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Joan Costa-Font
London School of Economics and Political Science and IZA

Mario Gyori
London School of Economics and Political Science

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IZA – Institute of Labor Economics

Schaumburg-Lippe-Straße 5–9
53113 Bonn, Germany

Phone: +49-228-3894-0
Email: publications@iza.org

www.iza.org

ABSTRACT

Can Unearned Income Make Us Fitter? Evidence from Lottery Wins

Although lower income is associated with overweight (and obesity), such an association is explained by a number of other confounding effects such as omitted variables (e.g., time preferences) explaining that income effect on overweight. We study the effect of unearned income shocks resulting from a lottery win (windfall income) on both overweight (alongside obesity and body mass index) distribution. We draw upon longitudinal data from the United Kingdom, a country where about half of a population plays the lottery. Our results suggest no evidence of contemporaneous effects of income on overweight, but a significant lagged effect. We find *a reduction in overweight 12 months after a lottery win. A 10,000-sterling win reduces overweight by 2-3 percentage points*. Furthermore, we document a nonlinear effect up to 36 months after the lottery win, suggesting that small wins increase overweight and large wins reduce it. The effect of a lottery win varies depending on an individual's working hours and educational attainment. A lottery win among low education individuals decreases the risk of overweight.

JEL Classification: I12, I18, J30

Keywords: obesity, overweight, income, windfall income, lottery wins, body mass index (BMI)

Corresponding author:
Joan Costa-Font
Department of Health Policy
London School of Economics and Political Science
Houghton Street WC2A 2AE
London
United Kingdom
E-mail: j.costa-font@lse.ac.uk

1. Introduction

Existing research has established that lower income is associated with a higher probability of overweight and obesity (Sallis et al., 2009). However, the effect of income on overweight and obesity is far from trivial and has been a matter of extensive discussion in the literature. Sobal and Stunkard (1989) reviewed the literature and found that whilst obesity is linked to income among women this is not the case among men. Preferences for not being overweight might well shift with an income change towards healthy options when their income changes.

A higher incomes affords individuals the resources to make healthier choices that otherwise would fall outside the feasible consumption bundle, and, effective access to private health care in the event of ill health (Cheng et al., 2018). Maintaining a healthy weight might be regarded as a luxury good, given that free time to invest on health is scare for many individuals, and the cost of some market inputs (e.g., fresh foods) to produce a healthy lifestyle. Previous studies show a limited consensus on the matter, and for the most part cannot separate income effects from other alternative influences.

Even when it is possible to disentangle both effects of income on an individual's probability to be overweight, the effect of income is far from straightforward, as it corelates with a number of unobservable that could stand behind the association between income and overweight, which might change the behavioural reference points (Caporale et al., 2009). Finally, changes in individual income might reflect their work effort and returns to human capital investment (Cutler and Lleras Muney, 2010, Kenkel 1991,).

To establish the effect of income shocks, one would need to examine the influence of windfall income that was truly orthogonal to an individual's health-related choices. This is the main goal of this paper. We sdocuments evidence of the effects of non-labor income resulting from a lottery win on individual's overweight. We use data from the United Kingdom, and more specifically the British Household Panel Study which collects individual level information on different sorts of income, including lottery wins, as well as information on weight and height.

So far attempts to study windfall income shocks on individuals' bodyweight have been limited. The causal effect of income on obesity and overweight is studied in Cawley *et al.* (2010). They draw upon data from the social security notch, namely a variation of identical retiree's income to examine the effects on weight. Strikingly, they find no effect on overweight and obesity. However, one question that prevails is whether the effect on retirees can be made extensive to the entire population. An alternative strategy to examining windfall income effects comes from examining the effect of lottery wins. Unearned income exerts effects on health behaviours insofar as they entail an unanticipated shift an individual's budget constraint without modifying the hours of work, nor cognitive effort nor the probability of receiving a bequest. The importance of looking at lottery wins rests in that the causal effect of income shocks might vary by the source of income shock, a reduction in social security income or an unexpected bequest can be anticipated.

Establishing the effect of exogenous changes in unearned income on individuals' weight encompasses understanding the different mechanisms associated with weight gain, including the specific effect on food consumption and diet. An extensive literature

examines the effect of income on different foods (Blundell and Pistaferri, 1994, Guo et al., 2000). One of the consequences of lottery wins is a slight reduction in an individual's working hours (Picchio et al., 2018), however most of the effect applies only to those who benefit from a sizeable win. Such effect on working hours can influence overweight on certain populations. We test whether the effect is driven by a reduction in individuals' working hours, so although they have a higher income, they might be working less which for blue collar workers could increase weight. Furthermore, we could look at heterogeneity by blue and white collar, and by hours of work, as well as test the effect on hours of work as a mechanism.

This paper contributes to the literature in several ways. First, it contributes to an existing literature that examines exogeneous income changes using policy induces changes in different forms of income (Cawley et al., 2010, Cawley and Price, 2011)). Most of this evidence does not find effect of income shocks on measures of overweight and obesity. Second, we contribute to the wider debate on the exogeneity of income effects on health (Smith, 1999), and some studies that use quasi-experimental evidence from Germany reunification find a very small effect on self-reported health and health satisfaction (Frijters *et al.*. 2005). Lindahl (2005) finds a positive effect of lottery wins on mental health but not on physical health. The reason behind the small effect might stem from the fact that the effect of income on health care will go the opposite way, namely that better health might increase the chances of getting a promotion and, hence affect individual's income (Costa-Font and Ljunge, 2018), or might simply be explained by the presence of common factors. Third, previous evidence does not find evidence or does not consider the influence of lagged effects of lottery wins, alongside potentially relevant heterogenous effects such as

differences on education and skill as well as working times. We show that although average effect confirms previous results, there is relevant heterogeneity in the effect of income on overweight to consider. Fourth, the paper examines additional evidence on the effects of lottery wins (Cesarini et al. 2016, Apouey and Clark, 2016, Cheng et al., 2018, Gardner and Oswald, 2007) on a new health outcome which has not been explored so far. Alternative strategy refers to the effect of income shocks coming from bequests does not find significant effects on health either (Meer *et al.*, 2003, Kim and Ruhm, 2012). However, income shocks from inheritances are less clean as they are affected by the death and intra-family distribution of income effects, and they are mainly anticipated.

