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IZA DP No. 14489

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ABSTRACT

Does Money Strengthen Our Social Ties? Longitudinal Evidence of Lottery Winners

We study the effect of lottery wins on social ties and support network in the United Kingdom. On average, we find that winning more in the lottery increases the probability of meeting friends on most days, which is consistent with the complementary effect of income on social ties. The opposite is true with regards to social ties held for more instrumental reasons such as talking to neighbors. Winning more in the lottery also lessens an individual support network consistently with a substitution for instrumental social ties. However, further robustness checks reveal that the average lottery effects are driven by the few outliers of very large wins in the sample, thus suggesting that small to medium-sized wins (<£10k) may not be enough to change people's social ties and support network in a substantial way.

JEL Classification: Z1

Keywords: income, lottery, socialization effect, unearned income, friendships, neighborhood, social ties

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1. Introduction

Given that individuals are embedded in social environments, we rely on our social ties for both emotional and physical support in carrying out daily tasks. However, social ties require investments in terms of effort, time, and psychological bandwidth (Dunbar, 2018). Social ties are important as they bind us in groups. This includes time spend with neighbors which binds us to society at large (Granovetter, 1973, Christakis and Fowler, 2009) and in turn influences our health and wellbeing (Dunbar, 2018, Dunn et al., 2008). However, not all social ties are equally influenced by economic motivations (Wuchty, 2009), despite almost all requiring investment of time and resources. Social ties differ not so much in investment or relational reciprocity, but by their emotional connection. The intensity of emotional connection defines friendships as opposed to other social ties that respond to some support network alone, and other extended social ties with whom individuals share less emotional connection. This paper examines how an unanticipated income shock affects social ties of different types, including friendships, neighbors and support networks.

Social ties can entail significant economic returns to those individuals that enjoy them. As other club goods, social ties reduce the within-group information costs and encompass benefits in terms of support and collective activities (Grief, 1993; Wuchty, 2009). Hence, it is rational to actively reveal a demand for social ties such as friendships (see, for example, Montgomery, 1991; Knack and Keefer, 1997; Burchardi and Hassan, 2013). Existing research indicates that individuals are happier if they spend money on others rather than themselves (Dunn, 2008). However, we know little about how sensitive such implicit markets for social ties are, and more specifically to what extent

individuals exhibit an excess demand and supply of socialization with strong and weaker ties.

There is some research on the effect of socio-economic status (SES) on social ties which suggests that socio-economic status has an influence on friendship and status in (Cohen, 1979). However, it is difficult to infer causality from such results due to the possibility of reverse causality. As Christakis and Fowler (2009) put it, *"if you are rich, you can attract more friends, and if you have more friends, you can have more ways to become rich"*. Some evidence suggests that future earnings rise significantly with the pre-existing level of social networks that include friendship ties, external work contacts and other social networks (Boxman et al., 1991; Simon and Warner, 1992; Amuedo-Dorantes and Mundra, 2007). One could also imagine that the relationship between income and social ties is confounded by omitted third variables such as time spent working and commuting to and from work. Despite a recent study by Nguyen (2021) that finds a positive effect from lottery winnings on the number of friends[1], the current literature is scarce and the extent to which income can affect social ties remains imperfectly understood. Our research aims to fill that research void.

There are different theories of how income affects social interactions and social ties. One hypothesis is that a rise in income substitutes *social ties that are instrumentally formed* to have access to information inputs and coordinate caregiving needs (e.g., child-care coordination) that otherwise would entail an income investment (Becker and Murphy, 2000). Hence, a positive income shock could substitute an individual's

[1] Based on his estimates, Nguyen (2021) finds that it would require an income shock of nearly US$5,000 to buy one additional friend.

demand for social ties with neighbors and support networks (e.g., reliance on the community and networks of friends and neighbors) by reducing the instrumental reasons that motivate people to socialize. Nonetheless, given the evidence that individual well-being rises with the extent of social interactions (Powdthavee, 2008), a positive income shock could also act as an enabler for individuals to pursue more time with their close friends and people who they enjoy seeing as well.

This paper addresses the endogeneity issue associated with income by examining the effect of a within-person change in the amount of lottery winnings on different measures of social ties in the United Kingdom. Unlike earned income, within-person changes in the amount of lottery winnings are randomly distributed among winners, which allows us to establish causality between changes in income and changes in social ties. We exploit nationally representative longitudinal data of British households in which information on different types of social interactions and support networks was collected annually, alongside information on different sources of earned and unearned income.

Focusing on the within-person evidence of lottery winners[2], our initial analysis finds a positive and statistically significant association between lottery winnings and meeting friends outside home on most days. We also find lottery winnings to be negatively associated with the time spent talking to neighbors on most days and the number of people in the support network, on average. These results are consistent with Kunh et al

[2] It should also be noted here that the current study follows a similar empirical strategy as Cheng et al. (2018), which uses the data of lottery winners to estimate the income effects on the utilization of healthcare services. We simply use the same identification strategy as Cheng et al. to identify the income effect on the extent of social network, which, to the best of our knowledge, has not been explored previously in the economics literature.

(2011) who find evidence of the social effects of lottery wins, including higher levels of car consumption on behalf of the neighbors of lottery winners. However, further robustness checks[3] reveal that the observed average effects are driven mostly by the outliers of very large wins in the sample, i.e., people who won at least £10,000 in the lottery. Hence, while we have some evidence of a statistically well-determined average treatment effect that runs from an exogenous increase in income on social ties and support network, the effect is only prominent among the big winners in the sample.

This paper is organized as follows: Section 2 provides a background on the influence of income in the formation of social ties and social interaction outside the household; Section 3 contains the empirical strategy; Section 4 displays the paper results; We conclude with a final section.

2. Background

2.1 The building of social ties

Social ties allow for the development of social interactions which underpin the formation of communities and social groups. The 'Stiglitz Commission' report (Stiglitz, Sen and Fitoussi, 2009) includes 'social connections and relationships' as an essential dimension of well-being. In their stronger form, these connections include close-knit friendships which result from within-group interactions developed through time (van Winden et al., 2008). Carley (1991) characterizes such social interactions as cyclical processes ignited by social activity resulting from "adaptation" and "motivation" (who interacts with whom). The acknowledgement of the potential

[3] We would like to thank the editor and two anonymous referees for suggesting that we carry out further robustness checks on the outliers of very large winners in our sample.

motivation effect opens up the role of potential returns to social interactions, and even the consideration of friendship and neighborhood capital. Individuals exhibit an unobserved demand for socialization, which is limited by time and income constraints. Hence, if social ties are a normal good, one would expect then to expand with individual's income. That is, extra income allows the individuals to fulfil an unsatisfied demand for socialization.

It is empirically well-established that there are substantial well-being gains from socialization. Friendships serve the role of social and emotional support (Hartup and Stevens, 1997), and influence pro-social behaviour (Goette et al., 2012). More generally, friendships play a key role in promoting the formation of individuals' sense of self and satisfy their need for community (Deci and Ryan, 2002). Evidence from the Gallup World Poll suggests that having someone to call in times of trouble is associated with higher life satisfaction, but the effects are primarily driven by close friends (Gallup, 2005). Helliwell and Huang (2013) examine online friendships and find that doubling the number of friends in real life has an equivalent effect on wellbeing as a 50% increase in income. Powdthavee (2008) finds that an increase in the level of social interactions with friends and relatives is estimated to be worth up to an extra £85,000 a year. However, such studies ignore the fact that there might be tangible returns, such as an income gain from social interactions. Indeed, income can influence the individual's capacity to fulfil an unsatisfied latent demand for further social interactions.

