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ARE YOU HAPPY WHILE YOU WORK?*

Alex Bryson and George MacKerron

Using a new data source permitting individuals to record their well-being via a smartphone, we explore within-person variance in individuals' well-being measured momentarily at random points in time. We find paid work is ranked lower than any of the other 39 activities individuals can report engaging in, with the exception of being sick in bed. Precisely how unhappy one is while working varies significantly with where you work; whether you are combining work with other activities; whether you are alone or with others; and the time of day or night you are working.

Paid work is a central part of many people's lives. They spend a considerable part of their waking hours doing it, or seeking it if they do not have it. Paid work thus seems likely, *a priori*, to be a major factor in people's utility or happiness. The standard neoclassical theory of labour supply considers income and leisure as the sources of individual utility. Income is generated through work but this eats into the time available for leisure. Individuals thus make a trade-off to maximise their utility. In this view, when holding income constant, work means disutility. It follows that when an individual becomes unemployed, the pain inflicted by the loss of wages should be adjusted downwards to account for the gain in leisure.

Research on subjective well-being appears to contradict this, however. It indicates that, holding income constant, work makes a contribution to overall life satisfaction and general happiness that is substantial and positive in the US, the UK and elsewhere (Blanchflower and Oswald, 2011). Losing work, through unemployment, results in a precipitous decline in well-being – a 'major disaster' that is greater, not smaller, than can be explained by the financial loss alone (Layard, 2003). Moreover, unlike most other changes in personal circumstances, individuals do not recover from becoming unemployed until they leave that state (Clark *et al.*, 2008).

Frey and Stutzer (2002, p. 408) assert that 'for many purposes, happiness or reported subjective well-being is a satisfactory empirical approximation to individual utility'. But the contradiction outlined above calls into question whether, in this instance, neoclassical utility and subjective well-being are indeed aligned. The issue is complicated by the fact that, while neoclassical utility is a single and clearly defined quantity, subjective well-being is not. There are in fact at least three broad categories of subjective well-being measure. The categories are: *evaluative* (or cognitive), in which people are asked for global assessments of their lives, such as their 'satisfaction with life

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as a whole nowadays'; *hedonic* (or affective), in which people rate their moment-to-moment levels of pleasant and unpleasant feelings; and *eudemonic*, capturing people's perceptions of meaning, purpose, reward or 'worthwhileness' (White and Dolan, 2009; Dolan and Metcalfe, 2012).

The measures used to capture well-being in studies on paid work are, overwhelmingly, evaluative measures and this reflects the situation in the wider literature on the economics of well-being too. Individuals are asked to reflect back on and evaluate their experiences to make what Kahneman and Krueger (2006, p. 6) refer to as 'global retrospective assessments'. These assessments have generally been assumed to be the measures that will be most closely related to neoclassical utility (Fujiwara and Campbell, 2011). However, recent work by psychologists and economists has drawn more attention to hedonic measures. Such measures relate to what has been called 'experienced utility', a 'continuous hedonic flow of pleasure or pain' (Kahneman and Krueger, 2006, p. 4). These measures echo an earlier strand of economic thought, identifying the integral of momentary sensations as the idealised measure of utility. Edgeworth described an imaginary apparatus for taking such measurements in the form of the *hedonimeter*:

> an ideally perfect instrument, a psychophysical machine, continually registering the height of pleasure experienced by an individual, exactly according to the verdict of consciousness, or rather diverging therefrom according to a law of errors. From moment to moment the hedonimeter varies; the delicate index now flickering with the flutter of the passions, now steadied by intellectual activity, low sunk whole hours in the neighbourhood of zero, or momentarily springing up towards infinity. The continually indicated height is registered by photographic or other frictionless apparatus upon a uniformly moving vertical plane. Then the quantity of happiness between two epochs is represented by the area contained between the zero-line, perpendiculars thereto at the points corresponding to the epochs, and the curve traced by the index.
>
> (Edgeworth, 1881 in Colander, 2007, p. 217).

This hedonic component of well-being may be important since expectations regarding the 'flow' of pleasure and pain may partly determine the choices individuals make as to what to do at any given moment, and for how long to do it.[1] It is also important in its own right because it leads to a fuller appreciation of the experienced life that individuals lead. As Kahneman *et al.* (2004, p. 1776) argue:

> Quantitative information about time use and the frequency and intensity of stress, enjoyment, and other affective states is potentially useful to medical researchers for assessing the burden of different illnesses and the health consequences of stress; to epidemiologists interested in social and environmental stressors; to economists and policy researchers for evaluating policies

[1] This issue is the subject of on-going debate. It appears that behaviour is actually determined primarily by individuals' remembered utility – not the duration of episodes of pain or discomfort, but remembrances of the end of particular episodes coupled with the sense of pain or pleasure at the peak and trough of those experiences (Clark and Georgellis, 2004; Kahneman and Thaler, 2006).

> and for valuing nonmarket activities; and to anyone who wishes to measure the well-being of society.
>
> (Kahneman *et al.*, 2004, p. 1776).

Economic models that define well-being by the temporal integral of momentary experienced utility require the ability to take detailed measures of the quality of people's experiences in daily life – that is, some approximation of Edgeworth's hedonimeter. Under the day reconstruction method (DRM), individuals are asked to divide the activities and experiences of the preceding day into episodes and to rate their affect during each episode on a variety of scales. Research to date on the experience of employment, using the DRM, suggests that the strong positive associations between paid work and retrospective assessments of well-being do not translate into positive associations between paid work and momentary hedonic, or experienced, well-being. Quite the opposite is true, in fact. Kahneman *et al.* (2004) studied 909 women who had undertaken paid work on the reference day. They found that working was the second lowest scoring activity on positive affect (just above commuting) and the highest scoring activity on negative affect.[2] However, there was substantial variance in the relationship between working and momentary well-being depending upon whether the person was at work or working at home, and whom he was with. In the latter case, time with one's boss was rated particularly poorly, while being with other work colleagues was rated much more highly. A second paper using the DRM, surveying 366 employed and 348 unemployed individuals in Germany, confirms that 'working belongs to the least satisfying times of the day' (Knabe *et al.*, 2010, p. 875). It also shows that the unemployed are able to make up for what the authors term the 'sadness' associated with being unemployed by altering what they do over the course of the day. That is, the unemployed take advantage of their unemployment by shifting their activities towards those they enjoy, something the employed are unable to do due to work commitments.[3]

