Available online at www.sciencedirect.com
ScienceDirect
Journal of Health Economics xxx (2006) xxx–xxx
JOURNAL OF HEALTH ECONOMICS
www.elsevier.com/locate/econbase

Money and mental wellbeing: A longitudinal study of medium-sized lottery wins

Jonathan Gardner [a], Andrew J. Oswald [b,*]

[a] *Watson Wyatt Worldwide, Watson House, London Road, Reigate, Surrey RH2 9PQ, UK*
[b] *Department of Economics, University of Warwick, Coventry CV4 7AL, UK*

Received 21 November 2005; received in revised form 26 July 2006; accepted 1 August 2006

Abstract

One of the famous questions in social science is whether money makes people happy. We offer new evidence by using longitudinal data on a random sample of Britons who receive medium-sized lottery wins of between £1000 and £120,000 (that is, up to approximately US$ 200,000). When compared to two control groups – one with no wins and the other with small wins – these individuals go on eventually to exhibit significantly better psychological health. Two years after a lottery win, the average measured improvement in mental wellbeing is 1.4 GHQ points.

JEL classification: D1; I3

Keywords: Psychological health; Happiness; GHQ; Income

1. Introduction

A large social science literature now exists on the determinants of happiness and mental health. As might be expected, this topic has attracted the attention of medical statisticians, psychologists, economists, and other investigators. However, one of the most fundamental research questions remains imperfectly understood. For the average person, do greater material riches bring about significantly greater mental wellbeing?

For discussions of this question, see, for example, Easterlin (1974), Martin (1995), and Diener and Biswas-Diener (2002). Many surveys of the field such as Myers (1992), Diener et al. (1999),

* Corresponding author. Tel.: +44 2476 523510
E-mail address: andrew.oswald@warwick.ac.uk (A.J. Oswald).

0167-6296/$ – see front matter © 2006 Published by Elsevier B.V.
doi:10.1016/j.jhealeco.2006.08.004

Argyle (2001), Nettle (2005a), and Layard (2005) conclude that the connection between money and happiness is slight or non-existent. A variant on this view is the interesting proposition, put forward by Marmot (2004) and others, that people's status and autonomy are what matter, and it is these, rather than wealth or income per se, that truly affect human beings. New work by Kahneman et al. (2006) raises further question-marks over the influence of income.

In cross-sections, we now know that, even after correcting for many potentially confounding influences, there is a statistically well-determined link between income and reported wellbeing. There is also some evidence from panels. A large modern literature across many nations includes Blanchflower and Oswald (2004), Di Tella et al. (2001, 2003), Easterlin (2003), Frey and Stutzer (2002), Graham (2005), Luttmer (2005), Winkelmann and Winkelmann (1996), Oswald (1997, 2005), Shields and Wheatley Price (2005), and Van Praag and Ferrer-I-Carbonell (2004). More recently, attention has been paid to the idea that happiness may habituate to influences like greater income. Hedonic adaptation is discussed in modern research by, for example, Rayo and Becker (2004), Clark (1999), Clark et al. (2004), Lucas et al. (2003, 2004), Di Tella et al. (2005), Gilbert et al. (1998), Riis et al. (2005), Frederick and Loewenstein (1999), Kahneman and Sugden (2005), Oswald and Powdthavee (2005), Smith et al. (2005), Stutzer (2004), Ubel et al. (2005), Wilson and Gilbert (2005), and Wu (2001).

The existing evidence on the link between income and mental wellbeing remains open to criticism. Perhaps the most effective way to object to the income–wellbeing correlation found in recent econometric work is to argue that it is not causal. This is the idea – see for example the cogent arguments in Nettle (2005b) – that income movements and wellbeing movements may merely be linked because of omitted variables (such as seniority in the workplace). Such an objection is important. It is also difficult to deal with decisively, because it is not possible to run giant experiments where, in the name of science, different amounts of government-funded research cash are randomly allocated to treatment and control groups. Somehow, naturally occurring equivalent conditions must be studied.

This paper attempts to do so. It uses data on lottery winners to create a setting as close as possible to the idealized laboratory experiment. In a sense, we follow in a different way the same interests and testing strategy as Sacerdote (1997), Imbens et al. (2001), Holtz-Eakin et al. (1993), Lindahl (2005), and Walker (1998). The paper can be thought of as a longitudinal equivalent to the oft-quoted cross-sectional work of Brickman et al. (1978) on a small sample of lottery winners. It differs from Ettner (1996), for instance, by not using instrumental variables for income. Conceptually, our analysis has elements in common with the work of Meer et al. (2003) who use inheritances to try to measure the effect of money on physical health and Frijters et al. (2004, 2005) who draw upon the natural experiment of German reunification to assess the effects of income upon life-satisfaction and satisfaction with health.

We assume a reported wellbeing function:

$$r = h(u(y,\ z,\ m,\ t)) + e \tag{1}$$

where r is a measure of psychological health or self-reported wellbeing; $u(\ldots)$ is to be thought of as the person's true wellbeing or utility; $h(.)$ the non-differentiable function relating actual to reported wellbeing; y the income or wealth, to include lottery winnings; z the set of demographic characteristics; m the set of personal characteristics such as marital status; t the time period; e an error term. It is assumed that $u(\ldots)$ is a function that is observable only to the individual. This general approach has links to the experienced-utility idea discussed in, for instance, Kahneman et al. (1997).

Please cite this article as: Jonathan Gardner, Andrew J. Oswald, Money and mental wellbeing: A longitudinal study of medium-sized lottery wins, Journal of Health Economics (2006), doi:10.1016/j.jhealeco.2006.08.004.