Individuals may invest in social ties for instrumental reasons. The '*tend-and-befriend strategy'* (Taylor, 2006) suggests that cooperation in the form of friendships and

engaged neighborhoods is frequently a response to need or stressful environments. This is especially true in the case of weaker social ties such as interactions with neighbors, which constitute a vital component of community formation. Evidence shows that women are slightly more likely than men to identify and engage with their neighbors, and education appears to be more important than income (Ferragina et al., 2011). However, the income effects continue to be positive and statistically significant in explaining volunteering labour supply (Menchik and Weisbrod, 1987). Yet, unlike friendships, social ties that are mainly helpful for instrumental reasons and entail limited emotional investment might be replaced after an income expansion. This assertion is consistent with the so-called *'resource dependence theory'* suggests that income reduces social engagement as individuals become less dependent on others (Rusbult et al., 1991, Karus and Kelter 2009). Experimental evidence reveals that priming the concept of money leads people to behave more "self-sufficiently" and less pro-socially (Vohs et al., 2006).

2.2 Investment and disinvestment effects

We can explain social ties as processes of investment and divestment of time, money, and effort, all of which entail costs to individuals. These ties are built from emotional investments conditioned by individual circumstances of space, employment, and affiliations with other support networks. As a result, individuals invest in friendships whenever there is emotional connection between persons. In such a spirit, changes in income can have several important effects. First, they can influence the resources for building and maintaining social networks (Bordieu, 1986). Second, they can impact the social consumption that arguably 'lubricates' social relationships. However, a friend's

reciprocal behaviors are not necessarily predictable or always expected (Leider et al., 2010)[4].

Individuals are also often confronted on a daily basis with all kinds of practical problems that require help from others. Hence, income might provide the resources to externalize the market and fulfil this requirement, resulting in a lower demand for social ties. In addition to pecuniary effects, social ties are argued to respond to the evolutionary desire for interpersonal attachments (Baumeister and Leary, 1995). Social ties can be used both to sanction bad behaviour as well as to reward kindness (Mui, 1995). These effects are important as they reduce social distance which is positively correlated with cooperation and economic growth (Burchardi and Hassan, 2013).

The demand for social ties can be expressed as a function of certain traits such as physical attractiveness or intelligence which correlate with income (Anthony et al., 2007). Social ties might well be motivated by the pursuits of some material reward or emotional reward (e.g., appreciation of an achievement by friends), hence a change in income social ties that are held for material reasons. Leider et al (2010) conduct a field experiment to show that people are more likely to be altruistic toward their own friends compared to nameless recipients, and that reciprocity is imperfect as subjects were unaware of the baseline altruism of people they know, including their close friends.

Nonetheless, the demand for social ties might depend on an individual's socio-economic position. Lower socio-economic status individuals might strategically

[4] Although reciprocity is not the sole motivation of social ties, in the presence of multiple competing social ties, absence of returns to socialization, might on the margin lead to a change in the investment in time and emotions in alternative social ties.

strengthen their ties with individuals who are more likely to bring payoffs in terms of instrumental support (Bianchi and Vohs, 2016). In contrast, higher socio-economic status individuals might prioritize social ties that are not necessarily valuable for resources, but rather for emotional wellbeing. Bianchi and Vohs (2016) find that although higher income reduces social ties, individuals with higher incomes spend less time socializing with family and neighbors and more time socializing with friends. More recently, in a study of lottery winners in Vietnam, Nguyen (2021) finds that lottery winners tend to increase the number of their non-colleague or long-term friends, rather than the number of friends among colleagues or new friends. They also tend to spend more money on the number of meals out, on sight-seeing and tourism, and on meeting with friends and/or relatives. However, it seems important to separate the pure 'income effect' from that of socio-economic status.

2.3 Attraction effects

If social ties are motivated by some expectation of reward, then successful individuals are more likely to be able to attract people into their social network, assuming that others perceive that they can participate in the individual's success. The latter might be more the case among people who believe in luck as determining individual success, as well as those driven by insurance motivation, as social ties serve a reciprocal source of support under hostile circumstances. Similarly, wealth might exert an evolutionary influence in attraction and sorting. Finally, unearned income might induce celebration and other sources of expenditure including transfers to friends and neighbors. On the other hand, lottery winnings can lead to envy and unhealthy social comparisons.

2.2.4 Other explanations

Alternate explanations refer to the perception that social isolation is associated with poverty and unemployment (Lelkes, 2010). It may also be a consequence of getting out of the labour market. On the other hand, it is likely to be a cause of long-term labour market opportunities. Hence, the causal effect of income changes on social ties should control for such effects; lottery wins can potentially be a way to separate such effects from those of social ties based purely on income.

3. Data and Empirical Strategy

3.1 Data

The data used in the analysis comes from the British Household Panel Survey (BHPS), which is a nationally representative sample of British households containing over 25,000 unique adult individuals surveyed from 1991-2009 (Taylor et al., 2004). Respondents are interviewed in successive waves. Households who move to a new residence are interviewed at their new location; if an individual split from the original household, all adult members of their new household are also interviewed. Children are interviewed once at 16 years old. The sample has remained broadly representative of the British population since its inception.

We study the extent of social interaction and support network of lottery winners in the BHPS. Data on lottery winners were collected for the first time in September 1996 and are available until April 2009 (BHPS Waves 7-18). In the survey, respondents were asked to state whether they received windfall income from football pools/national lottery and the amount of winnings. The exact question is:

"*About how much in total did you receive? Win on the football pools, national lottery or other form of gambling*"

In modern Britain, the national lottery is overwhelmingly the main form of gambling relevant to this question, so for succinctness we shall refer to this as lottery win[5]. For the design of the study, the variation in the size of any gambling windfall would be suitable as a quasi-experimental income shock.

We focus on all lottery winners at the year of winning the lottery. This produces 16,592 observations from 7,138 individuals. Of those individuals, 3,558 (21.4%) registered only one win in the entire panel. There were 2,950 individuals (17.8%) who won twice, 2,370 (14.3%) who won three times, and 7,714 (46.5%) who won between three and twelve times in the panel. The average real lottery win (adjusted to consumer price index in 2000) is £217 (or US$272) with a within-person standard deviation of £1,102 (US$1,380). There is also a long tail in the amount of lottery win. Of 16,592 observations of lottery winners, 14,953 (90.1%) reported a win of £1-£249, 1,182 (7.1%) reported a win of £250-£999, 392 (2.4%) reported a win of £1,000-£4,999, 37 (0.22%) reported a win of £5,000-£9,999, and 28 (0.17%) reported a win of £10,000 or more.

The BHPS also asked their respondents the following two questions about their daily social interactions in every year since September 1996 (Wave 7):

[5] The ratio of lottery players to those who play the football pools is approximately 50 to 1 (see, e.g., for example, http: //www.bestfreebets.org/betting-articles/football-pools-explained.html, assessed 14 July 2020.)