We contribute to the literature on momentary well-being by establishing the relationship between working and momentary well-being using a new experience sampling method (ESM) approach to the collection of momentary well-being data. Unlike the DRM, which asks individuals about their feelings yesterday – a procedure that requires a certain degree of retrospection, with some of the same attendant potential for distortion that afflicts the standard evaluative measures (Stone *et al.*, 2010) – the ESM approach obtains instantaneous responses. Individuals are signalled at random moments during the day and respond by reporting their feelings at the time they are experiencing them, while undertaking their day-to-day activities.

The ESM was first applied in the 1970s by Csikszentmihalyi and colleagues at the University of Chicago, using pagers controlled by radio signals to trigger self-

[2] In their study, positive affect is the average of happy, warm/friendly, enjoying myself, whereas negative affect is the average of frustrated/annoyed, depressed/blue, hassled/pushed around, angry/hostile, worried/anxious, criticised/put down.

[3] A related literature indicates that variance in people's happiness over the course of the working day is related to biological processes such as neuroendocrine, inflammatory and cardiovascular activity (Steptoe *et al.*, 2005).

completion of paper survey instruments (Hektner *et al.*, 2007, p. 7). The use of ESM here is therefore not, in and of itself, an innovation. However, the logistical burden of traditional ESM studies, for both researchers and respondents, limited respondent sample sizes to a few dozen individuals. In addition, in some traditional ESM studies, the majority of responses were found to have been completed long before or long after the signalling time, with the reported time and date having been fabricated to conceal this (Stone and Shiffman, 2002). The increasing ubiquity of smartphones in the UK and beyond – objects that are routinely carried on the person, that can convey a remotely triggered signal, present questions via a convenient interface, record the time and location of response, and send back the elicited data almost instantaneously – makes it possible to run ESM studies that are orders of magnitude larger than originally envisaged, at much lower cost, and with higher reliability. This allows the ESM to be applied to qualitatively new problems. We are aware of one other ESM study to date that has employed smartphones in a similar manner and at a somewhat similar scale, described by Killingsworth and Gilbert (2010). The labels 'citizen science' and 'crowdsourcing' are sometimes applied to these and similar endeavours (Haklay, 2010; Gura, 2013). The technology behind our data source, *Mappiness*, is described in greater detail by MacKerron (2012) and MacKerron and Mourato (2013).

Using the ESM, we can get closer to Edgeworth's ideal: we are better able than DRM studies to capture momentary experienced utility because, as Knabe *et al.* (2010, p. 869) note, the advantage of the ESM 'is that it allows the measurement of experienced utility without any distortions caused by aspirations, retrospective evaluations or memory effects'. Our data are therefore ideally suited to examining the relationship between work and utility as captured by momentary happiness. In doing so, we have two competing hypotheses in mind. The first, commonly associated with psychologists, is that human beings gain pleasure from working because it is an essential ingredient in human flourishing – they derive utility from working, irrespective of pay, because it is the essence of human being. As such, it is argued, they undertake work because it is intrinsically satisfying and enjoyable. This idea, which dates back as far as Aristotle, is nicely depicted by Hinchliffe (2004). The alternative perspective, more common among economists, is that work is experienced as a disutility by individuals because it entails effort at the expense of leisure. It is for this reason that individuals are usually paid to work.

We undertake similar types of analyses to Kahneman *et al.* (2004) but we extend their work in a number of dimensions, something made possible by our data. Like Kahneman *et al.* (2004), we establish the position of paid work in the rank order of momentary happiness for employed people and compare the momentary well-being scores for paid work with scores given for other activities. We compare work with 39 other activities respondents can record (Kahneman *et al.* and Knabe *et al.*'s respondents are only able to choose from around 16). We explore the extent to which the association between paid work and momentary well-being varies with aspects of the individual's environment, namely where one is working, who one is with at the time, and one's personal background characteristics. We extend the earlier work by looking at the joint effect of activities undertaken simultaneously, examining the extent to which momentary well-being scores for working vary according to the other activities one is also engaged in at the same time.

Furthermore, whereas Knabe *et al.*'s and Kahneman *et al.*'s DRM studies each reconstruct only a single day for each respondent, we have multiple observations on individuals over time. These longitudinal data permit comparisons to be made about the rank order of happiness *within* individuals over weeks and sometimes many months. Using only the variation within individuals over time, we can thus overcome the difficulties inherent in inter-personal comparisons in subjective well-being by accounting for fixed unobservable differences across individuals. Our data have a number of other advantages compared with the studies by Kahneman *et al.* and Knabe *et al.* For example, we have a much larger sample of respondents which – unlike Kahneman *et al.* – includes men as well as women and we have accurate information on time of day and location, captured at the moment of response by the app.[4] Indeed, the advances in ESM which come with smartphone technology mean many of the concerns that Knabe *et al.* express regarding ESM, such as the burden it imposes on respondents, arguably do not obtain any more.

Our findings are consistent with the traditional economists' perspective on work: individuals do experience disutility from work such that they derive greater momentary well-being from undertaking almost any other activity. It is very rare for any work episode to achieve the level of happiness individuals experience in the absence of work, even when work is combined with other more pleasurable activities. We do not dispute the instrumental value of work, nor the importance of work to human well-being broadly understood, but we suspect this latter is likely to correspond with the eudemonic dimension of well-being not measured in this study, and with evaluative well-being measures primarily via that route.