2. Data

The data used in this study come from consecutive waves of the British Household Panel Survey (BHPS). 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 (see Taylor et al., 2002). Respondents are interviewed in successive waves; households who move to a new residence are interviewed at their new location; if an individual splits 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.

The BHPS contains a standard mental wellbeing measure, a General Health Questionnaire (GHQ) score. This is used internationally by medical researchers and others as an indicator of psychological strain or stress. Recent applications of GHQ include Cardozo et al. (2000), Böheim and Ermisch (2001), Propper et al. (2005), Clark and Oswald (1994, 2002), Ermisch and Francesconi (2000), Gardner and Oswald (2004, 2006), Martikainen et al. (2003), McKenzie et al. (2004), O'Reilly and Stevenson (2003), Pevalin and Ermisch (2004), Robinson et al. (2004), Shields and Wheatley Price (2005), and Weinberg and Creed (2000). A GHQ score is one of the most commonly adopted questionnaire-based methods of measuring psychological health. It amalgamates answers to the following list of 12 questions:

Have you recently:

1. *Been able to concentrate on whatever you are doing*?
2. *Lost much sleep over worry*?
3. *Felt that you are playing a useful part in things*?
4. *Felt capable of making decisions about things*?
5. *Felt constantly under strain*?
6. *Felt you could not overcome your difficulties*?
7. *Been able to enjoy your normal day-to-day activities*?
8. *Been able to face up to your problems*?
9. *Been feeling unhappy and depressed*?
10. *Been losing confidence in yourself*?
11. *Been thinking of yourself as a worthless person*?
12. *Been feeling reasonably happy all things considered*?

Here we use the sum of the responses to these so-called GHQ-12 questions. As a measure of mental strain, the paper takes the simple summation, coded so that people answer with respect to usual and the response with the lowest wellbeing value scores 3 and that with the highest wellbeing value scores 0. This approach has been used many times before and is sometimes called a 36-point Likert scale. In general, medical opinion is that healthy individuals will score typically around 10–13 on the test. Numbers near 36 are rare and indicate depression in a clinical sense.

Although most windfalls are small, many people in the BHPS data have a financial windfall of some kind. The data set records either a win on a lottery or a win on the soccer pools. As half the British population play the national lottery, this form of winning windfalls swamps all other forms, and for simplicity we refer later merely to 'lottery winners'.

We measure people's GHQ score and their lottery winnings in each year between 1996 and 2003. To adjust for inflation, all financial amounts are deflated by the consumer price index and

Please cite this article as: Jonathan Gardner, Andrew J. Oswald, Money and mental wellbeing: A longitudinal study of medium-sized lottery wins, Journal of Health Economics (2006), doi:10.1016/j.jhealeco.2006.08.004.

Table 1
Sample characteristics—lottery wins and GHQ mental strain 1998–2001

Lottery win (£)	Observations	Individuals	Mean win	Median win	Mean GHQ Score
No win	26,646	9677			11.23 (5.46)
1–999	4822	2943	70.5 (120.6)	30.0	10.94 (5.16)
1000 or more	137	116	4,303.1 (11,944.4)	1,\987.8	10.73 (5.50)
Total	33,605	10,365	27.7 (809.3)	0.0	11.19 (5.42)

Notes: Standard deviations are in parentheses. The maximum win in the sample is £117,000. All wins are deflated to real values (1998 deflator).

converted into 1998 pounds. At the time of writing, one pound sterling £1 is approximately US$ 1.75 United States dollars.

To allow for lags, the wellbeing data are taken from 1998 to 2001. Hence, we observe whether an individual has won on the lottery within this 3-year period, but use the longer time frame of mental stress scores (from 1996 to 2001) to capture changes in well-being from 2-years before the win to 2-years after. Table 1 reports means and standard deviations. Of the 33,605 person-years in the data, there are more than 26,000 observations with no observed win. Small prizes of between one pound and 999 pounds are common: there are 4822 observations. Bigger wins, of over £1000, are uncommon. There are 137. It is these on which the paper particularly focuses. The other categories within Table 1 make a natural comparison: they provide control groups of individuals who get no win and only small wins. The latter category is particularly important, because, as in Imbens et al. (2001), it is not possible within our data set to know the number of times each person plays the lottery. Hence we need to find a way to allow for a different psychological makeup between people who never gamble and those who do. Like Imbens et al., therefore, we assume the most persuasive control group is the set of people in the data who report small wins.

Table 1 reveals that the mean win among those getting more than zero but less than £999 is £70.5. The median is just £30. Among the group receiving a windfall in excess of £1000, the mean win is approximately £4300, and the median is just below £2000.

The mean value of GHQ mental stress, on its 0–36 scale, is 11.19 in the entire data set. It is lower, at 10.73, among the medium-size winners.

This levels comparison, however, is perhaps not a natural one to emphasise. To allow person fixed-effects to be differenced out, it is more compelling to look at the changes – the so-called deltas – in individuals' GHQ scores. In this way, the issue becomes: does the GHQ mental strain score of a particular person tend to fall after winning a prize in the lottery? It is the deltas that contain the main information and on which we focus.

3. Results

The empirical approach begins by looking at movements in GHQ scores before and after a lottery win. Later, regression equations are estimated. Pragmatically, with 137 observations on what we describe as medium-sized lottery wins, it is probably not sensible to put a large amount of structure on the statistical testing. It is known, moreover, that there is some natural fluctuation in GHQ scores (Hauck and Rice, 2004). While it would be desirable to have more than 137 significant lottery wins, that is intrinsically difficult in longitudinal random samples of a population.

