Psychiatry Research Communications 3 (2023) 100130

Contents lists available at ScienceDirect

Psychiatry Research Communications

journal homepage: www.sciencedirect.com/journal/Psychiatry-Research-Communications

The relationship between subjective social status, impulsivity and addictive behaviours

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ARTICLE INFO

Handling Editor: Leonardo Fontenelle

Keywords:
Subjective social status
Addiction
Addictive behaviour
Alcohol
Gambling
Gaming
Smoking
Drugs

ABSTRACT

Why are people from less affluent social groups more likely to engage in addictive behaviours and to transition from recreational use to addiction? One contributing factor may be the influence that the environment has on decision-making. To test this, we examined the relationship between subjective social status, impulsivity, and engagement with addictive behaviours in 500 adults in the United Kingdom. Regression and Path Analyses were used to examine the direct and indirect relationships between subjective social status, trait impulsivity, and potentially addictive behaviours, including alcohol consumption, gambling, tobacco and drug use, and gaming. Social status was predictive of trait impulsivity but did not directly predict all of the addictive behaviours that we examined. Instead, we found an indirect relationship between subjective social status and trait impulsivity, and between trait impulsivity and participation with addictive behaviours. The data are important for our understanding of the role that environment plays in the development of individual differences and the distribution of addiction behaviour across social groups. We anticipate that early screening tools or interventions can be developed where individuals with low social status and high trait impulsivity are alerted to their increased risk of addiction.

1. Introduction

How does social status impact on the choices that people make? We know that early experiences of deprivation can have serious consequences for a child's neurobiological, social, behavioural, and cognitive development (Rutter, 1972, 1979). Adults who experience severe and prolonged deprivation as children are more likely to be diagnosed with a wide range of psychiatric, cognitive, and social impairments (Sonuga-Barke et al., 2017). What is less known is how subjective social status, as opposed to deprivation, influences the development of individual differences in behaviour and cognition. Evidence suggests that individuals from less affluent environments tend to make more impulsive and risky life choices than those who are more affluent. For example, rates of smoking (Windsor-Shellard et al., 2020), alcohol consumption (Cerdá et al., 2011), obesity (Houle, 2014), and debt dependence (Houle, 2014) are not distributed evenly across socioeconomic groups and tend to be higher in those that are less affluent. In this paper we report the results of a survey using diagnostic materials of addictive behaviours to understand the relationship between subjective social status and a range of impulsive behaviours that can lead to addiction.

1.1. Subjective social status

Subjective social status refers to an individual's perception of their relative rank in a society or community. Subjective social status can be a useful indicator of socioeconomic status, particularly when objective measures are unavailable, or as an indicator that is relevant to the individual rather than their geography or occupation. In fact, subjective social status is often a better predictor of health outcomes than objective education, income, and occupation (e.g. Euteneuer, 2014; Singh-Manoux et al., 2005; Zell et al., 2018). A common measurement tool is the MacArthur Scale (Adler et al., 2000) which asks participants to indicate their relative status in their community or wider society on a visual representation of a ladder with 10 rungs. The bottom rung (score = 1) indicates the lowest subjective status, and the highest rung (score = 10) indicates the highest subjective status. The MacArthur scale for Subjective social status is a robust predictor of health behaviour, and mental and physical health (Zell et al., 2018). The MacArthur scale is a useful measure because it has the tendency to 'self-normalise', that is the majority of people tend to place themselves in the middle of the scale, irrespective of whether they live in a poor or wealthy country (Evans and

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https://doi.org/10.1016/j.psycom.2023.100130
Received 8 February 2023; Received in revised form 23 May 2023; Accepted 31 May 2023

Kelley, 2004). Although it does broadly corelate with objective measures of social status such as relative wealth and socioeconomic status, it also reflects satisfaction with standard of living and economic security (Jackman and Jackman, 1973; Singh-Manoux et al., 2003). Unemployment has a negative effect on subjective social status and both general and mental health (Adler et al., 2000; Demakakos et al., 2008; Nicklett and Burgard, 2009; Singh-Manoux et al., 2005).

Factors that affect subjective social status such as unemployment can have acute effects on mental health (Bartelink et al., 2020) and, when experienced in early adulthood can have chronic long-term effects (Lee et al., 2019) leading to a cycle of unemployment and poor mental health (Butterworth et al., 2012). People with severe mental health problems are up to 7 times more likely to be unemployed, and people with common mental disorders are up to 3 times more likely to be unemployed, in part because of the perceived stigma attached to mental ill-health, and because of the low self-esteem and subjective social status of the individuals concerned (Brouwers, 2020). Unemployment is associated with an increase in addictive behaviours. Hazardous levels and patterns of alcohol consumption tend to be higher in unemployed people (Henkel, 2011). Similarly, unemployed people are more likely to use tobacco and drugs (Amiri, 2022; Bentley et al., 2021). Although, cross-sectional studies cannot establish the causal relationship between addictive behaviours and lower social status, the association between addictive behaviours and economic circumstance does appear to be cyclical, lending support to the hypothesis that there is at least directional causal relationship from deprivation to addictive behaviours. Some studies show a clear increase in addictive behaviours subsequent to job loss (Čihák, 2020; Fink et al., 2023; Plessz et al., 2020). Drinking and smoking patterns appear to be procyclical (Asgeirsdottir et al., 2012; Makela, 1999; Ruhm, 1995, 2000). However, other studies (e.g. Granados, 2005) show opposite patterns with economic expansion being positively associated with increased mortality (except suicide) including cirrhosis of the liver. It is likely, that economic conditions affect people in different ways. People who are at risk of addictive behaviour may transition from recreational use to dependence as a result of negative economic events, while people with fewer risk factors for addiction may become more self-controlled to conserve resources. Recent decades have seen considerable economic and social turbulence including two recessions resulting from the 2008 financial crisis and the COVID pandemic (Tunney, 2023). The risk factor that links subjective social status and addiction is impulsivity. Because impulsivity is associated with economic uncertainty (Casey et al., 2011, 2011, 2011; Tunney, 2022; Tunney and James, 2022) it is important to understand why some people are more impulsive than others, and the consequences this might have for engagement with addictive behaviours. It is possible that economic policies of austerity designed to address financial recessions may have long-term consequences for mental health.

