence that utility elements depend upon setting comes from a within-subject experiment that compared expectancies collected from undergraduates in a bar with those collected in a laboratory (Wall, Hinson, McKee, & Goldstein, 2001). The present study includes a direct test of the hypothesis that setting affects MAU.

Method

Sample

The data described in this article are from the first year of a 2-year school-based study conducted with adolescents in Orange County, California. Students were scheduled to be surveyed twice, once while in the 7th grade and again the next year while in the 8th grade. Ten school districts were approached, of which ten schools from four school districts agreed to participate. Of the 4,169 7th grade students within those ten schools, 2919 (70%) provided the two kinds of consent (active parental consent and student assent) we required. The sample for the study consists of the 2789 students who provided consent and were in attendance at the time of

the survey. The mean age of the sample at the time of the survey was 12.55 (*SD=1.9*) years; 47.4 % were male. 58.9% of the sample were Latino, with the remainder predominantly White.

Procedure

In order to keep thoughts about the consequences of smoking from impinging on thoughts about the consequences of alcohol use, we asked each participant detailed questions about only one of the drugs. There were four experimental conditions, generating by crossing setting (regular classroom vs. simulated party) with drug (tobacco vs. alcohol). We randomly assigned classrooms to conditions; all of the students in a classroom were in the same experimental condition. Data were collected during a single class period (45-50 minutes), either in the classroom or the party setting.

The party took place in the school's multipurpose room or gymnasium. Strobe lights flashed, music played, balloons fluttered, food and soft drinks were available. Students could play limbo or Dance, Dance Revolution. Five minutes after the party began, rotating small groups were asked to fill out half the questionnaire (in the party room), then to resume partying for 15 minutes, then to complete the questionnaire.

However, some of the individual school administrators did not allow the simulated party. As a result, there were considerably fewer students tested in that mode. In the regular classroom setting, there were 1087 students who completed the smoking questionnaire and 1157 students who completed the alcohol questionnaire. In the simulated party setting, there were 288 who completed the smoking questionnaire and 257 who completed the alcohol questionnaire.

The data collectors were college students not previously acquainted with the participants. The questionnaires were identified only by a code number. The data collectors emphasized that participation in this study was an opportunity for students to "have their voices heard".

Participants were instructed that there were no “right” or “wrong” answers, and that honest responses were crucial to the study. Questionnaires were collected immediately upon completion.

Instrument

Participants filled out a 75-item paper-and-pencil questionnaire that listed ten potential consequences of using the particular drug. The goal in constructing the list was to choose consequences that are independent (to yield proper weighting) and exhaustive (to ensure that the important consequences are examined). The selection and pruning are carried out subjectively by the researcher (von Winterfeldt & Edwards, 1986), usually with guidance from a focus group similar to the respondents. We simplified the process by adopting items from (for tobacco) the National Youth Tobacco Survey (Marshall et al., 2006), the National Household Survey on Drug Abuse (Grucza & Bierut, 2006), and the short form of the "Smoking Consequences Questionnaire" (Myers, McCarthy, MacPherson, & Brown, 2003), and from (for alcohol) the National Household Survey on Drug Abuse (Faden, 2006), and the Alcohol Expectancy Questionnaire (Leigh & Stacy, 1993). Because the consequences of smoking and drinking differ, 5 consequences appear in both lists and 5 others are drug-specific, although we attempted to focus on related constructs. For example, the counterpart to “damage my heart and lungs” in the smoking list in the alcohol list is “damage my liver”. The two lists of consequences are shown in Table 1.

Insert Table 1 here

Model parameters. The respondent was asked to provide three ratings, one for each of the three model parameters, for each consequence. Each parameter was investigated on a separate page. Response options were presented in a table with the consequences in rows and the ordered response options in columns. We were concerned about response set, the tendency to give similar answers to all questions regardless of their content. To help disrupt that tendency, we used different response scales to elicit each model component. For value, the response options were "extremely bad, very bad, bad, neither bad nor good, good, very good, extremely good." These responses were scored as a number between -3 and +3. For subjective likelihood, the response options were "completely unlikely, very unlikely, unlikely, likely, very likely, completely likely." These responses were scored as a number between 0 and 5. For momentary salience, the response options were "I don't care at all, I don't care that much, I don't care, I care a little, I care a lot, I care strongly." These responses were scored as a number between 0 and 5. There were 9 questions that explored recent and lifetime usage of tobacco, alcohol, and marijuana. In addition, we collected some demographic information.