Please cite this article as: Jonathan Gardner, Andrew J. Oswald, Money and mental wellbeing: A longitudinal study of medium-sized lottery wins, Journal of Health Economics (2006), doi:10.1016/j.jhealeco.2006.08.004.

What we attempt to look for, therefore, are persuasive simple patterns in the data. Fig. 1 is divided into three sections. In Fig. 1a, the changes in GHQ are plotted for the year before, and of, the lottery win. It can be seen that, on an average, mental stress actually increases in the year of winning (the data are collected after a reported win, and most people saying they have won will have done so very recently). The rise in strain is about 0.5 GHQ points more than for the two control groups, who, as can be seen in the first two bars of Fig. 1a, are similar to one another. This implies that, in these data, there is no immediate burst of psychological wellbeing from a lottery win. If anything, the reverse is true, although the standard errors on the >£1000 column in Fig. 1a are large. As far as we know, this finding is a new one.

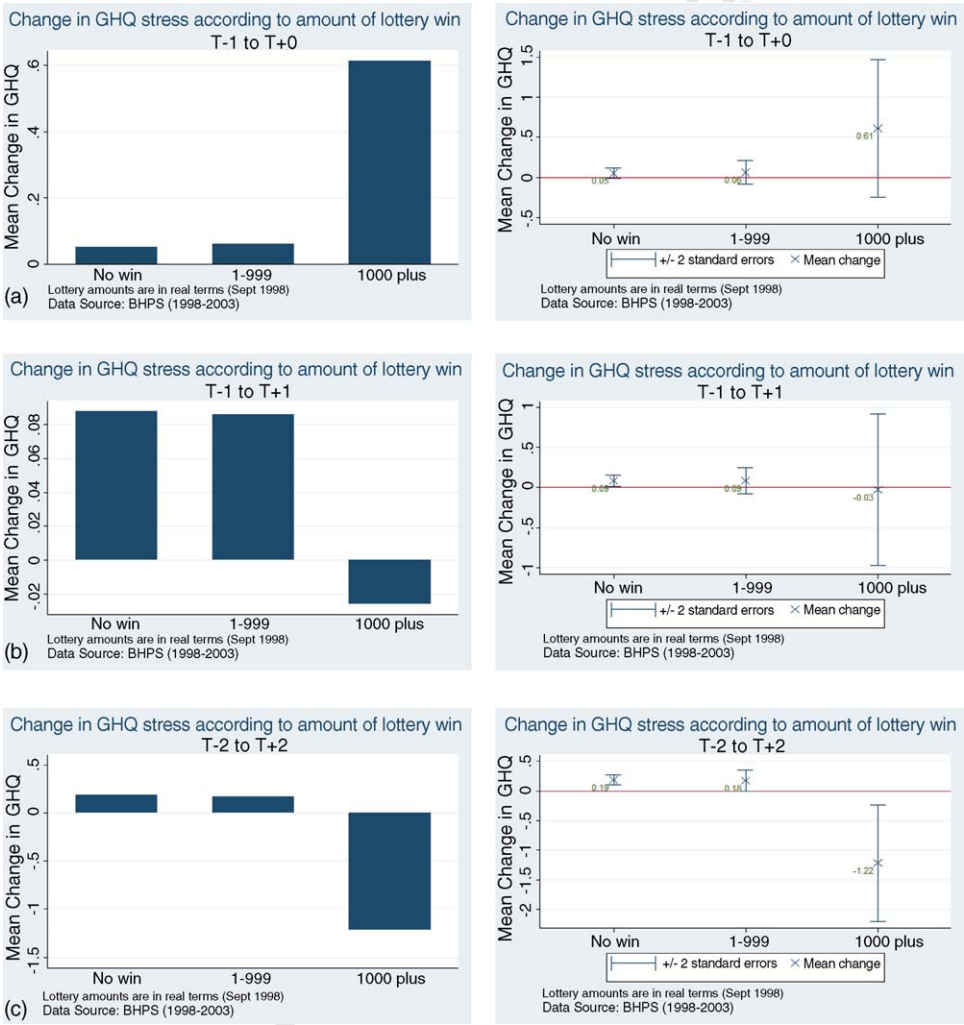

Fig. 1. The change in GHQ mental strain in the years surrounding a lottery win; (a) the change in GHQ mental strain (from $T-1$ to T) associated with a lottery win at time T; (b) the change in GHQ mental strain (from $T-1$ to $T+1$) associated with a lottery win at time T; (c) the change in GHQ mental strain (from $T-2$ to $T+2$) associated with a lottery win at time T. *Notes:* Graphs in the left-hand panel display the mean change in GHQ mental strain scores. Graphs in the right-hand panel additionally display confidence intervals. The scales differ across figures.

Please cite this article as: Jonathan Gardner, Andrew J. Oswald, Money and mental wellbeing: A longitudinal study of medium-sized lottery wins, Journal of Health Economics (2006), doi:10.1016/j.jhealeco.2006.08.004.

The second section, Fig. 1b, charts the change in mental stress between $T-1$ and $T+1$. These are the years immediately before and immediately after the one in which the lottery prize is won. Again, encouragingly for the statistical investigator, the columns make clear that individuals who get no win are almost indistinguishable in their responses from those with a small win, which is consistent with common sense. Interestingly, people in the >£1000 category do appear, in Fig. 1b, to exhibit a rise in psychological wellbeing (that is, a fall in their GHQ mental stress score). However, the size of this decline is tiny, and, as illustrated, the standard-error bars are wide.