The remainder of the article is as follows. Section 1 introduces our data, how the survey is undertaken, the measures of momentary well-being and the activities recorded. Section 2 presents our empirical strategy for describing and analysing the data. Section 3 presents our results. Section 4 concludes.

1. The Mappiness Data

We use a new data source, *Mappiness*, which permits individuals to record their well-being via a smartphone. The data contain more than a million observations on tens of thousands of individuals in the UK, collected since August 2010. Individuals who have downloaded the app receive randomly timed 'dings' on their phone to request that they complete a very short survey.[5]

The survey asks individuals to rate themselves on three dimensions of momentary well-being, stating how happy, how relaxed, and how awake they feel. Each score is elicited by means of a continuous slider (a form of visual analogue scale – see Couper *et al.*, 2006). The ends of each scale are labelled 'Not at all' and 'Extremely', and an individual positions him or herself on the scale by drawing a fingertip across the

[4] On the other hand, DRM permits the analyst to establish directly the time spent in various (more or less pleasurable) activities and map changes in affect across contiguous events.

[5] Individuals can choose to be signalled between one and five times a day. Most stick to the default option, which is twice a day. They may also specify the hours of the day during which they are likely to be asleep and should not be disturbed.

screen. Having completed this phase, the individual is asked whether they are alone and, if not, whom they are with. They are then asked whether they are indoors, outdoors, or in a vehicle, and whether they are at home, at work, or elsewhere (with the instruction 'If you're working from home, please choose "at home"'). Finally, they are asked what they were doing 'just now'. The respondent chooses all that apply out of 40 response options, including 'Working, studying', and/or 'Something else'. The complete survey is reproduced in Appendix A.

Together with the responses to the survey, the app transmits the satellite positioning (GPS) location of the individual and the precise time at which the survey was completed. It also records the time elapsed between the random 'ding' and response, thus allowing analysts to distinguish between immediate, 'random' responses and delayed responses. Individuals complete a short survey about their personal, work and household characteristics when registering for Mappiness. We use some of this information to characterise different types of respondent, for example, in relation to their household wealth.

Individual-level descriptives are provided in Table 1. The population of Mappiness respondents differs in a number of ways from the population at large. As one might expect from a survey conducted with smartphones, respondents are wealthier than the population at large: the median household income category is £40,000–£55,999, and the midpoint of this range is approximately double the figure for the UK as a whole (House of Commons, 2006). They are also relatively young: 66% are aged 35 or under, and 95% are aged 50 or under, compared to 29% and 56% respectively in the UK adult population (Office for National Statistics, 2010). Seventy-eight percent of participants are in employment and 13% are in full-time education. These groups are over-represented relative to the UK adult population, in which the proportions are respectively 57% and 4%, primarily at the expense of retired people, who constitute 1% of participants but 22% of the population (National Centre for Social Research, 2009). Participants' sex ratio is nearly balanced, at 53% male, compared to 49% in the UK adult population (Office for National Statistics, 2010). Response-level descriptives are given in Table 2.

The unrepresentativeness of *Mappiness* users may mean that the correlations we report below cannot be extrapolated to the population at large. However, although the magnitude of effects may differ in the population at large, it seems unlikely that the results presented below would be overturned if the survey were completed by a group of individuals who were more representative of the population as a whole. Wealthier individuals have greater choice as to whether they work and, if they do, the quality of work they are prepared to take. Since our respondents are drawn from the upper echelons of the income distribution where job quality is better, and since we know from other work (Kahneman *et al.*, 2004) that the nature of the job can affect responses to these sorts of questions, this may lead to an upward bias in our estimates of the association between paid work and momentary well-being compared to potential estimates for the population at large. On the other hand, wealthier individuals may also derive greater utility from their leisure time, in part because they are in a better position to choose what they do with their leisure time. This would lead to a bias going in the other direction.

Table 1

Individual-level Descriptives

	Employed only	All
Age (mean)	33.2	31.6
Male	57.5%	55.6%
Married/cohabiting	76.2%	71.8%
Number of children (< 16) in household (mean)	0.48	0.53
Number of people in household (mean)	2.59	2.72
Employment status		
Employed or self-employed	100%	78.0%
In full-time education	–	13.4%
Retired	–	0.6%
Unemployed and seeking work	–	3.1%
Long-term sick or disabled	–	0.9%
Looking after family or home	–	2.3%
Other	–	1.8%
Gross household income		
Under £8,000	1.2%	5.2%
£8,000–£11,999	1.9%	3.0%
£12,000–£15,999	3.7%	4.3%
£16,000–£19,999	4.4%	4.7%
£20,000–£23,999	5.7%	5.9%
£24,000–£31,999	11.8%	11.3%
£32,000–£39,999	12.8%	11.8%
£40,000–£55,999	20.9%	19.1%
£56,000–£71,999	15.1%	13.8%
£72,000–£95,999	10.9%	9.8%
£96,000 or more	11.7%	11.2%

Notes. Mean counts of children and people in the household assume the lowest value for the open top categories (i.e. 4 for '4 children or more', and 4 for '4 adults or more'). Income bands are nominal and cover all respondent registrations, regardless of when they took place.

2. Empirical Strategy

We explore the links between individuals' happiness measured momentarily at random points in time and their experiences of paid work. Figure 1 presents the distribution of happiness for all respondents (the distributions for workers and non-workers separately are indistinguishable).

One can see that the distribution of momentary happiness is skewed. There is also a notable spike at the top of the scale, suggesting some sort of right truncation with individuals scoring as high as they possibly can. The ordinary least squares estimates presented in the next Section were not sensitive to the use of interval regression techniques to tackle this issue.[6]

One of the attractive features of the *Mappiness* data collection process is that individuals provide a response when randomly requested to do so during the course of the day. They are asked to record the activities they are currently engaged in after they have rated their current happiness. As noted earlier, one advantage of this approach is

[6] These results are available from the authors on request.