"*We would like to ask how often you meet people, whether here at your home or elsewhere. How often do you meet friends or relatives who are not living with you? Is it… 1. Never, 2. Less often than once a month, 3. Once or twice a month, 4. Once or twice a week, 5. On most days*.", and "*How often do you talk to any of your neighbors? Is it… 1. Never, 2. Less often than once a month, 3. Once or twice a month, 4. Once or twice a week, 5. On most days."* Figures 1A-B illustrate the distributions of these two outcome variables. Here, we can see that most people in the UK meet up with friends and talk to their neighbors regularly; approximately 45% of the adult sample meet friends on most days, and 39% talk to their neighbors on most days. Given that we have two very highly skewed outcome variables that are ordinal in nature, our analysis will focus on estimating the effect of lottery winning on individuals reporting to be in the top category. More specifically, we will be estimating the effect of lottery win on two indicator variables: 1) 'Meeting friends on most days' (M=0.45; S.D.=0.49), and 2) 'Talking to neighbors on most days' (M=0.39; S.D.=0.49). Putting these variables into perspective, it is useful to work out that meeting friends on most days (=1) adds up to around 20-31 days of social interactions per month compared to meeting friends one or two days a week or less (=0), which can range between 0-8 days of social interactions per month.

In addition to this, the BHPS also asked their respondents every two years the following five questions about the extent of their support network. These include "*Is there someone who will listen?*", "*Is there someone to help you in a crisis?*", "*Is there someone you can relax with?*", "*Is there anyone who really appreciates you?*", and "*Is there anyone you can count on to offer comfort?*". Responses to these questions are on a 3-point scale: 0 = "*No one*", 1 = "*Yes, one person*", and 2 = "*Yes, more than one*

person". Given that responses to the five support network questions are moderately correlated (the average correlation is ≈ 0.6) and are categorical in nature, we applied a polychoric factor analysis on these five variables, which mostly loaded onto only one principal factor of support network[6]. We then standardized the factor variable to have a mean of 0 and a standard deviation of 1.

To assess whether lottery winners are representative of the general population, Table 1A in the Appendix examines the extent to which winners and non-winners are different in terms of social interactions, social support, and key socio-economic characteristics. It appears that more non-winners meet with their friends on most days than winners, but no differences in the propensity to talk to neighbors on most days between winners and non-winners. Winners are also more likely to be male, earn higher household income, retired, married, own home outright, and have fewer children than non-winners.

3.2 Empirical strategy

We assume the following social ties regression equation:

$$S_{it} = \alpha + \beta L_{it} + \gamma Y_{it-1} + Z'_{it-1}\delta + u_i + \varepsilon_{it}, \quad (1)$$

where $i = 1, \dots, N$ and $t = 1, \dots, T$. S_{it} denotes the extent of social ties of individual i at time t. More particularly, S_{it} can either take the form of i) a dummy variable that has a value of 1 for meeting friends on most days, and 0 otherwise; ii) a dummy variable that has a value of 1 for talking to neighbors on most days, and 0 otherwise; and iii) the

[6] See Table 2A in the appendix for the factor loadings on the support network variables.

standardized principal component of social network that has a mean of 0 and a standard deviation of 1. L_{it} is the amount of real lottery wins in the year of winning measured in £1,000s; Y_{it-1} is the one-year lag of log of real equivalent household income; Z'_{it-1} represents a vector of one-year lag of socio-demographic control variables, including age polynomials, employment status, qualifications, marital status, self-reported health status, homeownership status, number of days of hospitalization last year, number of dependent children (age<16), regional and survey wave dummies; u_i is the unobserved individual fixed effects; and ε_{it} is the error term. We choose to include lagged control variables is to minimize the "bad controls" problem as highlighted in Angrist and Pischke (2008), in which the control variables are themselves outcomes of the lottery win.

The key identification strategy is that the variation in the amount of real lottery winnings, L_{it}, among lottery winners in the year of winning is uncorrelated with both of the unobserved components in the regression equation, namely u_i and ε_{it}. While this assumption seems valid in that lottery winners cannot possibly manipulate winning lottery numbers, it discounts the possibility that large winners may have won more because they play more lotteries. This so-called "lottery-ticket (LT) bias" (Kim and Oswald, 2020), which stems from unobserved lottery spending, could potentially confound the relationship between the actual winning and the extent of social ties. However, assuming that individual's propensity to spend on lottery tickets is fixed (or slow-moving) over time, we can control for most, if not all, of the LT bias from confounding the effect of lottery win on social ties by including i) the order of the win in the panel, O_{it}, in the regression equation, and ii) estimating the regression using a linear probability model with fixed effects (FE). The inclusion of O_{it} as a control

variable allows for the possibility that there is an accumulation of expenditure on lottery tickets with each successive lottery win, whilst estimating the regression equation using linear FE estimator should eliminate any unobserved person-specific correlation between L_{it} and u_i. We use linear probability with FE estimator to estimate all social interaction models and cluster our standard errors at the individual level in all regressions.

4. Results

4.1 Average effects of lottery wins on social ties

Does money buy us more time with our friends? To make a first pass at this question, Figure 2 illustrates the proportion of individuals reporting to meet their friends and talk to neighbors on most days by the size of lottery win. On average, we can see that around 50% of individuals who reported a higher lottery win, i.e., £250 and over, in the year of winning met up with their friends on most days compared to 44% of those who reported a smaller lottery win, i.e., £1-£249. However, there is statistically insignificant difference in talking to neighbors on most days between winning big or small in the lottery. Figure 2 thus provides some preliminary raw data evidence that larger wins are associated positively with the frequency of social interactions with friends but not neighbors.

Table 1 tests for the lottery effects more systematically by estimating a linear probability mode with FE on meeting with friends on most days, talking to neighbors on most days, and the standardized principal component of social support. We report in Columns 1, 3, and 5 the estimates with only age polynomials, regional, and survey wave dummies as the control variables, and in Columns 2, 4, and 5 the estimates with

full set of controls. Looking across the columns, we can see that adding more control variables did not lead to a substantial change in the size of the estimated coefficients, thus reaffirming that the amount of winnings is exogenously determined across lottery winners in the linear probability with FE regressions.

Consistent with theories on investment and attraction effects, lottery win has a positive and statistically significant effect on meeting friends on most days, but a negative and statistically significant effect on talking to neighbors on most days and the factor support network variable. On average, we find that a unit increase in the amount of winnings (= £1,000) increases the probability of meeting friends on most days by 0.4 percentage points. To put this estimated effect into perspective, winning £1,000 is equivalent to around 10% of the positive effect retirement has on meeting friends on most days. By contrast, a win of £1,000 reduces the probability of talking to neighbors on most days by approximately the same amount; the estimated marginal effect of a £1,000 win on the probability of talking to neighbors on most days is -0.5 percentage points.

A bigger win in the lottery also has a negative effect on the extent of support network. Since we use a linear model to estimate the support network equation, we can readily interpret the coefficient as marginal effects. Here, a £,1000 increase in lottery win reduces the extent of support network by approximately 0.02 standard deviation. What Table 1's results seem to suggest is that, although a positive income shock increases the time that individuals spend socializing with friends outside their home, it also reduces the extent of their social interaction with people in their local area as well as the number of support network they feel they could call upon if they need help.

Table 1's other results show that the one-year lagged of real equivalent household income is not statistically significantly correlated with the frequency of meeting friends and talking to neighbors in period *t*. The nonsignificant coefficients are consistent with the hypothesis that the income-social ties relationship is often confounded by various omitted variables, including time spent commuting and working. The accumulating number of wins is positive and statistically significant in the meeting with friends on most days regression, thus suggesting there is an important association between the accumulation of expenditure on lottery tickets with each successive lottery win and meeting friends on most days. The retired, those not in the labour force, individuals with O-level qualification, and parents with dependent children spend significantly more time socializing with friends than others, on average. With respect to talking to neighbors, people who retired, the disabled, those not in the labour force, those who are married, and people with certain educational qualifications (HND, O-level, A-level, and CSE) are more likely to spend more time talking to their neighbors on most days. Interestingly, most of the covariates in the support network regression have coefficients that are not significantly different from zero.