Fig. 1c depicts the key finding of the paper. It compares wellbeing 2 years before the lottery win to 2 years afterwards. For those with no win, mental strain rises slightly, by 0.19 GHQ points. This increase – it might be viewed as the background rise in stress in Great Britain – is statistically significantly greater than zero. For those with a small win, GHQ goes up almost an identical amount, namely, by 0.18 points. Such a finding seems to make sense: winning a tiny amount does not alter a person's life.

However, the average change in mental stress is different among those in Fig. 1c who, at time $T=0$, get a windfall of £1000 or more. For them, GHQ drops fairly markedly between $T-2$ and $T+2$. It does so by -1.22 points. As shown, the standard errors allow the null of zero to be rejected at the 5% level, so the change is statistically significantly different from that for the two comparison groups of individuals. To this 1.22, the figure of 0.18 or 0.19 should be added. People who get a medium-sized win therefore eventually enjoy an improvement in mental health, relative to others, of approximately 1.4 GHQ points. If we separate the sample into men and women, a similar result is found for each of the sexes (not reported), although men show a larger improvement.

A further way to depict the main finding is illustrated in Fig. 2. The figure presents the average levels (as opposed to changes) of GHQ stress scores in the years surrounding a lottery win. Here the GHQ levels of the three groups of individuals diverge, by the time that period $T+2$ is reached, very noticeably. (These results in Fig. 2 are for the unbalanced panel, where an individual may be present in one period but not the next. When we instead restrict attention to the balanced sample – where each period we observe the same set of individuals – results are substantially the same.) Again this appears consistent with a causal link between windfalls and wellbeing. Although it might be expected that the size of the medium-size win would be correlated with the size of

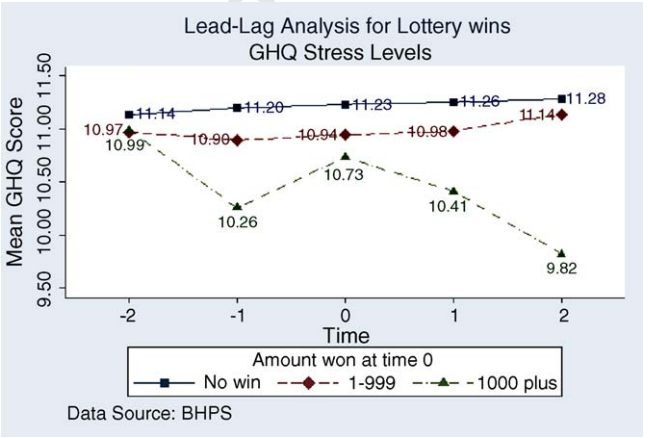

Fig. 2. GHQ mental strain levels before and after a win. *Notes*: The graph displays the mean GHQ scores for the years surrounding a lottery win.

Please cite this article as: Jonathan Gardner, Andrew J. Oswald, Money and mental wellbeing: A longitudinal study of medium-sized lottery wins, Journal of Health Economics (2006), doi:10.1016/j.jhealeco.2006.08.004.

the alteration in wellbeing within the sub-sample of 137 people themselves, it proved impossible, probably because of the small sample size relative to the noise in GHQ scores, to find a statistically significant relationship.

In sum, these data suggest that winning the lottery is associated with improved mental well-being. Intriguingly, the effect apparently takes some time to show through. The observed delay is surprising. One feasible interpretation of the phenomenon is that winning (even medium-sized prizes like these) can have a disruptive effect in time T. A second possibility, and a less attractive one for the ideas in the paper, is that the phenomenon of winning itself eventually makes people cheerier, by increasing their sense of optimism. Nevertheless, a potentially more plausible explanation is that spending the money is what matters and initially a windfall is saved. Clearly much remains to be understood.

4. Robustness checks

Is it possible that this pattern is an artefact or fluke of the data set and therefore not one of cause-and-effect? In principle, it is. Fig. 2, for instance, reveals some inherent volatility, and the drop in GHQ in $T-1$ among the winners is a potential concern.

As a check, various inquiries were done.

First, an examination of Fig. 2 shows that the GHQ levels of all three groups are similar in the initial year, $T-2$. This fact seems reassuring. It suggests that the nature of the people under study – non-winners, small winners, large winners – is not profoundly different.

Second, some regression-equation checks are given. Table 2 lays out a number of Delta GHQ equations. These equations take as the dependent variable the measured change in the GHQ stress

Table 2
The change in GHQ mental strain surrounding a lottery win ($T-2$ to $T+2$)

Regressors	(1)	(2)	(3)	(4)
Win 1–999	−0.014 (0.101)	−0.025 (0.101)	−0.018 (0.102)	0.024 (0.125)
Win 1000 or more	−1.406 (0.500)	−1.435 (0.501)	−1.449 (0.498)	−1.779 (0.571)
Age		0.001 (0.002)	−0.006 (0.004)	−0.005 (0.004)
Female		−0.152 (0.073)	−0.044 (0.076)	0.143 (0.091)
Non-white		0.177 (0.263)	0.211 (0.270)	0.191 (0.319)
Log family income			0.038 (0.064)	−0.009 (0.077)
Any health problems			−0.064 (0.080)	0.137 (0.095)
Married			0.365 (0.084)	0.254 (0.099)
Unemployed			−0.199 (0.312)	−0.202 (0.397)
Retired			0.337 (0.133)	0.139 (0.157)
Out of labour force			−0.439 (0.131)	−0.350 (0.159)
O-levels			−0.069 (0.103)	−0.100 (0.123)
A-levels			0.034 (0.126)	0.055 (0.149)
Degree			−0.066 (0.142)	−0.100 (0.168)
GHQ (t-3)				−0.125 (0.011)
Region dummies	No	No	Yes	Yes
R-squared	0.000	0.000	0.003	0.015
Observations	26,181	26,181	25,902	18,104

Notes: Standard errors are in parentheses. The omitted variables are: no lottery win, male, white, no health problems, unmarried, in employment, with a lower educational qualification. The variables in the table are people's characteristics measured at time T. The sample period for wins is 1998–2001. GHQ is measured between 1996 and 2003 to allow for the 2-year lags.