The paper is organized as follows. The next section we summaries the related literature on lottery wins, and more specifically the evidence of income effects on overweight. Next, section three provides the data and empirical strategy. Section four reports the results and a final section concludes.

2. Income effects on health behaviours

2.1 Evidence form lottery wins and income shocks

The development datasets that include lottery wins have allowed for the proliferation of studies on income effects on a number of health and health related behaviors. Lindahl (2005) finds that a 10 percent income increase improves health by about 4–5 percent of a standard deviation. However, Apouey et al., 2015, who examine effects on physical health does not find evidence of an effect.

Using data from the British Household Panel Survey some studies find that large lottery wins (£1000 and £120,000), improve immediate and later psychological health. Two years after a lottery win, the average measured improvement in mental wellbeing is 1.4 GHQ points (Gardner and Oswald, 2007).

Other sources of evidence on income effects come from unanticipated changes in taxation. Some studies show that tax rebates had a large and positive impact on affect, which is explained by a reduction in feelings of stress and worry (Lachowska, 2017), but limited effect on health and subjective wellbeing with the exception of Kippersluis and Galama, (2013) which examine the effect of lottery wins and inheritances on lifestyles.

2.2 Income effects on overweight and obesity

The literature on casual effects of income changes on obesity is limited to handful set of contributions. Cawley et al. (2010) exploit a natural experiment linked to a social security notch, that gave rise to a variation in the income of otherwise identical retirees based on their year of birth in order to examine the effects on weight. They do not find any evidence for a causal relationship between income and weight. Other studies have focused on examining the effect of lottery wins on child weight in Sweden. Cesarini et al. (2016) found that although lottery wins do not exert major changes in child outcomes, they find that wealth reduced the risk of obesity.

Consistent with this evidence, most studies did not find any long-term effect of financial incentives to reduce weight. Cawley and Price (2011) find that worksite programs

offering modest cash rewards for specific reductions in weight (e.g., $30 per quarter for a 10% weight reduction) were not successful. Moreover, there is evidence that the effectiveness of incentives changes over time. Finkelstein et al. (2007) present evidence of modest weight loss at three months but no difference after six months. However, some of these studies do not consider the lagged effects of lottery wins, alongside potentially relevant heterogenous effects across individuals based on their skills (previous human capital investment) and working times. Below we examine evidence exploiting such effects.

3. Data and Empirical Strategy

3.1 The Data

This study draws on longitudinal data from five consecutive waves of the British Household Panel Survey (BHPS) collected between 2002 and 2007 where we can identify weight and height data alongside windfall income. However, BHPS is a nationally representative sample of more than 5000 British households, containing over 10,000 adult individuals, conducted between September and Christmas of each year from 1991 to 2009. This dataset has been used by number of published studies to study overweight ad obesity (Oswald and Powdthavee, 2007; Blanchlower et al, 2009).

Respondents are interviewed in successive waves; households who move to a new residence are interviewed at their new location; if an individual split off from the original household, all adult members of their new household are also interviewed. Children are interviewed once aged 16 years. The sample has remained broadly representative of the British population since its inception.

Our sample of interest are all individuals who reported a financial windfall, either lottery wins or, alternatively, a win on the soccer pools, in at least one survey wave alongside weight and height data. This restricts the number of waves we can employ. The actual questions in the survey are as follows: 1.) “Have you received any lump sum payments from wins on football pools, national lottery, or other form of gambling?"; 2.) “About how much in total did you receive?". In Britain, the ratio of lottery players to those who play the football pools is approximately 50 to 1, hence winnings would overwhelmingly be represented by lottery wins (Cheng et al., 2016).

To allow for lags, the weight and weight data includes the period from 2002 to 2007. Hence, we observe whether an individual has won the lottery within this 3-year period but use the longer time frame of lottery wins to capture changes in weight and height from 2-years before the win to 2-years after. As it has been established in studies that examine evidence from lottery wins, the lottery prize variable is skewed (Cesarini et al., 2016). One way to check whether the inference based on analytical standard errors can be affected by a finite sample bias one of the procedures that can be run is to estimate randomly permuted lottery wins obtained from resampling without replacement.

Although winning the lottery is a random event, both participation and the amount spent on lottery ticket purchases is not. Hence, one strategy is to control for ticket expenditure, another is to examine only the estimates among the sample of participants and examine next wins. However, once such effects are accounted for, both the extensive and intensive margin of wins should be orthogonal to any other individual-level characteristics. One potential concern could be that more frequent players also win the lottery more frequently. In order to account for a potential bias here, we also include

individual-level fixed effects that allow us to control for possible unobservable individual characteristics, as long as they are time-invariant. Our identification strategy relies on drawing upon differences in lottery owns conditional on individuals fixed effects, time effects and other individual characteristics. The variation of lottery wins is regarded as exogenous. However, we run a few robustness checks such as whether lottery expenditures and individual characteristics explain lottery wins. In the Tables below we show mean labour earning, lottery wins, body mass index and employment among lottery participants, winners of small and large prices. We identify some variation in the data that is unrelated to prize winning.

Table 1 repots the descriptive statistics of the main sample. Table 1 reports that average BMI is 26, which is an average of overweight, and overall, 57% of the population is overweight and 19% obese for the sample years. 54% of the respondents are female and 73% own a property. 64% are married. The average income is 26,840£ and the average lottery win was 216£.

[Insert Table 1 about here]

3.2 Empirical Strategy

Our aim in this paper to examine the impact of income shocks on the extensive margin of an individual's overweight and the distribution of an individual's BMI controlling for individual fixed effects, time specific variation and potential covariates that are independently driving changes in overweight. We focus on the effect of any lottery wins as well as the amount of the win, alongside the presence of large lottery wins, namely wins

exceeding the value of 500 sterling. Finally, we examine both contemporaneous effects as well as the effects after the lottery won, that is, we consider a lagged lottery win period.