Table 2 tests for the heterogeneity in the income-social ties relationship by interacting level lottery win with dummy variables that represent three different sub-samples: i) males *vs*. females; ii) age 45 years old or below *vs*. age 46 and over; and iii) income below the median *vs*. income above the median. While we continue to find the main effects of lottery win on social interactions to be statistically robust in the interacted regression models, there is little evidence of heterogeneity in the estimated effects by gender, age groups, and household income.

We carried out further robustness checks on the average lottery effects in Tables 3A-6A in the Appendix. Table 3A tests whether we can still obtain qualitatively similar results as those obtained in Table 1 by replacing the dependent variable with the 5-point scale social interaction variables with the responses range from "1. Never" to "5. On most days". Hence, it makes empirically little differences to the overall findings whether or not we collapse the 5-point scale frequency of social interaction variables into a binary variable before running the analysis.

Table 4A checks whether the effect of lottery win on social ties is persistent over time. We do this by replacing the contemporaneous measure of lottery win with a one-year lag of lottery win as the explanatory variable of interest in Eq. (2) while restricting the sample to only individuals who did not win in the lottery in year *t*. We find little evidence that a lottery win in year *t*-1 has any statistically meaningful effect on the propensity of meeting friends on most days, talking to neighbors on most days, and the extent of support networks in year *t*. These results suggest that, on average, the lottery win's effect on social ties is likely to be experienced only in the year of winning.

As suggested by a referee, Table 5A includes the ratio between lottery win and household income as an additional control variable to allow for size of the lottery winnings relative to income to be taken into account in the estimation. However, including the lottery-income ratio variables in the regression does little to alter the lottery effects in any of the three social interaction regressions.

Finally, Table 6A investigates whether winning more in the lottery also has a statistically important average effect at reducing the extent of social isolation. We did

this by estimating the lottery effects on two indicator variables: i) meeting friends less than once a month, and ii) talking to neighbors less than once a month. Unlike the other extreme of social interactions, we find little evidence that winning more in the lottery reduces the probability of individuals spending less time with their friends and neighbors. In other words, it appears that winning more in the lottery mainly affects those who already have a fairly healthy social interaction with their friends and neighbors.

4.2 Are the average effects driven by the outliers of very large wins?

Given the skewness in both lottery win and social ties data, i.e., there are far fewer large wins than small wins and socially isolated than socially active individuals, it is possible that the average lottery effects observed in Table 1 are driven by a few outliers of big winners in the sample. In other words, it is highly likely that a large win will be required to make individuals even more socially active when the majority of people are already meeting friends and talking to their neighbors on most days.

To formally test this hypothesis, we first plot two locally weighted scatterplot smoothing (lowess) of lottery win and social ties and present them in Figures 3A-3B. Looking at these plots, we can see that the average lottery effects on meeting friends and talking to neighbors on most days previously observed in Table 1 are driven primarily by a few big winners, i.e., those with a win of at least £10,000. Figures 3A-3B thus suggest that a small to medium-sized win in the lottery might, in fact, have little to no impact on people's social ties and support network.

We conduct further robustness tests on the importance of these outliers of big winners in Tables 3 and 4. Following a referee's suggestion and studies by Young (2019) and Lindqvist et al. (2020), we conduct in Table 3 a randomization inference test based on a null hypothesis that lottery wins have zero effect on social ties and support network. More specifically, we independently permute the size of the lottery and use them to re-estimate Table 1's specifications. We repeat the process 1,000 times using STATA's ritest command (Heß, 2017) to obtain the *p*-values that would be robust to the exclusion of outliers. Looking across Table 3's columns, we can see that the permutated-based *p*-values of Table 1's estimated lottery effects range from 0.39 to 0.75, which implies that we cannot reject the null hypothesis of zero treatment effects.

Table 4 provides several more checks on the outlier effects, which include i) replacing level lottery win with log lottery win; ii) excluding the top 5% and, subsequently, 1% of lottery winners from the estimation; and iii) splitting lottery win into different winning categories and estimate them as dummy variables. Here, we can see from Panel A that log of lottery win, which ultimately gives less weight to the big winners in the sample, does not increase (decrease) the probability of meeting friends (talking to neighbors) on most days in a statistically meaningful way. Similarly, we find little evidence in Panels B and C that lottery win substantially increase (decrease) the probability of meeting friends (talking to neighbors) on most days once we exclude the top 5% -- or even the top 1% -- winners from the sample.[7] Finally, Panel D shows that only individuals with a win of £10,000 or more in the lottery (0.17% of the entire lottery winner sample) report a statistically significantly higher probability of meeting friends

[7] Because of the highly skewed lottery data, it is worth noting that individuals only have to win £55 to fall within the top 5% of winners and £238 to fall within the top 1% of winners.

on most days – the estimated coefficient on winning at least £10,000 in the "meet with friends on most days" equation is 0.235 with a standard error of 0.106 – and lower probability of having a good support network – the estimated coefficient on winning at least £10,000 in the factor of support network equation is -1.336 with a standard error of 0.759.

Based on these statistical tests, we conclude that, while money buys more time with friends and less time with people who we might only maintain the relationship purely for instrumental reasons, the effects are statistically robust only for those who had just experienced a very large income shock. A small to medium-sized win (<£10k) may not be enough to change people's social ties and support network in a substantial way.

5. Conclusions

This paper examines the effect of a lottery win on social ties and specific contact with friends and neighbors, as well as reliance on informal support networks. We first show a lottery win to increase, on average, the probability of meeting friends on most days, which is consistent with the hypothesis that a positive income shock helps individuals to strengthen social ties with old friends (and perhaps allows them to make new ones) with the objective to improve one's emotional wellbeing (Powdthavee, 2008). Alternatively, another consistent explanation refers to sharing or bandwagon effects driven by the higher relative attractiveness of individuals that experience an unearned income gain. By contrast, our analysis suggests that income substitutes contact with instrumental social ties such as neighbors and the individual reliance on a support network, which is consistent with resource constraint theory.

However, further robustness checks of the initial findings suggest that the average treatment effects are driven mainly by a few outliers of big winners, i.e., a win of at least £10,000. This is reasonable, considering that a small to medium-sized win in the lottery is unlikely to be enough to change people's social life in a substantial way. Nevertheless, given the very small number of big lottery winners in the nationally representative BHPS sample, future research may need to use a much larger sample of big lottery winners to get a better estimate of the turning point's location, and a more refined measurement of social engagement – perhaps, the number of hours spent with friends and family in the previous day – to detect the effects of smaller wins on social ties as well.

More generally, our results provide some evidence of a potential mediator on the effect that social ties have on an individual's overall life satisfaction (Easterlin, 2001; Dolan et al., 2008; Layard et al., 2008; Powdthavee, 2008, 2010; Kahneman and Deaton, 2010), and suggest a potential trade-off between devoting more time to nurturing social activities, which have an economic value, and improving one's income in the pursuit of higher life satisfaction.