1.2. Impulsivity

Psychometric and psychophysical measures of trait impulsivity are known risk factors for a range of behaviours that can potentially lead to addiction (Audrain-McGovern et al., 2009; Kirby et al., 1999; Rasmussen et al., 2010; Watts et al., 2018). Evidence is emerging that trait impulsivity is also unevenly distributed across socioeconomic groups (Tunney, 2022; Tunney and James, 2022). For example, older adults living in the least affluent areas tend to have more impulsive time preferences than people living in the most affluent areas (Tunney and James, 2022). These findings lend some support to the notion that economic scarcity can lead to impulsive decisions. Stronger support for the scarcity hypothesis comes from evidence that children as young as 4 years from deprived areas show more impulsive time preferences on a delay discounting task than children living in the least deprived areas (Tunney, 2022). However, we do not know whether an individual's social status impacts their decision-making directly, or indirectly through trait impulsivity.

In the study that follows we explored the relationships between subjective social status, trait impulsivity, and addictive behaviours. We hypothesised that subjective social status has both a direct effect of addictive behaviours, and an indirect effect of via trait impulsivity. We conceive the direct effect to be acute and to reflect personal circumstances. By contrast, we conceive that the indirect effect of subjective social status is a chronic influence on trait impulsivity. In this model, acute personal circumstances can make people more likely to engage in recreational behaviours but that it is impulsivity that can lead to the transition from recreational use to addictive behaviour.

2. Method

2.1. Participants

Five-hundred participants were recruited remotely using prolific (prolific.co) in return for £7.50 (US$10.00, €8.80). Inclusion criteria were that the participants were aged 18 years or older and were resident in the United Kingdom. Two-hundred and fifty participants responded on 2nd April 2020 and a further 250 responded on 15th April 2020. Two-hundred and forty-four participants were female, 250 were male, and 6 identified as neither male nor female. The average age was 29.67 years ($SD = 10.04$). The average subjective social status rating was 5.642 (SD = 1.480, median = 6) on a scale that ranges from 1 to 10. The distribution of ratings is given in Supplementary Table S1.

2.2. Ethics

The research was approved by the Aston University College of Health and Life Sciences Ethics Committee and conducted in accordance with the Code of Ethics of the World Medial Association (Declaration of Helsinki). Informed consent was obtained from all participants and the data were anonymised prior to collection.

2.3. Design and procedure

The participants completed a series of standardised questionnaires using Qualtrics software. This included the Alcohol Use Disorders Identification Test (AUDIT) (Babor et al., 2001), the Drugs Use Disorders Identification Test (DUDIT) (Berman et al., 2005), the Cigarette Dependence Scale (CDS-5) (Etter et al., 2003), the Problem Gambling Severity Index (PGSI) (Ferris and Wynne, 2001), and a 9-item dichotomous measure of the Diagnostic and Statistical Manual (DSM-5) Internet Gaming Disorder criteria (IGD) (American Psychiatric Association, 2013).

We used the MacArthur Scale of Subjective Social Status to measure subjective social status (Adler and Stewart, 2007). Finally, we measured psychometric impulsivity using the Barratt Impulsiveness Scale (BIS-11) (Patton et al., 1995), and delay discounting using the 27-Item Monetary Choice Questionnaire (27-MCQ) (Kirby and Maraković, 1996). The BIS-11 has 3 s order factors: Attentional-, Motor-, and Nonplanning Impulsiveness, which are made up of 6 first order factors: Attention, Motor, Self-control, Cognitive Complexity, Perseverance, and Cognitive Instability. The delay discounting yields a measure of impulsivity based on a parameter that describes the amount the amount of discounting for future financial rewards. The discount function is expressed as a logarithm (log-K). Large values reflect steep discounting and impulsivity, small values reflect shallow discounting and greater self-control.

2.4. Data analyses

The study ran online using Qualtrics (2020), and the resulting data were analysed using Jamovi (The Jamovi Project, 2022). We first conducted bivariate correlations on the relationships between the impulsivity measures (27-MCQ and BIS-11), addictive behaviours (AUDIT, DUDIT, CDS-5, PGSI, and IGD), and subjective social status. We ran separate correlations for the 1st and 2nd Order factors of the BIS-11. We

included an overall addiction behaviour score in these correlations that counted the number of different addictive behaviours a person engaged with, but not the severity of the score on each subscale.

We next conducted a series of regression analyses to determine which socioeconomic variables and aspects of impulsivity predicted the overall addiction score and with each addictive behaviour. Each scale was analysed separately using both the 1st and 2nd Order factors of the BIS-11. Age was entered as a continuous variable, and gender as a dummy coded variable with female as the reference category. The discount parameter Log-*k*, the three BIS-11 subscales, and subjective social status were entered as continuous variables. In addition, we also conducted binary logistic regressions to determine whether the sociodemographic data and impulsivity measures predicted whether respondents met the criteria for heavy/problem use or addiction.

Finally, we conducted Path Analysis using Structural Equation Modelling on each of the addictive behaviour measures and the overall addictive behaviour scores to determine the relationships between socioeconomic status, impulsivity, and addictive behaviours. The analyses reported here were different to the analyses in the pre-registration.

3. Results

Table 1a shows correlations for the 2nd Order BIS-11 factors, and Table 1b shows the correlations for the 1st Order BIS-11 factors. As expected, we found reliable correlations between both psychometric and psychophysical measures of impulsivity, and between subjective social status and addictive behaviours. Younger people had higher alcohol use, drug use, and gaming scores. Age was not related to tobacco, gambling, or subjective social status. Being male was associated with higher drug use and gaming scores.

Tables 1a and 1b also show the relationships between subjective social status and both BIS-11 and delay discounting. Subjective social status was negatively associated with discount rates, suggesting that people who perceived themselves to be relatively lower in social status tended to have higher discount rates, therefore placing less value on delayed rewards compared to immediate rewards. The analysis using 2nd Order factors (Table 1a) revealed that younger people also tended to have higher discount rates, and to score higher on Attentional Impulsivity, but not Motor or Non-Planning Impulsivity. Discount rates were associated with Non-Planning Impulsivity, and to a lesser extent with Motor Impulsivity, but not with Attentional Impulsivity. Subjective social status was associated with Attentional and Non-Planning Impulsivity. The analysis of 1st Order factors (Table 1b) showed that discount rates were moderately associated with Motor Impulsiveness, and more robustly with Self-Control and Cognitive Complexity. Subjective social status was associated with each 1st Order BIS-11 factor except for Motor Impulsiveness.

