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Intelligence and past use of recreational drugs☆

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ABSTRACT

One motivation for trying recreational drugs is the desire for novel experiences. More intelligent people tend to value novelty more highly and may therefore be more likely to have tried recreational drugs. Using data from a national survey, it is shown that intelligence tends to be positively related to the probabilities of having tried alcohol, marijuana, cocaine and several other recreational drugs. Evidence is also presented that those relationships typically disappear or change sign at high levels of intelligence. These patterns persist after accounting for a wide range of personal characteristics.

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1. Introduction

Intelligence is positively related to health (Auld & Sidhu, 2005; Gottfredson & Deary, 2004). This relationship may be partly driven by differences in the use of recreational drugs (Batty, Deary, & Macintyre, 2006; Gottfredson, 2004). Recreational drugs, including alcohol and cigarettes, contribute to about 22% of all deaths (Mokdad, Marks, Stroup, & Gerberding, 2004). Several researchers have shown that intelligence is negatively related to smoking and alcohol abuse later in life (Batty et al., 2006; Heckman, Stixrud, & Urzua, 2006; Kenkel, Lillard, & Mathios, 2006; Sander, 1999; Taylor et al., 2003; Wilmoth, 2010).

While this evidence suggests a negative relationship between intelligence and past use of recreational drugs, other evidence suggests that more intelligent people may be more likely to have tried recreational drugs. More intelligent people tend to value novelty more highly (Fagan, 1984; Raine, Reynolds, Venables, & Mednick, 2002; Zuckerman, 1994) and those who value novel experiences more highly are more likely to try recreational drugs (Zuckerman, 1994).

The relationship between intelligence and past use of recreational drugs is explored here using data from a national survey. It is shown that intelligence tends to be positively related to the probabilities of having tried alcohol, marijuana, cocaine and several other commonly used recreational drugs. Evidence is also presented that those relationships typically disappear or change sign at high levels of intelligence. These patterns persist after using multiple regression to account for a variety of personal characteristics, including education, income and religion.

The remainder of this paper is organized as follows. The second section reviews the literature on intelligence and recreational drugs. The third describes the data and methods that are used. The fourth presents the analysis. The fifth discusses the analysis and concludes.

2. Literature review

Scores on tests of different types of reasoning or knowledge are often highly correlated (Neisser et al., 1996). It is assumed here that those correlations arise because such scores reflect a single personal characteristic that will be referred to as intelligence.

Intelligence defined in this way is positively related to health. More intelligent people have lower mortality rates

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(Gottfredson & Deary, 2004) and fewer health limitations in their ability to work (Auld & Sidhu, 2005). It has been argued that the relationship between intelligence and health is partly driven by differences in the use of recreational drugs (Batty et al., 2006; Gottfredson, 2004). Recreational drugs, including alcohol and cigarettes, contribute to about 22% of all deaths (Mokdad et al., 2004).

Several researchers have presented evidence that more intelligent people are less likely to smoke (Heckman et al., 2006; Kenkel et al., 2006; Taylor et al., 2003). Evidence concerning the relationship between intelligence and alcohol abuse is mixed, with researchers reporting evidence of a positive relationship (Batty et al., 2008; Hatch et al., 2007), a negative relationship (Batty et al., 2006; Clarke & Haughton, 1975; Sander, 1999) and a null relationship (Kubicka, Matejcek, Dytrych, & Roth, 2001; Mortensen, Sorensen, & Gronbaek, 2005; Wennberg, Andersson, & Bohman, 2002). Wilmoth (2010) argued that these varied results arose because the relationship between intelligence and alcohol abuse changes from positive to negative with age.

This evidence suggests a negative relationship between intelligence and past use of recreational drugs. Other evidence from the scholarly literature suggests the opposite, however.

One reason for trying recreational drugs is the desire for novel experiences. The most widely studied measure of the desire for novel experiences is Zuckerman's (Zuckerman, 1994; Zuckerman, Kolin, Price, & Zoob, 1964) Sensation Seeking Scale (SSS). Zuckerman (1994) defined sensation seeking as “a trait defined by the seeking of varied, novel, complex, and intense sensations and experiences, and the willingness to take physical, social, legal and financial risks for the sake of such experience” (p. 27). He reviewed dozens of studies showing that those who value novel experiences more highly are more likely to try recreational drugs as adolescents and young adults. The SSS includes a small number of questions about trying recreational drugs, but excluding those questions did not change the pattern.