Table 2

Response-level Descriptives (valid responses from employed respondents only; %)

Location (1)	
At home	47.4
At work	27.9
Elsewhere	24.7
Location (2)	
Indoors	84.2
Outdoors	8.4
In a vehicle	7.5
Alone	40.5
Companionship (not mutually exclusive)	
With spouse, partner, girl/boyfriend	24.9
With colleagues, classmates	20.1
With children	10.3
With friends	8.4
With other family members	7.0
With clients, customers	1.8
With other people the respondent knows	1.5
Most frequent activities (not mutually exclusive)	
Working, studying	27.4
Watching TV, film	17.8
Talking, chatting, socialising	14.2
Sleeping, resting, relaxing	9.6
Eating, snacking	9.5
Travelling, commuting	9.1
Listening to music	6.0
Drinking tea/coffee	5.4
Drinking alcohol	5.2
Housework, chores, DIY	4.9

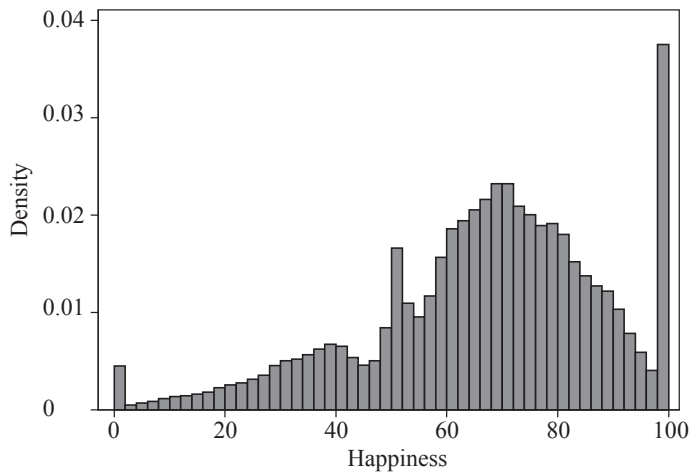

Fig. 1. *Distribution of 'Happy' Responses, Full Sample*

that it minimises focusing biases associated with DRM and other methods which entail some degree of reflection and, possibly, introspection. It also overcomes recall bias in relation to what one is doing or how one feels when one is doing it.

The purpose of the random 'ding' is to elicit responses which are random with respect to the activity an individual is undertaking and how the individual is feeling. However, individuals do not always respond and may respond after some delay. Non-response and delay prior to a response might both be non-random and could be related to types of activity or mood.[7] Figure 2 plots the cumulative probability of response over time only for those signals that ultimately receive a response. We restrict our analyses to responses given within one hour of the signal being sent. Under this criterion, approximately half of all signals result in a valid response. We find our results are not sensitive to varying this period, a point we return to later. As a further sensitivity test, we can exclude all responses from respondents with a highly incomplete response record, in case the choice to respond is correlated with affective state and this biases our coefficient estimates. Again, this has little impact on our results. It is not possible to know who has encountered the opportunity to take part (via the App Store, traditional media, social media and so on), so traditional response rates cannot be ascertained. The novelty of applying ESM on this scale means we do not have strong expectations regarding the kinds of individuals who choose to sign up and how they may or may not differ from the population at large. The *Mappiness* ESM survey is designed to be fast and convenient; over half of responses are completed in under 30 seconds. So any self-selection may be no more serious than for more traditional panel surveys, in which individuals are expected to commit a much larger amount of time to answering survey items, albeit in fewer and less frequent instalments.

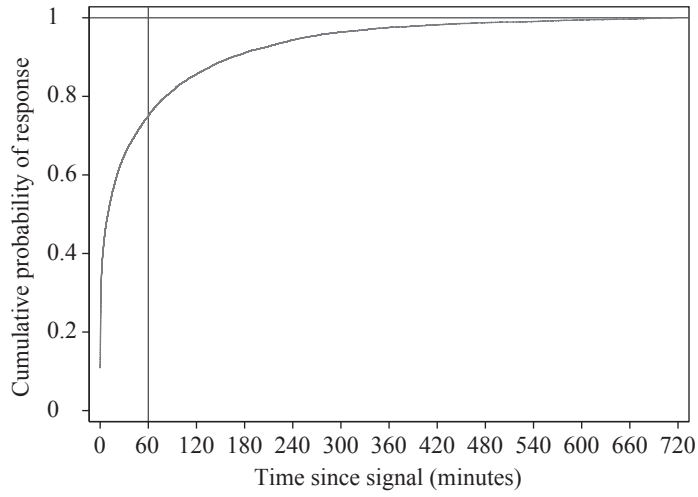

Fig. 2. *Cumulative Probability of Response (Counting Only Signals that Receive a Response Before the Next Signal is Sent)*

[7] We might anticipate lower response rates when individuals are experiencing very happy or very unhappy moments, leading to truncation in the observable distribution of happiness at both ends of the spectrum. However, it is not clear why this should differ across work and non-work activities.

Our starting point is the bivariate relationship between working and momentary happiness for the *Mappiness* population as a whole. Because the average individual responds about 60 times, we are able to account for unobservable fixed differences across individuals. We will therefore also present this bivariate relationship in a person fixed effects model. Comparison between this model and the simple OLS model will tell us whether, and to what degree, the correlation between paid work and well-being is biased by fixed differences between workers and non-workers responding to the survey.

The remainder of the analysis will be confined to individuals who at the time of their registration with *Mappiness* said that they were in paid work. This helps overcome one of the drawbacks of the *Mappiness* data in the context of this study, namely the fact that the activity individuals tick when working is actually labelled 'Working, studying'. Roughly one in seven respondents said they were students when registering for *Mappiness* but these individuals are dropped from analyses once we have presented the initial all-respondent models.

Throughout we account for person fixed effects so that we are presenting estimates of variance in well-being within individuals over time and how this relates to work and other activities.