3.1. Correlations between addictive behaviours and impulsivity

Tables 1a and 1b shows the computed Addictive Behaviour Score that counts the number of addictive behaviours each participant engaged with. Since we measured five behaviours the scale ranged from 0 (no engagement in addictive behaviours) to 5 (engagement in all 5 addictive behaviours). For example, if a participant used tobacco and alcohol but engaged in no other addictive behaviour then they would receive a score of 2 irrespective of their level of use. A score of 5 does not imply that an individual engaged in any activity to a harmful extent, merely that they engage in a range of potentially addictive behaviours. This score was negatively associated with age and social status and positively associated with being male, having higher discount rates, and each of the 1st and 2nd Order BIS-11 factors except Perseverance.

3.2. Regression analyses

The first regression model tested general engagement with addiction behaviours using the overall addition score as the dependent variable. The model using 1st Order factors was significant ($R^2 = .248$, $F_{10,\ 490} = 16.136$, $p < .001$, see Table 2). Being younger and male were both associated with engagement in a greater number of addictive behaviours. Delay discounting and three 1st Order factors of the BIS-11 (Attention, Motor, Self-Control) predicted the number of addictive behaviours that participants engaged in. Subjective social status was also a reliable predictor: people who perceived themselves to be relatively lower in social status tended to engage in more addictive behaviours than people who perceived themselves to be relatively higher in social status. The model using 2nd Order factors was significant ($R^2 = .234$, $F_{10,\ 493} = 21.572$, $p < .001$, see Table 2). Age was a negative predictor of engagement with addictive behaviours. Delay discounting and Attentional Impulsivity were strongly related with addictive behaviours. The effect of Motor Impulsivity was marginal ($p = .048$). There was a strong inverse relationship with Subjective Social Status.

3.2.1. Alcohol use disorder test

There were 74 (14.8%) Non-Drinkers, 314 (62.7%) Low-Risk Drinkers, 87 (17.4%) Drinkers at Increasing Risk, 13 (2.6%) Drinkers at Higher Risk, and 13 (2.6%) Drinkers with Possible Dependence.

The regression model for AUDIT scores using 1st Order BIS-11 factors was significant ($R^2 = .098$, $F_{10,\ 490} = 5.327$, $p < .001$, see Table 3). Younger people and males tended to have higher AUDIT scores than older people and females. AUDIT scores were predicted by Motor Impulsiveness and Self-Control. There was no effect of Subjective Social Status. The analysis using 2nd Order factors was significant ($R^2 = .096$, $F_{10,\ 493} = 7.515$, $p < .001$, see Table 3). Age was negatively related to AUDIT scores. Delay discounting, Attentional Impulsivity, and Subjective Social Status were not related to AUDIT scores, but there were positive associations with Motor and Non-Planning Impulsivity. The effect of gender was marginal ($p = .048$).

Table 1a
Exploratory correlations between variables using 2nd Order BIS-11 factors.

	Age	Gender	Log-k	Attention	Motor	Non-Planning	PGSI	AUDIT	DUDIT	CDS5	IGD	Addiction Score
Gender	−.108*	–										
Log K	−.123**	.084	–									
Attentional	−.252***	−.028	.081	–								
Motor	−.060	−.048	.099*	.462***	–							
Non-Planning	−.040	−.054	.234***	.478***	.415***	–						
PGSI	−.023	.077	.102*	.090*	.058	.106*	–					
AUDIT	−.130**	.077	.043	.210***	.237***	.220***	.029	–				
DUDIT	−.159***	.089*	.117**	.227***	.216***	.244***	.037	.351***	–			
CDS-5	.017	.061	.195***	.079	.141**	.145**	.110*	.272***	.267***	–		
IGD	−.284***	.195***	.162***	.278***	.111*	.144**	.321***	.056	.071	.057	–	
Addiction Score	−.305***	.212***	.262***	.275***	.198***	.216***	.370***	.463***	.437***	.536***	.410	–
Social Status	.017	.060	−.129**	−.175***	−.043	−.214***	−.098*	−.042	−.075	−.131**	−.147***	−.159***

Note. *p < .05, **p < .01, ***p < .001.

Table 1b
Exploratory correlations between variables using 1st Order BIS-11 factors.

	Age	Gender	Log-k	Attention	Cognitive Instability	Motor	Perseverance	Self-Control	Cognitive Complexity
Age	–								
Gender	−.108*	–							
Log K	−.123**	.084	–						
Attention	−.213***	.015	.059	–					
Cognitive Instability	−.215	−.083	.084	.412***	–				
Motor	−.065	−.042	.110*	.309***	.377***	–			
Perseverance	−.014	−.031	.019	.270***	.277***	.204***	–		
Self-Control	−.088*	−.052	.157***	.501***	.239***	.376***	.282***	–	
Cognitive Complexity	.040	−.037	.251***	.387***	.082	.211***	.158***	.400***	–
PGSI	−.023	.077	.102*	.052	.112*	.085	−.032	.097*	.078
AUDIT	−.130**	.077	.043	.187***	.165***	.224***	.124**	.219***	.139**
DUDIT	−.159***	.089*	.117**	.221***	.149***	.182***	.159***	.258***	.133**
CDS5	.017	.061	.195***	.081	.045	.169***	−.000	.128**	.113*
IGD	−.284***	.195***	.162***	.247***	.218***	.100*	.068	.174***	.049
Addiction Score	−.305***	.212***	.262***	.267***	.181***	.195***	.086	.248***	.091*
Social Status	.017	.060	−.129**	−.184***	−.096*	.014	−.133**	−.183***	−.176***

Note. *p < .05, **p < .01, ***p < .001.

Table 2
Regression coefficients for the Addictive Behaviour Score.

Predictor	Unstandardized coefficient	*se*	*t*	*p*
2nd Order factor model				
Age	−0.025	0.005	−5.364	< .001
Log K	0.286	0.069	4.172	< .001
Attentional	0.036	0.015	2.427	.016
Motor	0.025	0.013	1.985	.048
Non-Planning	0.014	0.012	1.217	.224
Subjective Social Status	−0.082	0.031	−2.612	.009
Gender (male)	0.432	0.090	4.785	< .001
1st Order factor model				
Age	−0.024	0.005	−5.046	< .001
Log K	0.310	0.069	4.476	< .001
Attention	0.050	0.021	2.358	.019
Cognitive Instability	0.011	0.029	0.385	.700
Motor	0.032	0.015	2.183	.029
Perseverance	−0.007	0.028	−0.236	.814
Self-Control	0.042	0.017	2.440	.015
Cognitive Complexity	−0.036	0.022	−1.648	.100
Subjective Social Status	−0.086	0.031	−2.748	.006
Gender (male)	0.424	0.090	4.688	< .001

Table 3
Regression coefficients for Alcohol Use Disorders Test scores.