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Figures 1A-B: Distribution of social interactions

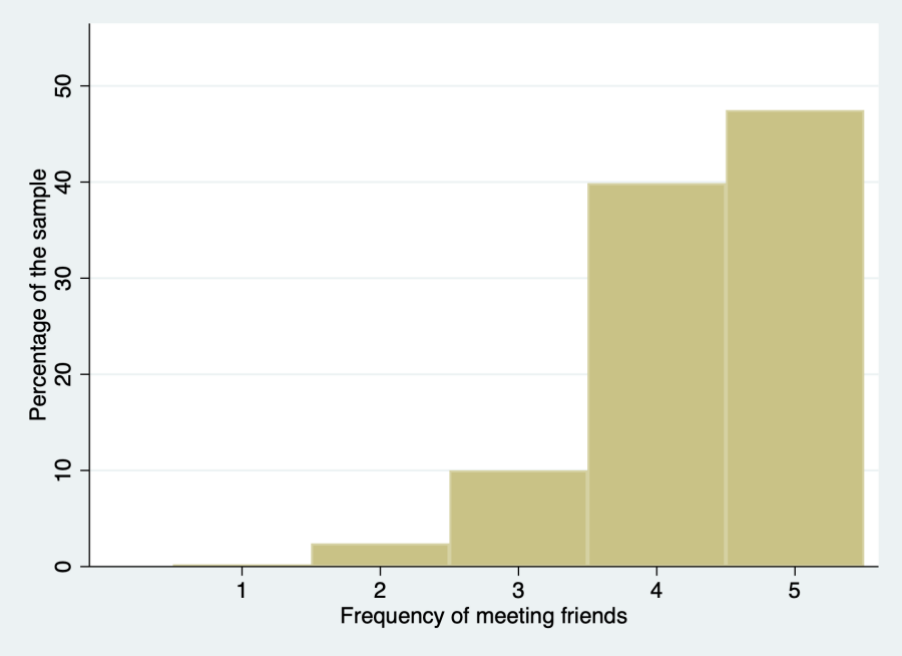


Fig. 1A: Frequency of meeting friends

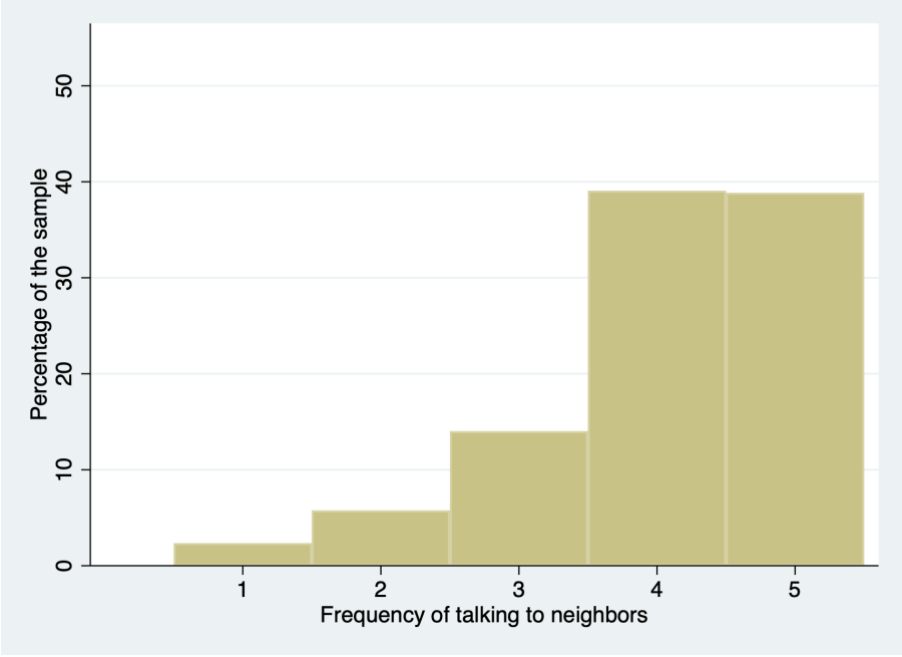
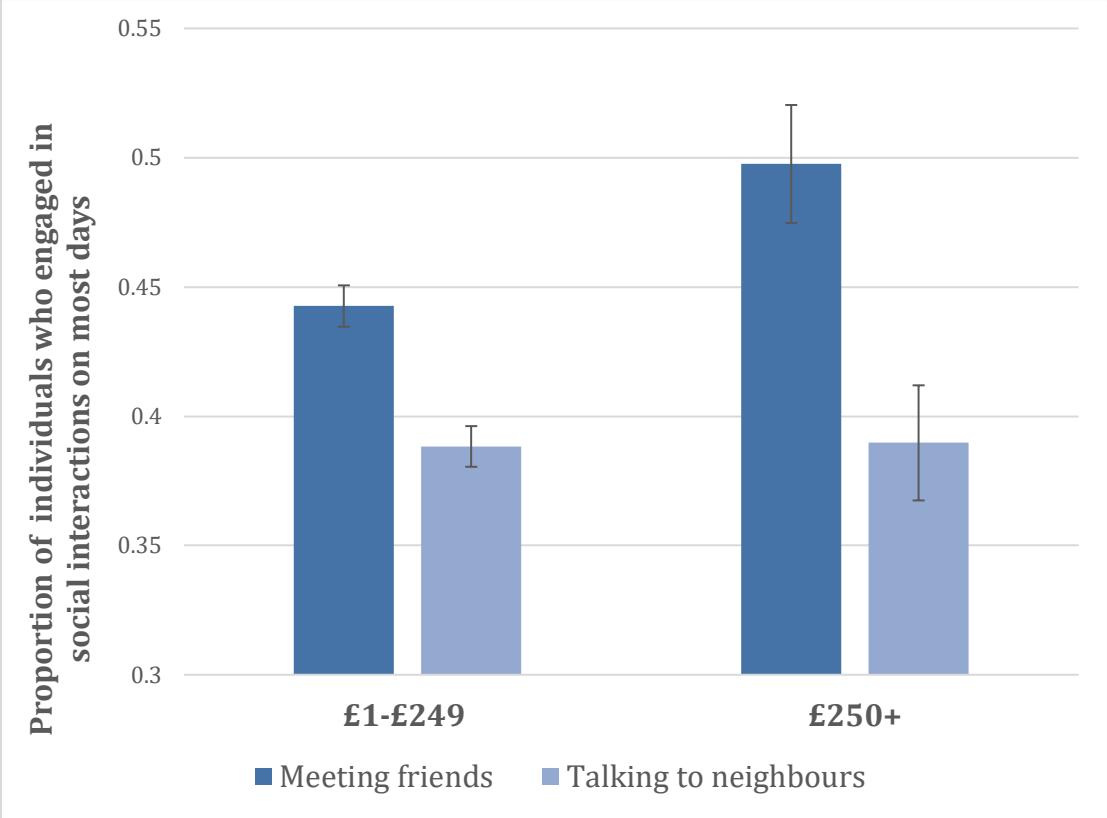


Fig. 1B: Frequency of talking to neighbors

Note: Responses to the frequency of social interactions are: 1 = "Never"; 2 = "Less than once a month"; 3 = "Once or twice a month"; 4 = "Once or twice a week"; 5 = "On most days".

Figure 2: Simple cross-sectional evidence: Proportions of people who meet friends and talk to neighbors on most days by the size of lottery win



Note: The sample consists of only lottery winners at the year of winning. There are 14,986 observations of small win, i.e., £1-£249, and 1,639 observations of medium-large win, i.e., £250+. Four standard error bars (two above, two below) – i.e., 95% confidence intervals – are presented.