Our period of observation begins in August 2010 and ends in September 2011. The models we present are of the following type:

$$h_{it} = \alpha_i + \beta_w w_{it} + \boldsymbol{\beta}_e \mathbf{e}_{it} + \boldsymbol{\beta}_{we}(w_{it} \times \mathbf{e}_{it}) + \boldsymbol{\beta}_x \mathbf{x}_{it} + \boldsymbol{\varepsilon}_{it}$$

where h is happiness of individual i at time t; w is working, $\mathbf{e}$ are other activities undertaken at the same point in time, with the following argument capturing their interaction; the β are parameters to be estimated; α_i is the person fixed effect; and $\boldsymbol{\varepsilon}_{it}$ is the error term. Other right-hand side control variables in the $\mathbf{x}$ vector include companionship and location type dummies, time indicators (month, day of week and time of day) and the number of responses an individual has given previously. Variants of the basic model interact the work activity with location type and companionship. Standard errors are clustered at the person level to account for non-independent repeat observations and a robust estimator is deployed to account for heteroscedasticity. The response variables are scaled from 0 to 100, so coefficients can be interpreted as percentage changes.

3. Results

Table 3 presents bivariate relationships between engaging in paid work and momentary happiness. The top panel presents the results for all individuals in the data set, whilst the bottom panel presents results for those who said they were in paid work when they registered for *Mappiness*. In each case, we present OLS and person fixed effects models. Across all models, engaging in paid work is associated with lower momentary happiness. It seems that engaging in paid work is associated with a reduction of around 8% in happiness. A comparison of the OLS and person fixed effects models indicates that the negative association between paid work and happiness is similar whether one compares across individuals or only within individuals over time. The effects are slightly larger for the sub-population who said they were in paid work

Table 3

Raw Associations Between Happiness and Work

	OLS	Fixed effects
All		
Working, studying (dummy)	−7.73	−7.81
	(52.62)	(67.79)
Constant	68.65	68.67
	(456.64)	(2,380.24)
Model fit	$R^2 = 0.03$	$p > f = 0.0000$
Workers		
Working, studying (dummy)	−8.38	−8.18
	(55.38)	(64.45)
Constant	69.06	69.00
	(417.35)	(1,984.61)
Model fit	$R^2 = 0.03$	$p > f = 0.0000$

Notes. t-stats in parentheses. 'All' models run on 1,620,220 observations for 26,682 individuals. Average *N* observations per individual is 60.7 with a maximum of 1,277. 'Workers' models run on 1,321,279 observations for 20,946 individuals. Average *N* observations per individual is 63.1 with a maximum of 1,207.

when they registered with *Mappiness*, suggesting that studying is somewhat less damaging to happiness than paid work is.[8]

Results are not sensitive to the time elapsed since the random ding. For example, when we reran all models reported in Table 3 with either a stricter validity criterion, including only responses made within 20 minutes of the receipt of a signal, or a more lax criterion, including responses made up to three hours after the receipt of a signal, in each case all of the estimated coefficients on work remained almost exactly the same (the differences for all 16 coefficients were within the range −0.05 to +0.09). The results are also robust to the exclusion of those responding infrequently. For example, when we reran all models reported in Table 3 including only responses from respondents who had given a valid response to at least 80% of all signals received and provided at least four valid responses, the negative coefficient on work increased in magnitude in every model, but these changes were small (the differences for all eight coefficients were within the range −1.26 to −0.94).

In Table 4 we see how working compares to the correlations with other activities.[9] The most pleasurable experience for individuals is love-making and intimacy, which raises individuals' happiness by roughly 14% (relative to not doing this activity). This is followed by leisure activities such as going to the theatre, going to a museum

[8] Since respondents may change employment status over time, we reran the estimates on the subset of observations obtained in the first week after *Mappiness* registration, that is, when we can be most certain of respondents' work status. If we confine the estimates to those who said they were working on registration (212,056 observations for 20,513 individuals), we find that the pattern of results is similar to that reported in the lower panel in Tables 1 and 2 but the negative association between working and happiness is larger. Taking the OLS results, the coefficient for working in the happiness equation reported in column (1) is −9.95 instead of −8.38. This is not surprising since change in employment status over time introduces some measurement error into our estimates.

[9] The activity 'Something else' is a category respondents can tick if what they are doing is not adequately described by the 40 labels provided (app versions are distinguished because several new activity options were introduced in version 1.0.2, therefore altering the range of activities that a respondent might classify as 'something else').

Table 4

Happiness in Different Activities (fixed effects regression model)

Happy (0–100) Activities (in rank order)	Coefficient	t
Intimacy, making love	14.20	(44.4)
Theatre, dance, concert	9.29	(29.6)
Exhibition, museum, library	8.77	(25.0)
Sports, running, exercise	8.12	(45.5)
Gardening, allotment	7.83	(22.8)
Singing, performing	6.95	(17.5)
Talking, chatting, socialising	6.38	(75.2)
Birdwatching, nature watching	6.28	(11.4)
Walking, hiking	6.18	(37.0)
Hunting, fishing	5.82	(3.98)
Drinking alcohol	5.73	(54.0)
Hobbies, arts, crafts	5.53	(22.5)
Meditating, religious activities	4.95	(11.2)
Match, sporting event	4.39	(15.2)
Childcare, playing with children	4.10	(19.4)
Pet care, playing with pets	3.63	(17.1)
Listening to music	3.56	(27.6)
Other games, puzzles	3.07	(11.1)
Shopping, errands	2.74	(25.1)
Gambling, betting	2.62	(2.82)
Watching TV, film	2.55	(36.3)
Computer games, iPhone games	2.39	(18.4)
Eating, snacking	2.38	(37.1)
Cooking, preparing food	2.14	(22.0)
Drinking tea/coffee	1.83	(18.4)
Reading	1.47	(13.3)
Listening to speech/podcast	1.41	(9.62)
Washing, dressing, grooming	1.18	(11.5)
Sleeping, resting, relaxing	1.08	(11.4)
Smoking	0.69	(3.16)
Browsing the Internet	0.59	(6.13)
Texting, email, social media	0.56	(5.64)
Housework, chores, DIY	−0.65	(−6.59)
Travelling, commuting	−1.47	(−16.2)
In a meeting, seminar, class	−1.50	(−9.01)
Admin, finances, organising	−2.45	(−14.2)
Waiting, queueing	−3.51	(−22.7)
Care or help for adults	−4.30	(−7.75)
Working, studying	−5.43	(−44.0)
Sick in bed	−20.4	(−67.9)
Something else (version < 1.0.2)	−1.00	(−5.43)
Something else (version ≥ 1.0.2)	−2.31	(−13.6)
Person fixed effects	Yes	
Constant	65.6	(978)
Observations	1,321,279	
Number of groups	20,946	