Predictor	Unstandardized coefficient	*se*	*t*	*p*
2nd Order factor model				
Age	−0.048	0.022	−2.127	.034
Log K	−0.210	0.329	−0.638	.524
Attentional	0.067	0.070	0.957	.339
Motor	0.191	0.061	3.155	.002
Non-Planning	0.143	0.055	2.598	.010
Subjective Social Status	−0.013	0.150	−0.088	.930
Gender (male)	0.859	0.433	1.984	.048
1st Order factor model				
Age	−0.046	0.023	−2.046	.041
Log K	−0.237	0.335	−0.708	.480
Attention	0.016	0.103	0.154	.878
Cognitive Instability	0.154	0.141	1.093	.275
Motor	0.200	0.072	2.782	.006
Perseverance	0.111	0.138	0.808	.419
Self-Control	0.173	0.083	2.086	.038
Cognitive Complexity	0.135	0.106	1.277	.202
Subjective Social Status	−0.026	0.151	−0.170	.865
Gender (male)	0.901	0.437	2.060	.040

To determine which variables might be risk factors for the transition from recreational to harmful drinking we conducted a binary logistic regression on two groups of drinkers by collapsing Low-Risk Drinkers and Drinkers at Increasing Risk into one group (n = 414), and Drinkers at Higher Risk and Drinkers with Possible Dependence into another (n = 26). We excluded Non-Drinkers. Predictor variables were social status, discount function, and the 2nd Order BIS-11 factors. The model was significant (χ^2 = 33.954, p < .001). Neither social status (OR = 0.720, *95% CI* [0.364, 1.425], p = .096), nor discount function (OR = 0.790, *95% CI* [0.598, 1.042], p = .35), were reliable predictors of drinking category. Attentional (OR = 1.132, *95% CI* [1.004, 1.276], p = .04), and Motor Impulsivity (OR = 1.132, *95% CI* [1.011, 1.267], p = .03), were predictive of drinking category. Non-Planning Impulsivity was not predictive of category (OR = 1.100, *95% CI* [0.986, 1.227], p = .09).

3.2.2. Drug use identification scores

There were 380 (75.8%) respondents who said that they did not use drugs, 118 (23.6%) Low-Risk Drug Users, and 3 (0.6%) Dependent Drug Users.

The model using the 1st Order factors was significant (R^2 = .115, $F_{10, 490}$ = 6.351, p < .001, see Table 4). Age and gender were reliable predictors of DUDIT scores. Of the measures of impulsivity, only Self-Control was associated with DUDIT scores. Subjective Social Status was not a reliable predictor of drug use. The module using 2nd Order factors was significant (R^2 = .110, $F_{10, 493}$ = 8.663, p < .001, see Table 4). Age and

Table 4
Regression coefficients for Drug Use Disorders Test scores.

Predictor	Unstandardized coefficient	*se*	*t*	*p*
2nd Order factor model				
Age	−0.049	0.019	−2.531	.012
Log K	0.256	0.284	0.903	.367
Attentional	0.077	0.061	1.275	.203
Motor	0.121	0.052	2.311	.021
Non-Planning	0.137	0.048	2.878	.004
Subjective Social Status	−0.072	0.129	−0.561	.575
Gender (male)	0.782	0.373	2.096	.037
1st Order factor model				
Age	−0.046	0.019	−2.381	.018
Log K	0.333	0.288	1.154	.249
Attention	0.092	0.089	1.037	.300
Cognitive Instability	0.039	0.122	0.324	.746
Motor	0.091	0.062	1.472	.142
Perseverance	0.196	0.118	1.659	.098
Self-Control	0.207	0.071	2.905	.004
Cognitive Complexity	0.020	0.091	0.221	.825
Subjective Social Status	−0.060	0.130	−0.458	.647
Gender (male)	0.767	0.376	2.039	.042

gender were reliable predictors of DUDIT scores, and Motor and Non-Planning Impulsivity predicted DUDIT scores. There was no effect of Subjective Social Status, delay discounting or Attentional Impulsivity.

We conducted a binary logistic regression to try to understand which aspect of impulsivity predicted drug use. We collapsed all drug users into a single group to compare with the Non-Drug Users. This analysis is a meaningful one since the DUDIT codes any drug use as harmful. The predictor variables were social status, discount function, and the 2nd Order BIS-11 factors. The model was significant ($\chi^2 = 29.290$, $p < .001$). Neither social status ($OR = 1.058$, *95% CI* [0.914, 1.225], $p = .0.45$), nor discount rates ($OR = 1.354$, *95% CI* [0.971, 1.890], $p = .07$), were reliable predictors of drug use. Attentional Impulsivity was predictive of drug use ($OR = 1.075$, *95% CI* [1.006, 1.148], $p = .03$), but neither Motor Impulsivity ($OR = 1.056$, *95% CI* [0.997, 1.119], $p = .07$), or Non-Planning Impulsivity ($OR = 1.030$, *95% CI* [0.976, 1.087], $p = .28$), were reliable predictors.

3.2.3. Five item Cigarette Dependence Scale

Most of the sample (366, 73.1%) were Non-Smokers, with 135 (26.9%) Smokers. The CDS-5 does not categorise different kinds of smoker since any level of smoking is harmful.

The model using 1st Order factors was significant ($R^2 = .084$, $F_{10,\ 490} = 4.503$, $p < .001$, see Table 5). Smoking was not associated with age or gender. Consistent with findings elsewhere in the literature smoking was strongly predicted by delay discounting and by Motor Impulsiveness and Subjective Social Status. The model using 2nd Order factors was significant ($R^2 = .072$, $F_{10,\ 493} = 5.439$, $p < .001$, see Table 5). Delay discounting and Motor Impulsivity were reliable predictors of tobacco use.