We asked only about the consequences expected with usage, not about those that might be expected from non-usage. Although a decision entails at least two options, we felt that because of their complementary connection, there was little information to be gained from the additional elicitation; and it would have meant doubling the number of responses.

Smoking and alcohol initiation. To assess initiation, all participants were asked to report their lifetime cigarette smoking and alcohol use on a scale with options ranging from "0" to "more than 30" times. Someone who has tried a substance at least once was considered to have initiated. Accordingly, those students who reported "0" were designated "Never-smokers" (89.9%) or "Never-drinkers" (65.9%). We are aware of the strong recommendation by

MacCallum, Zhang, Preacher, and Rucker (2002) against using dichotomized measures, in that they can lose sight of valuable information. Here, however, the only states of interest are whether the adolescent has initiated or not.

Results

The question of primary interest was whether MAU was associated with initiation. We found that adolescents who had already initiated smoking did have significantly higher MAU for smoking than those who had not; but we did not find the same pattern for alcohol. MAU was calculated by finding the product of reported value, likelihood, and momentary salience for each of the 10 consequences evaluated by a respondent. These 10 products were then summed to yield MAU for the individual.

The mean MAU for the 126 students who had initiated smoking was -29.65 (SD = 112.59), compared to the mean MAU of -79.01 (SD = 118.87) for the 1135 students who had not smoked. Analysis of variance showed this difference to be significant, $F_{(1, 1259)} = 19.76$ ($p < .0001$). The mean MAU for the 433 students who had initiated drinking was -108.53 (SD = 156.74), compared to the mean MAU of -106.27 (SD = 163.03) for the 851 who had not; this difference was not significant, $F_{(1, 1282)} = 0.06$ ($p = .81$). An alternative statistical route to these conclusions is via logistic regression. The odds ratio for MAU as a predictor of smoking initiation was significant (OR = 1.004; 95% CI= 1.002 to 1.006), whereas the odds ratio for MAU as a predictor of alcohol initiation was not significant (OR = 1.000; 95% CI = .999 to 1.001).

A more fine-grained analysis of these MAU differences can be seen by examining the individual products for each consequence. As seen in Figure 1, the smokers had higher products for every one of the consequences. The sign of a product is determined only by its value. For the

non-smokers, every product was negative, reflecting the perspective that all consequences associated with smoking are negative. For the non-smokers, even outcomes that would be viewed as desirable in isolation, such as becoming more popular, are seen as negative if they come about through smoking.

Insert Figure 1 here

The picture presented by the individual products for alcohol is less definitive. As shown in Figure 2, almost all of the products are negative, even for those who have initiated drinking. Differences between the drinkers and non-drinkers are small and not always in the same direction.

Insert Figure 2 here

There is more agreement among students on values than on likelihoods or momentary saliences. The inter-individual standard deviations for the three parameters are presented in Table 2, averaged across the ten consequences. For smoking, the standard deviation of the three parameters were significantly different ($F_{(2, 27)} = 14.43$, $p < .001$). Again, the picture is more clear for smoking than for alcohol. For alcohol use, the standard deviations for the three parameters were not significantly different ($F_{(2, 27)} = 0.60$, $p = .56$).

Insert Table 2 here

The attempt to change MAU by manipulating the setting proved not to be successful. Mean MAU for smoking as reported in the classroom was -75.09 (SD = 119.35), while that in the party was -67.56 (SD = 116.23). The differences between these two means were not statistically significant, $F_{(1, 1271)} = .83$ ($p = .36$). Similarly, mean MAU for alcohol in the classroom was -109.03 (SD = 164.29), while that in the party was -98.37 (SD = 144.39). Again, the difference between these two means was not statistically significant, $F_{(1, 1289)} = .83$ ($p = .36$).

There was a fair degree of missing data; 7.7% of the respondents omitted at least one parameter. When even a single one of the 30 parameters is missing for an individual, it is not possible to compute MAU accurately. Rather than use data imputation techniques in a domain in which the correct model for a response has not been previously established, we elected to exclude respondents who had missing data from the model analyses. Because the sample was large, the missing data is unlikely to affect the conclusions. The percentage of omissions was approximately the same for users and nonusers, and for students asked about tobacco or alcohol.

Alternative model

To provide context for the predictive success of the MAU model, we evaluated a more primitive model adapted from Ben Franklin's recommended procedure for making complex decisions (Dawes, 1986). Our Franklin model simply counts up the number of positive and negative consequences as seen through the sign of the individual's reported value. Summing over consequences yields an individual's Franklin score. In effect, the Franklin model is a utility model that regards all values as either +1 or -1, and all likelihoods and saliences as 1 (or any positive constant).