Preference for novelty is positively related to later intelligence in infants (Fagan, 1984) and young children (Raine et al., 2002). More intelligent people tend to have SSS scores indicating that they value novel experiences more highly (Zuckerman, 1994). This evidence suggests a positive relationship between intelligence and past use of recreational drugs, a suggestion opposite the one evoked earlier.

The existing literature does not yield a clear prediction about the relationship between intelligence and past use of recreational drugs. The next section describes the data and methods that will be used to explore that relationship.

3. Data and methods

The relationship between intelligence and past use of recreational drugs will be explored using the National Longitudinal Survey of Youth 1979 (NLSY79). The NLSY79 is a longitudinal survey of 12,686 men and women who were between the ages of 14 and 22 when first interviewed in 1979.

In 1980, nearly all NLSY79 participants were administered the Armed Services Vocational Aptitude Battery. Scores on four subtests can be used to create an Armed Forces Qualification Test (AFQT) score, which is an excellent measure of intelligence (Hernnstein & Murray, 1994). For ease of interpretation, AFQT scores will be normed by birth cohort to have a mean of 100 and a standard deviation of 15, the typical scale for IQ.

Participants were asked about past use of several types of drugs, including alcohol and cigarettes. In 1982, 1983, 1984, 1985, 1988, 1989 and 1994, participants were asked if they had ever tried an alcoholic beverage. In 1984, participants were asked about having tried cigarettes.

Participants were also asked about past use of more strictly controlled drugs. In 1984, 1988, 1992, 1994 and 1998, participants were asked if they had ever used marijuana or hashish. In 1984, 1988, 1992, 1994 and 1998, participants were asked if they had ever used cocaine. In 1992, 1994 and 1998, participants were asked if they had ever used hallucinogens such as LSD, PCP, peyote and mescaline without a doctor's instructions.

Participants were also asked about past use of prescription drugs without a doctor's instructions. It will be assumed here that such use was recreational. In 1992, 1994 and 1998, participants were asked if they had ever used pain killers such as Darvon, Demerol, Percodan or Tylenol with codeine without a doctor's instructions. In 1992, 1994 and 1998, participants were asked if they had ever used stimulants such as amphetamines, Preludin, uppers and speed without a doctor's instructions. In 1992, 1994 and 1998, participants were asked if they had ever used tranquilizers such as Librium, Valium and Xanax without a doctor's instructions. In 1992, 1994 and 1998, participants were asked if they had ever used sedatives such as barbiturates, sleeping pills and Seconal without a doctor's instructions.

Finally, participants were also asked about inhalants, a category that includes both household products and substances with medical applications. In 1992, 1994 and 1998, participants were asked if they had ever used inhalants such as glue, amyl nitrite, poppers and aerosol sprays without a doctor's instructions.

In each survey year, participants were asked about income, education, family size, urban residence and region of residence. In 1979, participants were asked about race and ethnicity. Race and ethnicity will be represented here by black and Hispanic indicator variables. In 1979, 1982, and 2000, participants were asked to name their religion, if any, and asked about the frequency with which they attended religious services. In survey years for which values for these control variables are missing, the most recent value from a preceding year will be used.

The Rotter Locus of Control Scale measures whether people believe that the courses of their lives are primarily determined by themselves or by external forces. Participants were given a version of the Rotter Locus of Control Scale in 1979. Their responses have been given numerical values and summed so that lower totals indicate stronger beliefs that the courses of their lives are primarily determined by themselves.

The Rosenberg Self-Esteem Scale measures people's approval of themselves. Participants were given a version of the Rosenberg Self-Esteem Scale in 1980. Their responses have been given numerical values and summed so that higher totals indicate higher levels of self-esteem.

Table 1 is a partial summary of these data. Each unique combination of participant and survey year with questions about past use of recreational drugs is a potential observation in the table below.

For most drugs, participants were asked in multiple years about past use. To fully employ the available data, all observations will be included in the statistical analysis. In many cases, this will result in multiple observations of a participant. Such observations are not independent. For example, if a participant had used a recreational drug by a given survey year, they must also have used that drug by each subsequent survey year. Researchers commonly use Cox hazard models in such circumstances, but that is not possible here because age at initial drug use is not generally reported. Instead, all relevant observations are used in estimating linear probability models. Robust standard errors with clustering at the individual level will account for the lack of independence (Wooldridge, 2002).

