

## BEHAVIORAL ECONOMICS AND DRINKING BEHAVIOR: PRELIMINARY RESULTS FROM AN IRISH COLLEGE STUDY

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*This article examines the results of single-equation regression models of the determinants of alcohol consumption patterns among college students modeling a rich variety of covariates including gender, family and peer drinking, tenure, personality, risk perception, time preferences, and age of drinking onset. The results demonstrate very weak income effects and very strong effects of personality, peer drinking (in particular closest friend), time preferences, and other substance use. The task of future research is to verify these results and assess causality using more detailed methods (JEL D12, I31).*

### I. INTRODUCTION

This article provides an examination of alcohol consumption among a sample of students at an Irish university. We examine the role of key demographic factors such as gender, age, year in college, housing tenure, and parental socioeconomic circumstances in determining students' alcohol consumption. Moreover, we attempt to measure and model behavioral parameters such as time preferences, risk perception, and personality as direct influences on consumption. We also examine the effects of peer, sibling, and parental drinking.

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### II. POTENTIAL DETERMINANTS OF ALCOHOL CONSUMPTION—BEHAVIORAL DRIVERS

The literature on alcohol consumption has identified a number of key influences.<sup>1</sup> However, the role of individual differences in personality merits consideration in the examination of health risk behavior patterns.

The most validated personality assessment tool currently used is based on the “Big-Five” personality framework, a multidimensional typology assessing personality on five dimensions—extraversion, agreeableness, conscientiousness, emotional stability, and openness to experience. For example, a study of university students by LemosGiraldez and Fidalgo-Aliste (1997) found that “conscientiousness” and “agreeableness” measures were significant predictors of health-related behaviors and attitudes regarding smoking and alcohol

1. For example, the international literature on health risk behaviors reflects consistent gender differences in alcohol consumption and frequency of use. For example, Courtenay (2000) reviewed a substantial body of national data and meta-analyses and concluded that males of all ages are more likely than females to engage in behaviors that increase the risk of disease, injury, and death, many of which are preventable.

#### ABBREVIATIONS

AUDIT: Alcohol Use Disorders  
Identification Test  
BMI: Body Mass Index  
WHO: World Health Organization

consumption. "Low Agreeableness" (which indicates, e.g., hostility) has been linked with poor health behaviors (Smith and Christensen 1992).<sup>2</sup>

Parental and sibling factors have also been investigated as determinants of alcohol consumption patterns (e.g., Windle 2000). These effects could operate through a number of channels. The alcohol consumption patterns of family members may be reflective of genetic predispositions to alcohol consumption. Individual consumption patterns may be reflective of imitative behavior or parental/sibling alcohol use (e.g., Brody et al. 2000). Different home environments may also be conducive to differential exposure to alcohol. Parents and siblings may also form part of an individual's budget and time constraints.<sup>3</sup> Moreover, parent and sibling effects may operate at a lag. Thus, while the literature emphasizes the importance of peer as opposed to parental effects on current alcohol consumption, this is mainly examined through the lagged effect of family alcohol patterns on current alcohol consumption, with childhood exposure to alcohol predictive of later alcohol consumption patterns (e.g., Webster et al. 1989).

Many studies have shown that peers exert a decisive influence over adolescent risk-taking behavior, with a greater influence than parental effects (Allen et al. 2003; Garnier and Stein 2002; Urberg, Decegmencioglu, and Pilgrim 1997). Peers can shape participation in risk-taking behaviors, such as alcohol or drug use, through a number of means—by influencing attitudes, norms, and values; by modeling the behavior; and by offering opportunity and support for the behavior (Bauman and Ennett 1996). Alexander et al. (2001) emphasized how "best friends" or close friendships may have a greater impact on behavior than a larger peer network due to the level of contact such relationships provide. They found that the risk for regular smoking was increased if the individ-

ual had one or two very close friends who were also regular smokers.

Finally, the age at which the person begins to consume alcohol has been implicated in later patterns of heavy alcohol use by a number of articles. This could be due to common unobserved factors affecting both onset and later alcohol use. However, there is strong evidence that alcohol consumption is habitual and highly persistent. Grant (1997) examined interview data with current and former drinkers from the 1992 National Longitudinal Alcohol Epidemiologic Survey and assessed the probability of alcohol abuse and dependence as a function of the age at which the individual began to consume alcohol. While only 4% of those who began to drink after the age of 20 experienced lifetime alcohol abuse, this figure rose to 11% for those who began drinking at 16 yr or younger. Similarly, with regards to prevalence rates for lifetime alcohol dependence, it was found to be 10% in those who began drinking at 20 yr and older and more than 40% in those who began at 14 yr or younger. The authors concluded that for each increasing year of age of alcohol initiation, the probability of lifetime alcohol abuse declined by 8%, and the probability of lifetime dependence declined by 14%.

