

Krekel, Christian; De Neve, Jan-Emmanuel; Fancourt, Daisy; Layard, Richard

**Working Paper**

## A Local Community Course That Raises Wellbeing and Pro-sociality: Evidence from a Randomised Controlled Trial

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**Christian Krekel**

*LSE and IZA*

**Jan-Emmanuel De Neve**

*University of Oxford*

**Daisy Fancourt**

*University College London*

**Richard Layard**

*LSE and IZA*

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**IZA – Institute of Labor Economics**

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

Phone: +49-228-3894-0  
Email: [publications@iza.org](mailto:publications@iza.org)

[www.iza.org](http://www.iza.org)

## ABSTRACT

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# A Local Community Course That Raises Wellbeing and Pro-sociality: Evidence from a Randomised Controlled Trial

Despite a wealth of research on its correlates, relatively little is known about how to effectively raise wellbeing in local communities by means of intervention. Can we teach people to live happier lives, cost-effectively and at scale? We conducted a randomised controlled trial of a scalable social-psychological intervention rooted in self-determination theory and aimed at raising the wellbeing and pro-sociality of the general adult population. The manualised course ("Exploring What Matters") is run by non-expert volunteers (laypeople) in their local communities and to date has been conducted in more than 26 countries around the world. We found that it has strong, positive causal effects on participants' subjective wellbeing and pro-sociality (compassion and social trust) while lowering measures of mental ill health. The impacts of the course are sustained for at least two months post-treatment. We compare treatment to other wellbeing interventions and discuss limitations and implications for intervention design, as well as implications for the use of wellbeing as an outcome for public policy more generally.

**JEL Classification:** C93, I12, I31

**Keywords:** wellbeing, pro-social behaviour, communities, intervention, RCT

**Corresponding author:**

Christian Krekel  
London School of Economics  
Department of Psychological and Behavioural Science  
Centre for Economic Performance (CEP)  
Houghton Street  
London WC2A 2AE  
United Kingdom  
E-mail: c.krekel@lse.ac.uk

## Introduction

For decades, enormous academic effort has been put into exploring the causes and consequences of wellbeing (Diener et al., 1999; Layard et al., 2014). Health (especially mental health), being partnered, and social relationships account for more than three quarters of the explained variance in adult people's life satisfaction (Clark et al., 2018). At the same time, there is growing evidence showing that wellbeing is a significant predictor of important life and economic outcomes, including health and longevity (Danner et al., 2001; Steptoe and Wardle, 2011; Graham and Pinto, 2019), productivity and income (De Neve and Oswald, 2012; Oswald et al., 2015; Bellet et al., 2020), voting (Liberini et al., 2017), and even compliance with lockdown measures during Covid-19 (Krekel et al., 2020).

Yet, we know little about how to effectively improve the wellbeing of the general adult population. Can we teach people to live happier lives? Can we do this by means of intervention, cost-effectively and at scale? Are impacts sustained over time? Answering these questions has profound implications: if wellbeing is not fixed and can be taught, it can be used as a meaningful indicator to measure societal progress, and help direct public policy attention towards areas that are malleable and where there is room for improvement.

The answers to these questions, however, are not *ex-ante* clear. A prominent view argues that there exists a set point of wellbeing around which individuals fluctuate (Brickman and Campbell, 1971). According to this view, individuals largely adapt to various changes in life circumstances, driven by withdrawal of attention to these changes, so that their wellbeing remains largely unchanged over time (Frederick and Loewenstein, 1999; Kahneman, 2000). Hedonic adaptation has been used to explain phenomena such as why life satisfaction has been stagnant in many developed countries over the past decades while economic living standards have increased substantially (Easterlin, 1974, 2010). There is now an established body of evidence on hedonic adaptation to various positive or negative changes in life circumstances, including changes in marital status (Lucas, 2005; Lucas and Clark, 2006; Oswald and

Gardner, 2006; Stutzer and Frey, 2006), disability (Menzel et al., 2002; Oswald and Powdthavee, 2008), or income (Di Tella et al., 2010; Kuhn et al., 2011). According to this view then, wellbeing is less malleable and significant increases in average population wellbeing may be limited in societies with already high economic living standards.

Another point of view, in line with expectancy-value theory in psychology (Battle, 1965), suggests that familiarising people with evidence on what could make them happier may lead to an update in their beliefs, which, in turn, may lead to a change in their behaviour. Expectancies refer to the subjective probabilities of becoming happier which are attached to certain behaviours, whereas values refer to the magnitudes of happiness changes resulting from these behaviours. To the extent that this change in their behaviour may improve people's wellbeing and thereby reinforce their beliefs, people may uphold that behaviour, leading to permanent (as opposed to temporary) wellbeing change. This mechanism may be especially effective when it comes to behaviours in life domains which are important for wellbeing and, at the same time, are less prone to hedonic adaptation, such as time spent on social relationships (Powdthavee, 2008), experiences (Carter and Gilovich, 2010), or pro-social action (Dunn et al., 2008; Aknin et al., 2013; Drouvelis and Grosskopf, 2016). According to this interventionist view, wellbeing is malleable and significant increases in average population wellbeing may be possible, even in economically affluent societies.

Interventions that aim to improve wellbeing directly have typically been narrow in focus, looking at specific, often clinical target groups or at-risk populations (as opposed to healthy adults in the general population), often including people suffering from depression and anxiety (see Taylor et al. (2017), for example) or bodily pain (see Hausman et al. (2014), for example).<sup>1</sup> A notable exception is Heintzelman et al. (2019): the authors evaluated the impact of ENHANCE, a 12-week wellbeing course targeted at the general adult population in

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<sup>1</sup> See Sin and Lyubomirsky (2009) and Bolger et al. (2013) for meta-analyses.

their local communities which has been trialled in hybrid (i.e. ten sessions online and two sessions offline) and face-to-face (i.e. twelve sessions offline) delivery. When delivered face-to-face, it is led by graduate-level trained clinicians. Similar to the intervention presented in this paper, it focuses primarily on positive habits, skills, and attitudes. During the course, a new skill is introduced every week, participants practice that skill, and then write about their experiences. The authors found that it had strong, positive causal effects on participants' wellbeing up to six months after the main intervention has ended and up to three months after an extended following-up period.

We studied the impact of a similar course – "Exploring What Matters" – which is a local community intervention aimed at raising the wellbeing and pro-sociality of the general adult population. Besides contents, it differs from existing interventions in at least two critical aspects: first, the course is manualised and led by non-expert volunteers (laypeople) rather than trained clinicians, making it highly cost-effective. Second, due to its cost-effectiveness, it is highly scalable and can be delivered face-to-face in the local communities of course leaders and participants. Cost-effectiveness and scalability have important implications for the feasibility of social prescribing in health economics, i.e. the referral by GPs to non-medical community interventions to address the wider determinants of health and to help patients improve health-related behaviours (see NHS Long Term Plan (2019), for example). As of August 2020, 431 courses have been completed, with a total of 5,621 participants, yielding an average course size of 15 (13 course participants plus two volunteers leading the course). Most courses have been conducted in the UK (343), with a further 88 courses run in 25 countries. "Exploring What Matters" is run by Action for Happiness, a registered charity in England, which was launched in 2011. Its patron is the Dalai Lama, who helped to launch the course in London in 2015.

Using a randomised controlled trial, we studied the impacts of six of these courses which took place in London between August 2016 and December 2017: two during autumn

2016, two during spring 2017, and two during autumn 2017. In what follows, we first describe the intervention, derive hypotheses on wellbeing change, and illustrate the study design, before turning to our findings on self-reported outcomes and biomarkers. We then present the results of a replication exercise using before-after data from the universe of courses conducted to date. Finally, we calculate the cost-effectiveness of the course in raising wellbeing, compare it to other interventions in the literature, and discuss shortcomings, implications, and avenues for future research in the field, as well as implications for the use of wellbeing as an outcome for public policy more generally.

### **The Intervention**

The "Exploring What Matters" course brings together participants in face-to-face groups to discuss what matters for a happy, meaningful, and virtuous life. Participants span a wide range of ages and socio-economic backgrounds but can be broadly classified, as per their self-reports, into two categories: people who are unhappy and looking for ways to improve their lives; and people who are interested in wellbeing more generally and want to learn more, or want to share these ideas with others.

The intervention is manualised: each course is led by two volunteers as facilitators on an unpaid basis.<sup>2</sup> Recruitment of course leaders follows a documented, standardised process: each candidate completes a *Leader Registration* process sharing their motivation and experience and is given instructions on what is required. Once potential course leaders have a co-leader, venue, and dates in mind, they complete a *Course Application* process. Action for Happiness reviews this application and, if certain criteria are met, arranges a call to discuss

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<sup>2</sup> Although the intervention is manualised, some degree of adaptation is possible. For example, course leaders may choose the most appropriate venue or allow for more group discussion time. However, they are encouraged to stick closely to the course guide.



next steps.<sup>3</sup> Once a course is approved, course leaders receive guidance and structured resources to facilitate course delivery. Supplementary Materials II includes a link to the complete documentation of the recruitment process of course leaders.

Participants sign up online, and when doing so, are asked to make a donation; donations aim to cover the implementation costs of the course (implementation costs are about £90 or \$113 per participant, including variable costs for course materials as well as allocated fixed costs).<sup>4</sup> Donations are voluntary and participants can take part without donating. The function of donations is to make the course scalable and accessible to people regardless of their financial situation. Besides that, they aim at raising course attendance, by exploiting the notion of sunk costs.<sup>5</sup> The course consists of eight consecutive weekly sessions lasting between two and 2.5 hours each. Each of these sessions builds on a thematic question, for example, what matters in life, how to find meaning at work, or how to build happier communities. Each of these questions is discussed against the background of scientific evidence on subjective wellbeing, mental health, and pro-sociality as well as motivation and group learning.

Courses are advertised both online and offline in local communities, and potential participants must register online. Online advertising is done via emails to people who have previously registered with Action for Happiness and live nearby and to new people via targeted local Facebook advertising. Offline advertising is done via local course leaders using word-of-mouth and, to a lesser extent, local promotion (for example, through notice boards or local press).

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<sup>3</sup> Course leaders have a similar demographic profile as course participants, with a slightly higher average age. 58% are female. 58% are between 31 and 50 years old, 25% between 18 and 30, and 17% between 51 and 70. They tend to have higher than average levels of life satisfaction and social trust (both about 7.9 on zero-to-ten scales).

<sup>4</sup> Converted using an exchange rate of 1:1.25 as of July 16, 2020.

<sup>5</sup> Unfortunately, we did not have data on the donation amount per participant, and hence could not study heterogeneity of course outcomes depending on donations.

**Hypotheses.** Course design and delivery are rooted in psychological self-determination theory (Deci and Ryan, 1985), which states that autonomy, relatedness, and competence are fundamental human needs that enable people to achieve wellbeing. The course aims at building *(i)* autonomy by enabling participants to discover for themselves what matters for their lives, using a weekly mindfulness exercise, gratitude exercise, and personal reflection, supported by a "Did You Know?" section that introduces scientific evidence on that week's theme; *(ii)* relatedness by facilitating interpersonal connections and social trust, within the gathering of people in their local communities; and *(iii)* competence by enabling participants to experience for themselves how behavioural changes to daily routines can make differences to their and other people's wellbeing, using goal-setting and social commitment tools to help translate motivation into action. Supplementary Materials II includes links to the complete course materials of both course participants and course leaders.

There is an established evidence base linking psychological self-determination theory to wellbeing (Ryan and Deci, 2000), across life domains and different cultural contexts (Milyavskaya and Koester, 2011; Church et al., 2012), including its constituent elements (Brown et al., 2003; Chirkov et al., 2003; La Guardia et al., 2000). Likewise, there is evidence from systematic reviews and meta-analyses linking certain elements of the course curriculum, in particular mindfulness, meditation, and related self-regulation strategies, to positive outcomes in non-clinical populations, including wellbeing, depression, and anxiety, with medium to strong effect sizes (see Sedlmeier et al. (2012), Gu et al. (2015), or Querstret et al. (2020), for example).

We therefore hypothesise that, first, the course has positive impacts on wellbeing. Second, we hypothesise that – to the extent that it fosters interpersonal connections between strangers and encourages pro-social action-taking – the course has positive impacts on pro-social attitudes. Third, we hypothesise that – to the extent that it changes beliefs about

behaviours in life domains that are important for wellbeing and that are less prone to hedonic adaptation – the course may have sustained impacts.

### Methods

We conducted a randomised controlled trial which focused on six courses that took place in London between August 2016 and December 2017, including a total of 146 participants. These were informed about the study, both during online registration and on site, and written consent was taken.<sup>6</sup> Following power calculations based on the historical number of course participants (about 13 per course), this sample size was determined before any data collection and analysis.<sup>7</sup>

Course participants were self-selected. To study the extent to which they differed from the general adult population, we compared our estimation sample, pre-treatment, with a sample from the nationally representative UK Household Longitudinal Survey ("Understanding Society"), restricted to London and to the same age span as our participants. We found that there were little, quantitatively relevant differences in the age distribution between course participants and the general population. Participants were, however, significantly more likely to be female in our sample (83% vs. 45%). Moreover, they were significantly less likely to be married (20% vs. 53%) and more likely to be in a domestic partnership (25% vs. less than one percent). This difference, however, is likely to be an artefact arising from survey design: Understanding Society does not ask about a "domestic" (as our survey did) but about a "civil" partnership. When it comes to income, we found again little, quantitatively relevant differences, except for the highest income category: our sample included significantly less

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<sup>6</sup> This study passed the Internal Review Board of the Research Ethics Division at the London School of Economics (Reference: 00507).

<sup>7</sup> A power of 0.8, alpha of 0.05 two-tailed, and an assumed effect size of 0.5 yielded at least N=128 individuals, with 64 per experimental group.

individuals earning £75,000 (\$94,000) or more and was somewhat more skewed towards lower incomes. Finally, participants reported, on average, a lower level of life satisfaction (by about 47% of a standard deviation), pre-treatment, than the general population.<sup>8</sup>

**Randomised Controlled Trial.** To account for self-selection of participants into the course, we employed a waitlist randomisation protocol: after registering for the course online, participants (who reported that they were able to attend the course on either one of two sets of pre-specified upcoming dates, two months apart) were randomly allocated to one of the two sets, unaware of how these related to treatment and control group. Participants in the earlier set of dates were in the treatment group, those in the later set in the waitlisted control group. They were then invited to arrive on the same date to have their first data collected. The event started with a brief introductory session which explained to participants that they were required to fill in surveys and provide saliva samples. This was when participants read the project information sheet and signed written consent forms. After written consent had been obtained, the data were collected. After data collection had finished, the brief introductory session was over and participants in the treatment group started their course immediately. Participants in the control group would start their course eight weeks later, after the treatment group would have finished, and left the premises. Treatment and control group were kept separate: neither group knew anything about the other, and the two groups did not meet on that day.

Note that the choice of the appropriate control group is not trivial: as there exists no natural, credible counterfactual that could lend itself as a business-as-usual scenario in our intervention context, choosing a waitlisted control group comprised of those who initially selected into the intervention seems most appropriate for adhering as closely as possible to evidence-based practice. Note that our control group does not include a placebo: arguably, a placebo could help to better isolate and identify the active ingredients of the intervention. At the

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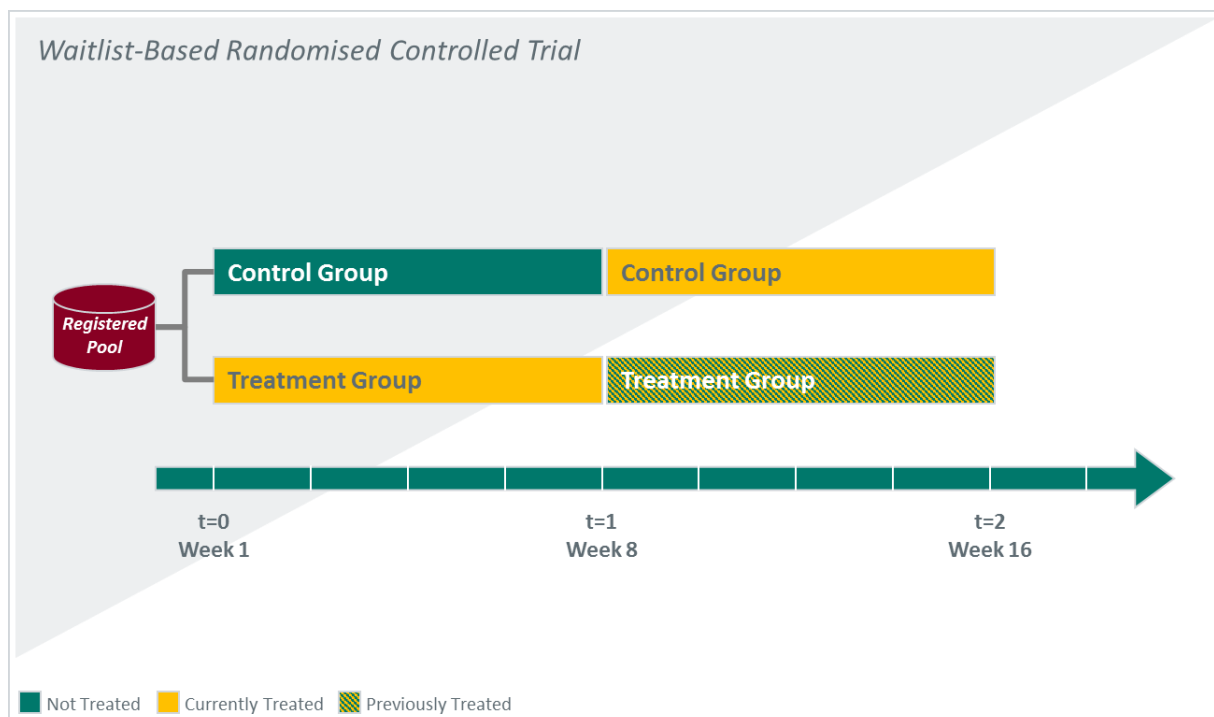
<sup>8</sup> See Supplementary Materials Table 1a for this analysis.

same time, however, it raises the question of what precisely the (neutral) placebo can be, whether one control group with one placebo is actually enough, and whether or not elements like socialising are active parts of the intervention package and should thus be accounted for as such. We will return to the issue of choosing the appropriate control group in more detail later on in the discussion section.

**Data Collection.** Data were collected at three points in time: at  $t=0$ , right before the course started; at  $t=1$ , right before it ended, which was eight weeks after  $t=0$ ; and at  $t=2$ , eight weeks after  $t=1$ . At each point in time, data were collected at the same hour of day (*circa* 6pm in the evening). Figure 1 illustrates our randomised controlled trial and data collection process.

**Figure 1**

*Randomised Controlled Trial and Data Collection*



Sources: Own illustration.

Our estimation sample (exploiting data points at  $t=0$  and  $t=1$ ) consisted of 146 respondents (279 observations), of which 73 were in the treatment (136 observations) and 73 (143 observations) were in the control group. As can be seen, in our estimation sample, we have an attrition rate of about 5%.<sup>9</sup> We will test the sensitivity of our results regarding attrition later in our robustness section. To look at treatment effect persistence, we exploited data points at  $t=2$  in an extended sample. As all respondents had been treated at  $t=2$ , results are exploratory.

Importantly, data at  $t=0$  and  $t=1$  were collected right before the start of the first and the last session, respectively, at the back of the meeting room. Collecting data before the start of the respective session reduced measurement error which may have resulted from participants' euphoria of having started or finished the course being mixed up with actual outcomes. Note that, during data collection at  $t=0$  and  $t=1$ , the atmosphere was deliberately kept neutral, and participants were asked to complete surveys and give biomarker samples *before* they had a chance to meet other participants in the main room. To be consistent, the same protocol regarding neutrality of atmosphere that applied to data collection at  $t=0$  and  $t=1$  also applied to data collection at  $t=2$ . Attending data collection at  $t=2$  had been communicated as mandatory beforehand. To avoid creating emotional arousal about attending this additional session, participants did not know what content and format it involved. Finally, neither course participants nor volunteers leading the course knew whether they were in the treatment or control group during data collection at  $t=0$ . Participants' group allocation was announced only *after* data collection at  $t=0$  had finished.

**Outcomes.** We collected data on two categories of outcomes: self-reported outcomes came from survey data, which included items on subjective wellbeing, mental health, and pro-sociality. Biomarkers were collected through saliva samples, which included cortisol – a

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<sup>9</sup> That is,  $((279/(146*2))-1)*(-1) \approx -0.05$ .

steroid hormone responsive to stress – and a range of cytokines – immune proteins involved in inflammatory response. Activation of the inflammatory response system has been shown to be bidirectionally associated with mental ill health and depressive symptoms (Dowlati et al., 2010; Miller and Raison, 2016). Supplementary Materials III contain the project information sheet, written consent form, and the survey instruments used in the study, including surveys at  $t=0$ ,  $t=1$ , and  $t=2$ .