We expect a heterogeneous effect of a lottery win only for individuals who are and are not obese at baseline. Health investments might be more intense for people who prioritized health at baseline. Our focus is on individuals who participate in the lottery, which are affected by lottery wins in different ways. If health investments are expensive, a lottery win might provide the resources to further them. On the other hand, income shocks might change individuals' preferences towards a different consumption bundle out of healthy investments and into luxuries that might render no effect from income shocks.

Let us denote L_{it} the lottery wins of an individual/household i at time t, and let y_{it} denote the overweight of an individual measured in both the extensive margin and the intensive margin as BMI. When we examine lagged effects, we consider y_{it+T} where T takes the value of 0,1,2,3 etc. Hence, a lottery win might take some time to change an individual's overweight. Our main equation of interest is:

$$y_{it+T} = L_{it}\theta_T + X_{it}\delta_T + \delta_i + \mu_t + \varepsilon_{it+T} \qquad (1)$$

Where X_{it} refers to a set of controls measures (age, education attainment, household size, household income, citizenship) for overweight of at time t, δ_T measures the coefficients of such controls, θ_T refers to the effect of a lottery win whether contemporaneous (T=0) or with a lag and ε_{it+T} is the error term. We include in our specification time μ_t and individual fixed effects δ_i to control for individual specific heterogeneity. If the effect of a lottery win

is random, and hence uncorrelated with the error term, one would expect that the estimates of θ_T are unbiased.

4. Results

We begin by examining how measures of overweight and BMI change after a lottery win. Table 2 illustrates that an additional British pound of lottery wins, on average does not have a statistically significant impact on BMI. This is irrespective of the specification of the functional form and the inclusion of lags (see columns 1-6). However, when considering a binary treatment variable, indicating whether there was any lottery win in the last 12 months, our regressions suggest that the occurrence of a lottery win increases BMI in the year in which the lottery win occurs by 0.246. However, large lottery wins in the previous year ($>$ £500) lead to a decrease in BMI by on average 0.414. These results indicate that there is a small and nonlinear effect of a lagged lottery win on BMI.

[Insert Table 2 about here]

Next, we examine the effect of a lottery win on obesity in Table 3. Our estimates suggest that past (12 month) lottery wins can reduce overweight at present. An additional £1000 pound of lottery income in the *previous year* leads to a 2*.3 percentage point decrease* in the risk of being overweight, an additional £1000 pound in the year before that would decline by an *extra 5.76 percentage points*. This means that a £1000 pounds win in the previous two years, reduces the cumulative average risk of being overweight at present by 5 percentage points. Nevertheless, our regression estimates with dummy variables (column

7) show some imprecise evidence that the mere occurrence of a lottery wins in either the present year, or 2 years ago would increase the risk of being overweight by approximately 2-3 percentage points, suggesting that the size of the income shock is decisive for the eventual overweight outcome. Lastly, obesity Table A1 in the appendix presents the same evidence for obesity, and results, consistently with prior evidence suggesting that overweight is systematically unaffected by income shocks such as lottery wins.

[Insert Table 3 about here]

5. Heterogeneity

5. 1 Effects across the BMI distribution

Given that average estimates might hide significant heterogeneous effects, and in order to gain further insights on potential effects across individuals, we proceed to estimate a quantile regression that evaluates the effect of a lottery win across the BMI distribution. More specifically, Table 4 reports the results resulting when a binary treatment variable is employed (any lottery win / any lottery wins over £500), and Table 5 reports the same results for a continuous treatment variable (lottery wins in £ over the last 12 months), which includes a quadratic term. Table 6 also presents the regression results with a continuous treatment variable, but considering the cumulative lottery wins over the previous 36 months.

[Insert Table 4 and 4 about here]

Table 4 reports the effect of any lottery win over 500 and finds that the impact of a lottery win is most pronounced when evaluated both at the four deciles of the BMI distribution alongside the ninth decile. Moreover, it should be noted that the effect size in the highest BMI decile is more than twice as high than for the first-fourth decile. *This implies that the occurrence of a lottery win may exacerbate overweight and obesity of those who are already affected by these conditions.* When we turn with the continuous treatment variables in Table 5, displays evidence of heterogeneous effects of a lottery win within 12 months before the win. Here, we predominantly find statistically significant and positive effects on BMI for those in the lowest BMI decile if we consider a lottery win in the last 12 months.

In contrast, Table 6 suggests a positive and statistically significant effect among the highest decile, if we consider wins over the last 36 months. For those in the highest BMI decile, an additional £1000 pound of windfall income in the last 36 months leads to a 0.138 increase in BMI. When we consider the cumulative effects, these results suggest that an additional £10,000 of windfall income over three years (£3,333 per year) would lead to a further increase in BMI by 1.38 points.

[Insert Table 6 about here]

5.2 Gender Effects

Table 7 provides evidence on heterogeneous treatment effects depending on gender. The interaction terms between lottery win and female gender are not statistically significant in

the linear regression models. However, there is suggestive evidence of a quadratic relationship between the lagged amount of a lottery win, and a women's likelihood to become overweight. Small lottery wins tend to increase women's likelihood of becoming overweight in the subsequent year, as compared to men, while larger wins lower the risk of overweight, following an inverted U-shape.

This is also confirmed by an analysis on the subsample of women presented in tables A2 and A3 of the appendix. In addition, the subsample analysis suggests that small lottery wins (under £500) lead to a contemporaneous increase in overweight at the extensive margin, while larger lottery wins (over £500) lead to contemporaneous decrease in obesity risk. This becomes evident in column 7 of table A3, where the likelihood of being overweight is regressed on binary variables relating to small vs. large lottery wins.

Overall, the heterogeneity analysis suggests that there are non-linear effects between lottery wins and overweight for women, which are not present (or not as pronounced) for men. Small lottery wins tend to increase the risk of overweight for women, while larger wins tend to reduce it.