The perception and judgment of risk are also central to any theoretical model of health risk behavior on the belief that an individual's behavior is influenced by how they perceive the consequences of their actions and whether they believe themselves to be vulnerable to these consequences (Millstein and Halpern-Felsher 2002). As outlined by Slovic (1987), psychological research on risk perception developed from studies of probability assessment and decision-making processes. A body of literature has demonstrated that individuals systematically misperceive risk and that the degree of misperception can be reliably predicted by a number of factors including the salience of the risk, its immediacy, and several other factors. This work implied that the risks of alcohol consumption may be underestimated, as the main consequences may not be revealed for a number of years; the risks are largely self-imposed and relatively predictable.

Alcohol consumption may also be viewed as a manifestation of underlying time preferences. The question of how individuals process future priorities is interesting in this context—alcohol consumption has frequently been

2. Kubicka et al. (2001) examined whether childhood personality ratings on three of the Big-Five dimensions would predict adult drinking and smoking behavior and showed that low levels of conscientiousness emerged as a significant predictor in adult smoking and heavy episodic drinking, while those exhibiting high "extraversion" show higher daily levels of alcohol consumption (Kubicka et al. 2001).

3. For example, it is important to assess for college students whether the student is still living at home with their parents, in which case one might expect that their behavior would be more constrained by family norms regarding alcohol consumption.

viewed as myopic and indicating a high rate of time preference. This has recently attracted the attention of economists (e.g., Fehr 2002; O'Donoghue and Rabin 2000). There have been some attempts to integrate survey measures of time preferences as independent variables, explaining different types of health risks. For example, Borghans and Golsteyn (2005) concluded that survey measures of discount rates can explain some of the variance in body mass index (BMI), though they found no evidence for changing discount rates being a driver for increases in obesity rates. Henson et al. (2006) found strong associations between future time orientation (as measured by the Zimbardo Time Perspective Inventory), higher engagement in health protective behavior, and lower engagement in health risk behavior.

### III. UCD GEARY INSTITUTE HEALTH BEHAVIOUR STUDY

The UCD Geary Institute Health Behaviour Study is planned as a major longitudinal study on a number of diverse populations. In the current phase, all the students of a large Irish university were contacted via e-mail and asked to participate in a Web-based survey.

The literature points to several advantages of our approach in terms of data collection. However, achieving high response rates is difficult with this format. To encourage participation, we offered an incentive of a lottery with 10 prizes of €1,000 (approximately \$1,300 at current rates). The current pilot study is based on a sample of 4,500 students, which represents approximately 20% of the total body of 20,000 students. This response is relatively low, taking the population as a whole. However, statistics provided from the University suggest that only half of the student body use the college e-mail system, which would imply that our total sampling frame population is closer to 10,000 (leading to response rate of 50%). More convincing is that the mean outcomes from this data closely align with the administrative records in terms of distribution across degree programs, course year, and other demographics such as age and gender.

The survey was divided into nine modules: personal information such as gender and age, physical health and psychological well-being, alcohol consumption patterns, personality as measured by a short Big-Five inventory (Gos-

ling, Rentfrow, and Swann 2003), vignettes surrounding occasional alcohol consumption, risk perceptions and other risk behaviors, anchoring vignettes, questions on time management and time preferences, and further demographic and family background questions. Drinking behavior was assessed using a number of measures. First, we examined monthly expenditure on alcohol. We also administered the World Health Organization (WHO) Alcohol Use Disorders Identification Test (AUDIT) examination—a screening test for alcohol misuse that includes several questions on different aspects of alcohol-related behavior.<sup>4</sup> Descriptive statistics are displayed in Table 1.<sup>5</sup>

### IV. RESULTS

In the empirical model, individuals maximize intertemporal utility subject to their budget constraint. Standard preference parameters are included such as measures of time preferences (as measured by survey scales) and risk tolerance (as measured by smoking). As in many different behavioral models, consumption can be generated by lack of information about risk. Drinking patterns are assumed to be influenced exogenously by peer groups and parents.<sup>6</sup> Age of onset influences alcohol consumption through the effects of persistence and habit. Table 2 displays the results of multiple regression models assessing the determinants of participation, expenditure, and scores on the AUDIT scale.