and playing sport. Paid work comes very close to the bottom of the happiness ranking. It is the second worst activity for happiness after being sick in bed, although being sick in bed has a much larger effect, reducing happiness scores by just over 20%.

Table 5

Work and Time Interactions

Variable	Coefficient	t
Working, studying	−5.44	(−45.02)
× Mon–Fri before 6 am	−4.24	(−2.71)
× Mon–Fri before 8 am	2.63	(3.62)
× Mon–Fri after 6 pm	−2.59	(−13.15)
× Mon–Fri after 8 pm	−0.05	(−0.17)
× Sat, Sun, bank holiday	−2.37	(−8.54)
Month and year dummies	Yes	
Hour × day of week dummies	Yes	
No. of prior responses dummies	Yes	
Person fixed effects	Yes	
Constant	63.57	(42.77)
Observations	1,321,479	
Number of groups	20,946	

Note. Model run for respondents in paid work only.

Not all work is the same, of course. How you feel during periods of work will depend upon when you are doing the work; where you are working and whom you are working with; what else you are doing during that work; and the quality of the work you are undertaking. We begin with a variant of Table 3 which distinguishes between when you are doing the work, that is, the time of day and when during the week. The results are presented in Table 5. They condition on month of the year and continuous time, as captured using hour of the day and day of the week as shown in Figure 3. The Figure shows how happiness develops during the course of the day across days of the week. It is important to condition on this because there is a clear, albeit non-monotonic, increase in happiness during the course of the day, as well as different patterns to this increasing happiness across days of the week. Having accounted for continuous time in this way we find those working between 8 am and 6 pm on a weekday suffer a 5% reduction in their happiness (coefficient of −5.44, t-stat = 45) compared with not working. But this negative effect rises by nearly a half when the individual is working

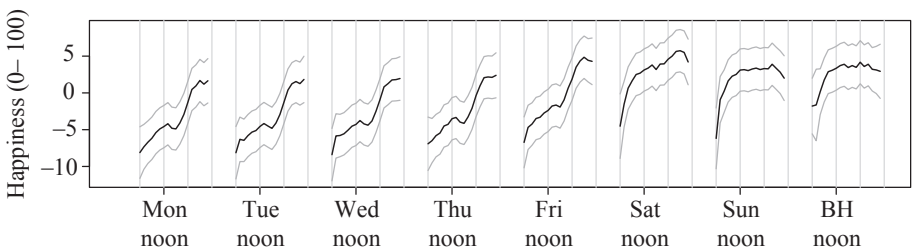

Fig. 3. *Variation in Happiness of Those in Paid Work by Hour × Day of Week/Bank Holiday (Mean and 95% Confidence Interval)*

Notes. Only daytime values are plotted. The origin of the *y*-axis is arbitrary. No other controls are included, so the variation seen here includes any effect of working.

Table 6

Work Interactions with Place and People

	Basic effect		Interaction with 'working, studying'		Total effect
	Coefficient	t	Coefficient	t	Sum of three coefficients
Working, studying	−1.53	(−6.62)			
At home (baseline)	–		−1.38	(−5.83)	−2.90
At work	−4.09	(−32.15)	−0.88	(−3.45)	−6.49
In a vehicle	−2.31	(−27.17)	1.59	(3.50)	−2.25
Spouse, partner, girl/boyfriend	5.91	(49.18)	−2.06	(−7.08)	2.32
Children	1.40	(8.20)	0.01	(0.04)	−0.11
Other family members	2.94	(26.22)	−0.82	(−2.12)	0.59
Colleagues, classmates	0.64	(4.98)	−0.87	(−4.44)	−1.76
Clients, customers	0.72	(2.12)	0.15	(0.28)	−0.66
Friends	8.19	(78.65)	−1.94	(−6.92)	4.73
Other people participant knows	0.66	(3.80)	−0.45	(−0.60)	−1.32
No. of prior responses dummies	Yes				
Person fixed effects	Yes				
Constant	60.87	(377.96)			
Observations	1,321,279				
Groups	20,946				
Mean, max obs. per group	63.1, 1,207				
$F_{30,\ 20945}$	484.32				

before 6 am in the morning, after 6 pm at night, or at the weekend. The negative effects of paid work on happiness are a little lower if the individual is working between 6 am and 8 am in the morning, perhaps capturing the effect individuals feel as they leave night shifts or begin their working day.

In Table 6 we turn to where and with whom you are working. Evidence from a recent field experiment in which opportunities to work at home were randomly assigned to workers indicated not only that workers randomly assigned to work at home were more productive than those assigned to remain on company premises, but that they were also more satisfied with their work, had higher psychological attitude scores and were less likely to quit the firm (Bloom *et al.*, 2013). Kahneman *et al.* (2004) show working at home is associated with greater enjoyment, and that this is not related to feelings of time pressure during working episodes.