5. 3 Effects among working times and education groups

Finally, Tables 6 and 7 provide further evidence on the presence of heterogeneous treatment effects across population groups based on working times (long working hours) and their education (low education). One would expect individuals who face long working times might not be able to change their lifestyles if their working conditions are demanding in terms of time (time poor). Similarly, lower education individuals might exhibit a

different reaction to extra income mainly because it provides for the windfall income to afford access to healthy inputs. Table 8 shows the heterogeneous effect of a lottery win on both BMI and overweight among individuals that face long working hours. We find that lottery wins on average lead to small increases in overweight among individuals who face long working hours (more than 35 hours per week). This is consistent with the differential effect of income on overweight among individual that are time constrained (time poor).

[Insert Table 8 about here]

Table 9 illustrates important differences in the impact of a lottery win on an individual's educational achievement on both BMI and overweight. We find that *for individuals with low educational achievement (primary education or less), a lottery win leads to an average decrease in overweight,* though the effect is nonlinear when BMI is examined. The effect size on overweight indicated that a windfall of £1000 among low education individuals would reduce overweight by 4.5-5 percentage points (pp).

[Insert Table 9 about here]

6. Conclusion

We study the effect of an unearned income on overweight and obesity drawing from unique longitudinal data from lottery wins in the UK. Our analysis suggests that the relationship between income and nutritional outcomes is complex and depends on a number of factors. First, the occurrence of a positive income shock may increase BMI in the short run.

Secondly, larger wins in the past have a protective effect against overweight at present. Third, apart from size and timing of the income shock, one's original position on the weight distribution scale also seems to matter, with those at the lower and upper end of the BMI distribution being particularly prone to BMI increases in response to an income shock.

Our results suggest no effect of a lottery win on obesity either irrespectively of the sample example. Furthermore, we find no evidence of contemporaneous effects of a lottery win on overweight. *Instead, our estimates suggest only a potential reduction in overweight 12 months after a lottery win. Our estimates suggest that a £10,000 win reduces overweight by 2-3 percentage points (pp)*. When we examine the effects across of the BMI distribution, we find that a *lottery win may exacerbate overweight and obesity of those who already are affected by these conditions.*

We document a non-linear effect up to 36 months after the lottery win on overweight, as well as heterogeneous effects of a lottery wins based on the working time schedule, and education attainment. Whilst on average lottery win leads to a small increase in overweight among individuals with long working hours, it significantly reduces overweight among those with low education. We estimate that a windfall wins of £1000 among low education individuals would reduce overweight in 4.5-5pp.

This evidence altogether consolidates the notion that exogenous income shocks take some time to exert an influence on overweight and are heterogenous across individuals. When one examines the effect over the time of the lottery win, we document a non-negligible

reduction in overweight. We document no reduction is found among individuals subject to long working times and, a reduction in overweight among individuals with lower education. Hence, this evidence indicates that generalized monetary incentives are unlikely to exert a difference among individuals' overweight. This result is consistent with previous evidence which documents a limited effect of income shocks on physical and mental health, as well as evidence of limited effects of other sources of income shocks on obesity and overweight. However, we find that there is scope to using monetary incentives among specific groups (low education individuals) who seem to exhibit a different response to a windfall income change.

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Tables and Figures

Table 1. Descriptive statistics of the main dependent and independent variables

	Number observations	Mean	standard deviation
BMI	22,646	26.35	4.95
Overweight	22,646	0.57	0.50
Obesity	22,646	0.19	0.39
Female	198,633	0.54	0.50
Age	200,629	45.55	18.67
Own home	196,786	0.73	0.44
Married	200,675	0.64	0.48
Education categories	190,708	3.28	1.78
Net household income (£)	175,483	26840.58	20893.86
Lottery win (£)	16,592	216.62	2830.17

Table 2: Estimates on the impact of lottery wins on BMI (fixed effect regressions)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	Dependent variable: BMI						
Lottery win last 12 months in £	$4.94*10^{-4}$	0.00015	$5.48*10^{-4}$	0.00018	$6.13*10^{-4}$	0.00018	
	($4.38*10^{-4}$)	(0.00014)	($5.1*10^{-4}$)	(0.00015)	($6.52*10^{-4}$)	(0.0002)	
(Lottery win last 12 months in £)^2		$-9.31*10^{-8}$		$-1.05*10^{-7}$		$-1.06*10^{-7}$	
		($8.92*10^{-8}$)		($9.48*10^{8}$)		($1.54*10^{-7}$)	
Lag (Lottery win last 12 months in £)			$-1.03*10^{-4}$	$1.40*10^{-4}$	$-8.45*10^{-5}$	$2.55*10^{-4}$	
			($2.00*10^{-4}$)	(0.000121)	(2.20e-05)	(0.000126)	
Lag (Lottery win last 12 months in £)^2				$-1.01*10^{8}$		$-1.39*10^{-8}$	
				($4.95*10^{-8}$)		($5.07*10^{-8}$)	
Lag2 (Lottery win last 12 months in £)					$2.21*10^{-4}$)	$1.61*10^{4}$	
					($6.37*10^{-4}$)	(0.000192)	
Lag2 (Lottery win last 12 months in £)^2						$-8.16*10^{-7}$	
						($1.47*10^{-7}$)	
Any lottery win last 12 months (dummy)							0.246**
							(0.119)
Any lottery win over £500 last 12 months (dummy)							0.0255
							(0.355)
Lag (Any lottery win last 12 months - dummy)							0.0387
							(0.0984)
Lag (Any lottery win over £500 last 12 months - dummy)							-0.414*
							(0.235)
Lag 2 (Any lottery win last 12 months - dummy)							0.166
							(0.111)
Lag 2 (Any lottery win over £500 last 12 months - dummy)							0.0144
							(0.267)
Controls	x	x	x	x	x	x	x

Time trend	x	x	x	x	x	x	x
Individual Fixed Effects	x	x	x	x	x	x	x
Observations	7,759	7,759	7,550	7,550	7,333	7,333	7,333
R-squared	0.046	0.046	0.046	0.047	0.040	0.040	0.043
Number of individuals	5,001	5,001	4,886	4,886	4,730	4,730	4,730

Note: Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. Sample is restricted to individuals who reported at least one lottery win over the 16-year survey period. All regressions include controls for age, age squared, log household income, binary variables on whether the person is married, and whether they are a homeowner, 7 dummy variables for educational achievement (following the ISCED categories: primary, lower secondary, upper secondary, post-secondary/non-tertiary, first degree tertiary, second degree tertiary; no formal education being the reference category), 9 dummy variables for employment status (in paid employment, unemployed, retired, maternity leave, family care, full-time student, long-term sick/disabled, government training scheme; self-employed being the reference category), as well as a linear time trend.