Table 1
NLSY79 selected summary statistics.

Variables	Observations	Means	Standard deviations
$alcohol_{i,y}$	76,887	0.9429	0.2320
$cigarettes_{i,y}$	12,030	0.8138	0.3893
$marijuana_{i,y}$	47,802	0.6153	0.4865
$cocaine_{i,y}$	47,736	0.2330	0.4228
$hallucinogens_{i,y}$	25,786	0.0924	0.2896
$pain\ killers_{i,y}$	25,798	0.1872	0.3901
$stimulants_{i,y}$	25,780	0.1224	0.3277
$tranquilizers_{i,y}$	25,790	0.0751	0.2636
$sedatives_{i,y}$	25,784	0.0735	0.2610
$inhalants_{i,y}$	25,772	0.0310	0.1733
IQ_i	89,946	99.7245	15.1737
$highest\ grade\ completed_{i,y}$	94,068	12.4007	2.3751
$age_{i,y}$	94,344	26.5260	5.5058
$married_{i,y}$	94,344	0.4194	0.4935
$black_i$	94,344	0.2687	0.4433
$Hispanic_i$	94,344	0.1697	0.3754
$male_i$	94,344	0.4960	0.5000
$Rotter\ Locus\ of\ Control\ Scale_i$	93,332	8.7087	2.4112
$Rosenberg\ Self\text{-}Esteem\ Scale_i$	90,284	32.2789	4.1055

Notes: The table summarizes selected variables from the NLSY79. Each unique combination of participant and survey year with questions about the use of recreational drugs was a potential observation. These observations represent 12,551 individuals. Subscripts denote the dimensions with which variables vary. The subscript i indicates individuals and y indicates survey year. The variables $alcohol_{i,y}$, $cigarettes_{i,y}$, $marijuana_{i,y}$, $cocaine_{i,y}$, $hallucinogens_{i,y}$, $pain\ killers_{i,y}$, $stimulants_{i,y}$, $tranquilizers_{i,y}$, $sedatives_{i,y}$ and $inhalants_{i,y}$ are all indicator variables equal to one if the participant reported having used those substances and zero otherwise. The variables $married_{i,y}$, $black_i$, $Hispanic_i$ and $male_i$ are all indicator variables equal to one if the name of the variable describes the participant and zero otherwise. Additional variables that will be included in the analysis below describe income, family size, urban residence, region of residence, religious affiliation and the frequency with which religious services were attended. Region of residence will be described using indicator variables for residence in the northeast, north central, southern and western regions of the United States. Religious affiliation will be described by a group of ten indicator variables corresponding to the categories of general protestant, Baptist, Episcopalian, Lutheran, Methodist, Presbyterian, Roman Catholic, Jewish, other religion and no religion. The frequency with which religious services were attended will be described by a group of six indicator variables corresponding to the categories of no attendance, infrequent attendance, attends about once per month, attends two to three times per month, attends about once per week and attends more than once per week.

Coefficients will be estimated for models of the form

$$\Pr\left(tried_{d,i,y}\right) = \beta_0 + \beta_{IQ} IQ_i + \vec{\beta}\,\vec{X}\,'_{i,y}.$$

The expression $\Pr(tried_{d,i,y})$ denotes the probability that individual i has tried recreational drug d by survey year y. The vector $\vec{X}_{i,y}$ contains the control variables. The hypothesis that intelligence is related to past use of recreational drug d will be tested formally using the null hypothesis $\beta_{IQ}=0$ and the alternative $\beta_{IQ}\neq 0$. The use of a linear model is not intended to imply that the relationship between IQ and the probability of past use is linear. Rather, β_{IQ} should be interpreted as a measure of the average relationship between IQ and past use of the recreational drug.

The figures that will be presented in the "Results" section suggest that the relationships between IQ and past use are not linear and not always monotonic. Therefore coefficients will also be estimated for models of the form

$$\Pr\left(tried_{d,i,y}\right) = \beta_0 + \beta_{IQ} IQ_i + \beta_{IQ^2} IQ_i^2 + \vec{\beta}\,\vec{X}\,'_{i,y}.$$

The variable IQ_i^2 is the square of IQ and the other terms are defined as above. Traditional hypothesis tests are predicated on the *a priori* specification of a statistical model. Choosing models to match the patterns observed in the figures changes the meanings of test statistics in a way that makes statistical inference problematic (Armstrong, 1970; Chatfield, 1995). Coefficients from this second model are merely descriptive and do not form a sound basis for statistical inference.