When we distinguish between working at home, working at work, or working in a vehicle, we find that the negative association between paid work and happiness is twice as large when that work is undertaken at work, compared to working at or from home (Table 6).[10] Whom you are with also matters a great deal. There are psycho-social benefits of being in the company of other people. Kahneman *et al.*'s (2004) DRM data show that individuals prefer being with almost anybody compared to being on their own. The exception is being with their boss: being with the boss is the only

[10] The total effect of working at work of −6.49 in the right-hand column is relative to a scenario in which the individual does not report work, and is obtained by summing the main effects from working and being at work with the interaction of the two (−1.53 + −4.09 + −0.88 = −6.49 after rounding).

circumstance that is deemed worse than being on one's own.[11] In contrast, individuals are happier when they are working with their peers.

We find that, compared to being alone, individuals are happiest when they are with their friends, followed by when they are with their partner. However, the positive effect of being with partners and friends is significantly diminished when one is working, as indicated by the negative interaction effects. Working with other family members and with colleagues follows the same pattern, albeit with lower effect sizes. We are unable to distinguish between bosses and co-workers; the effect is therefore likely an average of the two effects which, as noted above, may pull in opposite directions.

Working is one of 40 activities *Mappiness* participants can code when they are asked what they are currently doing. Respondents in paid work report working on 27% (362,170) of response occasions. On 67% of those occasions, this is the only activity reported. On the remainder of occasions, one or more additional activities are reported simultaneously. Table 7 reports the activities which are most frequently combined with working. In certain cases, these activities may represent the nature of the work being undertaken (e.g. in a meeting), while in others they seem more likely to be activities carried on in parallel to work (e.g. listening to music).

Table 8 shows that combining work with other activities significantly affects individuals' happiness. Eight of the ten activities that are most frequently combined with working significantly alter individuals' happiness relative to only doing work. Reading and Eating/Snacking do not interact with working to alter individuals' momentary happiness. In all eight cases where other activities affect the happiness of individuals who are working, they do so positively, as indicated by the positive and statistically significant interaction effects. The largest positive interaction is with being 'In a meeting, seminar or class'. However, the main effect associated with this activity is large and negative, which means that the overall net effect of working and being 'In a meeting, seminar or class', is not that different from working only (final column). Instead, the largest positive net effect of combining work and another activity on happiness relates to 'Talking, chatting, socialising'. This is because the overall effect

Table 7

Top Ten Activities Combined with Working (by Frequency)

Activity combined with working	Count	% of working occasions
Listening to music	20,321	5.6
Admin, finances, organising	20,230	5.6
Talking, chatting, socialising	19,458	5.4
Drinking tea/coffee	16,170	4.5
In a meeting, seminar, class	15,928	4.4
Texting, email, social media	13,921	3.8
Eating, snacking	11,911	3.3
Browsing the Internet	11,324	3.1
Watching TV, film	7,063	2.0
Reading	5,165	1.4

[11] A recent study for Denmark finds that having an unsupportive boss leads to a large increase in the probability of voluntary quits (Cottini *et al.*, 2011).

Table 8

Happiness Effects of Work with Top 10 Simultaneous Activities

	Basic effect		Interaction with 'working, studying'		Total effect when also 'working, studying'
Variable	Coefficient	t	Coefficient	t	Sum of three coefficients
Working, studying	−6.60	(−42.67)			
Listening to music	3.38	(24.93)	0.56	(1.96)	−2.66
Admin, finances, organising	−3.64	(−23.25)	2.34	(6.52)	−7.89
Talking, chatting, socialising	6.09	(68.28)	1.04	(5.96)	0.53
Drinking tea/coffee	1.51	(13.70)	1.07	(4.48)	−4.01
In a meeting, seminar, class	−3.70	(−19.26)	4.70	(17.43)	−5.60
Texting, email, social media	−0.03	(−0.28)	1.91	(8.61)	−4.72
Eating, snacking	2.25	(33.24)	−0.40	(−1.48)	−4.75
Browsing the Internet	0.02	(0.17)	2.12	(9.53)	−4.46
Watching TV, film	2.16	(30.37)	2.77	(11.74)	−1.68
Reading	1.18	(33.24)	0.24	(0.66)	−5.18
All other activities and their interactions with working	Yes				
Person fixed effects	Yes				
Constant	66.27	(850.36)			
Observations	1,321,279				
Number of groups	20,946				
Mean, max obs. per group	63.1, 1,207				
$F_{83,\ 20945}$	243.23				

combines a relatively modest interaction effect with a large positive main effect. There are clearly positive psychological benefits of being able to socialise while working. It is the only activity that, in combination with working, results in happiness levels that are similar to those experienced when not working.

Next we turn to the issue of whether the correlation between work and momentary happiness differs systematically across different types of individual. To explore this, we interact working with individuals' characteristics as provided by respondents when they registered for the survey.

Table 9 shows the association between happiness and work for different household income groups and demographic characteristics. Interactions between working and household income are jointly statistically significant. Relative to those in the median household income category, the happiness of those in the bottom two income categories is more positive when working compared to when they do not work, which is consistent with the idea that poorer people enjoy their leisure time less, making work relatively 'less bad'.[12] There are no additional happiness returns to working above this point in the income distribution. Indeed, the coefficients are fairly flat. There are no significant age interactions. Those who are married or in long-term relationships are relatively less happy when working, perhaps because they enjoy life outside work more,

[12] It is worth recalling that these effects are within-person so do not reflect fixed differences between people in different parts of the income distribution. For the US, Kahneman and Deaton (2010) find a positive association between affect and income which ceases at $75,000 per annum, whereas the association with life evaluation continues to rise with income.