We conducted a binary logistic regression to try to predict which aspects of impulsivity were associated with Smokers versus Non-Smokers. The predictor variables were social status, discount function, and the 2nd Order BIS-11 factors. The model was significant ($\chi^2 = 34.591$, $p < .001$). Discount rates ($OR = 1.737$, *95% CI* [1.248, 2.417], $p < .001$), and Motor Impulsivity ($OR = 1.069$, *95% CI* [1.010, 1.132], $p = .021$), predicted whether people smoked or not. Neither Attentional Impulsivity ($OR = 1.010$, *95% CI* [0.947, 1.077], $p = .764$), nor Non-Planning Impulsivity ($OR = 1.029$, *95% CI* [0.978, 1.084], $p = .27$) were reliable predictors of smoking status.

3.2.4. Problem Gambling Severity Index

There were 333 (66.5%) Non-Gamblers, 71 (14.2%) Non-Problem Gamblers, 46 (9.2%) Low-Risk Gamblers, 38 (7.6%) Moderate-Risk Gamblers, and 13 (2.6%) High-Risk Gamblers.

The model using 1st Order factors was significant ($R^2 = .049$, $F_{10,\ 490} = 2.506$, $p < .001$, see Table 6). PGSI scores were predicted by Cognitive Instability and Perseverance, but not by delay discounting or other 1st Order BIS-11 factors. The effect of Subjective social status failed to reach significance. Males had higher PGSI scores than women, but there was no effect of age. The model using the 2nd Order factors was significant ($R^2 = .031$, $F_{10,\ 493} = 2.227$, $p < .001$, see Table 6). However, none of the predictor variables were significantly related to PGSI scores.

Next, we conducted binary logistic regression to predict which aspects of impulsivity were associated with excessive gambling. To do so we collapsed High and Moderate-Risk Gamblers into one group (n = 58), and Low-Risk and Non-Problem Gamblers into another group (n = 117). We excluded Non-Gamblers. The predictor variables were social status, discount function, and the 2nd Order BIS-11 factors. The model was significant ($\chi^2 = 23.585$, $p < .001$). Discount rates ($OR = 2.034$, *95% CI* [1.083, 3.822], $p = .027$), and Attentional Impulsivity ($OR = 1.171$, *95% CI* [1.034, 1.326], $p = .013$), predicted whether people were Moderate or High-Risk Gamblers compared to Low-Risk on Non-Problem Gamblers. Neither Motor ($OR = 1.018$, *95% CI* [0.912, 1.135], $p = .751$), nor Non-Planning Impulsivity ($OR = 0.994$, *95% CI* [0.904, 1.094], $p = .907$), were reliable predictors of gambling severity.

3.2.5. Internet gaming disorder

There were 57 (11.4%) respondents who met the DSM-5 recommended clinical cut-off of 5 or more criteria for IGD, 211 (42.1%) Low-Risk Gamers, and 233 (46.5%) Non-Gamers.

The model using the 1st Order BIS-11 factors was significant ($R^2 = .185$, $F_{10,\ 490} = 11.126$, $p < .001$, see Table 7). Males and younger participants had higher IGD scores than women and older participants. Delay discounting, Attention, and Cognitive Instability were reliable predictors of IGD scores. Subjective social status was negatively associated with IGD scores. The model using 2nd Order factors was also significant ($R^2 = .179$, $F_{10,\ 493} = 15.364$, $p < .001$, see Table 7). Delay discounting and Attentional Impulsivity were reliable independent predictors of IGD scores.

We conducted a binary logistic regression to determine which aspects of impulsivity discriminated between gamers above and below the clinical cut (5) for IGD. The predictor variables were social status, discount function, and the 2nd Order BIS-11 factors. The model was significant ($\chi^2 = 17.629$, $p = .003$). Attentional Impulsivity was the only reliable predictor of whether gamers were above or below the clinical cut ($OR = 1.123$, *95% CI* [1.025, 1.231], $p = .013$). Neither discount rates ($OR = 0.818$, *95% CI* [0.497, 1.346], $p = .429$), Motor ($OR = 1.055$, *95% CI*

Table 5
Regression coefficients for Cigarette Dependence Scale scores.

Predictor	Unstandardized coefficient	*se*	*t*	*p*
2nd Order factor model				
Age	0.032	0.028	1.125	.261
Log K	1.472	0.416	3.538	< .001
Attentional	−0.022	0.089	−0.247	.805
Motor	0.169	0.077	2.206	.028
Non-Planning	0.067	0.070	0.965	.335
Subjective Social Status	−0.427	0.189	−2.252	.025
Gender (male)	0.830	0.548	1.516	.130
1st Order factor model				
Age	0.035	0.028	1.238	.216
Log K	1.441	0.422	3.417	< .001
Attention	0.028	0.130	0.219	.827
Cognitive Instability	−0.072	0.178	−0.408	.683
Motor	0.286	0.090	3.166	.002
Perseverance	−0.219	0.173	−1.266	.206
Self-Control	0.082	0.104	0.785	.433
Cognitive Complexity	0.025	0.133	0.187	.852
Subjective Social Status	−0.486	0.190	−2.555	.011
Gender (male)	0.823	0.550	1.497	.135

Table 6
Regression coefficients for Problem Gambling Severity Index Scores.

Predictor	Unstandardized coefficient	*se*	*t*	*p*
2nd Order factor model				
Age	0.003	0.012	0.221	.825
Log K	0.270	0.180	1.503	.134
Attentional	0.032	0.038	0.846	.398
Motor	0.005	0.033	0.160	.873
Non-Planning	0.029	0.030	0.968	.333
Subjective Social Status	−0.131	0.082	−1.604	.109
Gender (male)	0.429	0.237	1.811	.071
1st Order factor model				
Age	0.004	0.012	0.352	.725
Log K	0.206	0.182	1.132	.258
Attention	−0.053	0.056	−0.943	.346
Cognitive instability	0.182	0.077	2.369	.018
Motor	0.029	0.039	0.753	.452
Perseverance	−0.150	0.075	−2.014	.045
Self-Control	0.059	0.045	1.309	.191
Cognitive Complexity	0.046	0.058	0.796	.427
Subjective Social Status	−0.156	0.082	−1.900	.058
Gender (male)	0.500	0.237	2.106	.036

Table 7
Regression coefficients for Internet Gaming Disorder scores.

