HAPPINESS RAISED BY RAISING AWARENESS
Effect of Happiness Self-Monitoring Using the Happiness Indicator

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ABSTRACT

The Happiness Indicator (www.happinessindicator.nl) is an online tool designed to make people more aware of their own happiness. The theory behind the website is that a keener awareness of one's own happiness helps users find an optimal lifestyle and consequently promotes happiness among participants.

Participants periodically record how happy they feel on the present day and how happy they have felt over the past month, using the Happiness Comparer. They also have the option of indicating in the Happiness Diary how happy they felt during the various activities of the previous day. Participants receive instant feedback in the form of a comparison with their earlier scores and with the average scores of similar participants.

The website has been online since January 2011; 5,411 participants have participated at least twice, and 64% of them used the Happiness Diary one or more times. These numbers are now high enough to permit an initial analysis of the effect of the use of the Happiness Indicator on the participants' happiness.

We find that the use of the Happiness Comparer only marginally increases happiness. The effect of using the Happiness Diary turns out to be stronger. Using the Happiness Diary 10 times, results in an average increase in happiness of 2%. In addition, we find that repeated use of the Happiness Diary had a particularly strong effect for those who felt less happy when they first used the Happiness Indicator.

Use of the Happiness Indicator may have prevented a decline of happiness among our participants, such as observed in the control-groups of 10 studies among self-selected participants in happiness trainings. If so, the net effect of using the Happiness Indicator was about 5%, which is quite substantial and comparable to the short-term effects of real-life events, such as birth of a first child.

Keywords:
life satisfaction, mood, self-help, e-help, effectiveness, life style, day reconstruction method DRM

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1 INTRODUCTION

1.1 In search of greater happiness

It is in our nature to prefer feeling good over feeling bad (Grinde 2007) and this tendency extends to a universal quest for a satisfying life, called 'happiness' (Veenhoven 2010). Currently we pursue happiness probably more than in the past. One reason for this greater weight given to happiness is that chances of living a satisfying life have increased considerably in modern society and a related reason is that in modern multiple-choice society our happiness is more in our own hands (Veenhoven 2015).

Feeling happy is not only more pleasant than feeling unhappy; it also has positive side effects. Happiness makes people typically more productive (Oswald & Proto, 2014), as well as social, active, and engaged (Lyubomirsky, King & Diener 2005). Therefore, happy people are generally better citizens (Guven 2009). Happiness also makes people less susceptible to disease, and as a result, happy people live considerably longer than unhappy people do (Lyubomirsky et al., 2005; Veenhoven, 2008). These positive effects fit the theory that happiness is part of our affective orientation system and that feeling good tends to accompany functioning well (Grinde 2007; Johnston 2003).

In the light of the above findings especially, there is increasing support for the ideology that we should seek greater happiness for a greater number of people (e.g. Layard, 2006; Veenhoven, 2010; Diener et al., 2012). One way to promote happiness is to create situations in which most people will enjoy their life, such as material comfort and safety. Though quite successful, this approach involves the danger of paternalism, which may backfire on happiness (Omerod & Johns 2007). Another approach is to help people find happiness by themselves. In this paper, we follow that pathway and present tools by means of which people can get a better view on their happiness and adjust their way of life accordingly.

1.2 Methods for becoming happier

Happiness depends in part on genetic predisposition and on circumstances that are difficult to change. However, we can control a considerable part of our happiness. Researchers estimate that approximately 40% of our happiness depends on how we arrange our lives (Sheldon & Lyubomirsky, 2007). Therefore, many people ask themselves: What would be the best way to do this?

This question has led to the development of a growing range of happiness-help products, such as advisory books (e.g. Lyubomirski 2008), training courses (e.g. Fordyce 1977) and life-coaching services (e.g. Spence & Grant, 2007). These products use different techniques, such as training social skills, increasing personal insight, reducing stress and promoting positive thinking, for example, encouraging people to see a glass as half full instead of half empty. The majority of these techniques originate from psychology; in recent years, they have drawn mainly from the field of positive psychology. Other methods that aim to increase happiness draw on esoteric inspiration, such as Buddhist meditation.

At present, little is known about the effectiveness of these interventions on happiness[6]. Limited research has examined the effects of these methods, and the few studies that do exist typically show no significant effect of the effect on life satisfaction[7]. This does not necessarily mean that there is no effect at all; most of these studies' samples were too small to reveal effects, which are typically small, or to divide users into subtypes for whom the intervention does or does not work.

1.3 Approach of the Happiness Indicator

In collaboration with the health insurance company XX, a new online method has been developed at the YY University[8] that aims to provide people with greater insight into their own happiness. Participants monitor how well they feel in general and during specific daily activities and are informed of how similar people feel. The method is based on the expectation that a better awareness of one's own happiness helps individuals find a personally optimal life style, which subsequently leads to increased happiness.