Previous studies of intelligence and drug use have employed varying sets of control variables. Results are reported here for three specifications, ranging from a simple regression to a regression involving all of the variables described in Table 1 and the accompanying note. Using multiple specifications facilitates comparison with other studies and increases the likelihood that results will be reported for specifications of interest to researchers with varying agendas.

Researchers are often interested in causation and control variables are often included to isolate causal relationships. While the inclusion of control variables provides information about the potential mechanisms linking intelligence and past use, the definition of intelligence used here makes isolating a causal relationship difficult. Intelligence has not been defined in terms of any particular ability, so any outcome or ability could, in principal, reflect differences in intelligence. Therefore it is not clear what outcomes or abilities should be included as control variables in order to isolate a causal relationship. In terms of the causal framework popularized by Rubin (Holland, 1986; Rubin, 1986), the counterfactual is not well-defined and therefore it is not clear how one would measure the effects of differences in intelligence.

The statistical analysis was conducted using Stata 11.

4. Results

Fig. 1 shows how the proportions of observations in which the participant had tried alcohol and cigarettes varied with decile of IQ. The average relationship between IQ and past use of alcohol appears to be positive while the average relationship between IQ and past use of cigarettes appears

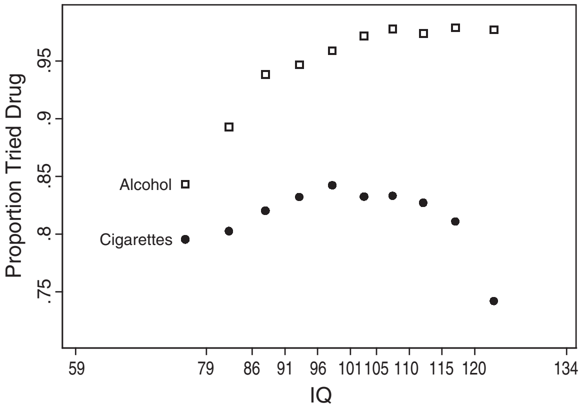

Fig. 1. Past use of legal drugs by decile of IQ. Notes: The figure is based on the NLSY79. Each unique combination of participant and survey year with questions about past alcohol consumption was a potential observation. Deciles are for the distribution of individual IQs. Labels on the IQ axis indicate the minimum and maximum values observed as well as the nine values demarcating the deciles. Proportions appear above the medians for the deciles. The alcohol portion of the figure is based on 76,887 observations of 12,519 individuals. The cigarettes portion of the figure is based on 12,030 observations of 12,030 individuals.

to be nearly null. The relationships between IQ and past use of these drugs appear to become less positive or become negative at high levels of intelligence.

Fig. 2 shows how the proportions of observations in which the participant had tried drugs like marijuana, cocaine and hallucinogens varied with decile of IQ. The average relationships between IQ and past use of these drugs appear to be positive. The relationships between IQ and past use of these drugs appear to become less positive or become negative at high levels of intelligence.

Fig. 3 shows how the proportions of observations in which the participant had used prescription drugs without a doctor's instructions varied with decile of IQ. The graphs appear on separate axes because some symbols would otherwise overlap. The average relationships between IQ and past recreational use of prescription drugs appear to be positive. The relationships between IQ and past use of these drugs appear to become less positive or become negative at high levels of intelligence.

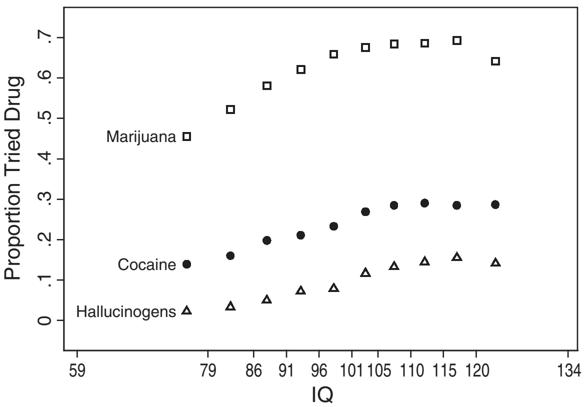

Fig. 2. Past use of illegal drugs by decile of IQ. Notes: The figure is based on the NLSY79. Each unique combination of participant and survey year with questions about past consumption of illegal drugs was a potential observation. Deciles are for the distribution of individual IQs. Labels on the IQ axis indicate the minimum and maximum values observed as well as the nine values demarcating the deciles. Proportions appear above the medians for the deciles. The marijuana portion of the figure is based on 47,802 observations of 12,357 individuals. The cocaine portion of the figure is based on 47,736 observations of 12,361 individuals. The hallucinogens portion of the figure is based on 25,786 observations of 9281 individuals.