Table 3: Estimates of the impact of lottery wins on overweight (Fixed Effect Regressions)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	Dependent variable: overweight						
Lottery win last 12 months in £	$-4.72*10^{-5}$	$2.60*10^{-4}$	$-3.88*10^{-4}$	$2.41*10^{-4}$	$2.63*10^{-4}$	$2.04*10^{-4}$	
	($2.20*10^{-4}$)	($2.41*10^{-4}$)	($2.44*10^{-4}$)	($2.67*10^{-4}$)	($1.66*10^{-4}$)	($3.42*10^{-4}$)	
(Lottery win last 12 months in £)^2		$-2.71*10^{-8}$		$-2.34*10^{-8}$		1.41e-09	
		($2.35*10^{-8}$)		($2.71*10^{-8}$)		($2.97*10^{-8}$)	
Lag (Lottery win last 12 months in £)			$-2.35*10^{-4}$**	$-1.19*10^{-5}$	$-3.04*10^{-4}$***	$-1.25*10^{-4}$	
			($9.75*10^{-5}$)	($2.24*10^{-4}$)	($6.14*10^{-5}$)	($1.83*10^{-4}$)	
Lag (Lottery win last 12 months in £)^2				-1.05e-09		-9.20e-10	
				($8.05*10^{-9}$)		($6.69*10^{-9}$)	

Lag2 (Lottery win last 12 months in £)					$5.76*10^{-4}$***	$1.16*10^{-4}$	
					($1.96*10^{-4}$)	($4.49*10^{-4}$)	
Lag2 (Lottery win last 12 months in £)^2						$4.62*10^{-8}$	
						($3.64*10^{-8}$)	
Any lottery win last 12 months (dummy)							0.0275*
							(0.0152)
Any lottery win over £500 last 12 months (dummy)							-0.0183
							(0.0492)
Lag (Any lottery win last 12 months - dummy)							-0.0126
							(0.0120)
Lag (Any lottery win over £500 last 12 months - dummy)							-0.0518
							(0.0443)
Lag 2 (Any lottery win last 12 months - dummy)							0.0225*
							(0.0137)
Lag 2 (Any lottery win over £500 last 12 months - dummy)							0.0761
							(0.0534)
Controls	x	x	x	x	x	x	x
Time trend	x	x	x	x	x	x	x
Individual Fixed Effects	x	x	x	x	x	x	x
Observations	7,759	7,759	7,550	7,550	7,333	7,333	7,333
R-squared	0.019	0.019	0.021	0.022	0.025	0.026	0.022
Number of individuals	5,001	5,001	4,886	4,886	4,730	4,730	4,730

Note: Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. Sample is restricted to individuals who reported at least one lottery win over the 16-year survey period. All regressions include controls for age, age squared, log household income, binary variables on whether the person is married, and whether they are a homeowner, 7 dummy variables for educational achievement (following the ISCED categories: primary, lower secondary, upper secondary, post-secondary/non-tertiary, first degree tertiary, second degree tertiary; no formal education being the reference category), 9 dummy variables for employment status (in paid employment, unemployed, retired, maternity leave, family care, full-time student, long-term sick/disabled, government training scheme; self-employed being the reference category), as well as a linear time trend.

Table 4: Estimates on the impact of lottery wins (binary) on BMI - Quantile regression results

	Dependent variable: BMI								
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Quantile	*0.1*	*0.2*	*0.3*	*0.4*	*0.5*	*0.6*	*0.7*	*0.8*	*0.9*
Any lottery win last 12 months (dummy)	0.321***	0.280**	0.278**	0.278**	0.219	0.283*	0.156	0.287	0.639**
	(0.0956)	(0.113)	(0.112)	(0.130)	(0.140)	(0.146)	(0.156)	(0.21)	(0.288)
Any lottery win over £500 last 12 months (dummy)	-0.424	-0.531	-0.268	-0.166	0.00511	-0.194	-0.0182	0.138	-0.0658
	(0.553)	(0.342)	(0.640)	(0.474)	(0.381)	(0.505)	(0.507)	(0.53)	(1.162)
Controls	x	x	x	x	x	x	x	x	x
Time trend	x	x	x	x	x	x	x	x	x
Observations	7,759	7,759	7,759	7,759	7,759	7,759	7,759	7,759	7,759

*Note: Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. Sample is restricted to individuals who reported at least one lottery win over the 16-year survey period. All regressions include controls for age, age squared, log household income, binary variables on whether the person is married, and wether they are a homeowner, 7 dummy variables for educational achievement (following the ISCED categories: primary, lower secondary, upper secondary, post-secondary/non-tertiary, first degree tertiary, second degree tertiary; no formal education being the reference category), 9 dummy variables for employment status (in paid employment, unemployed, retired, maternity leave, family care, full-time student, long-term sick/disabled, government training scheme; self-employed being the reference category), as well as a linear time trend.*

Table 5: Estimates on the impact of lottery wins (£) in the last 12 months on BMI - Quantile regression results