Items on subjective wellbeing covered evaluative (life satisfaction), experiential (happiness and anxiousness), and eudemonic (worthwhileness) dimensions. They were measured on eleven-point single-item Likert scales whereby zero denoted the lowest possible level and ten the highest. Items on mental health covered frequently used screening measures to detect depression (the three-point nine-item Patient-Health Questionnaire, PHQ-9) and anxiety (the three-point seven-item Generalised-Anxiety-Disorder Questionnaire, GAD-7). PHQ-9 scores from zero to four imply minimal, from five to nine mild, from ten to fourteen medium, and from fifteen to 27 strong depression symptomatology. GAD-7 scores have a similar interpretation but are cut off at 21. Respondents in our sample could thus be characterised as, on average, mildly depressed ( $M=6.4$ ,  $SD=4.5$ ) and anxious ( $M=6.1$ ,  $SD=4.6$ ). Distributions were, however, highly skewed: in case of depression, for example, we found that 24 out of 133 respondents for whom we had data at  $t=1$  (about 18%) showed medium or strong depressive symptomatology. When these were omitted, the remaining respondents could be characterised as only minimally depressed ( $M=4.4$ ,  $SD=2.7$ ), not much different from PHQ-9 scores typically found at the general adult population level, which range from  $M=3.0$ ,  $SD=4.3$  for 30 to 39 year olds to  $M=3.7$ ,  $SD=5.1$  for 50 to 59 year olds in the US, for example (Tomitaka et al., 2018). Items on pro-sociality included the Santa Clara Brief Compassion Scale – a composite score running from five to 35 which measures pro-sociality by asking respondents about their readiness to help others – and eleven-point single-item Likert scales on social trust and

gratitude. We standardised self-reported outcomes to have mean zero and standard deviation one, using the course-set-specific control group mean and standard deviation.

Biomarkers included, besides cortisol, pro-inflammatory cytokines IL-1 $\beta$  and IL-6, anti-inflammatory cytokine IL-10, interferon IFN- $\gamma$ , and chemokine IL-8. These markers have been shown to be responsive to both short-term and long-term psychosocial interventions (Fancourt et al., 2016). They were collected by means of a saliva sample right after the surveys with self-reported outcomes had been completed. We applied passive drool method of sample collection using low protein-bind collection cryovials. Samples were analysed – three times independently at the Institute for Interdisciplinary Salivary Bioscience Research at the University of California at Irvine – using multiplex immunoassays. Cortisol was measured in  $\mu\text{g/dL}$ , cytokines in  $\text{pg/mL}$ . We took means across the three analyses run for each biomarker, removed outliers, and log-transformed and standardised the data.

**Controls.** We collected survey data on socio-demographic characteristics of respondents, including age, gender, marital status, education, employment, income, religion, religious practice, preference for meeting new people and making new friends, health (including pregnancy), and health-related behaviours (including smoking and medication usage), to control for potential differences between treatment and control group over time. All controls were measured pre-treatment. Table 1b in the Supplementary Materials shows variable definitions and descriptive statistics, Table 1c balancing properties between treatment and control group: there was little evidence for significant mean differences in outcomes and controls between groups prior to course start. Similarly, Table 4 in the Supplementary Materials shows that there was little evidence for significant differences for the control group between  $t=0$  and  $t=1$ , pointing towards the absence of time trends or waitlist effects. There were no known confounding events during the study period.

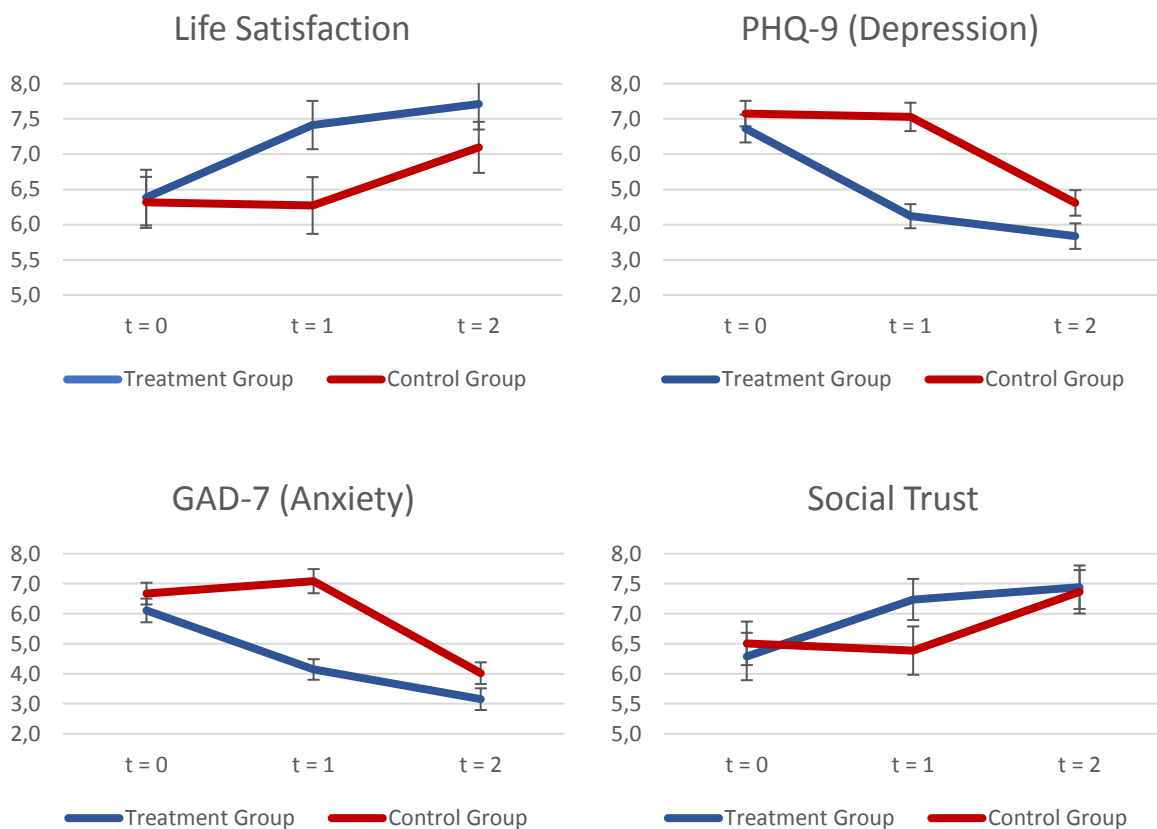
**Descriptive Evidence.** Before turning to our empirical estimation, we first look at selected descriptive evidence on subjective wellbeing, mental health, and pro-sociality. Figure 2



plots the raw means of four of our self-reported outcomes – life satisfaction, mental health (PHQ-9 for depression and GAD-7 for anxiety), and social trust – during the observation period.<sup>10</sup>

**Figure 2**

*Average Scores of Groups at Different Points in Time*



*Notes:* A waitlist randomisation design was applied: between t=0 and t=1, the treatment group received treatment; between t=1 and t=2, the control group received treatment. Scores are in natural units. Life satisfaction and social trust were measured on scales from zero to ten, PHQ-9 for depression on a scale from zero to 27, and GAD-7 for anxiety on a scale from zero to 21. N=383 (146 at t=0, 133 at t=1, and 104 at t=2). Confidence intervals are 95%.

*Sources:* Own data collection, own calculations.

We make three observations: first, between points t=0 and t=1, the course improved the scores of the treatment group, in line with our first and second hypotheses, whereas those of the

<sup>10</sup> Figures for other self-reported outcomes are available upon request.

control group remained constant. Second, between points  $t=1$  and  $t=2$ , the course improved the scores of the control group (which received treatment during that period) in a similar fashion, whereas those of the treatment group were sustained or even continued to improve, in line with our third hypothesis.

**Empirical Model.** We now turn to our empirical model. Our baseline model is a difference-in-differences specification that compared the evolution of course outcomes between groups over time:<sup>11</sup>

$$y_{it} = \beta_0 + \beta_1 \text{Treatment}_i * \text{Post}_t + \beta_2 \text{Treatment}_i + \beta_3 \text{Post}_t + \beta_4' X_{it} + \mu_s + \varepsilon_{it} \quad \text{with } t = \{0, 1\}$$

(1)

where  $y_{it}$  is the outcome of respondent  $i$  at time  $t$ ;  $\text{Treatment}_i$  is a dummy equal to one if the respondent belonged to the treatment group, and zero else;  $\text{Post}_t$  is a dummy equal to one at  $t=1$ , and zero else;  $X_{it}$  is a vector of controls; and  $\mu_s$  is a course-set-specific fixed effect. In what follows, we present coefficients obtained from estimating Equation 1 without controlling for  $X_{it}$ , and relegate those obtained from estimating the equation with the vector of controls to the Supplementary Materials. If randomisation was successful and treatment was exogenous, controlling for  $X_{it}$  should not make any difference, and this is precisely what we will show.

Our model was estimated using OLS, with robust standard errors clustered at the participant level.  $\beta_1$  is the causal effect (average treatment effect on the treated) of course participation. Note that our model could not exploit data points at  $t=2$  because there was no credible control group anymore.

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<sup>11</sup> Alternatively, one could regress the post-treatment on the pre-treatment outcome and a treatment dummy (which enforces a balanced panel). Results were qualitatively the same.

Taken together, we tested fifteen hypotheses in our main analysis (i.e. four outcomes related to subjective wellbeing, two outcomes related to mental health, three outcomes related to pro-sociality, plus six biomarkers). To account for multiple hypotheses testing, we used the stepdown multiple testing procedure suggested by Romano and Wolf (2005a, 2005b), with the four-step algorithm outlined in Romano and Wolf (2016). In essence, the algorithm constructs a null distribution for each of our fifteen hypotheses tests based on a set of null resampling test statistics (in our case, using a bootstrap with 100 repetitions and cluster-robust standard errors at the participant level in both the original regression and during the resampling procedure). We find that our stepdown adjusted P values (corresponding to the significance of a hypothesis test where fifteen tests were implemented) continue to indicate significance at conventional levels for all our coefficient estimates (where our original P values indicated significance).<sup>12</sup>

## Results

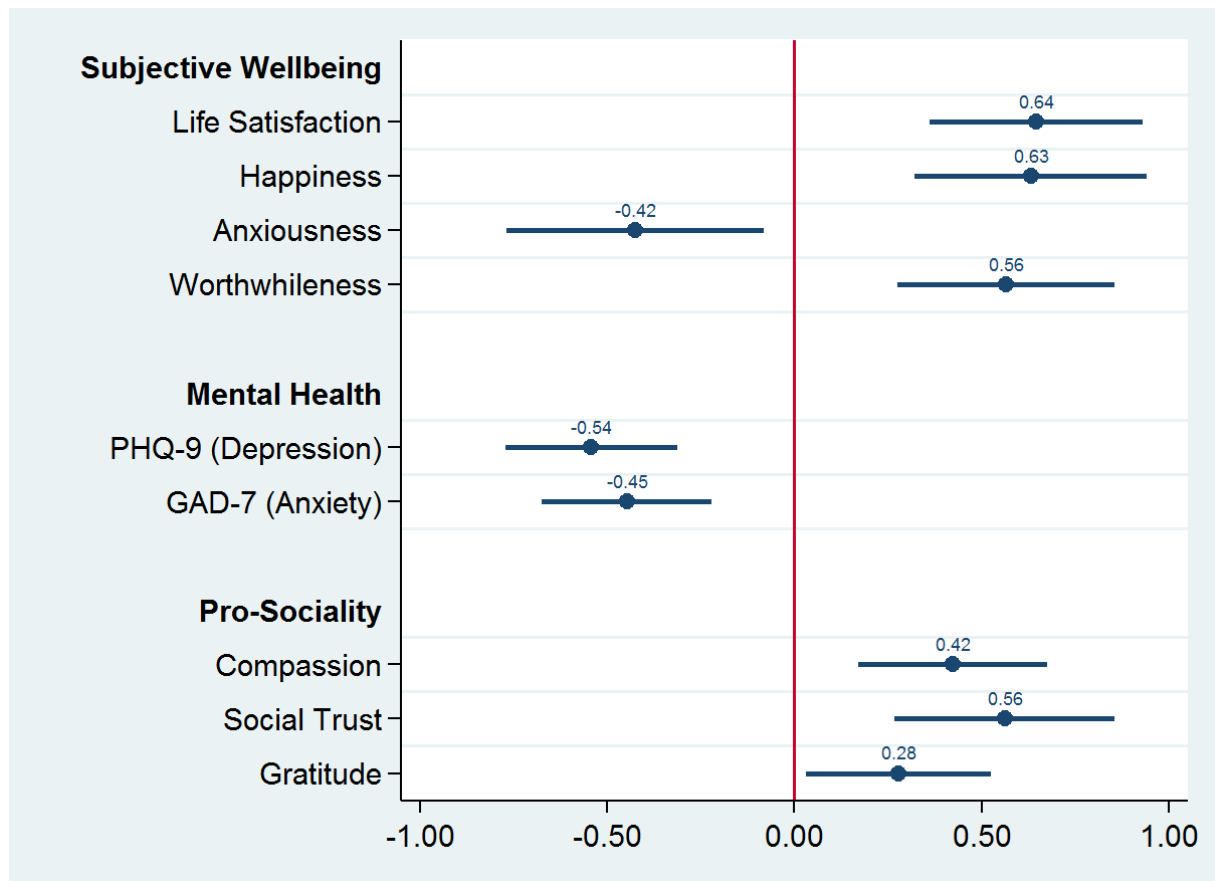
**Impacts on Subjective Wellbeing, Mental Health, and Pro-Sociality.** Figure 3 plots the coefficient estimates of our self-reported outcomes. We again confirmed our first and second hypotheses on positive impacts on wellbeing and pro-social attitudes.

### Figure 3

*Impacts on Self-Reported Outcomes: Subjective Wellbeing, Mental Health, and Pro-Sociality*

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<sup>12</sup> See Supplementary Materials Tables 5a and 5b for these results.



*Notes:* Outcomes have been standardised prior to running regressions (i.e. transformed to z-scores with mean of zero and standard deviation of one, using the control group mean and standard deviation). See Supplementary Materials Table 2a for the corresponding regression table with controls. Robust standard errors were clustered at the participant level. N=279 (146 respondents, of which 73 were in treatment and 73 in control). Confidence bands are 95%.

*Sources:* Own data collection, own calculations.

In terms of subjective wellbeing, the course increased life satisfaction by about 64% of a standard deviation, happiness by about 63%, and worthwhileness by about 56%. Anxiousness, on the contrary, was decreased by about 42%. Impacts were large: for life satisfaction, for example, the effect size corresponds to an increase of about one point on a zero-to-ten scale. Impacts were significant at the 5% level.

In terms of mental health, the course decreased both PHQ-9 and GAD-7 scores, respectively, by about 54% and 45% of a standard deviation (impacts did not significantly differ from each other). Impacts were again large: participants, prior to taking the course, reported mean PHQ-9 and GAD-7 scores of about 6.7 and 6.1, respectively, which corresponds to a clinical symptomatology of mild depression and anxiety. The course improved scores to, on

average, 4.3 points for PHQ-9 and 3.7 for GAD-7, which corresponds to minimal depression and anxiety. Impacts were again significant at the 5% level.

Although strong, impacts on mental health were clearly weaker than those found in trials based on cognitive behavioural therapy. For example, the Improving Access to Psychological Therapies scheme in the UK has been found to reduce PHQ-9 and GAD-7 scores, on average, by about eight and seven (Clark et al., 2009). The Cognitive Behavioural Therapy as an Adjunct to Pharmacotherapy trial has been found to reduce PHQ-9 and GAD-7 scores, on average, by about 7.1 and 4.7 (Wiles et al., 2016). However, these trials were targeted specifically at individuals who suffer from depression and anxiety, rather than the general adult population.

In terms of pro-sociality, we found that the course significantly increased both compassion and social trust at the 5% level, respectively, by about 42% and 56% of a standard deviation (about 0.6 and 1.1 points). The impact on gratitude, however, was lower and only marginally significant.

Next, we ran a series of regressions to look into the importance of social context, potential mechanisms behind our average treatment effects, and heterogeneous effects. To do so, we first re-estimated our baseline model with controls (Supplementary Materials Table 2a), and then selectively exploited these controls in these subsequent analyses. Note that including controls has little impact on our identified effects (compare Figure 3 with Supplementary Materials Table 2a), which suggests that randomisation was successful and treatment was exogenous.

To study the importance of social context, we note that whether or not we control for social context, measured as participants' preference for socialising, has made little difference

to our findings.<sup>13</sup> Next, we ran two additional regressions. First, we re-estimated our model without controlling for participants' preference for socialising but controlling for all other covariates: coefficient estimates were slightly attenuated yet continued to be strong, suggesting that socialising may play a role but only partially explains impacts. We then split our sample by the mean pre-treatment value of this variable: again, we did not find that impacts were systematically stronger for respondents who had a higher preference for socialising, pre-treatment, and *vice versa*. Thus, it does not seem that participants who had a higher preference for socialising benefited more from the course than others, or the other way around.<sup>14</sup>

To explore potential mechanisms, we collected data on two categories of additional outcomes: information and behaviour. The former included measures that relate to knowledge of what contributes to one's own and other people's wellbeing. The latter included measures that relate to frequencies of behaviours in various social domains, including the private sphere, close relationships, and other people.<sup>15</sup> Items on information and behaviour also served as manipulation checks, as the course explicitly aims at changing both.

Re-estimating our baseline model with standardised measures of information as outcomes, we indeed found that participants reported to feel more knowledgeable of what contributes to a happy and meaningful life, to know more what matters to them personally, and to feel more able to do things to improve their own, and to a somewhat lesser extent, the wellbeing of other people. When it comes to standardised measures of behaviour, the course increased the frequency in which participants reported to practice mindfulness or meditation, to treat themselves in a kind way, to connect with other people, and to do something kind or helpful for others. Effect sizes ranged between 50% and 80% of a standard deviation –

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<sup>13</sup> We found similar results regardless of whether a stated-preference (i.e. importance for meeting new people and making new friends) or a revealed-preference item (i.e. frequency of meeting in local clubs) was used to measure the importance of social context to participants.

<sup>14</sup> Results are available upon request.

<sup>15</sup> Data on these additional outcomes had only been collected at a later stage (starting from t=1).

comparable to our main outcomes.<sup>16</sup> Impacts of mindfulness on wellbeing and the importance of social relationships and pro-social behaviour for wellbeing are well-documented in the literature (see Bohlmeijer et al. (2010), Godfrin and van Heeringen (2010), or Gu et al. (2015) for mindfulness; Powthavee (2008) for social relationships; or Borgonovi (2008), Meier and Stutzer (2008), or Dolan et al. (2021) for pro-social behaviour, for example).

To shed light on whether some participants benefited more than others, we conducted a heterogeneity analysis, running separate regressions for participants in different terciles of the respective self-reported outcome distribution, pre-treatment.<sup>17</sup> Figure 1 in the Supplementary Materials shows our findings: only in case of PHQ-9 scores did differences between terciles turn out to be significant. Impacts on participants in the first tercile of PHQ-9 scores (who were more depressed) were almost seven times larger than for those in the bottom tercile (who were less); the difference was significant at the 5% level. Besides that, we did not find much evidence for heterogeneous effects.

**Impacts on Cortisol and Cytokines.** We next look at biomarkers – cortisol as a stress response hormone and a range of cytokines as immune response proteins associated with mental ill health and depressive symptoms. Figure 4 shows coefficient estimates.