Fig. 4 shows how the proportion of observations in which the participant had used inhalants without a doctor's instructions varied with decile of IQ. The average relationship between IQ and past recreational use of inhalants appears to be positive.

In Figs. 1 through 4, it appears that the probabilities of having used recreational drugs tend to increase with intelligence. Table 2 reports the coefficients on IQ_i from linear probability models. These coefficients demonstrate that the average relationships observed in Figs. 1 through 4 are preserved after accounting for a wide range of control variables.

Table 2 presents results for three regression specifications. The column labeled "Specification One" presents IQ coefficients from simple regressions. The column labeled "Specification Two" presents IQ coefficients from regressions that included commonly available control variables, such as education, income and region of residence. The column labeled "Specification Three" presents IQ coefficients from regressions that included additional variables for personality and religion that are available in the NLSY79.

The coefficients on IQ_i are typically positive. The sole exception is the simple regression for cigarettes, where the coefficient on IQ_i is negative and statistically significant at the ten percent level.

Differences in intelligence are typically associated with differences in the probabilities of past use of recreational drugs that are both large and statistically significant. Table 3 provides contexts for the sizes of the coefficients on IQ_i in the third specification.

Table 3 shows the average percentage point differences in past use associated with IQ differences of one point and one standard deviation. One standard deviation is 15 IQ points. For example, an increase in IQ of one point is associated with an average increase in the percentage of respondents expected to have tried alcohol of 0.18 percentage points. An increase in IQ of one standard deviation is associated with an average increase in the percentage of respondents expected to have tried alcohol of 2.7 percentage points.

The final column of Table 3 shows the average differences in the probabilities of having tried recreational drugs from the second column as percentages of the proportions of observations in which participants reported having tried the recreational drugs. For example, it is reported in Table 1 that in about 94.29% of observations the participants reported having tried alcohol. An increase in IQ of one standard deviation is associated with an average increase in the percentage of respondents expected to have tried alcohol of 2.7 percentage points. That increase is 2.86% of the proportion of observations in which participants reported having tried alcohol. As Table 3 demonstrates, in many cases the average differences in past use associated with differences in IQ are large relative to the proportions of observations in which past use was reported.