Table 1: Social network and lottery win: Linear probability model with individual fixed effects

	Meet friends on most days (=1)		Talk to neighbors on most days (=1)		Principal factor of support network	
VARIABLES	**(1)**	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**
Lottery win (in £1,000)	0.00358**	0.00334**	-0.00525***	-0.00508***	-0.0180***	-0.0183***
	(0.00157)	(0.00140)	(0.00100)	(0.00103)	(0.000944)	(0.00106)
Order of win		0.0112**		0.00445		-0.00585
		(0.00565)		(0.00512)		(0.0188)
Age	-0.0533**	-0.0519**	-0.0268	-0.0354	0.0893	0.161
	(0.0216)	(0.0238)	(0.0211)	(0.0232)	(0.113)	(0.121)
Age-squared	0.00102***	0.000889***	0.000495*	0.000328	-0.00169	-0.00240*
	(0.000264)	(0.000308)	(0.000261)	(0.000294)	(0.00110)	(0.00127)
Age-cubed	-5e-06***	-4.84e-06**	-3.00e-06*	-2.02e-06	1.11e-05	1.53e-05*
	(1.75e-06)	(1.97e-06)	(1.73e-06)	(1.90e-06)	(7.38e-06)	(8.13e-06)
Control variables measured in t-1						
Log of real equivalent household income		0.00868		0.00260		0.0490
		(0.0116)		(0.0101)		(0.0466)
Disabled/long-term illness		0.0256		0.0690		-0.0764
		(0.0391)		(0.0424)		(0.211)
Unemployed		0.0343		0.00424		0.0136
		(0.0350)		(0.0339)		(0.166)
Self-employed		-0.0250		-0.0181		-0.142
		(0.0301)		(0.0253)		(0.107)
Retired		0.0503*		0.0750***		-0.0769
		(0.0290)		(0.0290)		(0.0986)
Not in the labour force		0.0788***		0.0576**		-0.00502
		(0.0259)		(0.0234)		(0.118)
Married		-0.0541		0.0597*		-0.176
		(0.0350)		(0.0320)		(0.130)
Cohabiting		-0.0591*		-0.0312		-0.135
		(0.0327)		(0.0301)		(0.127)
Divorced		-0.0251		-0.0723		0.111
		(0.0617)		(0.0545)		(0.226)
Separated		0.0834		-0.0714		0.231
		(0.0643)		(0.0550)		(0.275)
Health: Poor		-0.0161		-0.0222		0.125
		(0.0338)		(0.0366)		(0.195)
Health: Fair		-0.00899		-0.0388		0.129
		(0.0340)		(0.0352)		(0.203)
Health: Good		-0.00533		-0.0598*		0.259
		(0.0353)		(0.0360)		(0.209)
Health: Excellent		-0.0129		-0.0522		0.317
		(0.0374)		(0.0373)		(0.214)
Qualification: Higher degree		0.198		0.191		0.0829
		(0.135)		(0.136)		(0.482)
Qualification: First degree		0.225**		0.125		0.289
		(0.0976)		(0.0900)		(0.496)
Qualification: HND/HNC/teaching		0.155		0.195**		-0.220

		(0.104)		(0.0855)		(0.276)
Qualification: A-level		0.103		0.170**		0.184
		(0.0768)		(0.0808)		(0.464)
Qualification: O-level		0.195***		0.203**		0.261
		(0.0727)		(0.0801)		(0.473)
Qualification: CSE		0.00943		0.240*		0.0225
		(0.137)		(0.141)		(0.377)
Homeowner		-0.0243		-0.000779		0.0194
		(0.0256)		(0.0258)		(0.108)
Number of days stayed in hospital last year		4.84e-05		0.000723		-0.00473
		(0.00134)		(0.00142)		(0.00988)
Number of dependent children		0.0409***		0.0287**		-0.0509
		(0.0131)		(0.0120)		(0.0452)
Observations	16,587	15,084	16,588	15,085	5,105	4,663
Overall R-squared	0.011	0.016	0.009	0.020	0.019	0.041
Number of unique individuals	7,137	6,364	7,137	6,365	3,721	3,337

Note: *<10%; **<5%; ***<1%. Principal factor of support network is standardized to have a mean of 0 and a standard deviation of 1. The sample consists of lottery winners in the winning year. Standard errors are clustered at the personal identification level and are reported in parentheses. Other controls include regional and survey wave dummies.

Table 2: Sub-sample analysis: Linear regression with individual fixed effects

	(1)	(2)	(3)
A) Meet friends on most days (=1)			
Lottery win (in £1,000)	0.00229***	0.00217***	0.00302
	(0.000543)	(0.000814)	(0.00381)
Lottery win (in £1,000) × male	0.00585		
	(0.00681)		
Lottery win (in £1,000) × age over 45		0.0148	
		(0.0101)	
Lottery win (in £1,000) × household income above median			0.000346
			(0.00371)
B) Talk to neighbors on most days (=1)			
Lottery win (in £1,000)	-0.00581***	-0.00548***	-0.00459
	(0.000567)	(0.000768)	(0.00296)
Lottery win (in £1,000) × male	0.00407		
	(0.00296)		
Lottery win (in £1,000) × age over 45		0.00475	
		(0.00387)	
Lottery win (in £1,000) × household income above median			-0.000606
			(0.00339)
C) Principal factor of support network			
Lottery win (in £1,000)	-0.0181***	-0.0186***	-0.0282***
	(0.000573)	(0.00113)	(0.00676)
Lottery win (in £1,000) × male	-0.00291		
	(0.0187)		
Lottery win (in £1,000) × age over 45		-0.0120	
		(0.0206)	
Lottery win (in £1,000) × household income above median			0.0103
			(0.00672)

Note: ***<1%. Linear regressions with individual fixed effects. Principal factor of support network is standardized to have a mean of 0 and a standard deviation of 1. The sample comprises of lottery winners in the year of winning. Standard errors are clustered at the personal identification level and are reported in parentheses. All regressions control for personal characteristics measured at t and t-1, as well as regional and survey wave dummies; see Columns 2, 4, and 6 in Table 1.

Figures 3A-B: Locally weighted scatterplot smoothing of lottery win and social ties