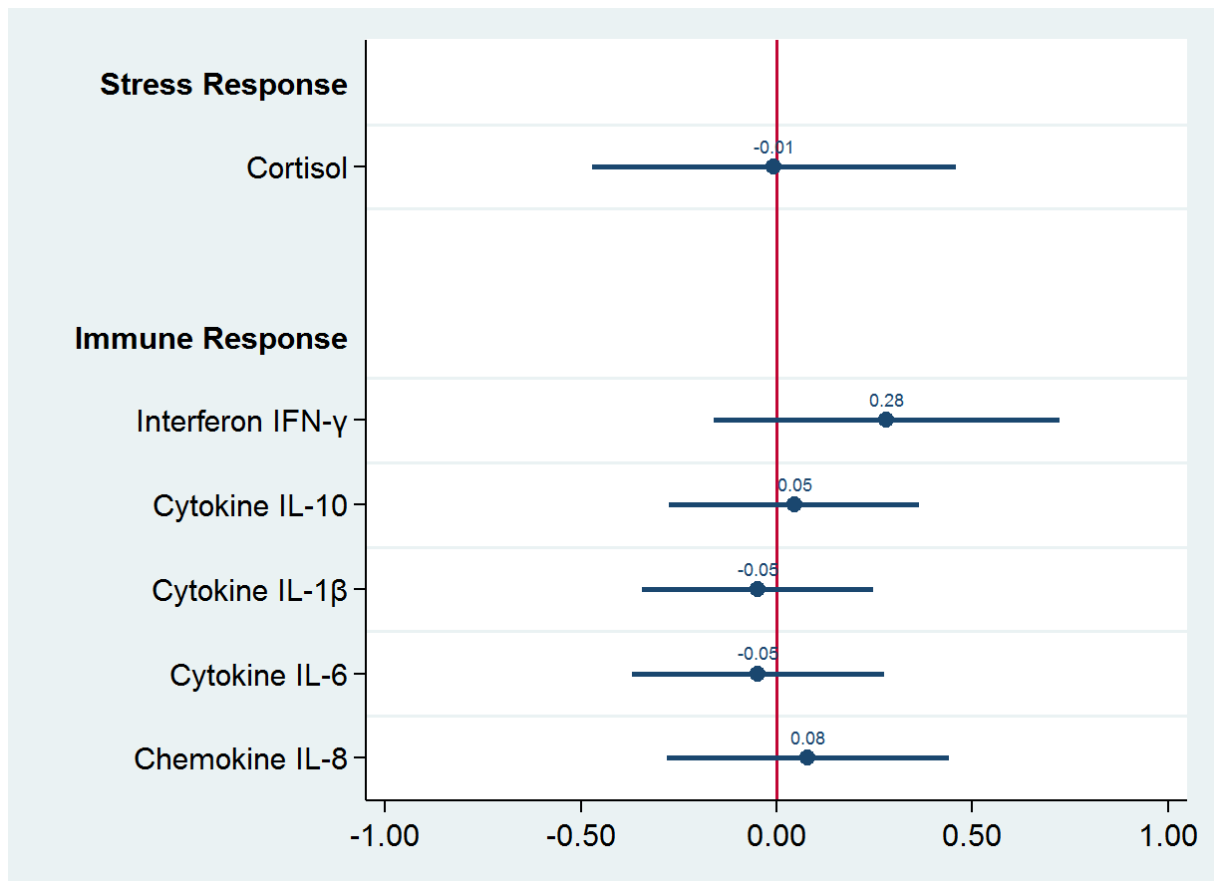
## Figure 4

*Impacts on Biomarkers: Cortisol and Cytokines*

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<sup>16</sup> See Supplementary Materials Tables 3a and 3b for these findings.

<sup>17</sup> The choice of terciles was motivated by sample size.



*Notes:* Outcomes have been standardised prior to running regressions (i.e. transformed to z-scores with mean of zero and standard deviation of one, using the control group mean and standard deviation). See Supplementary Materials Table 2b for the corresponding regression table with controls. Robust standard errors were clustered at the participant level. N between 236 and 275 depending on biomarker due to removal of outliers. Confidence bands are 95%.

*Sources:* Own data collection, own calculations.

We did not find that the course had significant impacts on biomarkers at conventional levels.

However, we found that cytokines consistently moved into the hypothesised direction: pro-inflammatory cytokines IL-1 $\beta$  and IL-6, which correlate positively with depressive symptoms, decreased, whereas anti-inflammatory cytokine IL-10, interferon IFN- $\gamma$ , and chemokine IL-8 (which correlate negatively) increased. Compared to self-reported outcomes, biomarkers were noisier and impacts smaller in size.<sup>18</sup>

<sup>18</sup> As with our self-reported outcomes, we ran separate regressions for participants in different terciles of the respective biomarker distribution, pre-treatment. Figure 2 in the Supplementary Materials plots coefficient estimates: we found again little systematic evidence that the course had significant impacts by tercile at conventional levels.



**Robustness.** To the extent that out-of-sample selection was not random and correlated with outcomes (for example, unhappier people may have been more likely to drop out of the study), or differed by group, it would have biased our identified effects. We looked at this attrition by regressing the number of periods on each outcome alongside course-set-specific fixed effects, using robust standard errors clustered at the individual level. We found little evidence that outcomes were significant predictors of the number of periods participants remained in the programme, neither on average nor by group.<sup>19</sup> We take this as evidence that out-of-sample selection was rather random. Note that only about 5% of participants dropped out between  $t=0$  and  $t=1$ , and a slightly larger proportion (22%) between  $t=1$  and  $t=2$ . Finally, compliance was high: on average, participants attended seven out of eight sessions.

### Replication

Since its launch in 2015, 431 courses have been completed worldwide, totalling 5,621 participants. From the beginning, the charity running the courses – Action for Happiness – has been collecting data on course outcomes at the participant level. Participants are sent a link to the survey at  $t=0$  after registering online for the course. Completing the online survey is mandatory for course participation. After the course has finished, they are again sent a link to the survey at  $t=1$ , whereby completion is incentivised by a voucher for a free, one-year subscription to a mindfulness app.

In particular, by means of online surveys, data on course participants' life satisfaction, mental wellbeing, compassion, and social trust have been collected. Mental wellbeing is measured using the Short Warwick-Edinburgh Mental Well-being Scale, which asks respondents to report the frequency of several experiences related to their mental wellbeing during the

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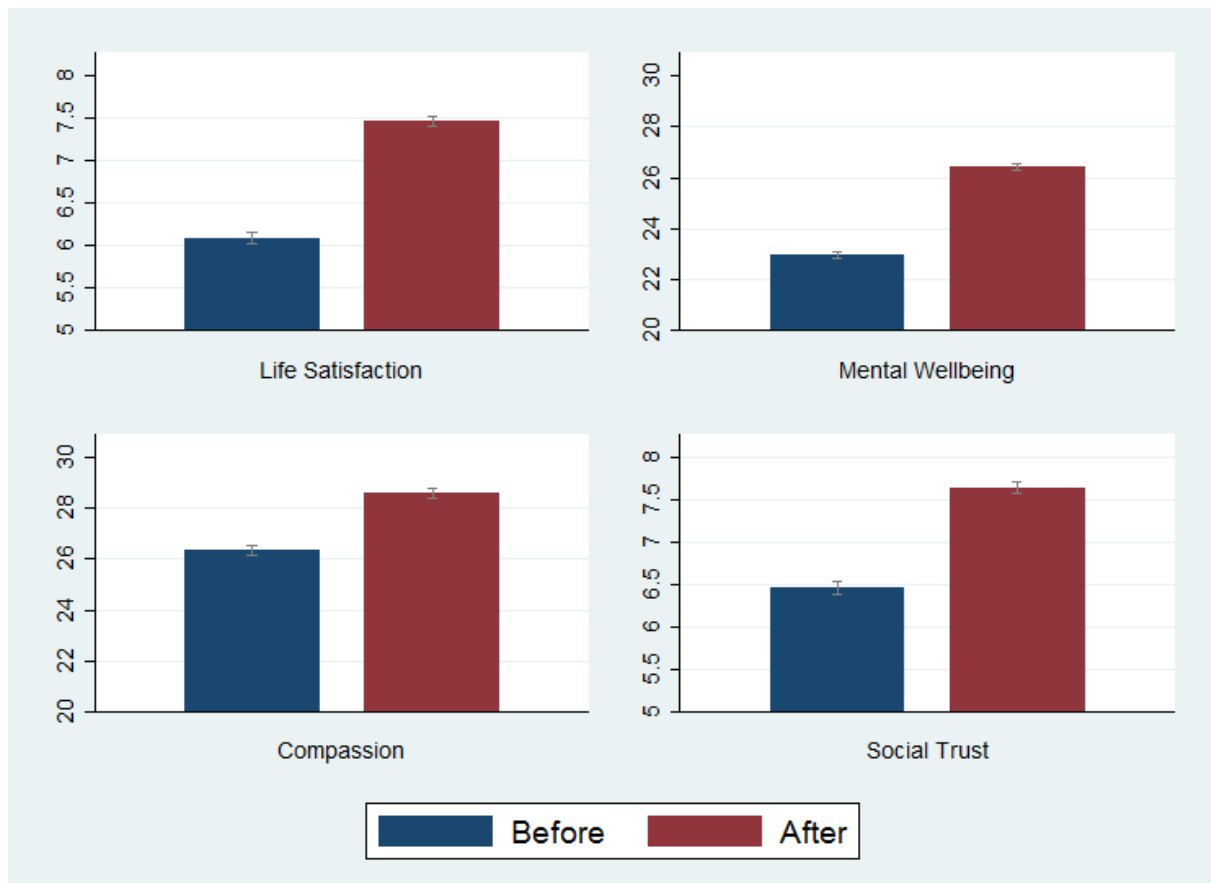
<sup>19</sup> Results are available upon request.

past two weeks. The item is bound between seven and 35, whereby higher scores indicate higher mental wellbeing.

Although a before-after comparison of these measures does not yield causal effects of course participation on course outcomes, we can still use these online surveys, which are high-powered and widely spread across geographical regions and over time, to check the external validity of our main findings, which were based on six courses in London between 2016 and 2017. Figure 5 shows the results of this before-after comparison of course outcomes collected via online surveys, restricted to respondents for whom we had both data at  $t=0$  and  $t=1$ , amounting to about 5,600 individuals (about 2,300 observations before and 2,300 after) for comparison.

### **Figure 5**

*Impacts on Self-Reported Outcomes in Online Surveys: Life Satisfaction, Mental Wellbeing, Compassion, and Social Trust*



*Notes:* Data at t=0 and t=1 from online surveys on the universe of courses during the period 2015 to 2019. Scores are in natural units. Life satisfaction and social trust were measured on scales from zero to ten; mental wellbeing by means of the Short Warwick-Edinburgh Mental Well-being Scale, which runs from seven to 35; and compassion by means of the Santa Clara Brief Compassion Scale, which runs from five to 35. Confidence intervals are 95%.

*Sources:* Own data collection, own calculations.

Similar to the findings in our trial, the before-after comparison showed strong, positive associations between course completion and life satisfaction, mental wellbeing, compassion, and social trust.

Associations were, however, larger: for life satisfaction, for example, we found a mean difference of about 1.4 points on a zero-to-ten scale (pre-mean of 6.1, post-mean of 7.5).

Larger associations could be driven by three factors: first, our before-after comparison did not account for general trends in wellbeing. Second, larger associations could, in part, be driven by attrition in online surveys: whereas attrition was low in our trial (only about 5% of participants dropped out between t=0 and t=1), attrition in online surveys was much higher, at about 36%. Finally, larger impacts could be explained by the timing of surveys at t=1: the link to the

survey is sent out shortly after the course has finished, whereas in our trial data at  $t=1$  had been collected *before* the last session started. It is therefore possible that participants' euphoria of having finished the course was mixed up with actual course outcomes in online surveys.

### Discussion

Using a randomised controlled trial, we found that the "Exploring What Matters" course had strong, positive causal effects on participants' self-reported subjective wellbeing and mental health. It also induced a shift in participants' attitudes towards more pro-sociality. These impacts seemed to be sustained at  $t=2$  two months post-treatment. An analysis of the mechanisms of wellbeing change suggested that effects on participants may have come about through changes in knowledge of wellbeing and behaviour in areas that have been shown to be important for wellbeing and in which there is little hedonic adaptation, including mindfulness, social relationships, and pro-social behaviour. Biomarkers collected through saliva samples, including cortisol and a range of cytokines involved in inflammatory response, moved consistently into the hypothesised direction yet failed to reach statistical significance at conventional levels.

One explanation for why we did not find significant effects on biomarkers may be power issues combined with relatively noisy measures. Another, related explanation may be the composition of our sample: high levels of pro-inflammatory cytokines have been found for major depression. Respondents in our sample, however, reported only mild depressive symptomatology on average, pre-treatment. In fact, we found that only eight out of 133 respondents for whom we had data at  $t=1$  (about 6%) reported strong symptomatology, as indicated by PHQ-9 scores of fifteen or higher. Moreover, even amongst these, only about a third showed associated elevated inflammation (Wium-Andersen and Nielsen, 2013). For cortisol, individual differences and timing of measurement matter: it has been found to be a rather short-term measure for stress (Miller et al., 2007). Another, complementary explanation is

that the course improves participants' positivity towards life more generally, which is initially captured by self-reported outcomes and may manifest itself in impacts on biomarkers only in the long-run. Indeed, there is some indication in the literature that tangible health outcomes of wellbeing interventions are attainable only in the longer term, especially if participants are motivated to sustain the behaviour promoted during the intervention afterwards, possibly over a period of months (see Steptoe (2019) for a review). While effects on biomarkers turned out insignificant, the fact that they consistently moved into the hypothesised direction still suggests a promising avenue for future exploration amongst individuals specifically with higher levels of depressive symptoms at  $t=0$ , and in particular, for long-run follow-up measurement.

Compared to the literature, impacts on self-reported outcomes were large: the course increased participants' life satisfaction on a zero-to-ten scale by about one point, which is more than being partnered as opposed to being single (+0.6) (Clark et al., 2018). Impacts were stronger than those found in trials funded by the UK Big Lottery Fund, which financed a wide range of wellbeing programmes (fourteen portfolios, each consisting of three to 34 actual trials) from 2008 to 2015 at a volume of £200 (\$251) million. Trials typically included community-based activities such as community gardens or sports events. As a conservative estimate, they increased life satisfaction on a zero-to-ten scale by, on average, 0.5 points for six months post-treatment (New Economics Foundation-Centre for Local Economic Strategies, 2013). Different from the "Exploring What Matters" course, however, these trials targeted specific groups with mental health needs.

Finally, impacts were highly comparable to those of ENHANCE (for life satisfaction, about one point in "Exploring What Matters" *versus* 1.1 points in ENHANCE), a 12-week wellbeing course focusing primarily on positive habits, skills, and attitudes, which is the most comparable intervention and which can be delivered both offline and online, with little

reported differences between both delivery modes (Heintzelman et al., 2019).<sup>20</sup> The authors were able to provide evidence of positive impacts over a period of up to six months post-treatment. Note that this six-month post-treatment period includes a three-month sub-period in which participants who had finished the course were repeatedly followed up: in the offline version, this included an alternating series of biweekly phone calls (of ten to fifteen minutes duration each) and in-person group sessions (of two hours duration each) during these three months; participants in the online version received six bi-weekly e-mails during this period.

"Exploring What Matters" differs from ENHANCE in several, fundamental aspects. We limit our comparisons to the offline version of ENHANCE because there exists, to date, no online version of "Exploring What Matters".<sup>21</sup> Different from ENHANCE, "Exploring What Matters" is led exclusively by non-expert volunteers (essentially laypeople), whereas ENHANCE relies on graduate-level trained clinicians. This is interesting, because it shows that laypeople without any specific academic background can be effectively utilised to systematically improve the wellbeing and pro-sociality of others. In fact, the manualisation of the "Exploring What Matters" course and its reliance on volunteer laypeople as course leaders make it highly cost-effective for face-to-face settings: costing only £90 (\$113) per WELLBY (a one-point increase in life satisfaction on a zero-to-ten scale for one individual for one year), it is well above the advocated wellbeing cost-effectiveness threshold of about £2,500 (\$3,139) derived from marginal National Health Service (NHS) spending in the UK (Clark et al., 2018), and well below the individual willingness to pay for one WELLBY of about £9,000

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<sup>20</sup> The impact of this course has been studied using a waitlist randomisation design, as in our paper, and the authors found an impact of about 0.5 between baseline and posttest on life satisfaction measured on a one-to-five multi-item summed scale (the Satisfaction With Life Scale) (Heintzelman et al., 2019, Table 3). With the caveat that both measures of life satisfaction are not perfectly comparable, rescaling this item to a zero-to-ten scale yields an impact of about  $0.5 \times (11/5) = 1.1$ .

<sup>21</sup> In light of Covid-19, Action for Happiness, the charity running the "Exploring What Matters" course, has developed a new version of the course optimised for online delivery, due to be launched in 2021. During the pandemic, over 100 local groups have conducted the course online using Zoom and over 5,000 participants have been involved.

(\$11,300) derived from marginal health improvements (Huang et al., 2018).<sup>22, 23</sup> Another fundamental difference between the two courses is the period after the course has ended. Different from ENHANCE, "Exploring What Matters" includes no three-month, labour-intensive maintenance period (i.e. biweekly alternating phone calls and group sessions), which should be seen as part of the intervention package and which has implications for cost-effectiveness. Such a period may not be necessary, considering the similarity in outcomes between the two courses.

Regardless of these differences, ENHANCE and the "Exploring What Matters" course show remarkable similarities in terms of impacts and demonstrate that the wellbeing of healthy adults in the general population can be effectively improved by means of intervention. An important, policy-relevant question is how average people can be motivated to take up wellbeing interventions (for example, by targeting their expectancies or subjective valuations of interventions), especially if they may not believe *ex-ante* in their effectiveness and interventions may therefore represent credence goods, i.e. goods of which the value only becomes apparent upon consumption.

Our study has several shortcomings. The most important one is that significant effects on self-reported outcomes were not mirrored by biomarkers. Impacts at  $t=1$  may thus have reflected participant's euphoria of having finished the course, placebo effects, or social desirability if course participants tried to please course leaders. Although none of these can be ruled out for sure, we argue that it is unlikely that our impacts were primarily driven by these

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<sup>22</sup> The wellbeing cost-effectiveness threshold of about £2,500 derived from marginal NHS spending can be calculated as follows: the NHS approves treatment if the QALY per cost ratio is 1/£25,000. Since QALYs are measured on a scale from zero-to-one and life satisfaction is measured on a scale from zero-to-ten, the translated advocated wellbeing cost-effectiveness threshold becomes  $(1/£25,000) \times 10$ . See Layard (2016), Clark et al. (2018), and Frijters et al. (2020) for the concept of WELLBY and Frijters and Krekel (2021) for a discussion of wellbeing cost-effectiveness analysis.

<sup>23</sup> We made the assumption that sustained impacts are sustained for at least one year. If we assume that they are sustained for two months only, for which we have suggestive evidence, the course would cost £540 (\$678) per WELLBY.

artefacts. First, recall that the atmosphere during data collection (including  $t=0$ ,  $t=1$ , and  $t=2$ ) was kept strictly neutral according to protocol, and that participants could meet and chat to each other only *after* data collection had finished. Second, there was evidence for sustained impacts: it is unlikely that placebo effects were sustained two months post-treatment. Moreover, impacts at  $t=2$  were similar (if not stronger) than at  $t=1$ : it is unlikely that, two months after having completed the last survey, participants perfectly recalled their previous responses. Likewise, the fact that different types of self-reported outcomes, particularly, PHQ-9 and GAD-7, point into the same direction makes us more confident in that our identified treatment effects are not driven exclusively by demand effects. Arguably, PHQ-9 and GAD-7 should be less susceptible to such effects, because they (*a*) are multi-item summary scales (and hence relatively less prone to them), (*b*) ask about actual experiences during the past two weeks (for example, trouble falling or staying asleep, or sleeping too much), and (*c*) are not framed around the notion of "happiness" (which the course is advertised to promote). Finally, data collection was strictly anonymous, and there was little incentive for participants to answer in a strategic or socially desirable way. Likewise, anonymous online surveys from the universe of courses conducted showed similar impacts. They also pointed against observer effects: for participants who completed online surveys, no field experiment was salient.

Despite these protocols, two other types of placebo effects are thinkable: first, participants self-selected into the intervention (i.e. knowing that it aims at increasing their happiness) and were likely to be actively looking to improve their lives. The question then arises whether our identified treatment effects are due to placebo effects (i.e. motivated cognition) to which self-selected participants may be especially susceptible. Alternatively, one might argue that self-selected participants may be especially motivated to "work hard" in order to improve their lives, i.e. pure motivational effects. Unfortunately, our study design does not allow us to disentangle these effects, but the literature provides evidence on their relative importance. Lyubomirsky et al. (2011) show that self-selection strengthens treatment effects, but only



when interacted with a wellbeing-enhancing treatment (as opposed to a neutral control).

Moreover, the authors show that self-selected participants put more effort into treatment compared to non-self-selected participants. Hence, self-selection seems to matter, but not so much because of motivated cognition. Rather, it seems that self-selected participants bring with them more positive behavioural attitudes towards treatment.

A second placebo effect may arise from the upfront donation (£90) that participants may make in order to cover costs: one could argue that, because participants paid upfront, they may report a higher wellbeing *ex-post* due to cognitive dissonance. Although we cannot fully exclude this possibility, the combination of (i) the rather small amount (i.e. between  $\pounds 90 / (8 \times 2) = \pounds 5.6$  to  $\pounds 90 / (10 \times 2) = \pounds 4.5$  per course hour for a course duration of between 16 and 20 hours); (ii) the relatively long duration between payment and outcome measurement of more than two months; and (iii) the fact that course participants were not primarily from the lower end of the income distribution reduces the likelihood of significant placebo effects from the possibility of making an upfront donation.

Another shortcoming was the waitlist randomisation design: the choice of this design was motivated by the fact that – in our non-clinical, general adult population, and local community intervention context – there exists no natural, credible control group that could lend itself as a counterfactual business-as-usual. At the same time, alternate double-blind impact study designs with placebo control groups are difficult to implement in the context of course-based social-psychological interventions (Herbert and Gaudiano, 2005). On the one hand, a placebo (for example, having meetings at the same time as the treatment group but in an unstructured format without delivering course contents) could have helped to better isolate and identify the active ingredients of the intervention (for example, specific course contents *versus* socialising or disrupting the daily routine), beyond the self-reported changes in information and behaviour that we document. On the other hand, a placebo that eliminates (ideally) one specific channel is difficult to find and implement, especially in case of in-person courses

involving several sessions over a long period of time. Ideally, one would want to work with multiple control groups and placebos, which can easily become quite complex. At a conceptual level, this raises the question of whether or not elements like socialising or disrupting the daily routine are themselves active parts of the intervention package.