Predictor	Unstandardized coefficient	*se*	*t*	*p*
2nd *Order factor model*				
Age	−0.041	0.009	−4.644	< .001
Log K	0.280	0.131	2.142	.033
Attentional	0.111	0.028	3.991	< .001
Motor	−0.001	0.024	−0.059	.953
Non-Planning	0.002	0.022	0.082	.934
Subjective Social Status	−0.148	0.059	−2.496	.013
Gender (male)	0.739	0.172	4.300	< .001
1st *Order factor model*				
Age	−0.039	0.009	−4.397	< .001
Log K	0.298	0.133	2.245	.025
Attention	0.095	0.041	2.320	.021
Cognitive Instability	0.135	0.056	2.419	.016
Motor	−0.004	0.028	−0.154	.878
Perseverance	−0.026	0.054	−0.486	.627
Self-Control	0.047	0.033	1.446	.149
Cognitive Complexity	−0.055	0.042	−1.301	.194
Subjective Social Status	−0.152	0.060	−2.535	.012
Gender (male)	0.752	0.173	4.348	< .001

[0.967, 1.151], $p = .228$), nor Non-Planning Impulsivity (*OR* = 1.030, *95% CI* [0.953, 1.113], $p = .456$), were reliable predictors of IGD cut-off.

Tables 8a and 8b summarize the results of all the 1st and 2nd Order linear regression models. Table 8c summarizes the results of all the 2nd Order binary logistic regression models.

3.3. Path analyses

We next conducted Path Analysis using Structural Equation Modelling on each of the addictive behaviour measures and the overall addictive behaviour scores. The results shown in Figs. 1–6 show that subjective social status was closely related to Attentional and Non-Planning Impulsiveness, and to delay discounting, but not to Motor Impulsivity. Subjective social status was not an independent or direct predictor of impulsive behaviours except for smoking status and internet gaming disorder. The effect on both was negative indicating that people with lower subjective social status were more likely to smoke, and people with higher IGD scores regarded themselves to be of lower social status. However, there was a reliable independent effect of social status on the overall addictive behaviour score, indicating that the lower the perceived social status the greater the engagement with different addictive behaviours. We suspect that the absence of a relationship between subjective social status and motor impulsivity suggests that the pathway between motor impulsivity and addition has a large heritable component. The statistical details of the path analyses are shown in Supplementary Tables 2–7.

4. Discussion

The pathways from personal circumstances to addictive behaviours are complex and idiosyncratic. Nonetheless it is a reasonable supposition that negative personal circumstances are broadly associated with negative choices. The study reported here shed some light on the psychological principles that might underpin this association. To examine this relationship, we administered diagnostic instruments of addictive behaviours to 500 participants based in the United Kingdom, along with a measure of subjective social status and two well-known measures of impulsivity. We conducted both regression and path analyses to determine whether social status is directly related to addictive behaviours, or acts indirectly via an effect on impulsivity.

Subjective social status was a reliable predictor of aspects of trait impulsivity and was negatively associated with discount rates. People who reported feeling lower in social status tended to have higher discount rates. This is an important finding because higher discount rates and impulsivity are risk factors for engaging with addictive behaviours and for transitioning from recreational use to addiction. Being relatively higher in motor impulsiveness predicted use of alcohol, drugs, tobacco and gaming. Males were more likely to engage in any addictive behaviours than females except smoking. Overall, motor impulsiveness predicted meeting the clinical threshold for alcohol and tobacco dependence. Attentional impulsiveness predicted meeting the clinical threshold for drug dependence, problem gambling, and internet gaming disorder. Discount rates predicted meeting the clinical cut for tobacco use and problem gambling. Perhaps the most compelling finding is that for the most part the effects of social status on individual addictive behaviours is indirect. Instead, we find that subjective social status impacts on impulsivity, which in turn is a risk factor for both engaging with addictive behaviours and transitioning from a recreational (lower risk) user to a problem (higher risk) user. This is an important finding for our understanding of the relationship between social status and impulsivity as an individual difference that can lead to significant consequences for the individual.

There is growing evidence that suggests that distribution of addictive behaviours across socioeconomic groups is related, in part, to the unequal distribution of impulsivity as an individual difference. A common assumption is that because individual differences tend to have a large heritable component that one would expect to be uniformly distributed across social groups. However, recent research suggests that in common

Table 8a
Summary of linear regressions with BIS-11 2nd Order factors.

	Addiction Score	AUDIT	DUDIT	CDS-5	PGSI	IGD
Age	*	*	*	–	*	*
Log K	*	–	–	*	–	*
Attentional	*	–	–	–	–	*
Motor	*	*	*	*	–	–
Non-Planning	–	*	*	–	–	–
Subjective Social Status	*	–	–	*	–	*
Gender (male)	*	*	*	–	–	*

Table 8b
Summary of linear regressions with BIS-11 1st Order factors.

	Addiction Score	AUDIT	DUDIT	CDS-5	PGSI	IGD
Age	*	*	*	–	–	*
Log K	*	–	–	*	–	*
Attention	*	–	–	–	–	*
Cognitive instability	–	–	–	–	*	*
Motor	*	*	–	*	–	–
Perseverance	–	–	–	–	*	–
Self-control	*	*	*	–	–	–
Cognitive complexity	–	–	–	–	–	–
Subjective social status	*	–	–	*	–	*
Gender (male)	*	*	*	–	*	*

Table 8c
Summary of binary regressions with BIS-11 2nd Order factors.

	AUDIT	DUDIT	CDS-5	PGSI	IGD
Log K	–	–	*	*	–
Attentional	–	*	–	*	*
Motor	*	–	*	–	–
Non-Planning	*	–	–	–	–
Subjective social status	–	–	–	–	–

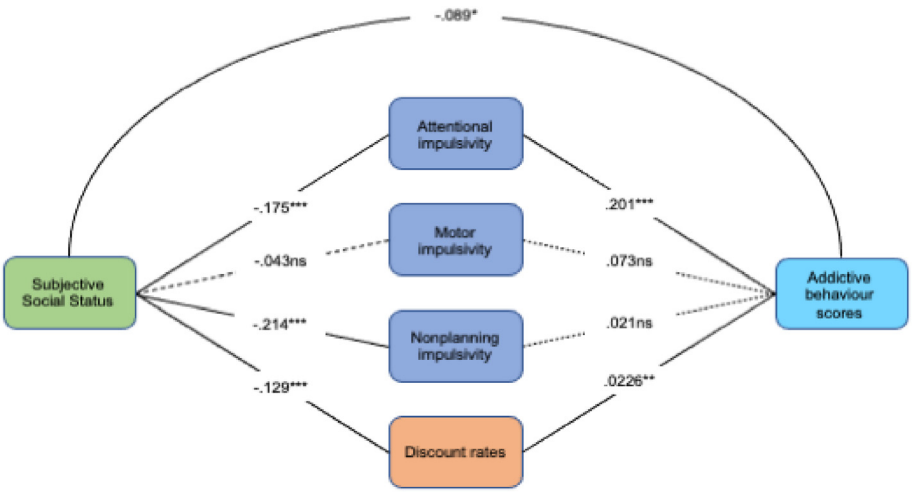

Fig. 1. Path analysis for the effect of subjective social status on 2nd Order BIS factors and Addictive Behaviour Scores.