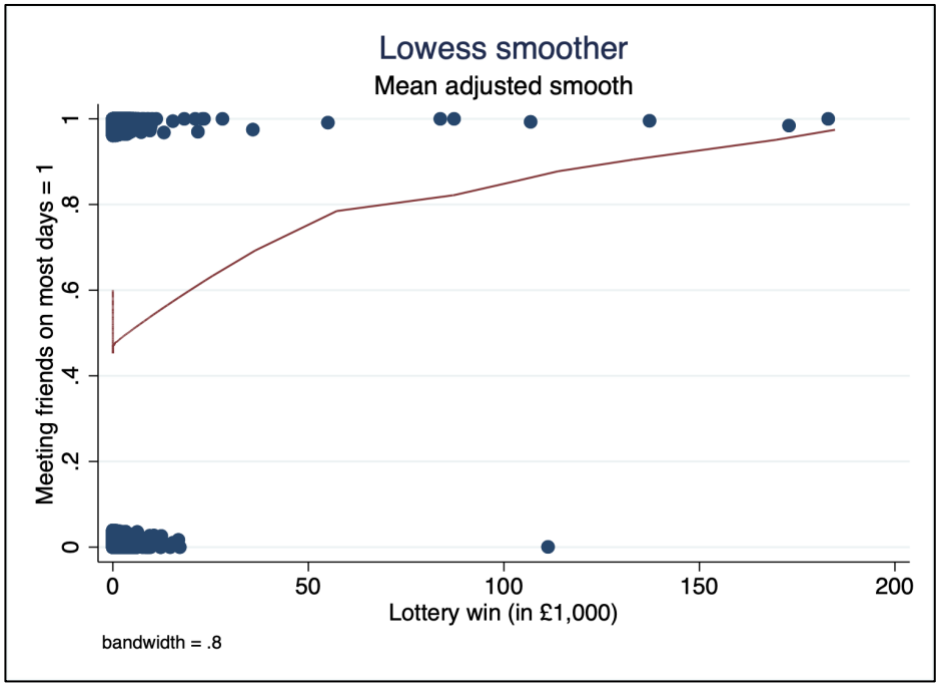


Fig. 3A: Meeting friends on most days=1

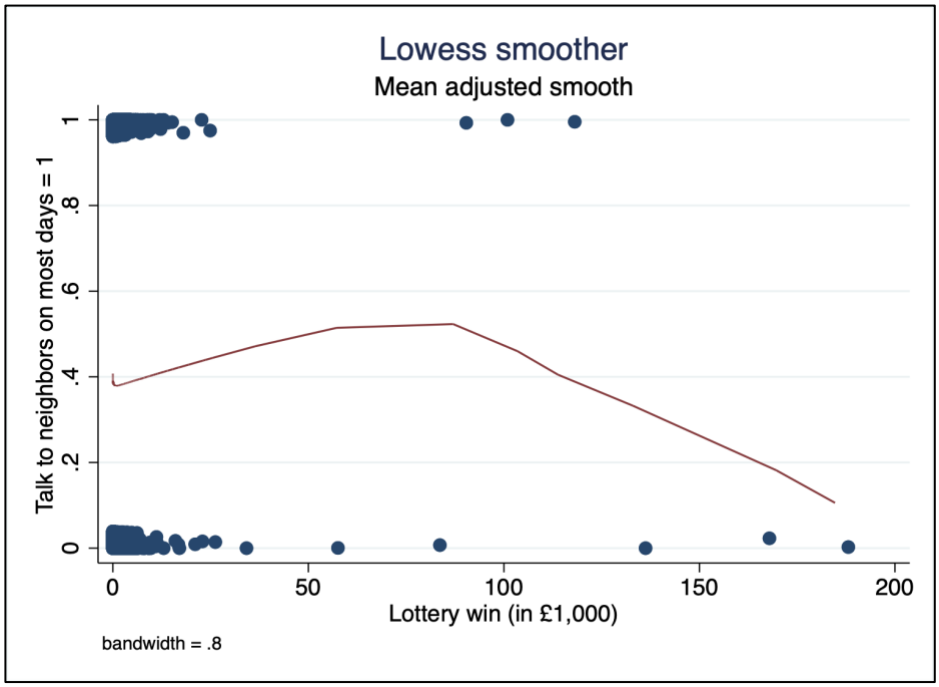


Fig. 3B: Talking to neighbors on most days=1

Note: Each locally weighted scatterplot smoothing is plotted using STATA's *lowess* command with bandwidth=0.8 and the adjust option, which adjusts the mean of the smoothed social tie variable to equal the mean of social tie variable by multiplying by an appropriate factor.

Table 3: P-values of the lottery win coefficient obtained from randomization inference estimation

	Meet friends on most days (=1)		Talk to neighbors on most days (=1)		Principal factor of support network	
	(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**
Lottery win (in £1,000)	0.00358	0.00334	-0.00524	-0.00507	-0.0179	-0.0182
p-value	*0.530*	*0.597*	*0.392*	*0.466*	*0.658*	*0.754*
SE(*p*)	(0.0158)	(0.0155)	(0.0154)	(0.0158)	(0.0150)	(0.0136)
Full controls as in Table 1	No	Yes	No	Yes	No	Yes
Observations	16,587	15,084	16,588	15,085	5,105	4,663
Overall R-squared	0.011	0.016	0.009	0.020	0.019	0.041
Number of unique individuals	7,137	6,364	7,137	6,365	3,721	3,337

Note: We carried out the randomization inference test using STATA's *ritest* command (Heß, 2017), which produces permutation-based *p*-values constructed by simulating the distribution of the relevant test statistic under the null hypothesis of zero treatment effects (Young, 2019). In each simulation iteration, we independently permuted the size of the lottery win and used that to estimate the lottery effect. This process was repeated 1,000 times to obtain the *p*-values that would be robust to the exclusion of outliers.

Table 4: Further robustness checks

VARIABLES	Meet friends on most days (=1)	Talk to neighbors on most days (=1)	Principal factor of support network
Panel A: All sample using log lottery win			
Log of lottery win (in £1,000)	-0.00209	-0.00381	-0.0325*
	(0.00398)	(0.00372)	(0.0173)
Panel B: Excluding the top 5% of lottery winners			
Lottery win (in £1,000)	0.0229	-0.0431	-0.393
	(0.0603)	(0.0570)	(0.257)
Panel C: Excluding the top 1% of lottery winners			
Lottery win (in £1,000)	0.000674	0.0102	-0.0705
	(0.0198)	(0.0179)	(0.0888)
Panel D: Dummies representing different winnings			
Lottery win: £250-£999 (7.1% of sample)	0.0311	-0.000953	-0.0860
	(0.0191)	(0.0169)	(0.0712)
Lottery win: £1,000-£4,999 (2.4% of sample)	-0.0108	0.00284	-0.0662
	(0.0311)	(0.0282)	(0.147)
Lottery win: £5,000-£9,999 (0.22% of sample)	0.0115	-0.0263	-0.367
	(0.0967)	(0.0831)	(0.276)
Lottery win: £10,000 and over (0.17% of sample)	0.235**	-0.0194	-1.336*
	(0.106)	(0.0897)	(0.759)

Note: *<10%; **<5%. Linear regressions with individual fixed effects. Principal factor of support network is standardized to have a mean of 0 and a standard deviation of 1. The sample comprises of lottery winners in the year of winning. Standard errors are clustered at the personal identification level and are reported in parentheses. All regressions control for personal characteristics measured at t and t-1, as well as regional and survey wave dummies; see Columns 2, 4, and 6 in Table 1.

For Online Appendix

Table 1A: Summary statistics of lottery winners

	Lottery winners at the year of winning (1)		Non-winners (2)		p-value from a balance test between samples (1) and (2)
Variables	**Mean**	**S.E.**	**Mean**	**S.E.**	
Lottery win (in £1,000)	.216	.022			
Meet friends on most days	.449	.004	.469	.001	(0.000)
Talk to neighbors on most days	.388	.004	.387	.001	(0.646)
Principal factor of support network	1.87	.006	1.814	.002	(0.000)
Male	.567	.004	.454	.001	(0.000)
Age	45.28	.135	45.276	.040	(0.974)
Log of real equivalent household income	9.494	.005	9.339	.002	(0.000)
Disabled/long-term illness	.038	.001	.025	.000	(0.000)
Unemployed	.023	.001	.023	.000	(0.748)
Self-employed	.073	.002	.041	.000	(0.000)
Retired	.187	.003	.121	.001	(0.000)
Not in the labour force	.096	.002	.09	.000	(0.008)
Married	.562	.004	.318	.001	(0.000)
Cohabiting	.131	.003	.062	.000	(0.000)
Divorced	.047	.002	.032	.000	(0.000)
Separated	.012	.001	.01	.000	(0.020)
Health: Poor	.082	.002	.086	.001	(0.065)
Health: Fair	.232	.003	.219	.001	(0.000)
Health: Good	.447	.004	.435	.001	(0.003)
Health: Excellent	.214	.003	.233	.001	(0.000)
Qualification: Higher degree	.023	.001	.022	.000	(0.584)