Our waitlist randomisation, therefore, balanced these challenges while adhering as closely as possible to evidence-based practice in social science. Nevertheless, it has drawbacks. The most important one is that being waitlisted itself could be a treatment. Bias could have gone both ways. We found little evidence for either: between  $t=0$  and  $t=1$ , there were little significant differences in outcomes and covariates for the waitlisted control group, except for mindfulness and meditation (which the waitlisted control group seemed to practice more at  $t=0$ ). Excluding individuals for whom this behavioural change occurred between  $t=0$  and  $t=1$  left our findings unchanged.<sup>24</sup>

Future research may build on and extend the evidence established in this trial, for example, by looking at long-term impacts that go beyond two months post-treatment. Moreover, it may be interesting to look at behavioural spillovers from one life domain to another or wellbeing spillovers between individuals. We found participants who were initially in more mental distress to benefit more from the course. A larger sample size could help stratifying results by demographics and other participant characteristics, providing useful insights into targeting particular groups of people more effectively. It may also help resolve power issues with biomarkers. Finally, motivated by the growing literature on mentoring and advice-giving in social psychology rooted in self-perception theory and advocacy, studying the causal effect of the course on the wellbeing of facilitators (i.e. the volunteers who lead the course) would be a promising avenue for future research.

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<sup>24</sup> Results are available upon request.

### **Conclusion**

Our study shows that wellbeing is not fixed but can be changed by means of intervention, cost-effectively and at scale, and that self-reported impacts are sustained over time. In particular, exposing people to the scientific evidence base on what has been found to cause wellbeing (even when presented by non-expert laypeople), jointly discussing this evidence, and committing to make behavioural changes to daily routines can have lasting impacts on wellbeing. This speaks against a set point of wellbeing around which individuals fluctuate and return to by adapting to changes in life circumstances (Brickman and Campbell, 1971). Rather, the evidence presented here speaks for an expectancy-value approach to behaviour change (Battle, 1965), in which individuals – once they update their beliefs about what matters to their wellbeing, change their behaviour initially, and experience an initial increase in wellbeing – may change their behaviour more permanently, with then sustained impacts on wellbeing. To the extent that people do not anticipate or believe in such interventions, these may constitute credence goods and there may be a role to play for policy to accredit their effectiveness and disseminate that information.

This has important implications for economics: apart from wellbeing being a significant predictor of economic behaviour and individual-level outcomes such as productivity and income (De Neve and Oswald, 2012; Oswald et al., 2015; B  llet et al., 2020), health (Graham and Pinto, 2019), voting (Liberini et al., 2017), or organisation-level productivity and profitability (Krekel et al., 2019), there are important implications for measuring societal progress more generally. If wellbeing is not fixed and adaptation is not inevitable (e.g. we know that there is no full adaptation to unemployment, cf. Clark et al., 2008), wellbeing can be used as a meaningful indicator to measure societal progress, and help direct policy attention towards areas in which there may be little adaptation (such as lack of social relationships, unemployment, lack of community cohesion and trust, or mental health), and by the same token, towards more wellbeing-improving activities.

The Easterlin Paradox (Easterlin, 1974, 2019) shows that, despite substantial increases in GDP per capita, wellbeing has been largely stagnant in many developed countries over the past decades, or even declined for some population groups (Stevenson and Wolfers, 2009). The finding that wellbeing can improve when redirected towards certain behaviours, combined with the growing evidence base on its causes and consequences, underlines its usefulness as an indicator for measuring how we are doing as a society, which is a core activity of the economics profession.

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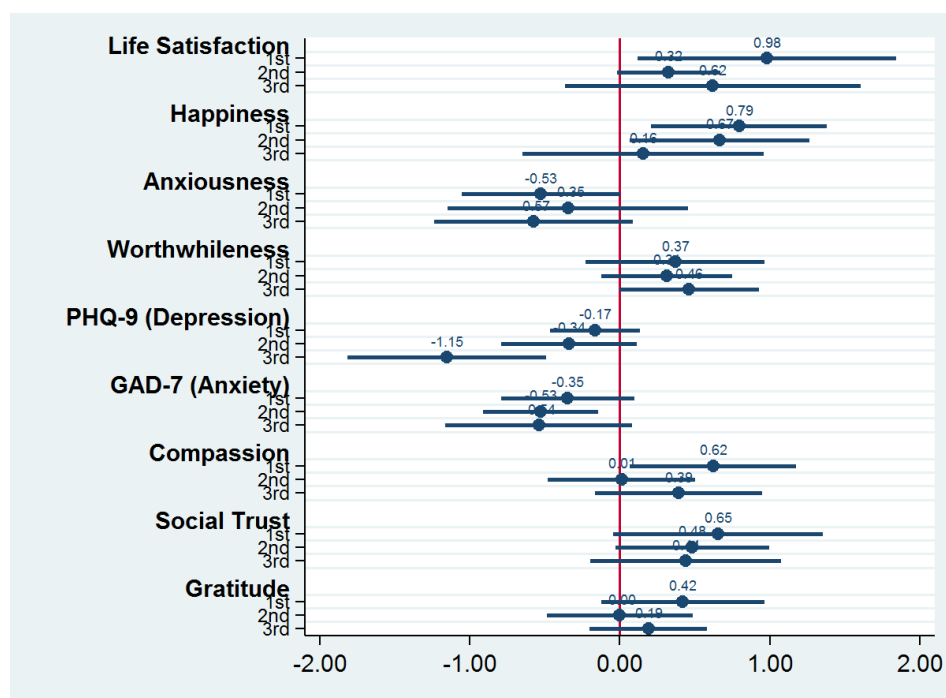
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## Supplementary Materials

## Figures

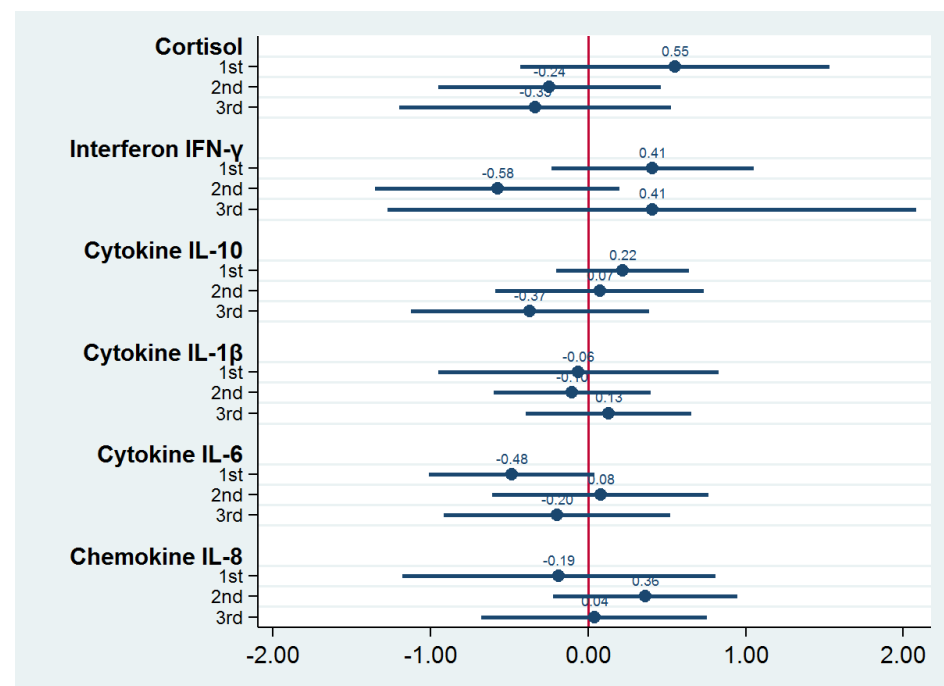
**Figure 1**

*Impacts on Self-Reported Outcomes by Tercile: Subjective Wellbeing, Mental Health, and Pro-Sociality*



*Notes:* Sample is split by tercile of respective outcome distribution, pre-treatment. Outcomes have been standardised prior to running regressions (i.e. transformed to z-scores with mean of zero and standard deviation of one, using the control group mean and standard deviation). Controls include age, gender, marital status, education, employment, income, religion, religious practice, preference for meeting new people and making friends, health (including pregnancy), health-related behaviour (including smoking and medication usage), and course-set-specific fixed effects. Robust standard errors are clustered at the participant level. N=279 (146 respondents, of which 73 are in treatment and 73 in control). Confidence bands are 95%.

*Sources:* Own data collection, own calculations.

**Figure 2***Impacts on Biomarkers by Tercile: Cortisol and Cytokines*

*Notes:* Sample is split by tercile of respective outcome distribution, pre-treatment. Outcomes have been standardised prior to running regressions (i.e. transformed to z-scores with mean of zero and standard deviation of one, using the control group mean and standard deviation). Controls include age, gender, marital status, education, employment, income, religion, religious practice, preference for meeting new people and making friends, health (including pregnancy), health-related behaviour (including smoking and medication usage), and course-set-specific fixed effects. Robust standard errors are clustered at the participant level. N=279 (146 respondents, of which 73 are in treatment and 73 in control). Confidence bands are 95%.

*Sources:* Own data collection, own calculations.



## Tables

**Table 1a***Comparison of Understanding Society in London with Estimation Sample*

	Mean Understanding Society (London, Same Age Span)	Mean Estimation Sample, Pre-Treatment	Difference
<i>Subjective Wellbeing</i>			
Life Satisfaction	7.087	6.349	0.738***
<i>Demographic Characteristics</i>			
Age: 20-24	0.101	0.055	0.046*
25-34	0.212	0.267	-0.055
35-44	0.242	0.232	0.009
45-54	0.217	0.226	-0.009
55-64	0.136	0.178	-0.042
65-74	0.092	0.041	0.051**
Gender: Male	0.547	0.171	0.376***
Female	0.453	0.829	-0.376***
Marital Status: Single	0.346	0.390	-0.044
Married	0.530	0.199	0.331***
Separated	0.023	0.034	-0.011
Divorced	0.069	0.102	-0.034
Widowed	0.028	0.007	0.021

Domestic Partner (Understanding Society: Civic Partner)	0.003	0.247	-0.243***
Prefer not to Say	-	0.021 0.142	
Income: £14,999 or Less	0.182	0.137	0.045
£15,000-£29,999	0.151	0.205	-0.055*
£30,000-£44,999	0.151	0.199	-0.048
£45,000-£59,999	0.137	0.130	0.007
£60,000-£74,999	0.109	0.116	-0.007
£75,000 or More	0.270	0.157	0.112***
Prefer not to Say	-	0.055 0.228	

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Observations	28,547	146	-
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Notes: See Table Supplementary Materials Table 1b for variable definitions.

\*\*\* p<0.01, \*\* p<0.05, \* p<0.1

**Table 1b***Variable Definitions and Descriptive Statistics*

	Mean	Standard Deviation	Minimum	Maximum	Number of Obser- vations	Remarks
<i>Self-Reported Outcomes</i>						
Life Satisfaction	6.570	1.669	1	10	279	“Overall, how satisfied are you with your life nowadays?”: (0) “Not at all” to (10) “Completely”
Happiness	6.376	1.989	1	10	279	“Overall, how happy did you feel yesterday?”: (0) “Not at all” to (10) “Completely”
Anxiousness	4.133	2.489	0	10	279	“Overall, how anxious did you feel yesterday?”: (0) “Not at all” to (10) “Completely”
Worthwhileness	7.194	1.827	1	10	279	“Overall, to what extent do you feel the things you do in your life are worthwhile?”: (0) “Not at all” to (10) “Completely”
PHQ-9 (Depression)	6.358	4.523	0	21	279	9-Item Patient-Health Questionnaire, see Kroenke et al. (2001)

GAD-7 (Anxiety)	6.057	4.640	0	20	279	7-Item Generalised-Anxiety-Disorder Questionnaire, see Spitzer et al. (2006)
Compassion	6.762	2.398	0	11.8	279	5-Item Santa Clara Brief Compassion Scale, see Hwang et al. (2008)
Social Trust	6.584	2.079	0	10	279	“Generally, would you say that most people can be trusted, or that you cannot be too careful in dealing with people?”: (0) “Cannot be too careful” to (10) “Most can be trusted”
Gratitude	6.222	0.890	0	7	279	“I have so much in life to be thankful for.”: (0) “Strongly disagree” to (10) “Strongly agree”
Information (a)	7.691	1.563	1	10	230	“I feel aware of what contributes to a happy and meaningful life.”: (0) “Not at all” to (10) “Completely”
Information (b)	7.374	1.738	1	10	230	“I know what really matters to me in life.”: (0) “Not at all” to (10) “Completely”
Information (c)	7.243	1.916	1	10	230	“I feel able to do things to improve my own wellbeing.”: (0) “Not at all” to (10) “Completely”

Information (d)	7.274	1.602	2	10	230	“I feel able to do things to improve the well-being of others.”: (0) “Not at all” to (10) “Completely”
Behaviour (a)	2.057	0.897	0	3	230	“In recent weeks, how often have you done the following? ...Noticed and felt grateful for good things”: (0) “Not at all”, (1) “Several days”, (2) “More than half the days”, (3) “Nearly every day”
Behaviour (b)	1.426	1.062	0	3	230	“...Practised mindfulness/meditation”: (0) “Not at all”, (1) “Several days”, (2) “More than half the days”, (3) “Nearly every day”
Behaviour (c)	1.570	0.868	0	3	230	“...Treated yourself in a kind way”: (0) “Not at all”, (1) “Several days”, (2) “More than half the days”, (3) “Nearly every day”
Behaviour (d)	1.661	0.813	0	3	230	“...Made time for something really important to you”: (0) “Not at all”, (1) “Several days”, (2) “More than half the days”, (3) “Nearly every day”
Behaviour (e)	1.561	0.800	0	3	230	“...Responded well to a difficult situation”: (0) “Not at all”, (1) “Several days”, (2) “More than half the days”, (3) “Nearly every day”
Behaviour (f)	1.248	0.801	0	3	230	“...Learnt or tried out something new”: (0) “Not at all”, (1) “Several days”, (2) “More than half the days”, (3) “Nearly every day”

Behaviour (g)	1.796	0.905	0	3	230	“...Gave time to one of your closest relationships”: (0) “Not at all”, (1) “Several days”, (2) “More than half the days”, (3) “Nearly every day”
Behaviour (h)	1.983	0.861	0	3	230	“...Connected with other people”: (0) “Not at all”, (1) “Several days”, (2) “More than half the days”, (3) “Nearly every day”
Behaviour (i)	1.765	0.808	0	3	230	“...Did something kind or helpful for others”: (0) “Not at all”, (1) “Several days”, (2) “More than half the days”, (3) “Nearly every day”
Behaviour (j)	1.343	0.966	0	3	230	“...Tried to increase happiness at work”: (0) “Not at all”, (1) “Several days”, (2) “More than half the days”, (3) “Nearly every day”
Behaviour (k)	0.896	0.845	0	3	230	“...Tried to increase happiness in the community”: (0) “Not at all”, (1) “Several days”, (2) “More than half the days”, (3) “Nearly every day”
Behaviour (l)	1.170	0.994	0	3	230	“...Thought about the difference you make in the world”: (0) “Not at all”, (1) “Several days”, (2) “More than half the days”, (3) “Nearly every day”
<i>Biomarkers</i>						
Cortisol	0.164	0.653	0.015	10.300	275	Cortisol in µg/dL

Interferon IFN- $\gamma$	7.978	26.302	0.061	205.826	243	Interferon IFN- $\gamma$ in pg/mL
Cytokine IL-10	1.433	2.900	0.023	37.906	274	Anti-Inflammatory Cytokine IL-10 in pg/mL
Cytokine IL-1 $\beta$	245.730	221.421	6.083	1,306.554	275	Pro-Inflammatory Cytokine IL-1 $\beta$ in pg/mL
Cytokine IL-6	9.324	18.997	0.710	206.299	275	Pro-Inflammatory Cytokine IL-6 in pg/mL
Chemokine IL-8	1,389.868	886.035	127.297	6,783.128	275	Chemokine IL-8 in pg/mL

*Controls*

Age: 20-24	0.050	0.219	0	1	279	-
25-34	0.265	0.442	0	1	279	-
35-44	0.233	0.423	0	1	279	-
45-54	0.237	0.426	0	1	279	-
55-64	0.176	0.381	0	1	279	-
65-74	0.039	0.195	0	1	279	-
Gender: Male	0.176	0.381	0	1	279	-
Female	0.824	0.381	0	1	279	-
Marital Status: Single	0.394	0.490	0	1	279	-
Married	0.201	0.401	0	1	279	-
Separated	0.036	0.186	0	1	279	-
Divorced	0.100	0.301	0	1	279	-
Widowed	0.007	0.085	0	1	279	-
Domestic Partner	0.247	0.432	0	1	279	-
Prefer not to Say	0.014	0.119	0	1	279	-
Educational Status: Secondary Degree	0.047	0.211	0	1	279	-
Vocational Degree	0.079	0.270	0	1	279	-
Tertiary Degree	0.384	0.487	0	1	279	-
Higher Than Tertiary Degree	0.484	0.501	0	1	279	-
Prefer not to Say	0.007	0.085	0	1	279	-
Employment Status: Working Full-Time for Employer	0.498	0.501	0	1	279	-
Working Full-Time for Self	0.151	0.358	0	1	279	-

Working Part-Time	0.194	0.396	0	1	279	-
Working Part-Time (Underemployed)	0.004	0.060	0	1	279	-
Unemployed	0.050	0.219	0	1	279	-
Out of Labour Force	0.068	0.252	0	1	279	-
Prefer not to Say	0.036	0.186	0	1	279	-
Income: £14,999 or Less	0.143	0.351	0	1	279	-
£15,000-£29,999	0.197	0.399	0	1	279	-
£30,000-£44,999	0.201	0.401	0	1	279	-
£45,000-£59,999	0.122	0.328	0	1	279	-
£60,000-£74,999	0.122	0.328	0	1	279	-
£75,000 or More	0.161	0.368	0	1	279	-
Prefer not to Say	0.054	0.226	0	1	279	-
Religion: None	0.563	0.497	0	1	279	-
Christian	0.222	0.416	0	1	279	-
Buddhist	0.082	0.276	0	1	279	-
Hindu	0.029	0.167	0	1	279	-
Jewish	0.007	0.085	0	1	279	-
Muslim	0.007	0.085	0	1	279	-
Sikh	0.007	0.085	0	1	279	-
Other	0.029	0.167	0	1	279	-
Prefer not to Say	0.054	0.226	0	1	279	-
Religious Practice: Never	0.516	0.501	0	1	279	-
Less Than Annually	0.090	0.286	0	1	279	-
At Least Annually	0.143	0.351	0	1	279	-
At Least Monthly	0.100	0.301	0	1	279	-
At Least Weekly	0.086	0.281	0	1	279	-
Prefer not to Say	0.065	0.246	0	1	279	-
Smoking: Yes	0.082	0.276	0	1	279	-
No	0.918	0.276	0	1	279	-
Pregnant: Yes	0.014	0.119	0	1	279	-
No	0.986	0.119	0	1	279	-
Medication: Yes	0.416	0.494	0	1	279	-



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No	0.584	0.494	0	1	279	-
Important to Meet New People and Make Friends: Yes	0.799	0.401	0	1	279	“How important is it for you to be meeting new people and making friends?” (0) “Not at all important” to (10) “Extremely important” (=6+7+8+9+10) (=0+1+2+3+4+5)
No	0.201	0.401	0	1	279	

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**Table 1c**

Balancing Properties Between Treatment and Control Group

	Mean Treatment Group, Pre-Intervention	Mean Control Group, Pre-Intervention	Difference
<i>Self-Reported Outcomes</i>			
Life Satisfaction	6.384	6.315	0.068
Happiness	6.151	6.288	-0.137
Anxiousness	4.233	4.438	-0.205
Worthwhileness	6.932	7.041	-0.110
PHQ-9 (Depression)	6.726	7.151	-0.425
GAD-7 (Anxiety)	6.110	6.671	-0.562
Compassion	6.523	6.792	-0.268
Social Trust	6.288	6.507	-0.219
Gratitude	6.205	6.178	0.027
Information (a)	7.479	7.469	0.010
Information (b)	7.188	7.224	-0.037
Information (c)	7.271	6.796	0.475
Information (d)	6.896	7.224	-0.329
Behaviour (a)	2.021	2.020	0.000
Behaviour (b)	1.333	1.429	-0.095
Behaviour (c)	1.417	1.449	-0.032
Behaviour (d)	1.667	1.571	0.095
Behaviour (e)	1.354	1.571	-0.217
Behaviour (f)	1.167	1.204	-0.037
Behaviour (g)	1.875	1.837	0.038
Behaviour (h)	1.854	2.061	-0.207
Behaviour (i)	1.521	1.816	-0.295*

Behaviour (j)	1.208	1.347	-0.139
Behaviour (k)	0.625	0.776	-0.151
Behaviour (l)	0.938	1.122	-0.185