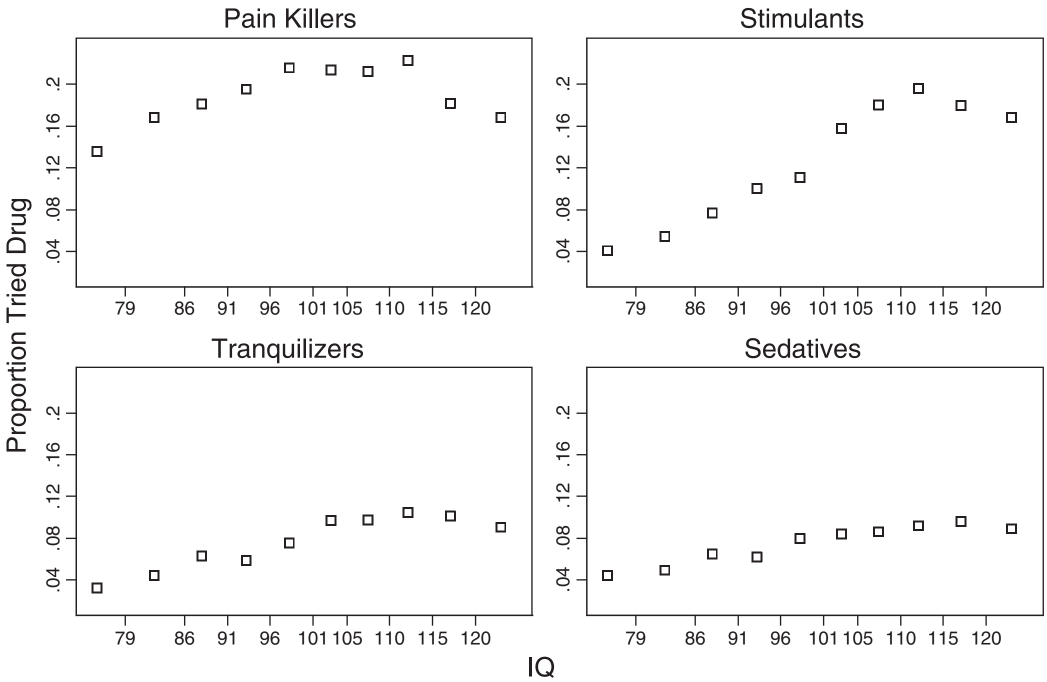

Fig. 3. Past recreational use of prescription drugs by decile of IQ. Notes: The figure is based on the NLSY79. Each unique combination of participant and survey year with questions about past consumption of prescription drugs was a potential observation. Deciles are for the distribution of individual IQs. Labels on the IQ axes indicate the nine values demarcating the deciles. Proportions appear above the medians for the deciles. The pain killers portion of the figure is based on 25,798 observations of 9281 individuals. The stimulants portion of the figure is based on 25,780 observations of 9282 individuals. The tranquilizers portion of the figure is based on 25,790 observations of 9283 individuals. The sedatives portion of the figure is based on 25,784 observations of 9282 individuals.

The coefficients on the control variables were generally as expected. Past use of recreational drugs was typically negatively related to marriage, education, family size and the frequency with which religious services were attended. It was typically positively related to age, urban residence and male gender.

Survey participants were also asked about heroin, ecstasy and steroids, but very few participants reported having used

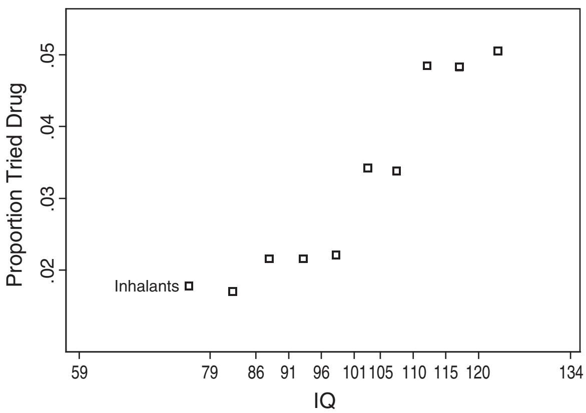

Fig. 4. Past recreational use of inhalants by decile of IQ. Notes: The figure is based on the NLSY79. Each unique combination of participant and survey year with questions about past consumption of inhalants was a potential observation. Deciles are for the distribution of individual IQs. Labels on the IQ axis indicate the minimum and maximum values observed as well as the nine values demarcating the deciles. Proportions appear above the medians for the deciles. The figure is based on 25,772 observations of 9282 individuals.

those substances. When models were estimated using IQ_i and the control variables described above to predict past use of those substances, the coefficients on IQ_i were not statistically significant. This may reflect the limited data available.

The figures suggest that the relationships between intelligence and the probabilities of past use are less positive or negative at the highest levels of intelligence. While these hypotheses cannot be tested using the same data that motivated them (Chatfield, 1995), multiple regression may be used to assess whether the patterns are preserved after accounting for various personal characteristics. Table 4 repeats the regression analysis from the third specification in Table 2 but adds IQ_i^2 to the regression equations.

The coefficients on IQ_i are positive and the coefficients on IQ_i^2 are negative for all drug categories except inhalants, in which case the coefficient on IQ_i is negative and the coefficient on IQ_i^2 is positive. For alcohol, cigarettes, marijuana, cocaine, pain killers, tranquilizers and sedatives, the derivatives of the predicted probabilities of past use with respect to intelligence are negative at the highest levels of intelligence represented in the regressions. These results indicate that the patterns observed in the figures are preserved after accounting for a wide range of personal characteristics.

The regression specifications represented in Table 4 were chosen after examining the data to reflect the patterns that had been observed. The additions of IQ_i^2 increase the proportions of variation explained by the models, but no straightforward method exists for determining if these improvements relative to the linear models are statistically significant (Armstrong, 1970; Chatfield, 1995). For all drug categories except inhalants, however, the differences would have been

Table 2
IQ and past use.