	Dependent variable: BMI								
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Quantile	*0.1*	*0.2*	*0.3*	*0.4*	*0.5*	*0.6*	*0.7*	*0.8*	*0.9*
Lottery win last 12 months in £	0.000259***	$1.80*10^{-4}$	0.000235	0.000407*	0.000337	0.000240	$1.22*10^{-4}$	$-5.65*10^{-4}$	0.000124
	(6.99e-05)	(0.000493)	(0.000348)	(0.000228)	(0.000273)	(0.000414)	(0.000313)	(0.000431)	(0.000611)
(Lottery win last 12 months in £)^2	$-2.35*10^{-7}$***	$-1.30*10^{-7}$	$-3.51*10^{-7}$	$-4.85*10^{-7}$***	$-5.04*10^{-7}$*	$-5.01*10^{-7}$	$-1.07*10^{-7}$	$-1.18*10^{-7}$	$-2.95*10^{-7}$
	(6.74e-09)	(7.73e-08)	(2.43e-08)	(1.57e-08)	(2.89e-08)	(7.70e-08)	(3.12e-08)	(4.39e-08)	(6.08e-08)
Controls	x	x	x	x	x	x	x	x	x
Time trend	x	x	x	x	x	x	x	x	x
Observations	7,759	7,759	7,759	7,759	7,759	7,759	7,759	7,759	7,759

*Note: Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. Sample is restricted to individuals who reported at least one lottery win over the 16-year survey period. All regressions include controls for age, age squared, log household income, binary variables on whether the person is married, and wether they are a homeowner, 7 dummy variables for educational achievement (following the ISCED categories: primary, lower secondary, upper secondary, post-secondary/non-tertiary, first degree tertiary, second degree tertiary; no formal education being the reference category), 9 dummy variables for employment status (in paid employment, unemployed, retired, maternity leave, family care, full-time student, long-term sick/disabled, government training scheme; self-employed being the reference category), as well as a linear time trend.*

Table 6: Estimates on the impact of lottery wins (£) in the last 36 months on BMI - Quantile regression results

	Dependent variable: BMI								
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Quantile	*0.1*	*0.2*	*0.3*	*0.4*	*0.5*	*0.6*	*0.7*	*0.8*	*0.9*
Lottery win last 36 months in £	$2.31*10^{-5}$	$-6.03*10^{-4}$	$-2.30*10^{-5}$	$-9.45*10^{-5}$	$-3.07*10^{-4}$	$-5.53*10^{-4}$	$-6.56*10^{-4}$	$5.24*10^{-4}$	0.00014***
	($8.52*10^{-5}$)	(0.00369)	($7.52*10^{-5}$)	(0.000678)	($7.80*10^{-5}$)	($9.58*10^{-5}$)	($5.59*10^{-5}$)	(0.00021)	($1.82*10^{-4}$)
(Lottery win last 36 months in £)^2	$-5.8*910^{-10}$	$3.13*10^{-9}$	0	$-1.38*10^{-9}$	-0	$7.59*10^{-9}$	$3.11*10^{-9}$	$1.25*10^{-9}$	$-1.07*10^{-9}$***
	(5.83e-10)	($3.0*10^{-6}$)	($8.*10^{-9}$)	($1.90*10^{-7}$)	($5.34*10^{-9}$)	($2.79*10^{-8}$)	($6.26*10^{-9}$)	($1.65*10^{-8}$)	($1.49*10^{-9}$)
Controls	x	x	x	x	x	x	x	x	x
Time trend	x	x	x	x	x	x	x	x	x
Observations	7,333	7,333	7,333	7,333	7,333	7,333	7,333	7,333	7,333

*Note: Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. Sample is restricted to individuals who reported at least one lottery win over the 16-year survey period. All regressions include controls for age, age squared, log household income, binary variables on whether the person is married, and wether they are a homeowner, 7 dummy variables for educational achievement (following the ISCED categories: primary, lower secondary, upper secondary, post-secondary/non-tertiary, first degree tertiary, second degree tertiary; no formal education being the reference category), 9 dummy variables for employment status (in paid employment, unemployed, retired, maternity leave, family care, full-time student, long-term sick/disabled, government training scheme; self-employed being the reference category), as well as a linear time trend.*

Table 7: Heterogeneous treatment effects depending on gender

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
VARIABLES	BMI				overweight			
Lottery win	$5.92*10^{-4}$	0.000217	$6.04*10^{-4}$	0.000255	$-4.34*10^{-5}$	$3.89*10^{-4}$	$-3.88*10^{-5}$	$4.08*10^{-4}$*
	($4.80*10^{-4}$)	(0.000158)	(4.70e-05)	(0.000156)	($2.67*10^{-4}$)	($2.48*10^{-4}$)	($2.63*10^{-4}$)	(2.41e-05)
Win * Female	$-5.19*10^{-4}$	-0.000284	$-9.76*10^{-4}$	-0.000418	$-1.97*10^{-5}$	$-7.14*10^{-4}$	$-2.35*10^{-5}$	$-8.62*10^{-4}$
	(0.000127)	(0.000462)	(0.000365)	(0.00134)	($3.55*10^{-4}$)	($8.56*10^{-4}$)	($7.44*10^{-4}$)	(0.000139)
Lottery win ^2		$-1.29*10^{-7}$		$-1.54*10^{-7}$		$-3.51*10^{-8}$		$-3.72*10^{-8}$
		($9.70*10^{-8}$)		($9.52*10^{-7}$)		($2.14*10^{-8}$)		($2.34*10^{-8}$)
Lottery win ^2 * Female		$2.31*10^{-7}$		$7.47*10^{-7}$		$7.11*10^{-8}$		$2.56*10^{-7}$
		($4.49*10^{-7}$)		(6.36e-07)		($8.39*10^{-8}$)		($7.46*10^{-7}$)
Lag (lottery win)			$4.20*10^{-4}$	0.000128			$-1.67*10^{-4}$	$-4.45*10^{-4}$
			($4.96*10^{-4}$)	(0.000219)			($1.74*10^{-4}$)	(3.59e-05)
Lag (lottery win) * Female			$-7.94*10^{-4}$	-0.000336			$-1.07*10^{-4}$	$6.71*10^{-4}$*
			($5.64*10^{-4}$)	(0.000271)			($1.92*10^{-4}$)	($3.84*10^{-4}$)
Lag (lottery win ^2)				$-4.57*10^{-8}$				$2.34*10^{-8}$
				($1.28*10^{-7}$)				($2.00*10^{-8}$)
Lag (lottery win ^2) * Female				$1.17*10^{-7}$				$-4.40*10^{-8}$**
				($1.41*10^{-7}$)				($2.07*10^{-8}$)
Individual-level controls	x	x	x	x	x	x	x	x
Individual-level fixed effects	x	x	x	x	x	x	x	x
Time trend	x	x	x	x	x	x	x	x
Observations	7,759	7,759	7,550	7,550	7,759	7,759	7,550	7,550
R-squared	0.046	0.046	0.047	0.047	0.019	0.020	0.021	0.023