Please cite this article as: Jonathan Gardner, Andrew J. Oswald, Money and mental wellbeing: A longitudinal study of medium-sized lottery wins, Journal of Health Economics (2006), doi:10.1016/j.jhealeco.2006.08.004.

level over the period $T-2$ to $T+2$. Column 1 of the table thus re-does the previous chart in a more formal way. Column 2 of Table 2 includes controls for age, gender, and race. The female dummy is negative and statistically significantly different from zero. The others, however, are not. Importantly, the coefficient on the Win >£1000 dummy variable is left unchanged by the addition of these demographic controls, which suggests that the pattern in the paper is not simply because of elementary omitted characteristics. The low R-squared values are a noticeable reminder of the noise in GHQ values.

Column 3 extends the list of independent variables: it incorporates income, health, marital status, job status, education level, and region dummies. Once again, the effect of winning the lottery is unaltered. The coefficient is now -1.449 with a well-determined t-statistic.

Finally, column 4 of Table 2 includes an extra variable for the person's mental stress score in $T-3$. This controls for potential habituation or mean-reversion in wellbeing levels; when individuals initially have high wellbeing (low GHQ stress scores) we might expect them, either substantively or for reasons of measurement error, to report a decline in wellbeing (increase in strain) towards some baseline, and vice versa. In column 4 of Table 2, the estimated improvement in mental wellbeing after a medium-size lottery win is slightly larger at approximately 1.8 GHQ points. If people who initially show greater mental strain are more likely to gamble on the lottery, then mean-reversion could conceivably account for the increase in wellbeing that we observe for lottery winners. However, while we do see some evidence of mean-reversion in GHQ mental strain scores, it apparently contributes little to an explanation of the estimated windfall effect. Here in column 4 of Table 2 there is a slight alteration in the size of the coefficient on Win >£1000, but the standard error remains around one third of the coefficient estimate. These explorations suggest that the correlation between winning and change-in-GHQ is robust.

Third, are low-income individuals perhaps more affected by a lottery prize, and are there any important gender differences in response to a win? Table 3 takes up these issues. It estimates four delta-GHQ equations. The first split of the sample is into two income categories. Interestingly, and perhaps surprisingly, the drop in GHQ is more marked, and statistically better determined, in the high-income households. In Table 3 the coefficients on Win >£1000 are at first, in columns 1 and 2, respectively -0.991 and -1.855. However, it not possible to reject the null of equality of these two numbers. Columns 3 and 4 divide individuals into men and women. In this case, the key coefficients are -1.674 and -1.140. Only the first of these, for the male sub-sample, is significantly different from zero. Nevertheless, the finding seems of value. If the paper's observation of a fall in GHQ after a win were the chance result of a small data set, we would not expect to see it in separate sub-samples for males and females. Perhaps the appropriate message from Table 3 – when it is borne in mind that the numbers of medium-size lottery winners do not allow detailed disaggregation – is that the size of the win >£1000 effect appears to be reasonably robust across sub-samples.

Fourth, data on the life satisfaction levels of individuals were examined, and the above calculations were re-done. The life-satisfaction question was not asked in the survey in the 2001, so as a result we were missing around a quarter of our sample of lottery wins. Most of the paper's patterns, however, carried through (for instance, those winning >£1000 had the largest rise in life satisfaction), although the satisfaction data were too noisy, given the effective sample size, to permit particularly well-defined results.

Lastly, because the data set does not provide a measure of how often people play the lottery, there remains one possibility that should be considered. It is that, for some unobservable reason, individuals who gain psychologically after we observe them winning a medium-sized lottery prize both play the lottery far more than those who gain only small wins (and thus win more money)

Please cite this article as: Jonathan Gardner, Andrew J. Oswald, Money and mental wellbeing: A longitudinal study of medium-sized lottery wins, Journal of Health Economics (2006), doi:10.1016/j.jhealeco.2006.08.004.

Table 3
The change in GHQ mental strain surrounding a lottery win—sub-samples ($T-2$ to $T+2$)

Regressors	Low income (1)	High income (2)	Male (3)	Female (4)
Win 1–999	−0.021 (0.156)	−0.029 (0.135)	−0.105 (0.134)	0.068 (0.156)
Win 1000 or more	−0.991 (0.680)	−1.855 (0.715)	−1.674 (0.627)	−1.140 (0.811)
Age	0.004 (0.005)	−0.019 (0.005)	−0.011 (0.005)	−0.002 (0.005)
Female	−0.106 (0.109)	0.010 (0.108)		
Non-white	−0.072 (0.403)	0.420 (0.362)	0.158 (0.362)	0.273 (0.393)
Log family income	−0.199 (0.103)	−0.051 (0.156)	0.080 (0.091)	0.004 (0.090)
Any health problems	0.031 (0.122)	−0.120 (0.107)	−0.097 (0.109)	−0.038 (0.116)
Married	0.451 (0.115)	0.345 (0.127)	0.221 (0.117)	0.521 (0.120)
Unemployed	0.061 (0.386)	−0.562 (0.539)	−0.156 (0.352)	−0.282 (0.568)
Retired	0.133 (0.177)	0.465 (0.229)	0.413 (0.185)	0.294 (0.190)
Out of labour force	−0.347 (0.179)	−0.508 (0.195)	−0.098 (0.276)	−0.527 (0.153)
O-levels	−0.176 (0.139)	0.143 (0.158)	−0.051 (0.140)	−0.045 (0.148)
A-levels	0.020 (0.188)	0.111 (0.177)	−0.078 (0.161)	0.175 (0.194)
HND, HNC	−0.283 (0.249)	0.266 (0.219)	−0.059 (0.205)	0.117 (0.247)
Degree	−0.107 (0.251)	−0.011 (0.190)	−0.321 (0.186)	0.221 (0.215)
Region dummies	Yes	Yes	Yes	Yes
R-squared	0.006	0.004	0.003	0.004
Observations	12,867	13,035	11,657	14,245