1.3.1 Underlying theory

The expectation that a better awareness of one's happiness will be helpful is based on several psychological insights.

Information function of affective experience

Our feelings have a signaling function (e.g. Schwartz 2012), and feeling happy basically indicates that our way of life matches our nature (Grinde 2007). In this perspective, it is functional to be well aware of how happy you feel, at least when there is opportunity to improve your situation. Locked in hell, it is probably better to reduce awareness of one's feelings as far as possible, since one cannot change the situation while the signal hurts. Awareness of happiness is also not functional in cases of affective disorder.

Inaccurate view on how happy one typically feels

Memories of how happy we felt in the past are often distorted and may feed us with false information. Several sources of bias in affective recall have been identified. One is that salient memories of ups and downs limit our perception of the average experience (Wilson, Gilbert & Meyers 2003). Another source of memory bias is in 'cognitive framing'; the longer ago the affective experience, the more its afterglow is adapted to existing views on the world and the more we are blinded to divergent information (Kahneman & Krueger 2006).

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[6] Though there is considerable research on effects of interventions on aspects of mental health, sometimes called 'eudaimonic happiness', research about effect on the enjoyment of life (which is called 'hedonic happiness' in contrast to 'eudaimonic') is still thin on the ground.

[7] Published research findings are gathered in the World Database of Happiness, Findings report Happiness and Therapy, subsection T2.2 Effects (Veenhoven 2014). Probably a lot more unsuccessful interventions did not see the light of publication.

[8] The first version of the Happiness Indicator was developed for a study of elderly people by xx in collaboration with xx. xx also involved in the development of the current version.

A related insight is that we are bad at predicting how our choices will affect our future happiness (Gilbert 2005). We tend to project our biased memories of past affective experience on the future, typically neglecting uncertainties and differences in conditions and being susceptible to suggestion (e.g. Wilson et. al 2000). For this reason, we frequently make misinformed choices, such as accepting a better paying job at a longer distance, which in the end makes us less happy because better pay does not compensate the happiness lost in commuting (Frey & Stutzer, 2004).

In this respect, it is plausible that the view on our affective experience will be less biased if we monitor it systematically and can retrieve in writing how well we have felt in the past and how well we typically feel during specific activities. It is also plausible that this will subsequently result in better informed choices when it come to decisions in which happiness is at stake and that a better view on one's happiness will therefore tend to result in a higher level of happiness in the long term.

Limited view on how happy one could be, given one's situation

Next to a better view on how happy one feels personally, we could profit from more accurate information on how our own happiness compares to the happiness of other people, similar people in particular. If these other people are typically unhappy, there is apparently little chance of a satisfying life and you better not sink energy in the pursuit of happiness; at least not in a real-world context. However, pursuing happiness makes more sense if a satisfying life appears to be possible in your situation.

It is not easy to assess how much happiness is realistically possible for you. There is a lot of misleading information in fiction and advertisement. Media coverage of happiness research concerns mostly the general population, while what you need to know is how happy people like you typically are. Good talks with intimates may provide you with information on this, but there are limits to openness and size of one's circle of intimates. Anonymous reports of a greater number of similar people are therefore helpful.

A further, more common sense, insight underlying the Happiness Indicator is that we can learn from each other and typically do. If you appear to be less happy than otherwise comparable people are and want to improve, it is worth knowing what these other people do differently. One of the most palpable things in that context is how these people usually spend their time, such as how much of the day they spend with others or alone, how long they commute and how many hours they sleep. It is also of interest to know how otherwise comparable people feel during particular activities. If they feel less miserable when the alarm clock goes off or enjoy diner more than you do, that is another clue in your search for a more satisfying way of life.

Limited view on effects of behavioral change

Bias in affective recall also makes it difficult to grasp the effect of behavioral changes on one's happiness. For instance, when you went to a gym, you are probably well aware of how you feel right after leaving the gym, but may have little awareness of how daily

exercise has affected your average mood in the last month. Systematic mood monitoring will make such small and delayed effects more visible.

The idea behind the Happiness Indicator is that accurate and tailored information will be helpful in the pursuit of happiness. As such, it fits a wider plea for 'informed pursuit of happiness' (Veenhoven 2015). The emphasis is more on *fact finding* than on *soul searching*. Contrary to mainstream happiness advice, the Happiness Indicator does not involve generic recipes, such as 'count your blessings', but aims to help you find what works for you in particular. This approach will not fit everybody, since it requires an ability to digest complex information and to behave accordingly.