Qualification: First degree	.079	.002	.09	.001	(0.549)
Qualification: HND/HNC/teaching	.068	.002	.061	.001	(0.000)
Qualification: A-level	.212	.003	.168	.001	(0.001)
Qualification: O-level	.284	.003	.238	.001	(0.000)
Qualification: CSE	.054	.002	.048	.000	(0.000)
Homeowner	.757	.003	.59	.001	(0.000)
Number of days stayed in hospital last year	.704	.035	1.061	.016	(0.000)
Number of dependent children	.450	.007	.517	.002	(0.000)

Table 2A: Polychoric factor loadings on the support network variables

Social support variables	Factor 1	Factor 2	Uniqueness
A: "Someone who will listen?"	0.825	-0.146	0.298
B: "Someone who can help you in a crisis?"	0.836	-0.127	0.284
C: "Someone you can relax with?"	0.807	0.073	0.343
D: "Anyone who really appreciates you?"	0.813	0.148	0.317
E: "Anyone you can count on to offer comfort?"	0.853	0.055	0.269

Note: Responses to the five (A-E) support network questions range from 0 = no one, 1 = yes, one person, and 3 = yes, more than one. We use the polychoric factor analysis, which is an analysis that accommodates variables that are dichotomous or ordinal, to calculate the factor variable for the support network. We adopt the user-written command polychoric in STATA to perform this analysis. Number of observations = 79,461. Retained factors = 2. Uniqueness represents the variance that is unique to the variable and not shared with other variables. As can be seen from the table, Factor 1 was able to extract almost all of the variance from each of the five support network variables, i.e., each correlation coefficient is at least 0.8.

Table 3A: Social network and lottery win: Assuming cardinality in the full-scale social interaction variables

	Frequency of meeting with friends		Frequency of talking to neighbors	
VARIABLES	**(1)**	**(2)**	**(3)**	**(4)**
Lottery win (in £1,000)	0.00501***	0.00334**	-0.00772***	-0.00508***
	(0.00151)	(0.00140)	(0.00182)	(0.00103)
Order of win		0.0112**		0.00445
		(0.00565)		(0.00512)
Age	-0.0331	-0.0519**	-0.0112	-0.0354
	(0.0319)	(0.0238)	(0.0435)	(0.0232)
Age-squared	0.000925**	0.000889***	0.000579	0.000328
	(0.000375)	(0.000308)	(0.000574)	(0.000294)
Age-cubed	-4.38e-06*	-4.84e-06**	-3.78e-06	-2.02e-06
	(2.48e-06)	(1.97e-06)	(3.60e-06)	(1.90e-06)
Control variables measured in t-1				
Log of real equivalent household income		0.00868		0.00260
		(0.0116)		(0.0101)
Disabled/long-term illness		0.0256		0.0690
		(0.0391)		(0.0424)
Unemployed		0.0343		0.00424
		(0.0350)		(0.0339)
Self-employed		-0.0250		-0.0181
		(0.0301)		(0.0253)
Retired		0.0503*		0.0750***
		(0.0290)		(0.0290)
Not in the labour force		0.0788***		0.0576**
		(0.0259)		(0.0234)
Married		-0.0541		0.0597*
		(0.0350)		(0.0320)
Cohabiting		-0.0591*		-0.0312
		(0.0327)		(0.0301)
Divorced		-0.0251		-0.0723
		(0.0617)		(0.0545)
Separated		0.0834		-0.0714
		(0.0643)		(0.0550)
Health: Poor		-0.0161		-0.0222
		(0.0338)		(0.0366)
Health: Fair		-0.00899		-0.0388
		(0.0340)		(0.0352)
Health: Good		-0.00533		-0.0598*
		(0.0353)		(0.0360)
Health: Excellent		-0.0129		-0.0522
		(0.0374)		(0.0373)
Qualification: Higher degree		0.198		0.191
		(0.135)		(0.136)
Qualification: First degree		0.225**		0.125

		(0.0976)		(0.0900)
Qualification: HND/HNC/teaching		0.155		0.195**
		(0.104)		(0.0855)
Qualification: A-level		0.103		0.170**
		(0.0768)		(0.0808)
Qualification: O-level		0.195***		0.203**
		(0.0727)		(0.0801)
Qualification: CSE		0.00943		0.240*
		(0.137)		(0.141)
Homeowner		-0.0243		-0.000779
		(0.0256)		(0.0258)
Number of days stayed in hospital last year		4.84e-05		0.000723
		(0.00134)		(0.00142)
Number of dependent children		0.0409***		0.0287**
		(0.0131)		(0.0120)
Observations	16,587	15,084	16,588	15,085
Overall R-squared	0.012	0.016	0.012	0.020
Number of unique individuals	7,137	6,364	7,137	6,365

Note: *<10%; **<5%; ***<1%. For both outcome variables, the responses range from 1 = "Never" to 5 = "Most days". The sample consists of lottery winners in the winning year. Standard errors are clustered at the personal identification level and are reported in parentheses. Other controls include regional and survey wave dummies.

Table 4A: Social network and lagged lottery win

VARIABLES	Meet friends on most days (=1)	Talk to neighbors on most days (=1)	Principal factor of support network
Lag lottery win (in £1,000) in *t*-1	0.00826	0.0128	-0.143
	(0.0132)	(0.0135)	(0.120)
Observations	8,448	8,450	1,817
Overall R-squared	0.035	0.048	0.206
Number of unique individuals	5,929	5,930	1,628

Note: ***<1%. Linear regressions with individual fixed effects. Principal factor of support network is standardized to have a mean of 0 and a standard deviation of 1. The sample comprises of lottery winners in year t-1, while excluding winners in year *t*. Standard errors are clustered at the personal identification level and are reported in parentheses. All regressions control for personal characteristics measured at t and t-1, as well as regional and survey wave dummies; see Columns 2, 4, and 6 in Table 1.

Table 5A: Controlling for the lottery-household income ratio

VARIABLES	Meet friends on most days (=1)	Talk to neighbors on most days (=1)	Principal factor of support network
Lottery win (in £1,000)	0.00328**	-0.00516***	-0.0143**
	(0.00136)	(0.00103)	(0.00586)
(Lottery/household income)× 100	1.62e-05	1.19e-05	-0.000859
	(4.63e-05)	(3.58e-05)	(0.00127)
Observations	15,010	15,011	4,633
Number of unique individuals	0.016	0.019	0.042
Overall R-squared	6,338	6,339	3,323

Note: *<10%; ***<1%. Linear regressions with individual fixed effects. Principal factor of support network is standardized to have a mean of 0 and a standard deviation of 1. The sample comprises of lottery winners in the year of winning. Standard errors are clustered at the personal identification level and are reported in parentheses. All regressions control for personal characteristics measured at t and t-1, as well as regional and survey wave dummies; see Columns 2, 4, and 6 in Table 1.

Table 6A: Lottery win and social isolations: Linear regression with individual fixed effects

VARIABLES	Meet friends less than once a month (=1)	Talk to neighbors less than once a month (=1)
Lottery win (in £1,000)	-0.000120	0.000525
	(0.000933)	(0.00147)
Observations	15,084	15,085
Number of unique individuals	0.009	0.017
Overall R-squared	6,364	6,365

Note: *<10%; ***<1%. Linear regressions with individual fixed effects. The sample comprises of lottery winners in the year of winning. Standard errors are clustered at the personal identification level and are reported in parentheses. All regressions control for personal characteristics measured at t and t-1, as well as regional and survey wave dummies; see Columns 2, 4, and 6 in Table 1.