Notes: Standard errors are in parentheses. The omitted variables are: no lottery win, male (where applicable), white, no health problems, unmarried, in employment, with a lower educational qualification. The variables in the table are people's characteristics measured at time *T*. The sample period for wins is 1998–2001. GHQ is measured between 1996 and 2003 to allow for the 2-year lags. High- and low-income are defined respectively as above and below median income (in each year).

and would for some unknown independent reason have improved mentally without the windfall of cash. In other words, there remains the potential that the correlation we observe is not truly causal.

Like most arguments that rest on assumed unobservabilities, this is a difficult possibility to avoid beyond doubt. Nevertheless, on the balance of the evidence, it is arguably unpersuasive and a causal interpretation seems the more appropriate one. Entering within a delta-GHQ regression equation a range of observable controls (which might be expected to be correlated with unobservables) leaves – see Tables 2 and 3 – the paper's key coefficient almost unchanged. Moreover, medium-size lottery winners begin with the same $T-2$ mental-health scores as other people in the data set, and thus do not appear to be fundamentally different from small-winners in some subtle psychological way.

5. Conclusions

A famous research question in social science is whether increases in income make people happier (and if so by how much). The key difficulty in testing is a practical one. It is how to find a quasi-experimental setting where some individuals are randomly assigned substantial sums of money while others in a control group are not.

The paper tackles this by studying longitudinal data on a statistically representative sample of Britons who receive medium-sized lottery wins. In our data, these are wins of between £1000 and approximately £120,000 in 1998 pounds sterling. We have 137 winners of this type. The effective sample is therefore fairly small, so it is sensible to be cautious in interpretation.

Please cite this article as: Jonathan Gardner, Andrew J. Oswald, Money and mental wellbeing: A longitudinal study of medium-sized lottery wins, Journal of Health Economics (2006), doi:10.1016/j.jhealeco.2006.08.004.

When compared to two control groups – one with no wins and the other with small wins – the paper demonstrates that these medium-size winners go on to have significantly better psychological health. After 2 years, their mental wellbeing compared to before the lottery win has improved by approximately 1.4 GHQ points on a 36-point scale, with a standard error of approximately 0.5. The standard deviation of the GHQ scores in the whole sample is approximately 5, but that is probably not a useful way to think about the within-person variation over time. To provide a better feel for the size of the units, in Clark and Oswald (2002) and Gardner and Oswald (2006) it is argued that the worst thing observable in standard data sets is – perhaps as might be expected – the impact effect of being widowed. That rare and traumatic event is associated with a worsening in people's mental wellbeing of, on an average, approximately five GHQ points. Such a calculation suggests that 1.4 points, the estimated consequence of a medium-sized lottery win for mental health, is economically significant and not merely statistically significant.

Checks on separate sub-samples of men and women, and high-income and low-income people, provide in each case broadly supportive evidence for the existence of a positive effect of windfalls upon mental wellbeing. Such corroboration, even on necessarily small sub-samples, seems encouraging. The explanation for the time delay in the wellbeing effect is unclear. It may be that actual spending is what matters and windfalls are initially saved, but this can be only a conjecture.

The paper's main result – that a windfall is followed eventually by a significant improvement in mental health – contrasts with standard interpretations of the work of Brickman et al. (1978). An advantage of the present study is that we follow the same individuals through time and do not have to rely on cross-section comparisons. Our paper is unable to examine adaptation to money over a long period. That possibility remains an important one to be explored by future research.

Uncited reference

Clark (1994).

Acknowledgements

We thank the editor and referees, and also Andrew Clark, Dan Gilbert, Carol Graham, Alois Stutzer and Ian Walker. The Economic and Social Research Council (ESRC) provided research support. The usual disclaimer applies. In particular, the views in this paper are not those of Watson Wyatt. The British Household Panel Survey data were made available through the UK Data Archive. The data were originally collected by the ESRC Research Centre on Micro-social Change at the University of Essex, now incorporated within the Institute for Social and Economic Research. Both the original collectors of the data and the Archive bear no responsibility for the analysis presented here.

This paper replaces the earlier calculations of Gardner and Oswald (2001). It used also data on inheritances and produced broadly similar findings. Because inheritances conflate a windfall with death of a family member, we decided to omit the inheritance calculations.

References

Argyle, M., 2001. The Psychology of Happiness, second ed. Routledge, London.

Blanchflower, D.G., Oswald, A.J., 2004. Wellbeing over time in Britain and the USA. Journal of Public Economics 88, 1359–1386.

Please cite this article as: Jonathan Gardner, Andrew J. Oswald, Money and mental wellbeing: A longitudinal study of medium-sized lottery wins, Journal of Health Economics (2006), doi:10.1016/j.jhealeco.2006.08.004.