*Biomarkers*

Cortisol	0.263	0.172	0.091
Interferon IFN- $\gamma$	9.613	7.510	2.103
Cytokine IL-10	1.783	1.397	0.387
Cytokine IL-1 $\beta$	256.544	284.884	-28.340
Cytokine IL-6	9.809	10.131	-0.322
Chemokine IL-8	1,379.952	1,603.446	-223.494

*Controls*

Age: 20-24	0.041	0.068	-0.027
25-34	0.288	0.247	0.041
35-44	0.233	0.233	-0.000
45-54	0.247	0.205	0.041
55-64	0.164	0.192	-0.027
65-74	0.027	0.055	-0.027
Gender: Male	0.178	0.164	0.014
Female	0.822	0.836	-0.014
Marital Status: Single	0.342	0.438	-0.096
Married	0.205	0.192	0.014
Separated	0.027	0.041	-0.014
Divorced	0.110	0.096	0.014
Widowed	0.000	0.014	-0.014
Domestic Partner	0.274	0.219	0.055
Prefer not to Say	0.041	0.000	0.041*
Educational Status: Secondary Degree	0.055	0.041	0.014
Vocational Degree	0.082	0.068	0.014

Tertiary Degree	0.425	0.356	0.068
Higher Than Tertiary Degree	0.425	0.534	-0.110
Prefer not to Say	0.014	0.000	0.014
Employment Status: Working Full-Time for Employer	0.534	0.466	0.068
Working Full-Time for Self	0.137	0.164	-0.027
Working Part-Time	0.151	0.219	-0.068
Working Part-Time (Underemployed)	0.014	0.000	0.014
Unemployed	0.055	0.041	0.014
Out of Labour Force	0.055	0.096	-0.041
Prefer not to say	0.055	0.014	0.041
Income: £14,999 or Less	0.137	0.137	-0.000
£15,000-£29,999	0.219	0.192	0.027
£30,000-£44,999	0.164	0.233	-0.068
£45,000-£59,999	0.082	0.178	-0.096*
£60,000-£74,999	0.123	0.110	0.014
£75,000 or More	0.192	0.123	0.068
Prefer not to Say	0.082	0.027	0.055
Religion: None	0.548	0.589	-0.041
Christian	0.192	0.247	-0.055
Buddhist	0.110	0.055	0.055
Hindu	0.041	0.014	0.027
Jewish	0.014	0.000	0.014
Muslim	0.014	0.000	0.014
Sikh	0.014	0.000	0.014
Other	0.014	0.041	-0.027
Prefer not to Say	0.055	0.055	-0.000
Religious Practice: Never	0.521	0.521	-0.000
Less Than Annually	0.068	0.110	-0.041
At Least Annually	0.164	0.123	0.041
At Least Monthly	0.082	0.110	-0.027
At Least Weekly	0.082	0.096	-0.014

Prefer not to Say	0.082	0.041	0.041
Smoking: Yes	0.082	0.110	-0.027
No	0.918	0.890	0.027
Pregnant: Yes	0.000	0.027	-0.027
No	1.000	0.973	0.027
Medication: Yes	0.397	0.438	-0.041
No	0.603	0.562	0.041
Important to Meet New People and Make Friends: Yes	0.726	0.808	-0.082
No	0.274	0.192	0.082
Observations	73	73	-

Notes: T-tests used robust standard errors clustered at individual level. See Supplementary Materials Table 1b for variable definitions.

\*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$

**Table 2a***Main Results – Self-Reported Outcomes (Regression Table for Figure 3), Including Controls*

	Subjective Wellbeing				Mental Health		Pro-Sociality		
	Life Satis- faction (1)	Happiness (2)	Anxious- ness (3)	Worth- whileness (4)	PHQ-9 (Depres- sion) (5)	GAD-7 (Anxiety) (6)	Compassion (7)	Social Trust (8)	Gratitude (9)
Treatment*Post	0.633*** (0.152)	0.596*** (0.173)	-0.468** (0.190)	0.491*** (0.154)	-0.497*** (0.135)	-0.424*** (0.119)	0.383*** (0.145)	0.531*** (0.160)	0.286** (0.136)
Treatment	0.0947 (0.168)	0.0313 (0.163)	0.0306 (0.174)	-0.0682 (0.162)	0.0132 (0.168)	-0.0622 (0.159)	-0.275* (0.153)	-0.181 (0.197)	0.000337 (0.172)
Post	-0.0182 (0.103)	-0.141 (0.126)	0.0370 (0.134)	-0.0518 (0.109)	-0.00930 (0.0863)	0.0680 (0.0915)	-0.101 (0.0958)	-0.0782 (0.102)	-0.0734 (0.0965)
Age: 20-24									
25-34	-0.437 (0.278)	-0.409 (0.330)	-0.0941 (0.329)	0.214 (0.261)	-0.464 (0.337)	-0.546 (0.374)	0.228 (0.321)	0.425 (0.465)	0.0929 (0.276)
35-44	-0.719** (0.318)	-0.573* (0.343)	0.0531 (0.373)	-0.109 (0.305)	-0.470 (0.337)	-0.246 (0.382)	-0.263 (0.365)	-0.430 (0.466)	-0.0309 (0.328)
45-54	-0.784** (0.355)	-0.643* (0.372)	-0.289 (0.403)	0.131 (0.318)	-0.497 (0.348)	-0.391 (0.390)	-0.211 (0.359)	0.126 (0.530)	0.351 (0.324)
55-64	-0.502 (0.342)	-0.382 (0.374)	-0.209 (0.414)	0.00985 (0.309)	-0.536 (0.399)	-0.433 (0.393)	-0.271 (0.414)	0.292 (0.538)	-0.0480 (0.339)
65-74	-0.968 (0.594)	-0.838* (0.486)	-0.0171 (0.564)	-0.444 (0.555)	-0.549 (0.511)	-0.0981 (0.469)	-1.258* (0.734)	-0.373 (0.735)	-0.817 (0.513)
Gender: Male									
Female	0.140 (0.209)	0.0599 (0.196)	-0.0526 (0.238)	0.209 (0.254)	-0.0558 (0.220)	0.0898 (0.218)	0.875*** (0.250)	0.238 (0.211)	0.257 (0.188)

## Marital Status: Single

Partnered	0.0655 (0.168)	-0.170 (0.172)	0.190 (0.186)	0.0624 (0.163)	0.00306 (0.173)	0.107 (0.184)	-0.103 (0.195)	-0.120 (0.226)	-0.140 (0.173)
Married	0.106 (0.214)	-0.282 (0.189)	-0.0888 (0.227)	-0.0236 (0.195)	-0.109 (0.204)	-0.194 (0.216)	0.0670 (0.215)	0.203 (0.255)	0.145 (0.202)
Separated	-0.0139 (0.404)	-0.840** (0.366)	0.0225 (0.381)	0.0868 (0.363)	0.0442 (0.353)	-0.0811 (0.338)	0.0234 (0.405)	-0.0862 (0.347)	-0.131 (0.381)
Divorced	-0.446 (0.345)	-0.527* (0.311)	0.0501 (0.301)	-0.756** (0.314)	0.274 (0.360)	-0.0524 (0.298)	0.567* (0.294)	-0.502 (0.328)	-0.168 (0.320)
Widowed	0.550 (0.639)	0.109 (0.519)	0.646 (0.582)	0.685 (0.611)	0.463 (0.600)	-1.357*** (0.513)	1.440* (0.759)	0.639 (0.646)	1.445*** (0.517)
Prefer not to Say	0.832** (0.366)	0.452 (0.483)	-0.611 (0.511)	-0.104 (0.733)	-0.460 (0.471)	-0.803*** (0.292)	-0.565 (0.506)	-1.120 (1.153)	0.721** (0.289)

## Educational Status: Secondary Degree

Vocational Degree	0.302 (0.547)	0.600 (0.477)	-0.447 (0.478)	0.0765 (0.552)	0.268 (0.506)	0.240 (0.437)	-0.374 (0.446)	-0.579 (0.434)	-0.642 (0.642)
Tertiary Degree	0.534 (0.507)	0.501 (0.390)	-0.0735 (0.362)	0.246 (0.369)	-0.396 (0.408)	-0.126 (0.361)	-0.327 (0.252)	-0.595* (0.306)	-0.401 (0.356)
Higher Than Tertiary Degree	0.305 (0.475)	0.355 (0.359)	0.226 (0.350)	-0.0663 (0.354)	-0.00718 (0.395)	0.214 (0.344)	-0.230 (0.241)	-0.700** (0.304)	-0.513 (0.335)
Prefer not to Say	0.226 (0.686)	0.637 (0.652)	-3.393*** (0.587)	0.157 (0.651)	-2.001*** (0.608)	-1.533** (0.640)	0.582 (0.542)	-0.142 (0.726)	-0.396 (0.559)

## Employment Status: Working Full-Time for Employer

Working Full-Time for Self	0.0604 (0.240)	-0.110 (0.227)	0.302 (0.250)	0.211 (0.276)	0.280 (0.252)	0.334 (0.233)	0.0169 (0.306)	0.00683 (0.236)	0.0378 (0.292)
Working Part-Time	0.0458 (0.294)	0.183 (0.224)	-0.0633 (0.254)	-0.0667 (0.248)	-0.00339 (0.289)	-0.304 (0.252)	-0.173 (0.254)	-0.0294 (0.323)	-0.479* (0.257)

Working Part-Time (Under-employed)	-2.141*** (0.764)	-1.984** (0.828)	-0.439 (0.765)	-0.992 (1.012)	-0.00678 (0.744)	0.157 (0.713)	0.0789 (0.767)	-0.697 (1.398)	-2.194*** (0.701)
Unemployed	-1.566*** (0.408)	-1.144*** (0.386)	0.609 (0.433)	-1.045** (0.439)	0.812** (0.395)	0.265 (0.343)	0.290 (0.371)	-0.273 (0.569)	-0.800** (0.400)
Out of Labour Force	-0.113 (0.409)	0.284 (0.385)	-0.0572 (0.409)	0.169 (0.397)	0.0950 (0.380)	-0.347 (0.302)	0.103 (0.308)	0.00220 (0.433)	-0.121 (0.440)
Prefer not to say	-0.507 (0.388)	-0.396 (0.445)	0.419 (0.357)	-0.369 (0.469)	-0.190 (0.306)	-0.707*** (0.270)	-0.400 (0.279)	-0.686* (0.411)	0.0153 (0.343)
Income: £14,999 or Less									
£15,000-£29,999	-0.0517 (0.290)	-0.239 (0.328)	0.410 (0.321)	-0.337 (0.320)	-0.0432 (0.279)	0.258 (0.275)	-0.121 (0.276)	-0.118 (0.405)	0.0925 (0.280)
£30,000-£44,999	-0.0803 (0.303)	-0.347 (0.315)	0.535 (0.329)	-0.126 (0.363)	0.0525 (0.311)	0.527* (0.293)	-0.288 (0.306)	-0.0209 (0.369)	-0.121 (0.356)
£45,000-£59,999	0.476 (0.324)	0.0785 (0.365)	0.268 (0.400)	-0.216 (0.389)	-0.106 (0.324)	0.100 (0.316)	-0.160 (0.368)	-0.113 (0.472)	0.457 (0.351)
£60,000-£74,999	0.333 (0.352)	0.276 (0.365)	0.325 (0.369)	-0.234 (0.359)	-0.237 (0.352)	0.0933 (0.370)	0.0205 (0.350)	-0.134 (0.420)	-0.0376 (0.323)
£75,000 or More	0.159 (0.352)	0.000426 (0.356)	0.0371 (0.342)	-0.219 (0.403)	-0.300 (0.332)	0.0649 (0.297)	0.0655 (0.367)	0.389 (0.403)	0.113 (0.332)
Prefer not to Say	0.834** (0.359)	0.575 (0.398)	-0.228 (0.363)	0.542 (0.439)	-0.328 (0.309)	0.0827 (0.330)	0.268 (0.415)	1.195** (0.484)	0.484 (0.378)
Religion: None									
Christian	-0.267 (0.307)	-0.366 (0.236)	-0.0735 (0.243)	-0.0667 (0.237)	-0.184 (0.262)	0.0929 (0.262)	-0.0942 (0.199)	-0.713*** (0.239)	-0.178 (0.248)
Buddhist	0.341 (0.339)	0.160 (0.324)	-0.230 (0.320)	0.223 (0.316)	-0.355 (0.385)	-0.191 (0.337)	0.538* (0.274)	-0.274 (0.347)	0.00938 (0.317)
Hindu	-0.0841 (0.555)	-0.000969 (0.470)	-0.192 (0.759)	-0.211 (0.448)	-0.0174 (0.519)	0.291 (0.485)	-0.331 (0.494)	-0.269 (0.620)	-0.444 (0.557)
Jewish	0.628	-0.0508	-1.205**	0.708	-0.340	0.0246	1.695***	1.359***	0.530



	(0.481)	(0.418)	(0.481)	(0.507)	(0.544)	(0.480)	(0.476)	(0.482)	(0.476)
Muslim	-1.270**	-0.831*	0.250	0.153	-0.0160	0.428	1.622***	-0.841*	-3.467***
	(0.560)	(0.454)	(0.479)	(0.646)	(0.532)	(0.444)	(0.550)	(0.495)	(0.551)
Sikh	0.260	-0.299	0.149	0.311	0.597	0.235	-1.125**	-0.515	-1.369***
	(0.582)	(0.513)	(0.465)	(0.508)	(0.706)	(0.649)	(0.451)	(0.587)	(0.459)
Other	-0.449	-0.241	0.234	-0.269	-0.639	-0.203	-0.662	-1.669**	-1.139
	(0.344)	(0.339)	(0.408)	(0.435)	(0.397)	(0.403)	(0.557)	(0.679)	(0.824)
Prefer not to Say	-0.420	-0.695*	0.827***	-0.792***	1.357***	1.145***	-0.0592	-0.353	-0.293
	(0.317)	(0.378)	(0.224)	(0.235)	(0.333)	(0.386)	(0.262)	(0.445)	(0.325)
Religious Practice: Never									
Less Than Annually	0.130	0.434*	-0.0805	0.251	-0.386	-0.333	-0.296	-0.0603	-0.128
	(0.291)	(0.231)	(0.268)	(0.300)	(0.257)	(0.237)	(0.316)	(0.320)	(0.321)
At Least Annually	0.00521	-0.179	0.483**	0.0319	0.290	0.182	-0.0124	0.114	0.299
	(0.275)	(0.230)	(0.237)	(0.263)	(0.312)	(0.279)	(0.210)	(0.244)	(0.275)
At Least Monthly	0.154	0.202	-0.0144	0.580*	-0.153	-0.129	-0.186	0.368	0.622*
	(0.320)	(0.304)	(0.308)	(0.339)	(0.296)	(0.348)	(0.324)	(0.352)	(0.365)
At Least Weekly	0.230	0.147	0.177	0.128	0.209	0.0621	0.328	0.708**	0.803**
	(0.366)	(0.336)	(0.342)	(0.314)	(0.333)	(0.352)	(0.299)	(0.355)	(0.321)
Prefer not to Say	-0.0879	0.0410	0.979***	-0.0982	-0.0190	0.101	-0.0827	-0.379	0.286
	(0.452)	(0.418)	(0.261)	(0.382)	(0.520)	(0.464)	(0.229)	(0.424)	(0.307)
Smoking: Yes									
No	0.271	0.204	0.0723	0.482*	-0.405	-0.262	-0.00821	0.0993	0.401
	(0.224)	(0.240)	(0.348)	(0.260)	(0.263)	(0.252)	(0.256)	(0.242)	(0.277)
Pregnant: Yes									
No	-0.411	-0.370	-0.0892	-0.222	-0.497	-0.410	-0.252	0.221	-0.168
	(0.728)	(0.469)	(0.609)	(0.662)	(0.696)	(0.652)	(0.362)	(0.368)	(0.384)
Medication: Yes									
No	-0.0356	0.212	-0.311*	0.134	-0.259	-0.279*	-0.0975	-0.0661	-0.0421
	(0.149)	(0.138)	(0.173)	(0.157)	(0.169)	(0.157)	(0.165)	(0.169)	(0.152)

Preference for Socialising:									
Yes									
No	-0.237 (0.185)	-0.224 (0.168)	-0.0720 (0.175)	-0.302 (0.213)	0.317* (0.169)	0.332* (0.180)	-0.396** (0.165)	-0.308* (0.175)	-0.178 (0.163)
Constant	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Set Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	279	279	279	279	279	279	279	279	279
R Squared	0.422	0.330	0.329	0.303	0.381	0.353	0.354	0.319	0.405

Notes: Robust standard errors clustered at individual level in parentheses. See Supplementary Materials Table 1b for variable definitions.

\*\*\* p<0.01, \*\* p<0.05, \*  
p<0.1

**Table 2b***Main Results – Biomarkers (Regression Table for Figure 4), Including Controls*

	Stress	Immune Response				
	Cortisol (1)	Interferon IFN- $\gamma$ (2)	Cytokine IL-10 (3)	Cytokine IL-1 $\beta$ (4)	Cytokine IL-6 (5)	Chemokine IL-8 (6)
Treatment*Post	0.0248 (0.252)	0.207 (0.246)	0.0623 (0.172)	-0.0738 (0.171)	-0.0873 (0.179)	0.0731 (0.200)
Treatment	0.175 (0.207)	-0.393* (0.201)	-0.0426 (0.198)	0.0416 (0.192)	0.0283 (0.175)	-0.158 (0.192)
Post	-0.302** (0.132)	-0.124 (0.171)	-0.149 (0.112)	-0.203** (0.0964)	-0.0589 (0.119)	-0.288** (0.123)
Age: 20-24						
25-34	-0.454 (0.486)	0.0213 (0.284)	0.303 (0.359)	0.398 (0.536)	0.444 (0.297)	0.496 (0.464)
35-44	-0.339 (0.499)	-0.437 (0.313)	0.180 (0.378)	0.236 (0.560)	0.318 (0.355)	0.409 (0.502)
45-54	-0.602 (0.496)	-0.255 (0.310)	0.139 (0.425)	0.871 (0.581)	0.743** (0.335)	0.903* (0.510)
55-64	-0.449 (0.548)	-0.167 (0.319)	0.160 (0.428)	0.955* (0.547)	0.797** (0.365)	1.014** (0.490)
65-74	-0.0713 (0.720)	-0.918* (0.502)	0.586 (0.501)	0.855 (0.739)	0.494 (0.426)	0.934 (0.662)
Gender: Male						
Female	-0.726*** (0.244)	-0.527** (0.245)	-0.212 (0.224)	-0.269 (0.213)	-0.476** (0.199)	-0.385* (0.224)
Marital Status: Single						

Partnered	-0.278 (0.232)	-0.530** (0.208)	-0.0175 (0.264)	-0.210 (0.254)	-0.293 (0.212)	-0.181 (0.227)
Married	0.0976 (0.479)	-0.417 (0.384)	-0.268 (0.333)	0.0717 (0.571)	0.325 (0.411)	-0.249 (0.622)
Separated	0.478 (0.349)	-0.663** (0.310)	-0.292 (0.316)	-0.686* (0.412)	-0.00438 (0.331)	-0.287 (0.370)
Divorced	1.871** (0.849)	1.183* (0.659)	-0.0915 (0.540)	0.126 (0.712)	0.286 (0.636)	0.506 (0.676)
Widowed	-0.275 (0.242)	-0.0468 (0.231)	-0.0890 (0.181)	0.213 (0.233)	0.0978 (0.199)	-0.00300 (0.236)
Prefer not to Say	-0.913 (0.755)	-0.262 (0.499)	0.00989 (0.689)	-0.310 (0.533)	-0.761** (0.293)	0.0821 (0.732)
Educational Status: Secondary Degree						
Vocational Degree	-0.801* (0.471)	0.781 (0.611)	0.429 (0.350)	0.596 (0.558)	0.591 (0.510)	0.863* (0.515)
Tertiary Degree	-0.372 (0.369)	-0.0111 (0.372)	0.917*** (0.257)	0.417 (0.323)	0.275 (0.383)	0.525* (0.315)
Higher Than Tertiary Degree	-0.270 (0.359)	0.0780 (0.352)	0.627*** (0.231)	0.584** (0.273)	0.337 (0.345)	0.601** (0.255)
Prefer not to Say	0.0317 (0.839)	0.271 (0.549)	0.0535 (0.612)	-1.100 (0.730)	0.840 (0.667)	-0.103 (0.587)
Employment Status: Working Full-Time for Employer						
Working Full-Time for Self	-0.121 (0.268)	0.149 (0.254)	0.557** (0.265)	0.322 (0.321)	0.360 (0.307)	-0.173 (0.313)
Working Part-Time	-0.551* (0.280)	0.439* (0.255)	0.0576 (0.262)	-0.0869 (0.291)	0.0854 (0.261)	-0.157 (0.276)