4. The AUDIT was developed and validated over the past two decades by the WHO as a simple screening instrument for excessive drinking (Babor et al. 2001). Initially designed for use in primary healthcare settings, it can also be self-administered or used by non-health professionals to identify alcohol dependence and a number of specific negative consequences of drinking. The AUDIT explicitly focuses on symptoms within the past year. It is the only alcohol screening test designed for international use; its use with primary healthcare patients has been validated in six countries (Babor et al. 2001).

5. Statistics are displayed both for all people who responded to the given question and for all people who responded to every single question. This gives some indication of the nature and scope of potential biases related to partial response. As can be seen, those who completed the survey fully tended to be slightly younger, with lower parental income, and were less likely to be smokers. The effects are not substantial but do give a useful clue as to the potential direction of survey biases.

6. This will be tested in later work through the gathering of more detailed information on family background.

**TABLE 1**  
Descriptive Statistics

Variable	Observation Used in the Full Regression Analysis					Total Observed on Each Variable				
	Observation	Mean	SD	Minimum	Maximum	Observation	Mean	SD	Minimum	Maximum
AUDIT	1,647	10.81526	5.97641	0	41	3,980	11.36432	6.41615	0	41
Age	1,647	20.85356	2.338071	17	29	4,446	21.5578	4.33041	12	61
Male	1,647	0.422987	0.494178	0	1	4,440	0.453153	0.497857	0	1
Cannabis	1,647	2.106745	1.227275	1	6	3,492	2.130584	1.218878	1	6
Ecstasy	1,647	1.179835	0.588057	1	5	3,471	1.187842	0.597673	1	6
Father drinking	1,647	3.534884	1.514687	1	6	3,381	3.558119	1.547648	1	6
Mother drinking	1,647	3.144282	1.485554	1	6	3,419	3.169348	1.533224	1	6
Close friend drinking	1,647	3.911267	1.136818	1	6	3,437	3.939773	1.181017	1	6
College friend drinking	1,647	4.187281	0.871446	1	6	3,433	4.197786	0.916487	1	6
Home friend drinking	1,647	4.056042	0.949243	1	9	3,428	4.081389	1.000189	1	6
Parental income	1,647	4.876896	1.679349	1	7	2,258	4.769708	1.72452	1	7
Time preferences	1,647	52.50351	9.127586	11	77	3,436	53.16473	9.252668	11	77
GHQ-12	1,647	29.13843	5.466925	12	48	4,037	29.41243	5.361055	12	48
Openness	1,647	10.48909	2.121953	3	14	3,533	10.52335	2.144637	3	14
Conscientiousness	1,647	9.837168	2.614222	2	14	3,530	9.984986	2.625496	2	14
Extraversion	1,647	8.823703	2.891579	2	14	3,539	9.072337	2.914627	2	14
Agreeableness	1,647	10.116	2.11491	3	14	3,507	10.07015	2.183976	2	14
Nervousness	1,647	6.684055	2.829748	2	14	3,532	6.492922	2.819141	2	14
Disposable income	1,647	848.9627	729.1022	5	8,550	3,334	919.7682	786.075	5	8,550
Religiosity	1,647	3.325554	1.067577	1	5	3,422	3.310929	1.094373	1	5
Risk perception	1,647	22.21762	23.36467	1	100	3,330	23.02372	37.57011	1	100
Age started drinking	1,647	17.09102	1.590214	1	27	2,980	17.59329	18.56875	1	27
Private renting	1,647	0.357643	0.479446	0	1	4,423	0.330771	0.470544	0	1
Student residences	1,647	0.151692	0.358827	0	1	4,423	0.140176	0.347209	0	1
Own property	1,647	0.017503	0.131174	0	1	4,423	0.046575	0.21075	0	1
Foreign full-time student	1,647	0.063011	0.243053	0	1	4,343	0.072991	0.260152	0	1
Foreign visiting student	1,647	0.025671	0.158198	0	1	4,343	0.022795	0.149268	0	1
Never smoked	1,647	0.625438	0.484151	0	1	3,510	0.580057	0.49362	0	1
Father lower secondary	1,647	0.210035	0.407452	0	1	3,416	0.16452	0.370801	0	1
Father upper secondary	1,647	0.26021	0.438877	0	1	3,416	0.229216	0.42039	0	1

continued

TABLE 1  
Continued

Variable	Observation Used in the Full Regression Analysis					Total Observed on Each Variable				
	Observation	Mean	SD	Minimum	Maximum	Observation	Mean	SD	Minimum	Maximum
Father university	1,647	0.443991	0.496998	0	1	3,416	0.537178	0.498689	0	1
Mother lower secondary	1,647	0.181447	0.385501	0	1	3,413	0.140639	0.347699	0	1
Mother upper secondary	1,647	0.342474	0.474676	0	1	3,413	0.323469	0.467869	0	1
Mother university	1,647	0.432322	0.495543	0	1	3,413	0.494287	0.500041	0	1
Parents separated	1,647	0.129019	0.314201	0	1	3,415	0.103075	0.295899	0	1

Notes: The highest level of nonresponse was on the parental income question. This generates the bulk of the disparity between the observed sample and those used in the full regression models. A number of other observations were discarded due to implausibility. The sample is also restricted to those aged younger than 30 yr. GHQ, General Health Questionnaire.