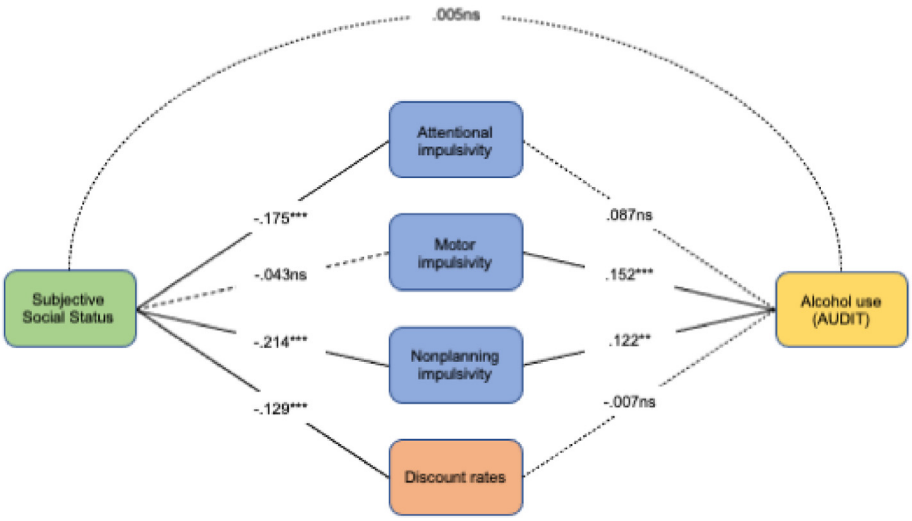

Fig. 2. Path analysis for the effect of subjective social status on 2nd Order BIS factors and AUDIT.

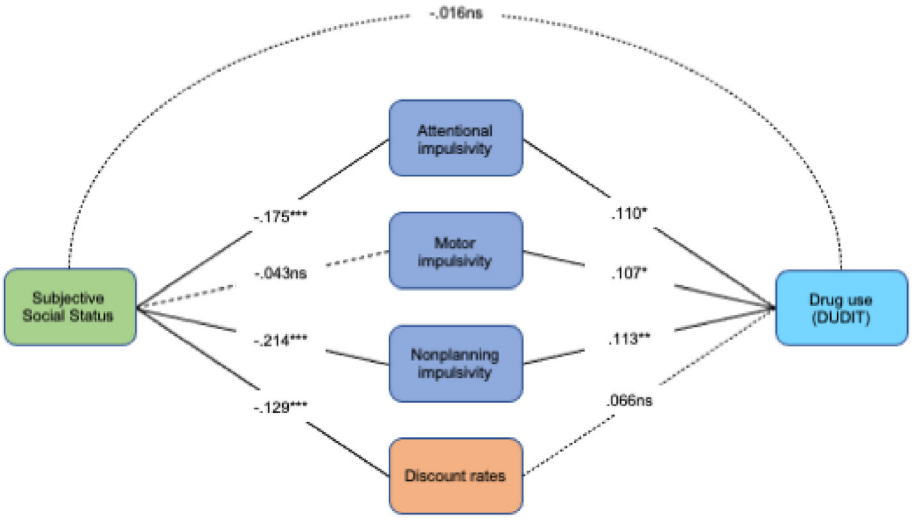

Fig. 3. Path analysis for the effect of subjective social status on 2nd Order BIS factors and DUDIT Scores.

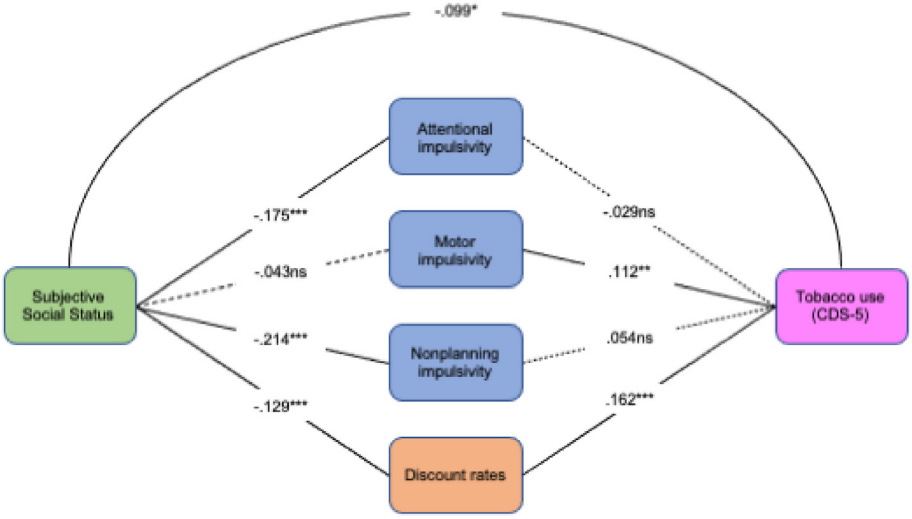

Fig. 4. Path analysis for the effect of subjective social status on 2nd Order BIS factors and CDS-5 Scores.

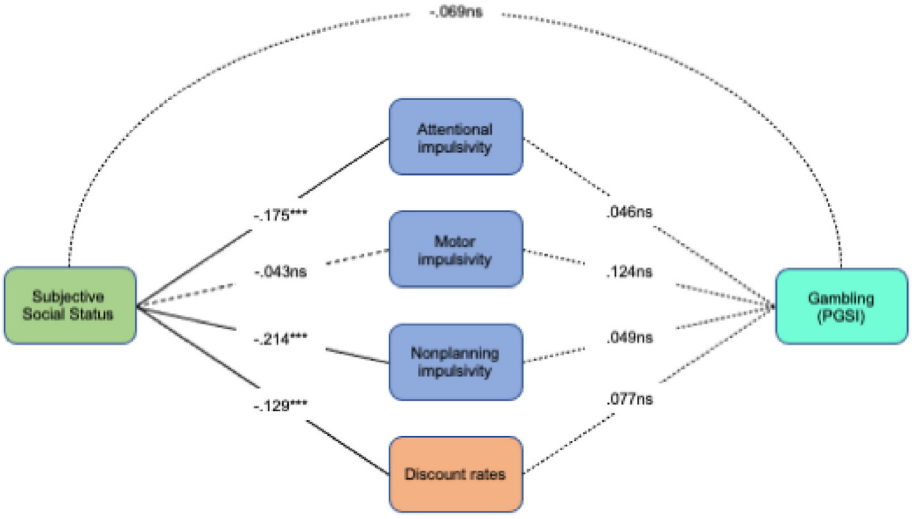

Fig. 5. Path analysis for the effect of subjective social status on 2nd Order BIS factors and PGSI Scores.