Working Part-Time (Underemployed)	0.265 (1.231)	0.383 (0.684)	2.392** (1.005)	1.383 (0.998)	0.0683 (0.855)	-0.0903 (1.053)
Unemployed	0.479 (0.648)	0.823 (0.594)	1.200** (0.534)	0.680 (0.486)	0.684 (0.416)	0.780* (0.456)
Out of Labour Force	-0.450 (0.393)	0.257 (0.302)	0.0806 (0.402)	0.330 (0.361)	0.297 (0.298)	0.0438 (0.380)
Prefer not to say	-0.249 (0.502)	0.110 (0.276)	0.521 (0.432)	0.748* (0.436)	-0.121 (0.375)	0.0141 (0.331)
Income: £14,999 or Less						
£15,000-£29,999	0.192 (0.420)	0.124 (0.365)	0.216 (0.292)	-0.465 (0.391)	0.136 (0.316)	0.0999 (0.362)
£30,000-£44,999	-0.0639 (0.400)	0.384 (0.399)	0.663** (0.284)	-0.000538 (0.391)	0.402 (0.338)	-0.0239 (0.382)
£45,000-£59,999	0.135 (0.442)	0.320 (0.440)	0.812** (0.376)	-0.0331 (0.382)	0.222 (0.389)	0.419 (0.390)
£60,000-£74,999	0.393 (0.472)	0.467 (0.410)	0.444 (0.298)	-0.163 (0.346)	0.280 (0.353)	0.253 (0.332)
£75,000 or More	-0.138 (0.410)	0.414 (0.375)	0.744** (0.375)	-0.107 (0.387)	0.356 (0.345)	0.307 (0.368)
Prefer not to Say	0.311 (0.514)	0.297 (0.432)	-0.367 (0.478)	-0.734 (0.573)	-0.150 (0.588)	-0.0152 (0.503)
Religion: None						
Christian	0.244 (0.305)	0.0628 (0.255)	0.138 (0.263)	-0.0853 (0.286)	-0.141 (0.265)	-0.00697 (0.320)
Buddhist	0.0665 (0.420)	0.0452 (0.314)	-0.223 (0.422)	-0.152 (0.419)	-0.139 (0.475)	-0.168 (0.489)
Hindu	0.464 (0.509)	0.171 (0.453)	0.161 (0.482)	-0.321 (0.495)	-0.911** (0.437)	-0.0799 (0.525)
Jewish	-0.124	0.207	-0.163	0.271	1.124**	0.949*

	(0.862)	(0.521)	(0.506)	(0.523)	(0.531)	(0.563)
Muslim	0.893	1.048*	0.996**	1.790***	0.548	1.086*
	(0.706)	(0.540)	(0.485)	(0.547)	(0.525)	(0.586)
Sikh	0.128	-0.963**	-1.073**	-1.571***	-1.294***	-0.702
	(0.566)	(0.477)	(0.439)	(0.464)	(0.487)	(0.481)
Other	-0.0458	-0.207	-0.187	-0.0504	-0.829	-0.338
	(0.449)	(0.469)	(0.453)	(0.552)	(0.523)	(0.663)
Prefer not to Say	0.279	0.0557	-0.352	0.163	-0.304	0.219
	(0.478)	(0.347)	(0.291)	(0.407)	(0.301)	(0.267)
Religious Practice: Never						
Less Than Annually	-0.250	0.0682	-0.0493	0.0371	0.190	0.0898
	(0.325)	(0.317)	(0.301)	(0.330)	(0.421)	(0.368)
At Least Annually	-0.470	-0.0300	0.228	0.239	-0.0887	-0.0759
	(0.308)	(0.249)	(0.308)	(0.276)	(0.231)	(0.301)
At Least Monthly	-0.794**	-0.196	0.384	0.953**	0.504	0.463
	(0.350)	(0.317)	(0.374)	(0.384)	(0.355)	(0.426)
At Least Weekly	-0.209	0.242	-0.209	0.0878	0.465	0.120
	(0.495)	(0.366)	(0.371)	(0.428)	(0.429)	(0.468)
Prefer not to Say	-0.539	0.229	0.632**	0.620*	0.457	0.433
	(0.429)	(0.286)	(0.242)	(0.361)	(0.373)	(0.331)
Smoking: Yes						
No	0.144	0.226	0.225	0.211	0.193	0.0950
	(0.408)	(0.265)	(0.222)	(0.221)	(0.267)	(0.284)
Pregnant: Yes						
No	0.549	0.458	1.163***	-0.133	0.227	0.490
	(0.540)	(0.371)	(0.407)	(0.413)	(0.340)	(0.611)
Medication: Yes						
No	-0.0400	-0.00962	-0.0461	0.0589	-0.0168	-0.124

	(0.148)	(0.162)	(0.170)	(0.175)	(0.161)	(0.167)
Preference for Socialising: Yes						
No	-0.184	0.000524	-0.235	-0.173	0.117	-0.210
	(0.192)	(0.192)	(0.185)	(0.210)	(0.199)	(0.212)
Constant	Yes	Yes	Yes	Yes	Yes	Yes
Set Fixed Effect	Yes	Yes	Yes	Yes	Yes	Yes
Observations	265	236	269	275	268	274
R-Squared	0.246	0.217	0.272	0.302	0.279	0.246

Notes: Robust standard errors clustered at individual level in parentheses. See Supplementary Materials Table 1b for variable definitions.

\*\*\* p<0.01, \*\* p<0.05, \* p<0.1

**Table 3a***Mechanisms – Changes in Information*

	Information			
	(a)	(b)	(c)	(d)
Treatment*Post	0.694*** (0.195)	0.651*** (0.193)	0.605*** (0.183)	0.549** (0.224)
Treatment	0.0878 (0.231)	0.0330 (0.206)	0.243 (0.199)	-0.279 (0.222)
Post	-0.0592 (0.111)	-0.0747 (0.132)	-0.0386 (0.128)	-0.0608 (0.157)
Age: 20-24				
25-34	0.0729 (0.288)	0.156 (0.298)	0.00778 (0.275)	0.0941 (0.268)
35-44	-0.0832 (0.302)	0.0241 (0.334)	-0.0846 (0.322)	-0.0138 (0.318)
45-54	-0.0166 (0.286)	0.178 (0.331)	-0.342 (0.383)	0.0810 (0.328)
55-64	0.0555 (0.335)	0.275 (0.371)	-0.259 (0.328)	0.115 (0.356)
65-74	-0.924* (0.483)	0.119 (0.577)	-1.079** (0.453)	-0.998* (0.558)
Gender: Male				
Female	-0.00456 (0.261)	-0.0359 (0.220)	0.0165 (0.270)	0.681*** (0.259)
Marital Status: Single				
Partnered	-0.143	0.140	0.102	-0.0331



	(0.185)	(0.217)	(0.214)	(0.197)
Married	0.182	1.054***	0.297	-0.306
	(0.313)	(0.315)	(0.483)	(0.425)
Separated	-0.425	-0.0748	-0.141	-0.272
	(0.354)	(0.322)	(0.344)	(0.347)
Divorced	1.412**	1.397**	1.715***	2.593***
	(0.636)	(0.647)	(0.603)	(0.646)
Widowed	-0.275	0.148	-0.0927	-0.178
	(0.236)	(0.191)	(0.198)	(0.196)
Prefer not to Say	0.337	0.544*	0.920**	0.414
	(0.497)	(0.296)	(0.354)	(0.347)
Educational Status: Secondary Degree				
Vocational Degree	0.0323	-0.0426	-0.417	-0.0506
	(0.540)	(0.544)	(0.535)	(0.295)
Tertiary Degree	-0.100	-0.0912	-0.562**	-0.414
	(0.255)	(0.330)	(0.283)	(0.257)
Higher Than Tertiary Degree	-0.0892	-0.437	-0.645**	-0.490**
	(0.258)	(0.317)	(0.272)	(0.223)
Prefer not to Say	0.259	-0.158	-0.691	-0.445
	(0.767)	(0.717)	(0.599)	(0.722)
Employment Status: Working Full-Time for Employer				
Working Full-Time for Self	0.108	0.215	0.137	0.207
	(0.308)	(0.277)	(0.292)	(0.250)
Working Part-Time	-0.269	-0.362	0.00442	-0.372
	(0.268)	(0.240)	(0.262)	(0.238)
Working Part-Time (Underemployed)	-0.915	-0.597	-1.766**	-0.940
	(0.778)	(0.682)	(0.753)	(0.645)

Unemployed	0.0802 (0.399)	-0.457 (0.424)	-0.486 (0.537)	-0.557 (0.387)
Out of Labour Force	0.256 (0.316)	0.337 (0.306)	0.425 (0.399)	0.0206 (0.338)
Prefer not to say	-0.540 (0.669)	-0.594 (0.463)	-0.193 (0.376)	-0.737 (0.496)
Income: £14,999 or Less				
£15,000-£29,999	0.0127 (0.346)	-0.132 (0.332)	0.104 (0.379)	-0.625** (0.303)
£30,000-£44,999	-0.0758 (0.406)	-0.182 (0.370)	-0.109 (0.411)	-0.631** (0.296)
£45,000-£59,999	-0.0151 (0.395)	0.000390 (0.338)	0.181 (0.392)	-0.758** (0.321)
£60,000-£74,999	0.0808 (0.366)	-0.226 (0.333)	0.403 (0.385)	-0.533* (0.319)
£75,000 or More	-0.0782 (0.459)	-0.550 (0.371)	-0.00954 (0.446)	-0.789** (0.382)
Prefer not to Say	0.801 (0.497)	0.596 (0.410)	0.934* (0.478)	0.277 (0.406)
Religion: None				
Christian	0.345 (0.238)	0.164 (0.243)	0.272 (0.236)	0.237 (0.238)
Buddhist	0.443 (0.344)	0.000895 (0.376)	0.136 (0.315)	0.366 (0.313)
Hindu	-0.486 (0.506)	-0.775 (0.524)	-0.314 (0.487)	-0.177 (0.469)
Jewish	0.459 (0.648)	0.677 (0.564)	0.386 (0.561)	0.794 (0.502)
Muslim	-0.146 (0.713)	0.144 (0.632)	0.250 (0.624)	-0.374 (0.573)

Sikh	-0.196 (0.569)	0.522 (0.484)	0.101 (0.536)	-0.0574 (0.472)
Other	-0.465 (0.502)	0.0813 (0.399)	-0.114 (0.468)	0.0230 (0.460)
Prefer not to Say	-0.466 (0.368)	-0.186 (0.353)	0.0743 (0.306)	0.187 (0.293)
Religious Practice: Never				
Less Than Annually	-0.201 (0.372)	0.145 (0.336)	0.144 (0.342)	0.110 (0.319)
At Least Annually	-0.592* (0.330)	-0.237 (0.310)	-0.0981 (0.290)	-0.0421 (0.274)
At Least Monthly	0.0339 (0.291)	0.291 (0.328)	0.310 (0.273)	0.0420 (0.305)
At Least Weekly	0.165 (0.300)	0.602* (0.317)	0.244 (0.367)	-0.324 (0.307)
Prefer not to Say	-0.405 (0.416)	-0.0783 (0.345)	-0.345 (0.418)	-0.00899 (0.235)
Smoking: Yes				
No	0.0436 (0.291)	0.396 (0.284)	0.378 (0.294)	0.239 (0.243)
Pregnant: Yes				
No	-1.101** (0.497)	-0.687 (0.538)	-0.832 (0.652)	-0.706** (0.313)
Medication: Yes				
No	-0.0431 (0.199)	-0.243 (0.196)	-0.169 (0.185)	-0.165 (0.162)
Preference for Socialising: Yes				

No	-0.0856 (0.175)	-0.0995 (0.183)	-0.0840 (0.185)	-0.253 (0.182)
Constant	Yes	Yes	Yes	Yes
Set Fixed Effect	Yes	Yes	Yes	Yes
Observations	230	230	230	230
R-Squared	0.357	0.328	0.316	0.352

Notes: Robust standard errors clustered at individual level in parentheses. The dependent variables are (a) awareness of what contributes to a happy and meaningful life, (b) knowledge of what really matters to oneself in life, (c) feeling of being able to do things to improve one's own wellbeing, and (d) feeling of being able to improve the wellbeing of others. See Supplementary Materials Table 1b for variable definitions.  
 \*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$

**Table 3b***Mechanisms – Changes in Behaviour*

	Behaviour											
	(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)	(j)	(k)	(l)
Treatment*Post	0.752*** (0.211)	0.823*** (0.226)	0.616*** (0.216)	0.387* (0.229)	0.282 (0.230)	0.430* (0.252)	0.309 (0.228)	0.465** (0.210)	0.653*** (0.226)	0.409* (0.210)	0.361* (0.206)	0.232 (0.185)
Treatment	-0.152 (0.218)	-0.157 (0.246)	-0.100 (0.207)	0.0180 (0.225)	-0.267 (0.202)	-0.0341 (0.258)	-0.153 (0.204)	-0.265 (0.224)	-0.665** (0.265)	-0.154 (0.220)	-0.300 (0.192)	-0.0330 (0.210)
Post	-0.0894 (0.126)	-0.209* (0.126)	0.0345 (0.130)	0.0274 (0.169)	0.137 (0.158)	0.0947 (0.171)	-0.172 (0.120)	0.0122 (0.134)	0.0365 (0.125)	-0.0116 (0.141)	0.380*** (0.142)	0.119 (0.122)
Age: 20-24												
25-34	0.0605 (0.377)	0.840** (0.325)	-0.142 (0.341)	0.0523 (0.373)	0.0416 (0.278)	-0.0401 (0.521)	-0.0515 (0.365)	0.612 (0.398)	0.213 (0.339)	0.391 (0.257)	0.953*** (0.297)	0.460 (0.335)
35-44	0.143 (0.400)	0.725* (0.432)	-0.203 (0.385)	-0.0407 (0.399)	-0.544* (0.326)	-0.375 (0.530)	-0.351 (0.372)	0.276 (0.426)	0.242 (0.365)	0.461 (0.321)	1.172*** (0.344)	0.270 (0.381)
45-54	0.241 (0.411)	0.817* (0.453)	-0.332 (0.407)	-0.196 (0.408)	-0.0590 (0.348)	-0.290 (0.582)	-0.232 (0.397)	0.172 (0.456)	0.412 (0.362)	0.367 (0.317)	1.353*** (0.356)	0.606 (0.369)
55-64	-0.0673 (0.418)	0.798* (0.478)	0.0693 (0.453)	-0.200 (0.433)	-0.463 (0.359)	-0.562 (0.590)	-0.421 (0.401)	0.521 (0.455)	0.440 (0.428)	0.241 (0.377)	0.921** (0.386)	0.187 (0.392)
65-74	-1.309** (0.548)	-0.153 (0.512)	-0.446 (0.648)	0.126 (0.694)	-0.618 (0.524)	-0.422 (0.642)	-1.589*** (0.535)	0.0126 (0.572)	-0.315 (0.505)	0.580 (0.737)	1.234** (0.565)	0.428 (0.481)
Gender: Male												
Female	0.625** (0.253)	0.159 (0.291)	0.210 (0.237)	-0.0320 (0.251)	0.339 (0.221)	0.124 (0.288)	0.220 (0.263)	0.473* (0.277)	0.869*** (0.253)	0.535** (0.250)	0.805*** (0.213)	0.489** (0.215)
Marital Status: Single												
Partnered	0.0707 (0.198)	0.173 (0.251)	-0.0316 (0.225)	0.412* (0.217)	0.369** (0.183)	0.318 (0.239)	0.717*** (0.225)	0.285 (0.251)	0.0894 (0.228)	-0.237 (0.227)	0.180 (0.192)	-0.140 (0.184)
Married	0.243	-0.00998	0.870	0.367	0.198	0.155	0.123	0.0803	0.238	0.814*	-0.406	-0.0452

	(0.490)	(0.488)	(0.546)	(0.469)	(0.473)	(0.501)	(0.479)	(0.608)	(0.687)	(0.482)	(0.462)	(0.380)
Separated	-0.0316	0.268	0.0684	0.207	0.0177	0.0919	-0.113	-0.199	-0.0403	-0.121	0.335	0.0212
	(0.430)	(0.396)	(0.383)	(0.405)	(0.393)	(0.424)	(0.292)	(0.366)	(0.516)	(0.364)	(0.378)	(0.417)
Divorced	0.648	1.563**	-0.321	-0.390	-0.405	-1.749***	2.955***	1.334**	-0.173	-0.728	0.899	0.561
	(0.543)	(0.676)	(0.736)	(0.763)	(0.630)	(0.617)	(0.621)	(0.605)	(0.681)	(0.848)	(0.604)	(0.604)
Widowed	-0.0707	0.274	0.0231	0.218	0.166	0.198	0.323	0.103	0.139	-0.0987	-0.0504	-0.0780
	(0.228)	(0.267)	(0.201)	(0.221)	(0.185)	(0.255)	(0.223)	(0.214)	(0.244)	(0.197)	(0.205)	(0.221)
Prefer not to Say	1.095**	-0.478	1.376**	0.853**	-0.944*	1.625*	-0.627*	-0.851**	-0.425	-0.287	0.739***	-0.437
	(0.498)	(0.802)	(0.551)	(0.386)	(0.494)	(0.914)	(0.376)	(0.427)	(0.375)	(0.330)	(0.265)	(0.399)
Educational Status: Secondary Degree												
Vocational Degree	-0.445	0.262	-1.038**	-0.962	-0.449	-0.404	0.550	-0.905*	-0.290	0.226	-0.385	-0.349
	(0.568)	(0.404)	(0.523)	(0.621)	(0.465)	(0.469)	(0.375)	(0.521)	(0.466)	(0.510)	(0.415)	(0.586)
Tertiary Degree	-0.407	0.219	-1.002***	-0.663*	-0.630*	-0.115	0.465	-0.598	-0.407	0.470	-0.109	-0.277
	(0.425)	(0.375)	(0.364)	(0.388)	(0.347)	(0.368)	(0.329)	(0.373)	(0.291)	(0.344)	(0.217)	(0.417)
Higher Than Tertiary Degree	-0.599	0.0252	-1.196***	-0.871**	-0.561*	-0.310	0.153	-0.935**	-0.868***	0.0449	-0.335	-0.0122
	(0.405)	(0.354)	(0.327)	(0.364)	(0.314)	(0.338)	(0.324)	(0.385)	(0.275)	(0.326)	(0.208)	(0.400)
Prefer not to Say	-0.488	-1.570*	0.139	-0.637	-1.980***	0.249	1.329**	0.0421	0.800	-0.552	-0.266	-0.284
	(0.681)	(0.836)	(0.603)	(0.708)	(0.593)	(0.633)	(0.582)	(0.665)	(0.785)	(0.626)	(0.515)	(0.690)
Employment Status: Working Full-Time for Employer												
Working Full-Time for Self	0.317	-0.122	0.291	0.218	0.470*	0.127	-0.0472	0.146	0.149	0.499*	0.526*	0.338
	(0.315)	(0.306)	(0.291)	(0.289)	(0.245)	(0.317)	(0.299)	(0.298)	(0.362)	(0.293)	(0.295)	(0.307)
Working Part-Time	0.103	-0.215	-0.0963	0.0229	-0.129	0.197	-0.0404	-0.381	0.0183	-0.118	-0.329	0.188
	(0.270)	(0.315)	(0.253)	(0.274)	(0.222)	(0.323)	(0.241)	(0.275)	(0.319)	(0.285)	(0.231)	(0.259)
Working Part-Time (Underemployed)	-0.721	1.675	-4.005***	-2.464***	-0.0200	-3.579***	-1.730**	-0.0992	0.579	0.00843	0.476	-0.428
	(0.871)	(1.117)	(0.884)	(0.862)	(0.769)	(1.182)	(0.743)	(0.871)	(0.856)	(0.731)	(0.684)	(0.771)
Unemployed	-0.633	-0.0557	-0.181	-0.242	0.195	0.513	0.0428	-0.276	0.283	-0.955**	0.315	0.212
	(0.384)	(0.557)	(0.405)	(0.395)	(0.439)	(0.486)	(0.389)	(0.461)	(0.389)	(0.369)	(0.448)	(0.341)
Out of Labour Force	0.863*	0.0516	0.783	0.500	0.242	0.610	0.582	0.212	0.419	0.126	0.328	0.670
	(0.484)	(0.437)	(0.511)	(0.487)	(0.513)	(0.515)	(0.363)	(0.413)	(0.442)	(0.542)	(0.531)	(0.433)
Prefer not to say	0.00643	0.283	-0.0814	0.339	-0.527*	-0.500	0.149	-1.303***	-0.526	-0.506	-0.417	-0.540
	(0.352)	(0.542)	(0.378)	(0.384)	(0.294)	(0.381)	(0.266)	(0.373)	(0.456)	(0.378)	(0.425)	(0.399)
Income: £14,999 or Less												