Table 9

Interactions of Work with Individual Characteristics

Variables	Coefficient	t
Working, studying	−9.10	(−4.86)
× household income band		
< £8,000	3.44	(3.93)
£8,000–£11,999	2.94	(3.26)
£12,000–£15,999	−2.03	(−1.15)
£16,000–£19,999	−0.076	(−0.11)
£20,000–£23,999	−0.10	(−0.15)
£24,000–£31,999	0.83	(1.61)
£32,000–£39,999	0.96	(2.17)
£40,000–£55,999 (median)	–	
£56,000–£71,999	0.38	(0.93)
£72,000–£95,999	0.42	(1.00)
£96,000+	0.77	(1.78)
× male	−0.50	(−1.99)
× age	0.057	(0.55)
× age^2	0.00045	(0.34)
× married/in a relationship	−2.65	(−8.25)
× has one or more children	0.68	(2.16)
Constant	69.0	(1,963)
Observations	1,286,321	
R-squared	0.042	
Number of groups	20,247	

Note. t-statistics in parentheses.

whereas those with children are relatively happier working (relative to not working) than those without.[13]

These results beg an obvious question. If people are so positive about paid work when reflecting on the meaning and value of their lives, why does it appear to have such an adverse effect on their momentary happiness? There are perhaps two potential hypotheses. The first is that work is negatively associated with hedonic well-being. That is to say, it really is a disutility as economists traditionally conceive of it, one which requires some form of monetary reward to induce work effort. The alternative proposition is that work can be, and often is, a pleasurable experience, but that it comes mixed with the pain associated with anxiety and stress which emanates from the responsibilities individuals have when working. Kahneman *et al.* (2004) show that workers' happiness varies markedly according to whether or not they feel pressure to work quickly.

We try to address this question by running happiness equations which condition on how relaxed respondents say they are at the time of the activity. Respondents are asked to record how relaxed they feel, just as they are asked to record how happy they feel, only this time the scale which runs from 'Not at all' to 'Extremely' is labelled 'Relaxed' instead of 'Happy'. Although being relaxed and being happy are positively correlated, the correlation is not that high.[14] Furthermore, in the psychological literature,

[13] This last point is consistent with the findings of Kahneman *et al.* (2004), who report that 'taking care of one's children ranks just above the least enjoyable activities of working, housework, and commuting'.

[14] The correlation coefficient is 0.73.

Table 10

Happiness with Relaxed Score as a Control

Variables	(1)	(2)
Relaxed score	0.59	0.59
	(186)	(186)
Working, studying	−0.80	−0.98
	(−12.6)	(4.67)
Work × relaxed score	–	0.0031
		(1.03)
Constant	28.8	28.9
	(140)	(138)
Observations	1,321,279	1,321,279
R-squared	0.447	0.447
Number of user_id	20,946	20,946

Note. t-statistics in parentheses.

happiness and relaxation are quite distinct concepts. For instance, many psychologists depict affect in two dimensions. Along a horizontal axis is the degree to which the feeling involves pleasure or displeasure; the vertical axis is concerned with the degree to which the feeling involves a high or low level of mental activation – in other words the extent to which the person is ready to act or expend energy (Russell, 2003, p. 156). Relaxation, which in the psychology literature is the opposite of anxiety, can be found in the low-activation but high pleasure quadrant, while (un)happiness is the (left) right-hand extreme on the horizontal pleasure axis (Warr *et al.*, 2013). By conditioning on the degree of relaxation or anxiety a respondent feels, we can establish the extent to which working engenders happiness net of any effect on pleasurable low activation feelings.

We run two models in Table 10. The first model, in column (1), introduces the relaxation score to see if it can eliminate the negative association between happiness and paid work, as one might expect if the paid work effect was wholly due to the stress and anxiety associated with working. The second model interacts paid work with the relaxation score so as to distinguish between more and less relaxing forms of work. We find the introduction of relaxation as a control variable reduces the size of the negative working coefficient quite substantially. The working coefficient remains statistically significant but it is roughly one-tenth the size of the coefficient presented in Tables 1 and 2, suggesting that a substantial part of the work effect may be due to the worry and stress of work. However, the interaction of work and relaxation, whilst positive, is both small and statistically non-significant. This suggests that, although feeling relaxed is very important for feeling happy, and controlling for relaxation accounts for some of the work effect, working continues to be negatively associated with momentary happiness, regardless of the stress associated with working.

4. Conclusion

In this article, we contribute to the literature on momentary well-being using a new data source, *Mappiness*, which permits individuals to record their well-being via a

smartphone. The data contain more than a million observations on tens of thousands of individuals in the UK, collected since August 2010. We explore the links between individuals' well-being measured momentarily at random points in time and their experiences of paid work. We quantify the effects of working on individuals' affect relative to other activities they perform.

We find paid work is ranked lower than any of the other 39 activities individuals engage in, with the exception of being sick in bed. Although controlling for other factors reduces the size of the association, its rank position remains the same and the effect is still equivalent to a 7–8% reduction in happiness relative to circumstances in which one is not working. However, precisely how unhappy or anxious one is while working depends on the circumstances. Well-being at work varies significantly with where you work (at home, at work, elsewhere); whether you are combining work with other activities; whether you are alone or with others; the time of day or night you are working; and your personal and household characteristics. Many of these circumstances can be influenced by public policy, which may facilitate working conditions conducive to 'happier' working, something which economists have recently noted can also improve labour productivity (Oswald *et al.*, forthcoming).

We are left with the question as to why work appears to have such an adverse effect on individuals' momentary well-being. We know that part of the answer is related to anxiety at work. Even though people are so positive about paid work when reflecting on the meaning and value of their lives, actually engaging in paid work comes at some personal cost to them in terms of the pressures and stress they face while working. This suggestion is supported by previous research which shows that workers' happiness varies markedly according to whether or not they feel pressure to work quickly (Kahneman *et al.*, 2004, p. 1779). But our results suggest that this is not the whole story. First, as Table 8 indicates, working continues to be negatively correlated with happiness, even when it is combined with other activities which are pleasurable. Second, even when one conditions on feelings of relaxation, working continues to be negatively associated with momentary well-being. Instead, it appears that work *per se* is negatively associated with hedonic well-being, such that we would rather be doing other things. That is to say, work really is disutility, as economists have traditionally held.

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