*Note: Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. Sample is restricted to individuals who reported at least one lottery win over the 16-year survey period. All regressions include controls for age, age squared, log household income, binary variables on whether the person is married, and homeownership, 9 dummy variables for employment status (in paid employment, unemployed, retired, maternity leave, family care, full-time student, long-term sick/disabled, government training scheme; self-employed being the reference category), as well as a linear time trend.*

Table 8: Heterogeneous treatment effects for individuals with long working hours (>35 hours per week)

	(1)	(2)	(3)	(4)	(5)	(6)
VARIABLES		BMI			Overweight	
Lottery win	$7.49*10^{-4}$	0.000327	$4.05*10^{-4}$	$-5.26*10^{-5}$	$-4.60*10^{-4}$	$-4.84*10^{-5}$
	($7.32*10^{-4}$)	(0.000362)	(5.07e-05)	($1.58*10^{-4}$)	($7.62*10^{-4}$)	($1.59*10^{-4}$)
Win * long working hours	$4.04*10^{-4}$	$-6.32*10^{-4}$	0.000282*	6.39e-5***	4.13e-05	7.58e-5**
	(0.000114)	(0.000434)	(0.000162)	($2.40*10^{-4}$)	($7.83*10^{-4}$)	($3.19*10^{-4}$)
Lottery win ^2		$-3.13*10^{-7}$			$5.01*10^{-8}$	
		($3.73*10^{-7}$)			($7.76*10^{-8}$)	
Lottery win ^2 * long working hours		$1.47*10^{-7}$			$2.11*10^{-8}$	
		($4.18*10^{-7}$)			($7.85*10^{-8}$)	
L.win			-0.00015**			$-1.79*10^{-4}$
			($6.59*10^{-4}$)			($1.71*10^{-4}$)
L.win * long working hours			0.000450**			$3.34*10^{-4}$
			(0.000213)			($4.08*10^{-4}$)
Individual-level controls	x	x	x	x	x	x
Individual-level fixed effects	x	x	x	x	x	x
Time trend	x	x	x	x	x	x
Observations	3,034	2,954	2,954	3,034	2,954	2,954
R-squared	0.050	0.050	0.049	0.027	0.029	0.025

*Note: Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. Sample is restricted to individuals who reported at least one lottery win over the 16-year survey period. All regressions include controls for age, age squared, log household income, binary variables on whether the person is married, and wether they are a homeowner, 7 dummy variables for educational achievement (following the ISCED categories: primary, lower*

secondary, upper secondary, post-secondary/non-tertiary, first degree tertiary, second degree tertiary; no formal education being the reference category), 9 dummy variables for employment status (in paid employment, unemployed, retired, maternity leave, family care, full-time student, long-term sick/disabled, government training scheme; self-employed being the reference category), as well as a linear time trend.

Table 9: Heterogeneous treatment effects for individuals with low educational attainment (primary schooling or lower)

	(1)	(2)	(3)	(4)	(5)	(6)
VARIABLES		BMI			Overweight	
Lottery win	$4.94*10^{-4}$	0.000155	$5.48*10^{-4}$	$-4.71*10^{-5}$	$2.60*10^{-4}$	$-3.88*10^{-5}$
	($4.3*10^{-4}$)	(0.00014)	($5.1*10^{-4}$)	($2.20*10^{-4}$)	($2.41*10^{-4}$)	($2.4*10^{-4}$)
Win * Low education	0.00383	-0.055***	-0.00165	-0.0046**	-0.0042**	-0.0058***
	(0.0410)	(0.0117)	(0.0363)	(0.00197)	(0.00207)	(0.00195)
Lottery win ^2		$-9.31*10^{-8}$			$-2.71*10^{-8}$	
		($8.92*10^{-8}$)			($2.35*10^{-8}$)	
Lottery win ^2 * Low education		0.0027***			$-1.97*10^{-4}$	
		(0.0001)			($1.71*10^{-4}$)	
L.win			$-1.03*10^{-4}$			$-2.35*10^{-4}$**
			($2.00*10^{-4}$)			($9.76*10^{-5}$)
L.win * Low education			-0.0141			0.000392
			(0.0261)			(0.000379)
Individual-level controls	x	x	x	x	x	x
Individual-level fixed effects	x	x	x	x	x	x
Time trend	x	x	x	x	x	x
Observations	5,001	4,866	4,866	5,001	4,866	4,866
R-squared	0.050	0.050	0.049	0.027	0.029	0.025

*Note: Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. Sample is restricted to individuals who reported at least one lottery win over the 16-year survey period. All regressions include controls for age, age squared, log household income, binary variables on whether the person is married, and homeownership, 9 dummy variables for employment status (in paid employment, unemployed, retired, maternity leave, family care, full-time student, long-term sick/disabled, government training scheme; self-employed being the reference category), as well as a linear time trend.*