£15,000-£29,999	-0.241 (0.410)	-0.0169 (0.443)	-0.364 (0.380)	-0.142 (0.391)	-0.353 (0.353)	0.0478 (0.388)	-0.366 (0.363)	0.0143 (0.357)	-0.00364 (0.343)	-0.149 (0.327)	-0.175 (0.314)	-0.195 (0.375)
£30,000-£44,999	-0.0761 (0.372)	0.161 (0.396)	-0.0125 (0.413)	-0.131 (0.418)	0.241 (0.325)	-0.235 (0.400)	-0.578* (0.308)	-0.197 (0.365)	-0.0511 (0.391)	-0.0348 (0.377)	-0.557* (0.308)	0.0248 (0.358)
£45,000-£59,999	0.158 (0.405)	0.00964 (0.453)	0.209 (0.428)	0.340 (0.404)	0.285 (0.370)	0.173 (0.424)	0.192 (0.391)	0.371 (0.463)	0.205 (0.420)	0.393 (0.423)	-0.170 (0.362)	-0.0240 (0.372)
£60,000-£74,999	-0.0111 (0.398)	-0.239 (0.459)	0.407 (0.443)	0.224 (0.407)	0.163 (0.384)	-0.0547 (0.427)	0.320 (0.363)	0.0509 (0.446)	0.195 (0.456)	0.0671 (0.368)	-0.668* (0.377)	-0.238 (0.361)
£75,000 or More	-0.0332 (0.410)	0.0728 (0.488)	0.162 (0.455)	-0.0191 (0.424)	0.537 (0.353)	0.413 (0.450)	-0.342 (0.414)	-0.236 (0.415)	-0.0108 (0.420)	-0.209 (0.416)	-0.307 (0.358)	0.142 (0.356)
Prefer not to Say	0.549 (0.434)	0.0841 (0.547)	0.956** (0.482)	0.838* (0.462)	1.145*** (0.377)	0.452 (0.422)	0.155 (0.377)	1.186*** (0.413)	0.474 (0.531)	0.300 (0.495)	-0.0796 (0.441)	0.381 (0.493)
Religion: None												
Christian	0.103 (0.265)	-0.269 (0.379)	0.235 (0.278)	0.0498 (0.270)	0.0838 (0.243)	-0.241 (0.287)	-0.130 (0.228)	-0.451* (0.253)	0.384 (0.299)	0.345 (0.217)	-0.0223 (0.233)	-0.356 (0.261)
Buddhist	0.112 (0.390)	0.0917 (0.460)	0.594* (0.302)	0.374 (0.397)	0.696* (0.357)	-0.276 (0.369)	0.378 (0.338)	0.0405 (0.422)	0.783* (0.414)	0.101 (0.389)	-0.0270 (0.355)	-0.128 (0.377)
Hindu	-0.453 (0.624)	-0.784 (0.698)	-0.186 (0.682)	0.00196 (0.660)	0.229 (0.726)	0.163 (0.616)	0.685 (0.563)	0.112 (0.595)	-0.0664 (0.811)	0.298 (0.660)	-0.449 (0.516)	-0.383 (0.539)
Jewish	0.796 (0.535)	0.301 (0.621)	-0.790 (0.548)	-0.517 (0.495)	-0.498 (0.506)	-0.0696 (0.549)	-1.648*** (0.504)	-1.546*** (0.531)	-0.606 (0.566)	0.0573 (0.592)	0.581 (0.555)	1.073** (0.522)
Muslim	0.391 (0.668)	0.526 (0.694)	0.777 (0.564)	0.442 (0.552)	0.662 (0.533)	0.205 (0.644)	0.717 (0.534)	0.486 (0.555)	2.033*** (0.564)	-0.0307 (0.597)	0.0806 (0.545)	-0.550 (0.567)
Sikh	-1.409** (0.684)	-0.150 (0.539)	0.423 (0.432)	0.449 (0.661)	0.395 (0.484)	0.685 (0.594)	-0.232 (0.508)	0.182 (0.488)	0.306 (0.660)	0.172 (0.503)	1.073** (0.435)	-0.181 (0.586)
Other	0.0638 (0.534)	-0.387 (0.524)	0.0783 (0.403)	-0.0547 (0.451)	-0.547 (0.406)	-0.313 (0.443)	-0.693** (0.298)	-1.202** (0.588)	0.125 (0.567)	0.0788 (0.403)	-0.786** (0.360)	-0.0784 (0.413)
Prefer not to Say	-0.0936 (0.384)	-0.652* (0.332)	0.0356 (0.222)	-0.138 (0.407)	-0.0559 (0.330)	-0.546** (0.265)	-0.268 (0.321)	0.0207 (0.307)	0.00176 (0.363)	0.522** (0.263)	-0.191 (0.335)	0.382 (0.314)
Religious Practice: Never												
Less Than Annually	-0.156	0.433	-0.0293	-0.352	-0.412	0.0686	-0.318	-0.0204	-0.0182	-0.0536	0.197	0.128

	(0.365)	(0.420)	(0.342)	(0.310)	(0.305)	(0.384)	(0.297)	(0.315)	(0.385)	(0.307)	(0.339)	(0.446)
At Least Annually	0.108	0.00657	-0.195	-0.211	0.0345	0.0440	-0.152	0.00826	-0.185	-0.0167	0.123	0.0115
	(0.317)	(0.331)	(0.253)	(0.283)	(0.239)	(0.307)	(0.237)	(0.282)	(0.291)	(0.264)	(0.258)	(0.264)
At Least Monthly	0.576	1.108***	0.457	-0.0822	0.0512	0.544	-0.389	0.0615	-0.382	0.174	0.467*	0.490*
	(0.404)	(0.398)	(0.313)	(0.370)	(0.308)	(0.332)	(0.298)	(0.384)	(0.374)	(0.323)	(0.272)	(0.289)
At Least Weekly	0.647*	0.883	0.117	0.371	0.246	1.007**	0.265	0.559	0.0327	0.182	0.322	0.565
	(0.337)	(0.535)	(0.372)	(0.359)	(0.381)	(0.403)	(0.316)	(0.392)	(0.368)	(0.331)	(0.346)	(0.410)
Prefer not to Say	0.323	0.996***	-0.149	-0.0530	0.207	0.660*	0.0938	-0.165	0.160	0.526	0.941***	0.801*
	(0.473)	(0.325)	(0.229)	(0.476)	(0.271)	(0.351)	(0.329)	(0.317)	(0.387)	(0.331)	(0.268)	(0.408)
Smoking: Yes												
No	0.732*	0.211	0.749**	0.491	-0.234	-0.211	0.645**	0.310	0.698**	-0.0389	-0.0755	-0.238
	(0.414)	(0.393)	(0.363)	(0.317)	(0.385)	(0.411)	(0.293)	(0.348)	(0.301)	(0.319)	(0.353)	(0.333)
Pregnant: Yes												
No	-0.548	-0.262	-0.852	0.263	0.637	0.919*	0.376	0.0602	0.230	-0.230	0.205	-0.356
	(0.832)	(0.385)	(0.727)	(0.960)	(0.798)	(0.508)	(0.898)	(0.699)	(0.698)	(0.327)	(0.688)	(0.665)
Medication: Yes												
No	-0.0356	-0.00986	-0.0374	0.0517	0.193	0.116	0.137	-0.103	0.217	0.132	0.0377	0.203
	(0.179)	(0.203)	(0.179)	(0.180)	(0.146)	(0.199)	(0.174)	(0.188)	(0.213)	(0.189)	(0.141)	(0.178)
Preference for Socialising: Yes												
No	-0.0740	0.147	0.166	-0.0932	-0.287	-0.194	0.181	0.0495	0.0574	-0.293*	-0.343**	0.0298
	(0.200)	(0.238)	(0.194)	(0.213)	(0.174)	(0.215)	(0.216)	(0.235)	(0.221)	(0.167)	(0.148)	(0.181)
Constant	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Set Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	230	230	230	230	230	230	230	230	230	230	230	230
R Squared	0.336	0.316	0.376	0.263	0.339	0.294	0.399	0.313	0.307	0.298	0.442	0.306

Notes: Robust standard errors clustered at individual level in parentheses. The dependent variables are the frequency in recent weeks of (a) noticing and feeling grateful for good things, (b) practising mindfulness or meditation, (c) treating oneself in a kind way, (d) making time for something really important for oneself, (e) responding well to difficult situations, (f) learning or trying out something new, (g) giving time to one of oneself's closest relationships, (h) connecting with other people, (i) doing something kind or helpful for others, (j) trying to increase happiness at work, (k) trying to increase happiness in the community, and (l) thinking about the difference one makes to the world. See Supplementary Materials Table 1b for variable definitions.

\*\*\* p<0.01, \*\* p<0.05, \* p<0.1



**Table 4***Absence of Time Trend for Control Group*

	Mean Control Group, Pre-Intervention	Mean Control Group, Post-Intervention	Difference
<i>Self-Reported Outcomes</i>			
Life Satisfaction	6.315	6.271	0.044
Happiness	6.288	5.957	0.331
Anxiousness	4.438	4.500	-0.062
Worthwhileness	7.041	6.971	0.070
PHQ-9 (Depression)	7.151	7.057	0.094
GAD-7 (Anxiety)	6.671	7.086	-0.414
Compassion	6.792	6.657	0.135
Social Trust	6.507	6.386	0.121
Gratitude	6.178	6.114	0.064
Information (a)	7.469	7.271	0.198
Information (b)	7.224	6.943	0.282
Information (c)	6.796	6.629	0.167
Information (d)	7.224	7.171	0.053
Behaviour (a)	2.020	1.829	0.192*
Behaviour (b)	1.429	1.129	0.300***
Behaviour (c)	1.449	1.471	-0.022
Behaviour (d)	1.571	1.514	0.057
Behaviour (e)	1.571	1.586	-0.014
Behaviour (f)	1.204	1.129	0.076
Behaviour (g)	1.837	1.629	0.208*
Behaviour (h)	2.061	1.929	0.133
Behaviour (i)	1.816	1.786	0.031

Behaviour (j)	1.347	1.314	0.033
Behaviour (k)	0.776	0.986	-0.210*
Behaviour (l)	1.122	1.214	-0.092
<i>Biomarkers</i>			
Cortisol	0.172	0.102	0.070
Interferon IFN- $\gamma$	7.510	7.733	-0.223
Cytokine IL-10	1.397	1.433	-0.037
Cytokine IL-1 $\beta$	284.884	214.072	70.813***
Cytokine IL-6	10.131	8.783	1.348
Chemokine IL-8	1,603.446	1,287.056	316.390***
<i>Controls</i>			
Age: 20-24	0.068	0.057	0.011
25-34	0.247	0.243	0.004
35-44	0.233	0.229	0.004
45-54	0.205	0.214	-0.009*
55-64	0.192	0.200	-0.008*
65-74	0.055	0.057	-0.002
Gender: Male	0.164	0.171	-0.007
Female	0.836	0.829	0.007
Marital Status: Single	0.438	0.443	-0.005
Married	0.192	0.200	-0.008
Separated	0.041	0.043	-0.002
Divorced	0.096	0.100	-0.004
Widowed	0.014	0.014	-0.001
Domestic Partner	0.219	0.200	0.019
Prefer not to Say	0.000	0.000	0.000
Educational Status: Secondary Degree	0.041	0.043	-0.002
Vocational Degree	0.068	0.071	-0.003

Tertiary Degree	0.356	0.357	-0.001
Higher Than Tertiary Degree	0.534	0.529	0.006
Prefer not to Say	0.000	0.000	0.000
Employment Status: Working Full-Time for Employer	0.466	0.457	0.009
Working Full-Time for Self	0.164	0.171	-0.007
Working Part-Time	0.219	0.229	-0.009
Working Part-Time (Underemployed)	0.000	0.000	0.000
Unemployed	0.041	0.043	-0.002
Out of Labour Force	0.096	0.086	0.010
Prefer not to say	0.014	0.014	-0.001
Income: £14,999 or Less	0.137	0.143	-0.006
£15,000-£29,999	0.192	0.186	0.006
£30,000-£44,999	0.233	0.229	0.004
£45,000-£59,999	0.178	0.171	0.007
£60,000-£74,999	0.110	0.114	-0.005*
£75,000 or More	0.123	0.129	-0.005*
Prefer not to Say	0.027	0.029	-0.001
Religion: None	0.589	0.586	0.003
Christian	0.247	0.243	0.004
Buddhist	0.055	0.057	-0.002
Hindu	0.014	0.014	-0.001
Jewish	0.000	0.000	0.000
Muslim	0.000	0.000	0.000
Sikh	0.000	0.000	0.000
Other	0.041	0.043	-0.002
Prefer not to Say	0.055	0.057	-0.002
Religious Practice: Never	0.521	0.529	-0.008
Less Than Annually	0.110	0.100	0.010
At Least Annually	0.123	0.114	0.009
At Least Monthly	0.110	0.114	-0.005
At Least Weekly	0.096	0.100	-0.004

Prefer not to Say	0.041	0.043	-0.002
Smoking: Yes	0.110	0.086	0.024
No	0.890	0.914	-0.024
Pregnant: Yes	0.027	0.029	-0.001
No	0.973	0.971	0.001
Medication: Yes	0.438	0.429	0.010
No	0.562	0.571	-0.010
Importance of Meeting New People and Making Friends: Yes	0.808	0.814	-0.006
No	0.192	0.186	0.006
Observations	73	70	-

Notes: T-tests used robust standard errors clustered at individual level. See Supplementary Materials Table 1b for variable definitions.

\*\*\* p<0.01, \*\* p<0.05, \* p<0.1

**Table 5a**

*Main Results – Self-Reported Outcomes (Regression Table for Figure 3), Adjusted for Multiple Hypotheses Testing (Stepdown P-Values)*

	Subjective Wellbeing				Mental Health		Pro-Sociality		
	Life Satis- faction (1)	Happiness (2)	Anxious- ness (3)	Worth- whileness (4)	PHQ-9 (Depres- sion) (5)	GAD-7 (Anxiety) (6)	Compassion (7)	Social Trust (8)	Gratitude (9)
Treatment*Post	0.645 (0.144)	0.631 (0.157)	-0.425 (0.174)	0.565 (0.146)	-0.543 (0.116)	-0.448 (0.114)	0.422 (0.127)	0.561 (0.148)	0.278 (0.125)
<i>P Value (Rounded)</i>	<i>0.000 (***)</i>	<i>0.000 (***)</i>	<i>0.016 (**)</i>	<i>0.000 (***)</i>	<i>0.000 (***)</i>	<i>0.000 (***)</i>	<i>0.001 (***)</i>	<i>0.000 (***)</i>	<i>0.028 (**)</i>
<i>Stepdown P Value (Rounded)</i>	<i>0.010 (***)</i>	<i>0.010 (***)</i>	<i>0.059 (*)</i>	<i>0.010 (***)</i>	<i>0.010 (***)</i>	<i>0.010 (***)</i>	<i>0.010 (***)</i>	<i>0.010 (***)</i>	<i>0.059 (*)</i>
Treatment	0.062 (0.166)	-0.020 (0.146)	-0.111 (0.166)	-0.071 (0.157)	-0.083 (0.157)	-0.141 (0.152)	-0.192 (0.159)	-0.126 (0.177)	0.014 (0.163)
Post	-0.024 (0.095)	-0.143 (0.116)	0.027 (0.127)	-0.046 (0.100)	-0.024 (0.080)	0.050 (0.088)	-0.101 (0.086)	-0.068 (0.092)	-0.065 (0.083)
Constant	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Controls	No	No	No	No	No	No	No	No	No
Set Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	279	279	279	279	279	279	279	279	279
R Squared	0.107	0.081	0.061	0.062	0.099	0.069	0.026	0.033	0.030

Notes: Robust standard errors clustered at individual level in parentheses. See Supplementary Materials Table 1b for variable definitions.

\*\*\* p<0.01, \*\* p<0.05, \* p<0.1

**Table 5b**

*Main Results – Biomarkers (Regression Table for Figure 4), Adjusted for Multiple Hypotheses Testing (Stepdown P-Values)*

	Stress	Immune Response				
	Cortisol (1)	Interferon IFN- $\gamma$ (2)	Cytokine IL-10 (3)	Cytokine IL-1 $\beta$ (4)	Cytokine IL-6 (5)	Chemokine IL-8 (6)
Treatment*Post	-0.007 (0.235)	0.281 (0.223)	0.045 (0.162)	-0.049 (0.149)	-0.047 (0.163)	0.080 (0.183)
<i>P Value (Rounded)</i>	<i>0.976</i>	<i>0.211</i>	<i>0.780</i>	<i>0.745</i>	<i>0.773</i>	<i>0.662</i>
<i>Stepdown P Value (Rounded)</i>	<i>0.990</i>	<i>0.990</i>	<i>0.990</i>	<i>0.990</i>	<i>0.990</i>	<i>0.980</i>
Treatment	0.150 (0.208)	-0.395** (0.171)	-0.019 (0.184)	0.001 (0.175)	-0.047 (0.169)	-0.123 (0.172)
Post	-0.255** (0.121)	-0.131 (0.154)	-0.146 (0.104)	-0.182** (0.087)	-0.057 (0.112)	-0.261** (0.116)
Constant	Yes	Yes	Yes	Yes	Yes	Yes
Controls	No	No	No	No	No	No
Set Fixed Effect	Yes	Yes	Yes	Yes	Yes	Yes
Observations	265	236	269	275	268	274
R-Squared	0.021	0.028	0.007	0.016	0.012	0.018

Notes: Robust standard errors clustered at individual level in parentheses. See Supplementary Materials Table 1b for variable definitions.

\*\*\* p<0.01, \*\* p<0.05, \* p<0.1

**Supplementary Materials II:****Course Materials**

The recruitment process of course leaders is documented at:

[http://www.actionforhappiness.org/media/498423/exploring\\_what\\_matters\\_course\\_leader.pdf](http://www.actionforhappiness.org/media/498423/exploring_what_matters_course_leader.pdf)

The course materials for course participants can be found at:

[http://www.actionforhappiness.org/media/508643/exploring\\_what\\_matters.pdf](http://www.actionforhappiness.org/media/508643/exploring_what_matters.pdf)

The course materials for course leaders can be found at:

[http://www.actionforhappiness.org/media/519959/course\\_leader\\_guide.pdf](http://www.actionforhappiness.org/media/519959/course_leader_guide.pdf)

**Supplementary Materials III:**

**Impact Evaluation Materials**

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2. Written Consent Form
3. Baseline Survey
4. Endline Survey
5. Follow-up Survey



## EXPLORING WHAT MATTERS – PROJECT INFORMATION

You are being invited to take part in a research project. Before you decide, it is important for you to understand why the research is being done and what it will involve. Please take time to read the following information and ask us if there is anything that is not clear. Thank you

### PROJECT OVERVIEW

This study aims to learn about the psychological and physiological wellbeing of people taking part in the 'Exploring What Matters' course developed by Action for Happiness. Participation is voluntary and you have the right to withdraw at any point without needing to give any reason.

### YOUR INVOLVEMENT

Taking part in this study involves attending the 8-week 'Exploring What Matters' course, which has been run successfully many times in local communities across the UK. On three occasions - before, during and after the course - you will also be invited to provide some information about your personal wellbeing and attitudes, plus a small salivary sample to allow the measurement of biomarkers.

### WHAT ARE BIOMARKERS?

Biomarkers are measurable features that can be used to predict physiological states. For this study, salivary samples will be used to measure specific hormones and proteins relating to wellbeing, with a particular focus on stress response and immune function. No markers for any other illnesses will be investigated. The biomarker samples may be shipped to a laboratory outside the UK for analysis.

### DATA CONFIDENTIALITY

All data collected as part of this project will be treated confidentially. You will be given an identification number so that all the data you provide will be anonymous and you cannot be identified by it. Any data that is retained will be kept securely in accordance with the Data Protection Act.

### ARE THERE ANY RISKS INVOLVED?

We do not envisage any risks from taking part in this project. If you don't enjoy the course or don't wish to provide the required information or salivary samples, you can withdraw at any time. While it is unlikely, it is possible you may experience distress at some point as the study asks you to consider your emotions. If this occurs you may wish to seek advice from your GP or a counsellor, therapist or other professional.

### PROJECT OUTCOMES

The results of the project may be published in academic journals and books as well as in other forms (e.g. reports, websites) in the public domain. You will not be identified by name or other identifying feature in any publication. If you are interested, we can send these results to you once the project is complete.

### WHO IS BEHIND THE STUDY?

The study is being led by the Centre for Economic Performance at the London School of Economics, with funding from the Templeton Foundation. It is being run in collaboration with Action for Happiness.

### THANK YOU

We are very grateful for your participation in this study. Your responses will help to provide valuable insight into the wellbeing of individuals who participate in the Exploring What Matters course.

For more information about the project, please contact:

LSE / CEP:	<b>Dr Jan-Emmanuel de Neve</b>	020 7955 7447	<a href="mailto:j.de-neve@lse.ac.uk">j.de-neve@lse.ac.uk</a>
Action for Happiness:	<b>Dr Mark Williamson</b>	020 8980 6263	<a href="mailto:mark.williamson@actionforhappiness.org">mark.williamson@actionforhappiness.org</a>

## EXPLORING WHAT MATTERS – CONSENT FORM

I have read the Information Sheet relating to this research study and have been provided with the opportunity to discuss any details or questions about this.

I understand the aims of this research and the procedures which I will be involved with as part of the study, including providing salivary samples and information about my wellbeing.