The Franklin model was more effective than the MAU model at capturing differences between those who initiated and those who had not. The mean Franklin score for the 118

students who had initiated smoking was -5.48 (SD = 4.85), compared to the mean Franklin score of -8.77 (SD = 2.90) for the 1109 who had not smoked. Analysis of variance showed this difference to be significant, $F_{(1, 1225)} = 116.95$ ($p < .0001$). In contrast, the Franklin model for alcohol did show a difference in the expected direction. The mean Franklin score for the 407 students who had initiated drinking was -6.33 (SD = 5.20), compared to the mean Franklin score of -7.58 (SD = 5.36) for the 783 who had not; this difference was significant, $F_{(1, 1188)} = 14.92$ ($p < .0001$). An alternative statistical route to these conclusions is via logistic regression. The odds ratios for Franklin scores as predictors of smoking initiation (OR = 1.20; 95% CI = 1.15 to 1.26) and alcohol initiation were both significant (OR = 1.04; 95% CI = 1.02 to 1.07).

Discussion

The important finding of this study is that MAU for tobacco users was on average higher than those for non-users. This result is especially striking because the participants did not articulate their MAUs. Rather, the predictor was obtained by calculations that employed parameters reported by the participants. This success illustrates the power of the "divide and conquer" strategy extolled by Edwards (1973).

The causality underlying the observed association cannot be substantiated from these snapshot data. It is logically possible that higher MAUs result from usage rather than causing usage. It will be even more impressive if the model can accurately predict which of the current nonusers initiate usage during the next year. Causality will be confirmed if the nonusers with higher MAUs this year turn out to be users next year.

The new element in the model, momentary salience, gained credence because it showed the largest interpersonal variability of the three parameters. This is perhaps not surprising, as likelihoods, and to some extent values, are culturally transmitted and taught effectively in the

schools' drug awareness campaigns. Momentary salience, on the other hand, is more personal and circumstantial.

Initiation is a unique experience. The decision to initiate also differs from most lifestyle decisions. The consequences of one option, refusal, have been personally experienced for a long time, but the consequences of the other option, initiation, have been experienced only vicariously. This situation obtains no matter how many decision opportunities have arisen prior to initiation. It is not surprising, then, that circumstances such as the presence of friends with usage experience play a powerful role in initiation. The circumstances make their mark by affecting momentary saliences.

However, we probably did not capture the moment very effectively. The fact that the Franklin model, a simple model that is sensitive only to values, outperformed the MAU model argues that the momentary salience parameter did not contribute to the prediction of initiation. Rather, differences in values were what distinguished users from non-users.

Our contention is that momentary salience fluctuates with circumstance; in particular, which consequences get high salience at the moment of potential initiation determines whether the adolescent accepts or refuses the offer. But we did not measure the saliences anytime near that moment. Measures taken on an ongoing basis might be more accurate. Experience sampling methodology (Csikszentmihalyi, Larson, & Prescott, 1977) may offer promise in that regard.

The failure of the party manipulation was disappointing, but is understandable because the act of filling out a questionnaire inherently invokes reflective System 2 thinking. We had hoped to overcome this tendency by asking for intuitive responses, but apparently the mood was broken once the students began to respond. Their desire to be good subjects, to respond carefully,

interfered with our ambition. Experience sampling methodology may help to alleviate this problem too. It might also help to ask fewer questions per response occasion.

The length of the instrument may have also contributed to another problem we observed in the data, the missing responses. The limited access we had to the participants necessitated using a lengthy questionnaire. It might be preferable to elicit fewer parameters at a time, in order to minimize the tedium some respondents are likely to feel (Slovic, Lichtenstein, & Edwards, 1965).

It is noteworthy that all of the consequences attached to smoking and drinking have mean negative values for nonusers, and most do for users as well. The products shown in Figures 1 and 2 carry the signs of the values (likelihoods and momentary saliences are always positive). These negative attitudes suggest that the school-based and media campaigns in California trumpeting the evils of tobacco and alcohol have been successful in transmitting adult values to the children. The negativity holds even for outcomes that in isolation would be very positive for adolescents, such as increased popularity or feeling more like an adult. It will be of interest to see whether the values for the consequences of alcohol use, which we know will achieve high prevalence, become more positive in later years.

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