Drugs	Coefficients on IQ_i		
	Specification One	Specification Two	Specification Three
Alcohol	0.0025***	0.0020***	0.0018***
	(0.0001)	(0.0002)	(0.0002)
Cigarettes	−0.0004*	0.0004	0.0006
	(0.0003)	(0.0004)	(0.0004)
Marijuana	0.0043***	0.0053***	0.0051***
	(0.0003)	(0.0004)	(0.0004)
Cocaine	0.0033***	0.0041***	0.0041***
	(0.0002)	(0.0003)	(0.0003)
Hallucinogens	0.0029***	0.0033***	0.0033***
	(0.0002)	(0.0002)	(0.0003)
Pain killers	0.0008***	0.0018***	0.0018***
	(0.0002)	(0.0003)	(0.0003)
Stimulants	0.0033***	0.0036***	0.0037***
	(0.0002)	(0.0003)	(0.0003)
Tranquilizers	0.0014***	0.0018***	0.0018***
	(0.0001)	(0.0002)	(0.0002)
Sedatives	0.0011***	0.0015***	0.0015***
	(0.0001)	(0.0002)	(0.0002)
Inhalants	0.0008***	0.0010***	0.0010***
	(0.0001)	(0.0001)	(0.0001)
Control variables for age, race, ethnicity, gender, marital status, education, income, family size, urban residence and region of residence included?	No	Yes	Yes
Control variables for locus of control, self-esteem, religious affiliation and frequency of attending religious services included?	No	No	Yes

Notes: The table reports coefficients from linear probability models estimated using the NLSY79. Robust standard errors, with clustering at the individual level, appear in parentheses.
***Statistically different from zero with $p<0.01$.
**Statistically different from zero with $p<0.05$.
*Statistically different from zero with $p<0.1$.

Table 3
Sizes of differences in past use.

Drugs	For each IQ point	For each standard deviation of IQ	
	Percentage points	Percentage points	Percentages of means
Alcohol	0.18	2.7	2.86
Cigarettes	0.06	0.9	1.11
Marijuana	0.51	7.65	12.43
Cocaine	0.41	6.15	26.39
Hallucinogens	0.33	4.95	53.56
Pain killers	0.18	2.7	14.42
Stimulants	0.37	5.55	45.35
Tranquilizers	0.18	2.7	35.93
Sedatives	0.15	2.25	30.61
Inhalants	0.1	1.5	48.38

Notes: The table was constructed using the coefficients from “Specification Three” in Table 2. The first column of the table shows how the average percentages of respondents expected to report past use change with increases in IQ of one point. The second column shows how the average percentages of respondents expected to report past use change with increases in IQ of one standard deviation. The third column shows the average differences in probabilities of reporting past use from the second column as percentages of the proportions of observations in which participants reported having tried the recreational drugs.

statistically significant had the tests been chosen *a priori*. This can be seen by calculating test statistics using the coefficients on IQ_i^2 and the associated standard errors in Table 4. When adding a single variable to a linear regression model, an *F* test of the statistical significance of the improvement in R^2 is mathematically equivalent to a *t* test of the statistical significance of the coefficient on the additional variable. The improvement in R^2 is significant if and only if the coefficient on the variable added is significantly different from zero (Wooldridge, 2006).

AFQT scores are affected by education (Hansen, Heckman, & Mullen, 2004; Neal & Johnson, 1996; Winship & Korenman, 2010) and researchers have sometimes adjusted scores to account for differences in education at the time of testing (Auld & Sidhu, 2005). Intelligence has not been defined here as inherent ability, so no adjustments have been made here. When the statistical analysis summarized in Table 2 was repeated using adjusted scores, similar patterns were observed.

One potential concern is that past college attendance may be related to both intelligence and past use of recreational drugs. Under some scenarios simply including years of education as a control variable would be inadequate to account for those relationships. To address this concern, the statistical analysis was performed separately for those participants who had completed fewer than twelve years of education by 2008,

Table 4
Further exploration of IQ and past use.

Drugs	Coefficients	
	IQ_i	IQ_i^2
Alcohol	0.017701+++	−0.000080+++
	(0.001670)	(0.000008)
Cigarettes	0.020490+++	−0.000100+++
	(0.003386)	(0.000017)
Marijuana	0.042490+++	−0.000189+++
	(0.003253)	(0.000016)
Cocaine	0.020021+++	−0.000080+++
	(0.002578)	(0.000013)
Hallucinogens	0.008729+++	−0.000027+++
	(0.001977)	(0.000010)
Pain Killers	0.020021+++	−0.000092+++
	(0.002423)	(0.000012)
Stimulants	0.013328+++	−0.000048+++
	(0.002153)	(0.000011)
Tranquilizers	0.008312+++	−0.000033+++
	(0.001657)	(0.000009)
Sedatives	0.006335+++	−0.000025+++
	(0.001620)	(0.000008)
Inhalants	−0.000241	0.000006
	(0.001152)	(0.000006)
Control variables	Age, race, ethnicity, gender, marital status, education, income, family size, urban residence, region of residence, locus of control, self-esteem, religious affiliation, frequency of attending religious services	