Participation (i.e., whether a person drinks at all as opposed to abstaining) is determined by a number of variables. Males are less likely to participate than females controlling for other factors. Foreign students are not significantly more or less likely to participate than Irish students. Higher parental income makes one more likely to participate. With regards to effects of parental and peer drinking, we find little evidence that parental drinking influences the decision to participate in alcohol consumption. Participation is related to closest peer and outside college peer drinking, though not to college friend drinking.

Second, we examine the determinants of scores on the WHO AUDIT scale. The time preferences scale substantially predicts higher drinking levels across all specifications. The results reveal a substantial effect of peer group drinking but very little effect of parent drinking. Indeed, parental variables in general are poor explanatory variables in explaining AUDIT scores, with neither parental income nor parental education having an effect on individual AUDIT scores. The drinking levels of the individuals' closest peer are most predictive of own drinking, with the drinking behavior of friends outside college more predictive than the drinking levels of college friends. In terms of personality variables, conscientiousness predicts lower scores on the AUDIT, while extraversion predicts higher scores. There is a slight relationship between openness to experience and lower scores and no discernible relationship between scores and measures of agreeableness or "nervousness." High perception of risks related to drinking predicts lower AUDIT scores. Consistent with the previous literature, AUDIT scores are higher for those who begin drinking at an earlier age. Both cannabis usage and ecstasy usage predict higher scores on the AUDIT, pointing toward complementarities between consumption of alcohol and illegal drugs. However, even after controlling for all these factors, males score substantially higher than females on the AUDIT. The drinking behavior of domestic students in college dorms is more pronounced than the other groups. In fact, the raw correlation between living in a student dorm and drinking is actually negative, but this reflects the higher number of foreign students who live in dorm accommodation. Most interestingly from an economic perspective, high time preferences (i.e., lower patience scores) increase

**TABLE 2**  
**Determinants of Alcohol Expenditure, WHO AUDIT, and Alcohol Participation**

Variable	Alcohol Expenditure	WHO AUDIT	Alcohol Participation
Age	2.27*** (0.87)	-0.15*** (0.05)	0.00 (0.00)
Male	6.59*** (4.07)	1.83*** (0.25)	-0.02*** (0.01)
Lodgings/renting	-12.27*** (4.46)	0.57** (0.28)	0.00 (0.01)
College dorm	-6.08 (5.82)	1.64*** (0.37)	-0.02** (0.01)
Own property	-20.36 (15.01)	0.03 (0.89)	—
Foreign full-time student	-28.55*** (7.69)	-1.95*** (0.51)	-0.02 (0.02)
Foreign visiting student	-32.08*** (11.27)	-2.50*** (0.74)	-0.02 (0.02)
Never smoked	-19.81*** (6.59)	-1.31*** (0.40)	-0.01 (0.01)
Cannabis use (1-6 scale)	6.88*** (2.04)	0.82*** (0.12)	0.03*** (0.01)
Ecstasy use (1-6 scale)	12.89*** (3.75)	0.94*** (0.22)	-0.02 (0.01)
Mothers drinking (1-6 scale)	-2.26 (1.41)	0.07 (0.09)	0.00 (0.00)
Fathers drinking (1-6 scale)	-0.66 (1.46)	-0.05 (0.09)	0.00 (0.00)
Close friend drinking (1-6 scale)	13.52*** (1.83)	0.84*** (0.12)	0.01*** (0.00)
College friends drinking (1-6 scale)	9.44*** (2.41)	0.26** (0.16)	0.01** (0.00)
Outside college friends drinking (1-6 scale)	9.70*** (2.35)	0.67*** (0.15)	0.01 (0.00)
Father lower secondary	10.50 (7.67)	-0.16 (0.48)	-0.01 (0.01)
Father upper secondary	4.96 (7.69)	-0.23 (0.48)	0.00 (0.01)
Father higher education	4.47 (7.63)	-0.44 (0.48)	-0.02 (0.01)
Mother lower secondary	10.70 (9.71)	0.20 (0.62)	0.02** (0.01)
Mother upper secondary	-4.22 (9.40)	-0.04 (0.61)	0.02 (0.01)
Mother higher education	-12.97 (9.55)	-0.58 (0.62)	0.03** (0.01)
Parental income (1-7 scale)	0.20 (0.15)	0.01 (0.01)	0.00 (0.00)
Parents separated	-8.93 (6.03)	-0.79 (0.37)	-0.01 (0.01)
Time preferences	-1.19*** (0.23)	-0.07*** (0.01)	0.001*** (0.00)
Well-being (GHQ-12, 12-48 positive scale)	0.63** (0.37)	-0.07*** (0.02)	0.00 (0.00)
Openness	-1.74* (0.95)	-0.10* (0.06)	0.00 (0.00)
Conscientiousness	-0.56 (0.80)	-0.24*** (0.05)	0.00 (0.00)
Extraversion	3.70*** (0.71)	0.26*** (0.04)	0.01** (0.00)
Agreeableness	1.42 (0.90)	0.04 (0.06)	0.01** (0.00)
Neuroticism	-0.39 (0.76)	0.00 (0.05)	0.00 (0.00)
Disposable income (in €)	0.02*** (0.00)	0.00 (0.00)	0.00 (0.00)
Religiosity (1-6 scale from religious to not religious)	1.25 (1.84)	0.03 (0.12)	0.01** (0.00)
Risk perception (1-100 scale)	-0.15*** (0.06)	-0.01*** (0.00)	0.00 (0.00)
Age started drinking	-1.01** (0.46)	-0.08** (0.04)	—
Constant	-79.28 (33.15)	10.78 (2.08)	—
N	1,647	1,647	1,647
R <sup>2</sup> /pseudo R <sup>2</sup>	0.28	0.40	0.29