Böheim, R., Ermisch, J., 2001. Partnership dissolution in the UK—the role of economic circumstances. Oxford Bulletin of Economics and Statistics 63, 197–208.
Brickman, P., Coates, D., Janoff-Bulman, R., 1978. Lottery winners and accident victims—is happiness relative? Journal of Personality and Social Psychology 36, 917–927.
Cardozo, B.L., Vergara, A., Agani, R., Gotway, C.A., 2000. Mental health, social functioning, and attitudes of Kosovar Albanians following the war in Kosovo. Journal of the American Medical Association 284, 569–577.
Clark, A.E., Oswald, A.J., 1994. Unhappiness and unemployment. Economic Journal 104, 648–659.
Clark, A.E., 1999. Are wages habit-forming? Evidence from micro data. Journal of Economic Behavior and Organization 39, 179–200.
Clark, A.E., Oswald, A.J., 2002. A simple statistical method for measuring how life events affect happiness. International Journal of Epidemiology 31, 1139–1144.
Clark, A.E., Diener, E., Georgellis, Y., Lucas, R.E., 2004. Lags and leads in life satisfaction: a test of the baseline hypothesis. DELTA Paris: working paper.
Di Tella, R., MacCulloch, R.J., Oswald, A.J., 2001. Preferences over inflation and unemployment: evidence from surveys of happiness. American Economic Review 91, 335–341.
Di Tella, R., MacCulloch, R.J., Oswald, A.J., 2003. The macroeconomics of happiness. Review of Economics and Statistics 85, 809–827.
Di Tella, R., Haisken, J., Macculloch, R.J., 2005. Happiness adaptation to income and to status in an individual panel, working paper, Harvard Business School.
Diener, E., Biswas-Diener, R., 2002. Will money increase subjective wellbeing? Social Indicators Research 57, 119–169.
Diener, E., Suh, E.M., Lucas, R.E., Smith, H.L., 1999. Subjective wellbeing: three decades of progress. Psychological Bulletin 125 (2), 276–302.
Easterlin, R.A., 1974. Does economic growth improve the human lot? Some empirical evidence. In: David, P.A., Reder, M.W. (Eds.), Nations and Households in Economic Growth: Essays in Honor of Moses Abramowitz. Academic Press, New York, pp. 89–125.
Easterlin, R.A., 2003. Explaining happiness. In: Proceedings of the National Academy of Sciences, vol. 100, pp. 11176–11183.
Ermisch, J., Francesconi, M., 2000. Cohabitation in Great Brita: not for long, but here to stay. Journal of the Royal Statistical Society (Series A) 163, 153–171.
Ettner, S.L., 1996. New evidence on the relationship between income and health. Journal of Health Economics 15, 67–85.
Frederick, S., Loewenstein, G., 1999. Hedonic adaptation. In: Diener, E., Schwarz, N., Kahneman, D. (Eds.), Hedonic Psychology: Scientific Approaches to Enjoyment, Suffering, and Wellbeing. Russell Sage Foundation, New York, pp. 302–329.
Frey, B.S., Stutzer, A., 2002. Happiness and Economics. Princeton University Press, Princeton.
Frijters, P., Haisken-DeNew, J.P., Shields, M.A., 2004. Money does matter! Evidence from increasing real income and life satisfaction in East Germany following reunification. American Economic Review 94, 730–740.
Frijters, P., Haisken-DeNew, J.P., Shields, M.A., 2005. The causal effect of income on health: evidence from German reunification. Journal of Health Economics 24, 997–1017.
Gardner, J, Oswald, A., 2001. Does money buy happiness? A longitudinal study using data on windfalls. University of Warwick: working paper.
Gardner, J., Oswald, A., 2004. How is mortality affected by money, marriage and stress? Journal of Health Economics 23, 1181–1207.
Gardner, J., Oswald, A.J., 2006. Do divorcing couples become happier by breaking up? Journal of the Royal Statistical Society (Series A) 169, 319–336.
Gilbert, D.T., Pinel, E.C., Wilson, T.D., Blumberg, S.J., Wheatley, T., 1998. Immune neglect: a source of durability bias in affective forecasting. Journal of Personality and Social Psychology 75, 617–638.
Graham, C., 2005. Insights on development from the economics of happiness. World Bank Research Observer 20, 201–231.
Hauck, K., Rice, N., 2004. A longitudinal analysis of mental health mobility in Britain. Health Economics 13, 981–1001.
Holtz-Eakin, D., Joulfaian, D., Rosen, H., 1993. The Carnegie conjecture: some empirical evidence. Quarterly Journal of Economics 108, 413–435.
Imbens, G.W., Rubin, D.B., Sacerdote, B.I., 2001. Estimating the effect of unearned income on labor earnings, savings, and consumption: evidence from a survey of lottery players. American Economic Review 91, 778–794.
Kahneman, D., Sugden, R., 2005. Experienced utility as a standard of policy evaluation. Environmental and Resource Economics 32, 161–181.
Kahneman, D., Wakker, P.P., Sarin, R., 1997. Back to Bentham? Explorations of experienced utility. Quarterly Journal of Economics 112, 375–406.

Please cite this article as: Jonathan Gardner, Andrew J. Oswald, Money and mental wellbeing: A longitudinal study of medium-sized lottery wins, Journal of Health Economics (2006), doi:10.1016/j.jhealeco.2006.08.004.