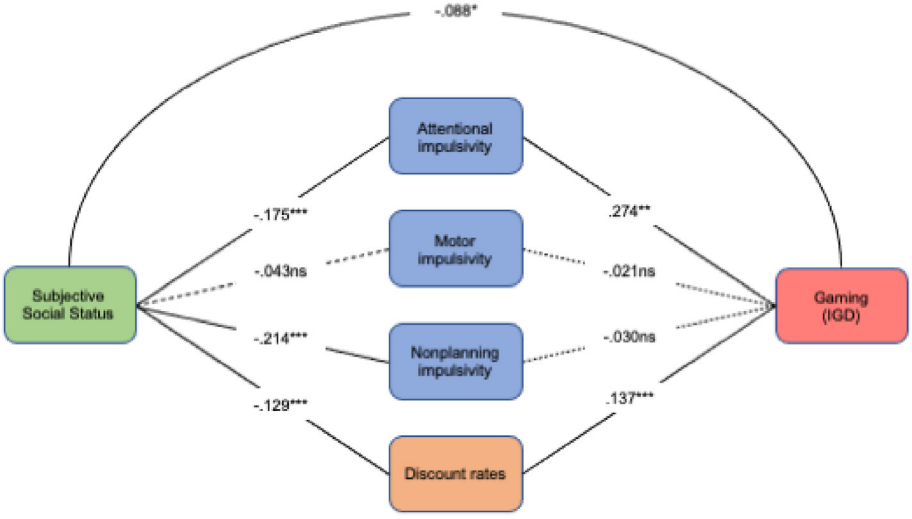

Fig. 6. Path analysis for the effect of subjective social status on 2nd Order BIS factors and IGD Scores.

with addictive behaviours, and other psychiatric disorders, that people who experience greater levels of deprivation tend to have higher levels of impulsivity, compared to people who experience the least amount of deprivation (Tunney, 2022; Tunney and James, 2022).

There are several potential mechanisms by which subjective social status could affect impulsivity. One possibility is that individuals with lower subjective social status may feel a greater sense of hopelessness or lack of control over their lives, which can lead to impulsive behaviour as a way of coping with these feelings (Kraus et al., 2009; Manstead, 2018). Additionally, lower subjective social status may be associated with increased stress and negative affect, which can also lead to impulsive behaviour (Sharpe et al., 2021). There is a well-established relationship between lower subjective social status and negative affect (Tan et al., 2020). One potential explanation for this relationship is that individuals with lower subjective social status may experience greater stress and exposure to adverse life events (Schneider, 2019), while income inequality lowers the self-perception of social status and, in turn, the overall well-being of individuals. In addition, social comparison processes may also play a role, as individuals who perceive themselves as having lower social status may experience feelings of inferiority and shame, which can contribute to negative affect (Wetherall et al., 2019). This sort of affect based model may or may not directly impact on impulsivity as a stable individual difference. It is unclear whether a person who experiences a period of hardship such as unemployment would become less impulsive after returning to a stable and relatively comfortable financial situation. There is compelling evidence however that subjective social status is related to income inequality. Larger gaps between rich and poor have significant effects on the prevalence of mental health (Dierckens et al., 2020; Nagata, 2020; Tibber et al., 2022). Our social status data (mean = 5.642) sampled in the United Kingdom do not compare particularly favourably with other countries: Präg et al. (2016) compared the relationship between subjective social status, health, wellbeing, income inequality, and overall GDP. The average subjective social status were highest in Denmark (6.5) and Germany (6.4), and lowest in China (4.3) and Bulgaria (4.2). They found a substantial positive corelations between per capita GDP and subjective social status ($r = .65$), and between wealth inequality and social status ($r = -0.55$).

An alternative, developmental model (Tunney, 2022), borrows from behavioural ecology and also the Thrifty Phenotype Hypothesis (Hales and Barker, 1992) which, although originally designed to explain type-2 diabetes, has been implicated in a wide range of health outcomes (Robertson et al., 2022). In short, a scarcity of resources during childhood programs the child's decision-making processes to expect a sparse economic environment. This is an adaptive mechanism that allows the developing child to efficiently process scarce resources during childhood. But if, as is likely in developed economies, after birth the infant encounters abundant resources, the adaptation becomes maladaptive and leads to overconsumption. The basic premise of this proposal is as follows: If a child experiences a scarcity or uncertainty in resources then they adapt their foraging behaviour. This adaptation becomes a stable individual difference that, as an adult, and in an abundant environment becomes maladaptive, leaving the individual vulnerable to addiction and other impulse control disorders.

Impulsivity is, of course a multi-faceted construct, and its appearance as a feature in diagnosis of one psychiatric disorder does not necessarily mean that the same aspect of impulsivity that is implicated in another (Caswell, Bond, Duka, & Morgan, 2015). This study adds to a growing body of research that suggests that the there is a casual relationship between socioeconomic status and psychiatric disorders, particularly those that involve poor decision-making, that is mediated by impulsivity. This relationship may begin in early childhood (Casey et al., 2011; R. Tunney, 2022) which suggests that economic and social deprivation experienced by children may ultimately be a key environmental driver of poor mental health in adults. We anticipate that early screening tools can be developed where individuals with low social status and high trait impulsivity are alerted to their increased risk of addiction, and that early intervention could reduce those risks. We also believe that policy makers should be aware that economic uncertainty and poverty, and in particular wealth inequality that affect subjective social status, can have profound and often unexpected consequences.

Author statement

Richard Tunney conducted the statistical analysis. Jodie Raybould and Richard Tunney co-wrote the manuscript. Jodie Raybould collected the data. The research forms part of Jodie Raybould's doctoral research.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.psycom.2023.100130.

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