*Notes:* Robust standard errors are given in parentheses following coefficient. The base category for "lodging/renting," "college dorm," and "own property" is whether the individual lives with their parents. The base category for "foreign full-time student" and "foreign visiting student" is "Irish student." Openness, conscientiousness, extraversion, agreeableness, and neuroticism are constructed by summing two items for each variable derived from the Gosling, Rentfrow, and Swann (2003) brief measure of the Big Five. Risk perception was elicited by asking respondents to assign a probability of dying from alcohol-related diseases consequent on drinking-specified quantities of alcohol over time. Marginal effects are reported for the participation equation. Well-being was measured by coding and summing the 12 items of the GHQ, giving a scale from 12 (lowest well-being) to 48 (highest well-being). The authors have estimated significant numbers of alternative specifications which are available from the authors on request. GHQ, General Health Questionnaire.

\*\*\*Significant level at 1%; \*\*significant level at 5%; \*significant level at 10%.

AUDIT scores, but scores are not related to personal disposable income.

Third, we examine the determinants of alcohol expenditures. Alcohol expenditures and consumption are not necessarily strongly related, particularly among students as students may access cheap alternatives if their income is not high. This is borne out by the fact that our results demonstrate that disposable income does not have an effect on the AUDIT score, but it does have an effect on alcohol expenditures. Moreover, while older students do not score higher on the AUDIT, they do spend more on alcohol and nights out. This points to a substitution toward more expensive types of drinking occasions as both income and age increase. Once again, we find very little evidence for parental effects on alcohol expenditures in terms of parental education, parental income, or parental drinking. Those living away from home spend more on alcohol than those residing at home. In this instance, the drinking behavior of the individuals' closest friend, average friend at college, and average friend outside college all have a similar positive effect on alcohol expenditures. Higher perceptions of risks from drinking do not have an effect on alcohol expenditures. High time preferences predict higher alcohol expenditure. Both cannabis and ecstasy usage predict alcohol expenditures, suggesting consumption complementarities.

## V. CONCLUSIONS

This article is an initial attempt to incorporate several important economic and psychological parameters into the study of alcohol consumption and provides a useful baseline study for future research in this area. The results provide evidence that income is a very weak explanatory factor for alcohol consumption patterns and that higher income students instead of consuming more alcohol tend to consume more expensive alcohol. Alcohol consumption is better explained by personality and peer factors than by parental resources, family background, or disposable income. In terms of individual psychological and economic parameters, time preferences are strongly related to alcohol consumption, and we also find an effect of extraversion, conscientiousness, and levels of well-being.

Exploring the use of psychometric measures of time preferences in explaining risk behavior is an important future question for this study. The exploration of the interplay between parental, peer, and sibling effects is also a high priority for future research. While the models outlined in this article indicate that drinking behavior by close friends affects one's own drinking and that peer and sibling drinking have much bigger effects than parental drinking, more work needs to be done to examine the transmission of parental drinking to peer selection and the endogeneity of peer effects.

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