Kahneman, D., Krueger, A.B., Schkade, D., Schwarz, N., Stone, A.A., 2006. Would you be happier if you were richer? A focusing illusion. Science 312, 1908–1910.
Layard, R., 2005. Happiness: Lessons From a New Science. Allen Lane, London.
Lindahl, M., 2005. Estimating the effect of income on health and mortality using lottery prizes as an exogenous source of variation in income. Journal of Human Resources 40, 144–168.
Lucas, R.E., Clark, A.E., Georgellis, Y., Diener, E., 2003. Re-examining adaptation and the setpoint model of happiness: reactions to changes in marital status. Journal of Personality and Social Psychology 84, 527–539.
Lucas, R.E., Clark, A.E., Georgellis, Y., Diener, E., 2004. Unemployment alters the set point for life satisfaction. Psychological Science 15 (1), 8–13.
Luttmer, E., 2005. Neighbors as negatives: relative earnings and wellbeing. Quarterly Journal of Economics 120, 963–1003.
Marmot, M., 2004. Status Syndrome. Bloomsbury, London.
Martikainen, P., Adda, J., Ferrie, J.E., Smith, G.D., Marmot, M., 2003. Effects of income and wealth on GHQ depression and poor self rate health in white collar women and men in the Whitehall II study. Journal of Epidemiology and Community Health 57, 718–723.
Martin, A., 1995. Can money buy happiness? Science 268, 1113–1114.
McKenzie, D.P., Ikin, J.F., McFarlane, A.C., Creamer, M., Forbes, A.B., Kelsall, H.L., Glass, D.C., Ittak, P., Sim, M.R., 2004. Psychological health of Australian veterans of the 1991 Gulf War: an assessment using the SF-12, GHQ-12 and PCL-S. Psychological Medicine 34, 1419–1430.
Meer, J., Miller, D.L., Rosen, H.S., 2003. Exploring the health-wealth nexus. Journal of Health Economics 22, 713–730.
Myers, D.M., 1992. The Pursuit of Happiness. Morrow, New York.
Nettle, D., 2005a. Happiness: The Science Behind your Smile. Oxford University Press, Oxford.
Nettle, D., 2005b. Social Gradients in Subjective Wellbeing: Is It Money or Person Control that Matters? Department of Psychology, Brain and Behaviour, University of Newcastle: working paper.
O'Reilly, D., Stevenson, M., 2003. Mental health in Northern Ireland: have the troubles made it worse? Journal of Epidemiology and Community Health 57, 488–492.
Oswald, A.J., 1997. Happiness and economic performance. Economic Journal 107, 1815–1831.
Oswald, A.J., 2005. On the common claim that happiness equations demonstrate diminishing marginal utility of income. IZA Discussion paper 1781, and University of Warwick working paper.
Oswald, A.J., Powdthavee, N., 2005. Does happiness adapt? A longitudinal study of disability with implications for economists and judges, University of Warwick: working paper.
Pevalin, D.J., Ermisch, J., 2004. Cohabiting unions, repartnering and mental health. Psychological Medicine 34 (8), 1553–1559.
Propper, C., Jones, K., Bolster, A., Burgess, S., Johnston, R., Sarker, R., 2005. Local neighbourhood and mental health: evidence from the UK. Social Science and Medicine 61, 2065–2083.
Rayo, L., Becker, G., 2004. Evolutionary efficiency and happiness. University of Chicago: working paper.
Riis, J., Loewenstein, G., Baron, J., Jepson, C., 2005. Ignorance of hedonic adaptation to hemodialysis: a study using ecological momentary assessment. Journal of Experimental Psychology: General 134 (1), 3–9.
Robinson, K.L., McBeth, J., MacFarlane, G.J., 2004. Psychological distress and premature mortality in the general population: a prospective study. Annals of Epidemiology 14, 467–472.
Sacerdote, B., 1997. The lottery winner survey, crime and social interactions, and why is there more crime in cities? Harvard University: PhD thesis.
Shields, M.A., Wheatley Price, S., 2005. Exploring the economic and social determinants of psychological wellbeing and perceived social support in England. Journal of the Royal Statistical Society (Series A) 168, 513–537.
Smith, D.M., Langa, K.M., Kabeto, M.U., Ubel, P.A., 2005. Health, wealth and happiness. Psychological Science 16, 663–666.
Stutzer, A., 2004. The role of income aspirations in individual happiness. Journal of Economic Behavior and Organization 54, 89–109.
Taylor, M.F., Brice, J., Buck, N., Prentice-Lane, E., 2002. British Household Panel Survey User Manual. University of Essex, Colchester.
Ubel, P.A., Loewenstein, G., Jepson, C., 2005. Disability and sunshine: can hedonic predictions be improved by drawing attention to focusing illusions or emotional adaptation? Journal of Experimental Psychology: Appl 11, 111–123.
Van Praag, B., Ferrer-I-Carbonell, A., 2004. Happiness Quantified: A Satisfaction Calculus Approach. Oxford University Press, Oxford.
Walker, I., 1998. Lotteries: determinants of ticket sales and optimal payout rate. Economic Policy 27, 358–399.

Please cite this article as: Jonathan Gardner, Andrew J. Oswald, Money and mental wellbeing: A longitudinal study of medium-sized lottery wins, Journal of Health Economics (2006), doi:10.1016/j.jhealeco.2006.08.004.

Weinberg, A., Creed, F., 2000. Stress and psychiatric disorder in healthcare professionals and hospital staff. Lancet 355, 533–537.
Wilson, T.D., Gilbert, D.T., 2005. A model of affective adaptation. University of Virginia: working paper.
Winkelmann, L., Winkelmann, R., 1996. Why are the unemployed so unhappy? Economica 65, 1–15.
Wu, S., 2001. Adapting to heart conditions: a test of the hedonic treadmill. Journal of Health Economics 20, 495–508.

Please cite this article as: Jonathan Gardner, Andrew J. Oswald, Money and mental wellbeing: A longitudinal study of medium-sized lottery wins, Journal of Health Economics (2006), doi:10.1016/j.jhealeco.2006.08.004.