Supplementary file 1: Model specification

To estimate the parameters in our model, we form a latent index capturing the difference in the present value of the SS and LL payments. The joint estimation maximum likelihood approach used for risk attitudes and time preferences was developed by Andersen *et al.* (2008). The approach uses the 100 risk choices to estimate the 2 parameters (r and γ) of the utility function. The 30 time preference choices are then used to estimate δ, conditional on the estimated shape of the utility function.

We define the utility of income from prize x using a constant relative risk aversion (CRRA) utility function:

$$U(x) = \frac{x^{1-r}}{1-r} \quad (1)$$

Recall that participants were presented with 100 choices between two lotteries. The expected utility for each lottery is calculated using function (1), summed over prizes and probabilities for each prize. The difference in expected utility between the two lotteries presented in each risky choice is used to form a latent index, which is linked to actual lottery choices using the cumulative normal distribution function. This 'probit' link function determines the likelihood of selecting one of the two lotteries for each observation, given the value of the latent index. Maximum likelihood estimation is used to find the value of r that maximises the likelihood of observing all the actual choices seen in the data.

The maximum likelihood approach is extended to estimate parameters (including r) as functions of individual characteristics (such as whether a person is physically active or not) and to incorporate other dimensions of the utility function, including probability weighting and time preference.

We use a power weighting function to incorporate probability weighting in the utility function. Rank dependent utility allows for weighting of objective probabilities based on the ranks of the prize outcomes. For example, a pessimistic probability weighter will overestimate the likelihood of the worst outcome and underestimate the likelihood of the best outcome.

Formally, for prizes $x_1, x_2, \ldots x_n$ with associated probabilities $p_1, p_2, \ldots p_n$ where $x_1 > \cdots > x_n$,

$$\mathrm{RDU}(p_1, x_2; \ldots; p_n, x_n) = \sum_{j=1}^{n} \pi_j \, U(x_j),$$

Where, for each j, $\pi_j = w(p_1 + \cdots + p_j) - w(p_1 + \cdots + p_{j-1})$ and $\pi_1 = w(p_1)$.

We use a power probability weighting function for our estimates.

$$w(p) = p^{\gamma} \qquad (2)$$

This implies probability optimism where $\gamma<1$ and probability pessimism where $\gamma>1$. Results are very similar with different specifications of the form of the probability weighting function.

For time preferences, δ is a discounting parameter setting utility of income at time t (the utility of the smaller, sooner (SS) payment in the time preference choices) equal to the utility of income at time $t + \tau$ (the utility of the larger, later (LL) payment in the time preference choices). That is,

$$\left[\frac{1}{(1+\delta)^{t}}\right] U(x_t) = \left[\frac{1}{(1+\delta)^{t+\tau}}\right] U(x_{t+\tau}) \qquad (3)$$

δ=1 implies that utility of present and future income is the same and δ<1 implies that future income is discounted (valued less) relative to present income. As detailed previously, the utility function $U(x)$ uses the CRRA utility function in (1) and the probability weighting function in (2).