Appendix for Online Publication

Table A1: Estimates of the impact of lottery wins on obesity (fixed effect regressions)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	Dependent variable: obesity						
Lottery win last 12 months in £	$9.34*10^{-6}$	$9.23*10^{-5}$	$-3.18*10^{-6}$	$6.02*10^{-5}$	$-6.4*10^{-5}$	$-8.14*10^{-6}$	
	($6.95*10^{-5}$)	($2.08*10^{-4}$)	($8.16e*10^{-5}$)	($2.33*10^{-4}$)	($1.22*10^{-4}$)	($3.44*10^{-4}$)	
(Lottery win last 12 months in £)^2		$-7.32*10^{-9}$		$-5.51*10^{-9}$		$-3.78*10^{-9}$	
		($1.28*10^{-8}$)		($1.36*10^{-8}$)		($2.66*10^{-8}$)	
Lag (Lottery win last 12 months in £)			$6.47*10^{7}$	$-3.20*10^{-5}$	$1.81*10^{-5}$	$-1.61*10^{-5}$	
			($2.9*10^{-6}$)	($1.40*10^{-4}$)	($3.56*10^{-5}$)	($1.48*10^{-4}$)	
Lag (Lottery win last 12 months in £)^2				$1.96*10^{-9}$		$1.71*10^{-9}$	
				($5.53*10^{-9}$)		($5.79*10^{-9}$)	
Lag2 (Lottery win last 12 months in £)					-1.25e-05	-1.96e-05	
					(1.40e-05)	(4.46e-05)	
Lag2 (Lottery win last 12 months in £)^2						$6.74*10^{-9}$	
						($3.42*10^{-9}$)	
Any lottery win last 12 months (dummy)							0.0111
							(0.0134)
Any lottery win over £500 last 12 months (dummy)							0.0452
							(0.0529)
Lag (Any lottery win last 12 months - dummy)							-0.0146
							(0.0122)
Lag (Any lottery win over £500 last 12 months - dummy)							-0.0211
							(0.0375)
Lag 2 (Any lottery win last 12 months - dummy)							0.0128
							(0.0137)
Lag 2 (Any lottery win over £500 last 12 months - dummy)							-0.00648
							(0.0605)

Controls	x	x	x	x	x	x	x
Time trend	x	x	x	x	x	x	x
Individual Fixed Effects	x	x	x	x	x	x	x
Observations	7,759	7,759	7,550	7,550	7,333	7,333	7,333
R-squared	0.011	0.011	0.011	0.011	0.013	0.013	0.014
Number of individuals	5,001	5,001	4,886	4,886	4,730	4,730	4,730

Table A2: Estimates of the impact of lottery wins on BMI (Fixed Effect Regressions), subsample of all women

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
VARIABLES				BMI			
Lottery win last 12 months in £	-3.42e-06	-0.000156	-0.000128	-0.000257	-0.000134	0.000597	
	(0.000117)	(0.000415)	(0.000346)	(0.00124)	(0.000374)	(0.00125)	
(Lottery win last 12 months in £)^2		2.08e-08		5.99e-08		-2.85e-07	
		(4.19e-08)		(5.99e-07)		(5.95e-07)	
Lag (Lottery win last 12 months in £)			-3.68e-05	-0.000244	-2.90e-05	-0.000225	
			(2.95e-05)	(0.000197)	(2.44e-05)	(0.000197)	
Lag (Lottery win last 12 months in £)^2				8.61e-09		9.23e-09	
				(7.43e-09)		(7.47e-09)	
Lag2 (Lottery win last 12 months in £)					-7.90e-05	0.00258***	
					(0.000310)	(0.000995)	
Lag2 (Lottery win last 12 months in £)^2						-1.14e-06***	
						(3.60e-07)	
Any lottery win last 12 months (dummy)							0.239
							(0.151)
Any lottery win over £500 last 12 months (dummy)							-0.414
							(0.508)

Lag (Any lottery win last 12 months - dummy)							-0.0450
							(0.129)
Lag (Any lottery win over £500 last 12 months - dummy)							-0.627
							(0.498)
Controls	x	x	x	x	x	x	x
Time trend	x	x	x	x	x	x	x
Individual Fixed Effects	x	x	x	x	x	x	x
Observations	3,518	3,518	3,443	3,443	3,370	3,370	3,518
R-squared	0.083	0.083	0.089	0.089	0.084	0.090	0.085
Number of individuals	2,322	2,322	2,276	2,276	2,221	2,221	2,322

Table A3: Estimates of the impact of lottery wins on overweight (Fixed Effect Regressions), subsample of all women

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
VARIABLES				Overweight			
Lottery win last 12 months in £	-8.44e-06	-4.48e-05	-1.90e-05	-6.15e-05	-2.64e-05	3.62e-05	
	(2.29e-05)	(7.81e-05)	(6.55e-05)	(0.000135)	(8.06e-05)	(0.000138)	
(Lottery win last 12 months in £)^2		4.97e-09		2.34e-08		-2.14e-08	
		(7.75e-09)		(7.07e-08)		(7.66e-08)	
Lag (Lottery win last 12 months in £)			-2.69e-05***	1.70e-05	-2.72e-05***	1.91e-05	
			(7.01e-06)	(1.67e-05)	(8.26e-06)	(1.74e-05)	
Lag (Lottery win last 12 months in £)^2				-1.79e-09***		-1.79e-09***	
				(6.49e-10)		(6.78e-10)	

Lag2 (Lottery win last 12 months in £)					-4.78e-05	0.000226	
					(8.57e-05)	(0.000151)	
Lag2 (Lottery win last 12 months in £)^2						-1.20e-07*	
						(7.18e-08)	
Any lottery win last 12 months (dummy)							0.0423**
							(0.0189)
Any lottery win over £500 last 12 months (dummy)							-0.163*
							(0.0988)
Lag (Any lottery win last 12 months - dummy)							-0.00261
							(0.0193)
Lag (Any lottery win over £500 last 12 months - dummy)							-0.0155
							(0.0640)
Controls	x	x	x	x	x	x	x
Time trend	x	x	x	x	x	x	x
Individual Fixed Effects	x	x	x	x	x	x	x
Observations	3,443	3,518	3,518	3,443	3,443	3,370	3,370
R-squared	0.092	0.041	0.041	0.050	0.051	0.048	0.053
Number of individuals	2,276	2,322	2,322	2,276	2,276	2,221	2,221