I understand that all data relating my involvement in this study will remain confidential and the researchers involved will not be able to identify me by my responses as my data are anonymous. I also understand that the samples provided may be shipped to a laboratory outside the UK for analysis. I have been informed what will happen when the study has been completed.

I fully and freely provide my consent to participate in this study. By giving this consent, I also understand that at any time during the study, I have the right to withdraw without disadvantage to myself and I will not be required to provide a reason. I can withdraw from the study by sending an email to [info@actionforhappiness.org](mailto:info@actionforhappiness.org).

I also understand that if I do decide to withdraw, the researchers reserve the right to use the anonymous data which I have provided when analysing and writing-up the study.

Name of participant (please print): \_\_\_\_\_

Date: \_\_\_\_\_

Signature: \_\_\_\_\_

## EXPLORING WHAT MATTERS – PARTICIPANT QUESTIONS

### SECTION I: YOUR WELLBEING

Please answer these 4 questions on a scale of 0 to 10 where 0 means “Not at all” and 10 means “Completely”.

**Overall, how satisfied are you with your life nowadays?**

Not at all										Completely
0	1	2	3	4	5	6	7	8	9	10

**Overall, how happy did you feel yesterday?**

Not at all										Completely
0	1	2	3	4	5	6	7	8	9	10

**Overall, how anxious did you feel yesterday?**

Not at all										Completely
0	1	2	3	4	5	6	7	8	9	10

**Overall, to what extent do you feel the things you do in your life are worthwhile?**

Not at all										Completely
0	1	2	3	4	5	6	7	8	9	10

<b>Over the <u>last two weeks</u>, how often have you been bothered by any of the following problems?</b>	Not at all	Several days	More than half the days	Nearly every day
1. Little interest or pleasure in doing things	0	1	2	3
2. Feeling down, depressed or hopeless	0	1	2	3
3. Trouble falling or staying asleep, or sleeping too much	0	1	2	3
4. Feeling tired or having little energy	0	1	2	3
5. Poor appetite or overeating	0	1	2	3
6. Feeling bad about yourself – or that you are a failure or have let yourself or your family down	0	1	2	3
7. Trouble concentrating on things, such as reading the newspaper or watching television	0	1	2	3
8. Moving or speaking so slowly that other people could have noticed? Or the opposite – being so fidgety or restless that you have been moving a lot more than usual	0	1	2	3
9. Thoughts that you would be better off dead or hurting yourself in some way	0	1	2	3

<b>Over the last two weeks, how often have you been bothered by the following problems?</b>	<b>Not at all</b>	<b>Several days</b>	<b>More than half the days</b>	<b>Nearly every day</b>
1. Feeling nervous, anxious or on edge	0	1	2	3
2. Not being able to stop or control worrying	0	1	2	3
3. Worrying too much about different things	0	1	2	3
4. Trouble relaxing	0	1	2	3
5. Being so restless that it is hard to sit still	0	1	2	3
6. Becoming easily annoyed or irritable	0	1	2	3
7. Feeling afraid as if something awful might happen	0	1	2	3

## SECTION II: YOUR ATTITUDES

### COMPASSION

Please answer the following questions honestly and quickly using the scale below.

**When I hear about someone (a stranger) going through a difficult time, I feel a great deal of compassion for him or her**

Not at all true of me						Very true of me
1	2	3	4	5	6	7

**I tend to feel compassion for people, even though I do not know them**

Not at all true of me						Very true of me
1	2	3	4	5	6	7

**One of the activities that provides me with the most meaning to my life is helping others in the world when they need help**

Not at all true of me						Very true of me
1	2	3	4	5	6	7

**I would rather engage in actions that help others, even though they are strangers, than engage in actions that would help me**

Not at all true of me						Very true of me
1	2	3	4	5	6	7

**I often have tender feelings toward people (strangers) when they seem to be in need**

Not at all true of me						Very true of me
1	2	3	4	5	6	7

## TRUST

Generally speaking, would you say that most people can be trusted, or that you can't be too careful in dealing with people?

Can't be too careful					Most people can be trusted					
0	1	2	3	4	5	6	7	8	9	10

## GRATITUDE

I have so much in life to be thankful for

Strongly Disagree	Disagree	Slightly Disagree	Neutral	Slightly Agree	Agree	Strongly Agree
1	2	3	4	5	6	7

## SOCIAL CONTEXT

How important is it for you to be meeting new people and making friends?

Not at all important					Extremely important					
0	1	2	3	4	5	6	7	8	9	10

How regularly do you meet with local groups (e.g. club, residents association, choir etc)?

Never										Extremely often
0	1	2	3	4	5	6	7	8	9	10

## SECTION III: ABOUT YOU

Please circle the answers which apply:

What age are you?	16-19	20-24	25-34	35-44	45-54	55-64	65-74	75+
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What is your gender?	Male	Female
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Tick here

<b>What is your approximate annual household income?</b>	<input type="checkbox"/>	Less than £15,000
	<input type="checkbox"/>	£15,000 to £29,999
	<input type="checkbox"/>	£30,000 to £44,999
	<input type="checkbox"/>	£45,000 to £59,999
	<input type="checkbox"/>	£60,000 to £74,999
	<input type="checkbox"/>	£75,000 or more
	<input type="checkbox"/>	<i>Prefer not to say</i>

<b>What is your current marital status?</b>	<input type="checkbox"/>	Single/never been married
	<input type="checkbox"/>	Married
	<input type="checkbox"/>	Separated
	<input type="checkbox"/>	Divorced
	<input type="checkbox"/>	Widowed
	<input type="checkbox"/>	Domestic partner
	<input type="checkbox"/>	<i>Prefer not to say</i>

<b>What is your employment status?</b>	<input type="checkbox"/>	Employed full time for an employer
	<input type="checkbox"/>	Employed full time for self
	<input type="checkbox"/>	Employed part time - do not want full time
	<input type="checkbox"/>	Employed part time - want full time
	<input type="checkbox"/>	Unemployed
	<input type="checkbox"/>	Out of workforce
	<input type="checkbox"/>	<i>Prefer not to say</i>

<b>What is your highest completed level of education?</b>	<input type="checkbox"/>	Completed elementary education or less
	<input type="checkbox"/>	Secondary education
	<input type="checkbox"/>	Tertiary education – vocational
	<input type="checkbox"/>	Tertiary education – graduate
	<input type="checkbox"/>	Tertiary education – post-graduate
	<input type="checkbox"/>	<i>Prefer not to say</i>

Tick here

<b>What is your ethnic group?</b>	<input type="checkbox"/>	White
	<input type="checkbox"/>	Indian
	<input type="checkbox"/>	Pakistani
	<input type="checkbox"/>	Bangladeshi
	<input type="checkbox"/>	Chinese
	<input type="checkbox"/>	African
	<input type="checkbox"/>	Caribbean
	<input type="checkbox"/>	Arab
	<input type="checkbox"/>	Mixed
	<input type="checkbox"/>	Other
<input type="checkbox"/>	<i>Prefer not to say</i>	

<b>Do you regard yourself as belonging to any particular religion? If yes, which?</b>	<input type="checkbox"/>	No religion
	<input type="checkbox"/>	Christian (including Church of England, Catholic, Protestant)
	<input type="checkbox"/>	Buddhist
	<input type="checkbox"/>	Hindu
	<input type="checkbox"/>	Jewish
	<input type="checkbox"/>	Muslim
	<input type="checkbox"/>	Sikh
	<input type="checkbox"/>	Other religion (please specify):
	<input type="checkbox"/>	<i>Prefer not to say</i>

<b>Apart from such special occasions as weddings, funerals and baptisms, how often nowadays do you attend services or meetings connected with your religion?</b>	<input type="checkbox"/>	Never
	<input type="checkbox"/>	Less than annually
	<input type="checkbox"/>	At least annually
	<input type="checkbox"/>	At least monthly
	<input type="checkbox"/>	At least weekly
	<input type="checkbox"/>	<i>Prefer not to say</i>

**How much do you care about eating a healthy diet?**

Not at all										Very Much	
0	1	2	3	4	5	6	7	8	9	10	

**How often do you drink alcohol?**

Not at all										Very Often	
0	1	2	3	4	5	6	7	8	9	10	

**How often are you physically active (for example, by doing sports)?**

Not at all										Very Often	
0	1	2	3	4	5	6	7	8	9	10	

**How many hours did you sleep last night?**

--

**How satisfied are you with your sleep last night?**

Not at all										Completely	
0	1	2	3	4	5	6	7	8	9	10	

<b>Do you smoke?</b>	Yes	No
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<b>Are you pregnant?</b>	Yes	No
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<b>Are you currently on any medication?</b>	Yes	No
	If yes please specify:	



### SECTION III: YOUR LIFE

Please respond to the following statements honestly and quickly using the scale below.

#### I feel aware of what contributes to a happy and meaningful life

Not at all										Completely
0	1	2	3	4	5	6	7	8	9	10

#### I know what really matters to me in life

Not at all										Completely
0	1	2	3	4	5	6	7	8	9	10

#### I feel able to do things to improve my own wellbeing

Not at all										Completely
0	1	2	3	4	5	6	7	8	9	10

#### I feel able to do things to improve the wellbeing of others

Not at all										Completely
0	1	2	3	4	5	6	7	8	9	10

In recent weeks, how often have you done the following?	Not at all	Several days	More than half the days	Nearly every day
1. Noticed and felt grateful for good things	0	1	2	3
2. Practised mindfulness / meditation	0	1	2	3
3. Treated yourself in a kind way	0	1	2	3
4. Made time for something really important to you	0	1	2	3
5. Responded well to a difficult situation	0	1	2	3
6. Learnt or tried out something new	0	1	2	3
7. Gave time to one of your closest relationships	0	1	2	3
8. Connected with other people	0	1	2	3
9. Did something kind or helpful for others	0	1	2	3
10. Tried to increase happiness at work	0	1	2	3
11. Tried to increase happiness in the community	0	1	2	3
12. Thought about the difference you make in the world	0	1	2	3

Many thanks for taking the time to provide this information.  
Please check to make sure that you have answered all the questions.

## EXPLORING WHAT MATTERS – PARTICIPANT QUESTIONS

### SECTION I: YOUR WELLBEING

Please answer these 4 questions on a scale of 0 to 10 where 0 means “Not at all” and 10 means “Completely”.

**Overall, how satisfied are you with your life nowadays?**

Not at all										Completely
0	1	2	3	4	5	6	7	8	9	10

**Overall, how happy did you feel yesterday?**

Not at all										Completely
0	1	2	3	4	5	6	7	8	9	10

**Overall, how anxious did you feel yesterday?**

Not at all										Completely
0	1	2	3	4	5	6	7	8	9	10

**Overall, to what extent do you feel the things you do in your life are worthwhile?**

Not at all										Completely
0	1	2	3	4	5	6	7	8	9	10

<b>Over the <u>last two weeks</u>, how often have you been bothered by any of the following problems?</b>	Not at all	Several days	More than half the days	Nearly every day
1. Little interest or pleasure in doing things	0	1	2	3
2. Feeling down, depressed or hopeless	0	1	2	3
3. Trouble falling or staying asleep, or sleeping too much	0	1	2	3
4. Feeling tired or having little energy	0	1	2	3
5. Poor appetite or overeating	0	1	2	3
6. Feeling bad about yourself – or that you are a failure or have let yourself or your family down	0	1	2	3
7. Trouble concentrating on things, such as reading the newspaper or watching television	0	1	2	3
8. Moving or speaking so slowly that other people could have noticed? Or the opposite – being so fidgety or restless that you have been moving a lot more than usual	0	1	2	3
9. Thoughts that you would be better off dead or hurting yourself in some way	0	1	2	3

<b>Over the last two weeks, how often have you been bothered by the following problems?</b>	<b>Not at all</b>	<b>Several days</b>	<b>More than half the days</b>	<b>Nearly every day</b>
1. Feeling nervous, anxious or on edge	0	1	2	3
2. Not being able to stop or control worrying	0	1	2	3
3. Worrying too much about different things	0	1	2	3
4. Trouble relaxing	0	1	2	3
5. Being so restless that it is hard to sit still	0	1	2	3
6. Becoming easily annoyed or irritable	0	1	2	3
7. Feeling afraid as if something awful might happen	0	1	2	3

## SECTION II: YOUR ATTITUDES

### COMPASSION

Please answer the following questions honestly and quickly using the scale below.

**When I hear about someone (a stranger) going through a difficult time, I feel a great deal of compassion for him or her**

Not at all true of me						Very true of me
1	2	3	4	5	6	7

**I tend to feel compassion for people, even though I do not know them**

Not at all true of me						Very true of me
1	2	3	4	5	6	7

**One of the activities that provides me with the most meaning to my life is helping others in the world when they need help**

Not at all true of me						Very true of me
1	2	3	4	5	6	7

**I would rather engage in actions that help others, even though they are strangers, than engage in actions that would help me**

Not at all true of me						Very true of me
1	2	3	4	5	6	7

**I often have tender feelings toward people (strangers) when they seem to be in need**

Not at all true of me						Very true of me
1	2	3	4	5	6	7

## TRUST

Generally speaking, would you say that most people can be trusted, or that you can't be too careful in dealing with people?

Can't be too careful					Most people can be trusted					
0	1	2	3	4	5	6	7	8	9	10

## GRATITUDE

I have so much in life to be thankful for

Strongly Disagree	Disagree	Slightly Disagree	Neutral	Slightly Agree	Agree	Strongly Agree
1	2	3	4	5	6	7

## SOCIAL CONTEXT

How important is it for you to be meeting new people and making friends?

Not at all important					Extremely important					
0	1	2	3	4	5	6	7	8	9	10

## HEALTH

Do you smoke?	Yes	No
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Are you pregnant?	Yes	No
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Are you currently on any medication?	Yes	No
	If yes please specify:	

### SECTION III: YOUR LIFE

Please respond to the following statements honestly and quickly using the scale below.

#### I feel aware of what contributes to a happy and meaningful life

Not at all										Completely
0	1	2	3	4	5	6	7	8	9	10

#### I know what really matters to me in life

Not at all										Completely
0	1	2	3	4	5	6	7	8	9	10

#### I feel able to do things to improve my own wellbeing

Not at all										Completely
0	1	2	3	4	5	6	7	8	9	10

#### I feel able to do things to improve the wellbeing of others

Not at all										Completely
0	1	2	3	4	5	6	7	8	9	10

In recent weeks, how often have you done the following?	Not at all	Several days	More than half the days	Nearly every day
1. Noticed and felt grateful for good things	0	1	2	3
2. Practised mindfulness / meditation	0	1	2	3
3. Treated yourself in a kind way	0	1	2	3
4. Made time for something really important to you	0	1	2	3
5. Responded well to a difficult situation	0	1	2	3
6. Learnt or tried out something new	0	1	2	3
7. Gave time to one of your closest relationships	0	1	2	3
8. Connected with other people	0	1	2	3
9. Did something kind or helpful for others	0	1	2	3
10. Tried to increase happiness at work	0	1	2	3
11. Tried to increase happiness in the community	0	1	2	3
12. Thought about the difference you make in the world	0	1	2	3

## SECTION IV: YOUR COURSE

Please respond to the following statements honestly and quickly using the scale below.

**How many of the 8 Exploring What Matters course sessions did you attend?**

None								All	
0	1	2	3	4	5	6	7	8	

**How was the course overall?**

1 Very poor	2 Poor	3 Ok	4 Good	5 Very good
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**How was the content of the sessions?**

1 Very poor	2 Poor	3 Ok	4 Good	5 Very good
----------------	-----------	---------	-----------	----------------

**How was the facilitation of the course?**

1 Very poor	2 Poor	3 Ok	4 Good	5 Very good
----------------	-----------	---------	-----------	----------------

**How likely are you to recommend the course to others?**

Not at all likely								Extremely likely		
0	1	2	3	4	5	6	7	8	9	10

**What were the highlights of the course for you?**

--

**What could we do to make the course even better?**

--

**How would you describe the impact of the course on your life?**

Negative	Neutral	Positive
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**What will you do differently as a result of the course?**

--

Many thanks for taking the time to provide this information.  
Please check to make sure that you have answered all the questions.

## EXPLORING WHAT MATTERS – PARTICIPANT QUESTIONS

### SECTION I: YOUR WELLBEING

Please answer these 4 questions on a scale of 0 to 10 where 0 means “Not at all” and 10 means “Completely”.

**Overall, how satisfied are you with your life nowadays?**

Not at all										Completely
0	1	2	3	4	5	6	7	8	9	10

**Overall, how happy did you feel yesterday?**

Not at all										Completely
0	1	2	3	4	5	6	7	8	9	10

**Overall, how anxious did you feel yesterday?**

Not at all										Completely
0	1	2	3	4	5	6	7	8	9	10

**Overall, to what extent do you feel the things you do in your life are worthwhile?**

Not at all										Completely
0	1	2	3	4	5	6	7	8	9	10

<b>Over the <u>last two weeks</u>, how often have you been bothered by any of the following problems?</b>	Not at all	Several days	More than half the days	Nearly every day
1. Little interest or pleasure in doing things	0	1	2	3
2. Feeling down, depressed or hopeless	0	1	2	3
3. Trouble falling or staying asleep, or sleeping too much	0	1	2	3
4. Feeling tired or having little energy	0	1	2	3
5. Poor appetite or overeating	0	1	2	3
6. Feeling bad about yourself – or that you are a failure or have let yourself or your family down	0	1	2	3
7. Trouble concentrating on things, such as reading the newspaper or watching television	0	1	2	3
8. Moving or speaking so slowly that other people could have noticed? Or the opposite – being so fidgety or restless that you have been moving a lot more than usual	0	1	2	3
9. Thoughts that you would be better off dead or hurting yourself in some way	0	1	2	3

<b>Over the last two weeks, how often have you been bothered by the following problems?</b>	<b>Not at all</b>	<b>Several days</b>	<b>More than half the days</b>	<b>Nearly every day</b>
1. Feeling nervous, anxious or on edge	0	1	2	3
2. Not being able to stop or control worrying	0	1	2	3
3. Worrying too much about different things	0	1	2	3
4. Trouble relaxing	0	1	2	3
5. Being so restless that it is hard to sit still	0	1	2	3
6. Becoming easily annoyed or irritable	0	1	2	3
7. Feeling afraid as if something awful might happen	0	1	2	3

## SECTION II: YOUR ATTITUDES

### COMPASSION

Please answer the following questions honestly and quickly using the scale below.

**When I hear about someone (a stranger) going through a difficult time, I feel a great deal of compassion for him or her**

Not at all true of me						Very true of me
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**I tend to feel compassion for people, even though I do not know them**

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**One of the activities that provides me with the most meaning to my life is helping others in the world when they need help**

Not at all true of me						Very true of me
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**I would rather engage in actions that help others, even though they are strangers, than engage in actions that would help me**

Not at all true of me						Very true of me
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**I often have tender feelings toward people (strangers) when they seem to be in need**

Not at all true of me						Very true of me
1	2	3	4	5	6	7



## TRUST

Generally speaking, would you say that most people can be trusted, or that you can't be too careful in dealing with people?

Can't be too careful					Most people can be trusted					
0	1	2	3	4	5	6	7	8	9	10

## GRATITUDE

I have so much in life to be thankful for

Strongly Disagree	Disagree	Slightly Disagree	Neutral	Slightly Agree	Agree	Strongly Agree
1	2	3	4	5	6	7

## SOCIAL CONTEXT

How important is it for you to be meeting new people and making friends?

Not at all important					Extremely important					
0	1	2	3	4	5	6	7	8	9	10

## HEALTH

Do you smoke?	Yes	No
---------------	-----	----

Are you pregnant?	Yes	No
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Are you currently on any medication?	Yes	No
	If yes please specify:	

### SECTION III: YOUR LIFE

Please respond to the following statements honestly and quickly using the scale below.

**I feel aware of what contributes to a happy and meaningful life**

Not at all										Completely
0	1	2	3	4	5	6	7	8	9	10

**I know what really matters to me in life**

Not at all										Completely
0	1	2	3	4	5	6	7	8	9	10

**I feel able to do things to improve my own wellbeing**

Not at all										Completely
0	1	2	3	4	5	6	7	8	9	10

**I feel able to do things to improve the wellbeing of others**

Not at all										Completely
0	1	2	3	4	5	6	7	8	9	10

<b>In recent weeks, how often have you done the following?</b>	Not at all	Several days	More than half the days	Nearly every day
1. Noticed and felt grateful for good things	0	1	2	3
2. Practised mindfulness / meditation	0	1	2	3
3. Treated yourself in a kind way	0	1	2	3
4. Made time for something really important to you	0	1	2	3
5. Responded well to a difficult situation	0	1	2	3
6. Learnt or tried out something new	0	1	2	3
7. Gave time to one of your closest relationships	0	1	2	3
8. Connected with other people	0	1	2	3
9. Did something kind or helpful for others	0	1	2	3
10. Tried to increase happiness at work	0	1	2	3
11. Tried to increase happiness in the community	0	1	2	3
12. Thought about the difference you make in the world	0	1	2	3

Many thanks for taking the time to provide this information.  
Please check to make sure that you have answered all the questions.