Notes: The table reports coefficients from linear probability models estimated using the NLSY79. Robust standard errors, with clustering at the individual level, appear in parentheses. Because this regression specification was chosen to match patterns observed in the data, these results do not form a sound basis for statistical inference (Chatfield, 1995).
+++More than 2.58 standard deviations from zero.
++More than 1.96 standard deviations from zero.
+More than 1.64 standard deviations from zero.

the most recent year for which data were available. Similar patterns were observed, although the coefficients on IQ_i were typically larger and the coefficient on IQ_i in the simple regression for cigarettes became positive and statistically significant at the 1% level. These results suggest that differences in college attendance are not driving the positive relationships reported in Table 2.

When the statistical analysis summarized in Table 2 was repeated using probit and logit models, similar results were obtained.

5. Discussion

The positive average relationships between intelligence and the probabilities of past use of recreational drugs are consistent with the positive relationship between intelligence and the value of novelty. The relationships between intelligence and past use may not be driven entirely by differences in the value of novelty, however.

For example, more intelligent people may be less concerned about addiction. More intelligent people tend to be better at self-control (Dempster, 1991; Evdokimidis et al., 2002; Friedman et al., 2006; Heitz, Unsworth, & Engle, 2005; Salthouse, Atkinson, & Berish, 2003; Schmeichel, Vohs, & Baumeister, 2003; Shoda, Mischel, & Peake, 1990) and may therefore be better at restricting their consumption of addictive substances. Wilmoth (2010) showed that among NLSY79 participants intelligence is negatively related to the probability of a failed attempt to restrict alcohol consumption. If more intelligent people anticipate that they will be able to break their addictions, then they may be more likely to try recreational drugs.

Another possibility is that the positive relationships between intelligence and the probabilities of past use arose because more intelligent people are better informed about the health risks association with recreational drugs. Viscusi (1990) reported evidence that the health risks associated with smoking are commonly overestimated. Those with better information may have lower risk estimates and may therefore be more likely to try recreational drugs. Note, however, that cigarettes are the recreational drug for which the relationship between intelligence and the probability of past use is the least positive.

The figures and the regression coefficients in Table 4 indicate that the relationships between intelligence and the probabilities of past use are not always monotonic. For several drugs, the relationships between intelligence and the probabilities of past use appear to become negative at the highest levels of intelligence. One possible reason for this pattern is homophily. People tend to associate with those similar to themselves in dimensions such as race, age, education and intelligence (McPherson, Smith-Lovin, & Cook, 2001). There is a social component to the consumption of recreational drugs; indeed, many recreational drugs are available only through social networks. High levels of intelligence are unusual and may therefore be socially isolating (Plucker & Levy, 2001; Winner, 2000). This may limit the use of recreational drugs among the highly intelligent.

Another possibility is that while intelligence is related to the desire for novel experiences it is also related to other traits that affect drug use. For example, more intelligent people tend to discount the future less (Shamosh & Gray, 2008) and may therefore be more heavily influenced by the potential for negative outcomes in the future. It may be that differences in the value of novelty are dominant over some ranges of IQ while other differences are dominant elsewhere.

Although researchers have found evidence of a negative relationship between intelligence and alcohol abuse later in life, the average relationship between intelligence and the probability of having tried alcohol was found here to be positive. Similarly, although researchers have found evidence of a strong negative relationship between intelligence and smoking, the average relationship between intelligence and the probability of having tried cigarettes was not found here to be strongly negative. These patterns may have arisen because of differences in information, discounting or self-control that become apparent once the novelty of using alcohol or cigarettes has worn away.

The strong relationships between intelligence and past use of recreational drugs may have important public health implications. Each year the federal government spends over a billion dollars on preventing the initiation of recreational drug use (Office of National Drug Control Policy, 2009). State and local governments and nongovernmental organizations also spend substantial amounts. For policymakers and others interested in discouraging the use of recreational drugs, information about who is more likely to try recreational drugs may be useful.

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