1.3.2 Focus on feeling

The Happiness Indicator addresses how happy one feels, in other words, how pleasant or unpleasant one's mood is most of the time. In the academic literature on subjective well-being, this is referred to as the 'affective component' of happiness and is distinguished from the 'cognitive component', the more rational assessment of the extent to which life brings what one wants it to bring (Veenhoven 1984: Section 2.2). Research has shown that the affective component dominates in the overall evaluation of life (Kulainen, Saari, & Veenhoven 2015) and that the effect of happiness on health mainly takes place via the affective component (Veenhoven 2009).

1.3.3 Related self-monitoring techniques

Self-tracking techniques are also used in health care, for example for controlling weight and drinking and are part of the 'Quantified Self' movement[9] (e.g. Neff & Natus 2016) also called 'life-logging'. The aim is mostly to help people achieve particular behavioral changes, whereas the Happiness Indicator rather helps people to find out what to change. The use of these techniques has increased considerably since self-tracking tools became available on mobile phones and other wearable electronic devices. Though mostly welcomed, these practices are also criticized (e.g. Lipton 2016).

1.3.4 Difference with other approaches in Positive Psychology

As noted above in section 1.3.2, the focus of the Happiness Indicator is on how happy one feels. In Positive Psychology this is called 'hedonic happiness' and distinguished from 'eudaimonic happiness', which denotes a wider set of desirable mental and moral features and is also referred to as 'positive mental health (Jahoda 1960). Next to this difference in object, there is also a difference in method. The Happiness Indicator aims specifically at providing a better view on the facts of one's happiness, assuming that this will enable more informed life-choices Positive Psychology interventions cover a much broader range of mental changes, such taking another view on one's self and practicing

[9] https://en.wikipedia.org/wiki/Quantified_Self

new behaviors.

1.4 Tools in the Happiness Indicator

The website is presented as 'A tool for working on your happiness' and is available free of charge on www.happinessindicator.nl[10]. Upon visiting the website for the first time, the participants create an account and complete a profile questionnaire. They receive an e-mail every month with a link to the website, where they complete the 'Happiness Comparer' and, if desired, also the 'Happiness Diary'. At the end of each calendar year, they also specify what has changed in their lives.

1.4.1 Happiness Comparer

The participants' first task is to answer two questions: first, how happy they feel that day, and next, how happy they have felt over the past month. The answers are rated using a visual faces scale, ranging from zero (very unhappy) to 10 (very happy); see Figure 1. In asking the participants first how they feel that day, we focus the participants' attention on the affective component of happiness and minimize the influence of their current mood on their answer to the second question on their happiness over the past month. After answering the two questions, the participants receive instant feedback in the following two ways:

Comparison with others

The program compares the answer to the two questions with the average score of all participants and with the average score of participants with the same profile; e.g. those in same age category, with same gender and with a similar level of education. A screenshot of this feedback is shown in Figure 2. This feedback is meant to provide the participants with insight about the likelihood of becoming happier than they are at present.

Comparison over time

If the participant has previously used the Happiness Comparer, the program generates a trend line (see Figure 3). This trend line shows participants whether they have made progress in their happiness and whether they have fared better or worse than similar participants have.

[10] The version in Dutch: www.gelukswijzer.nl

Figure 1
Questions about how happy the participant feels

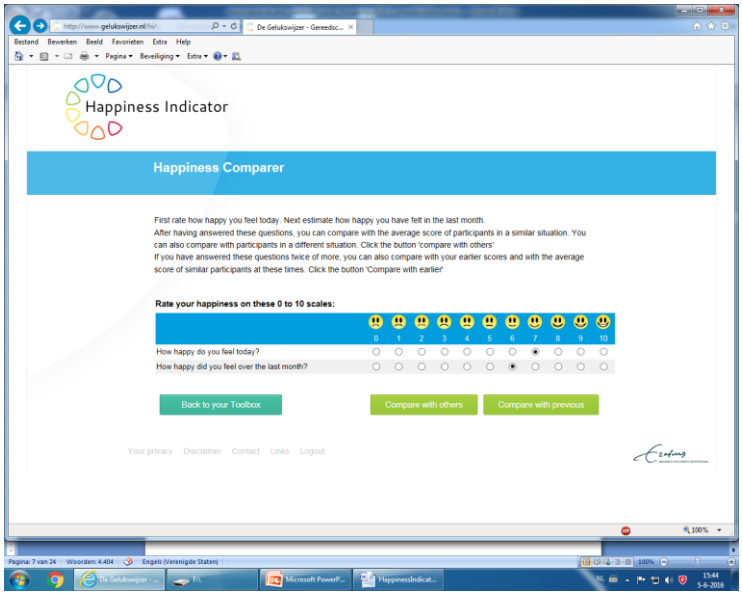


Figure 2
The participant's happiness compared with the happiness of other participants

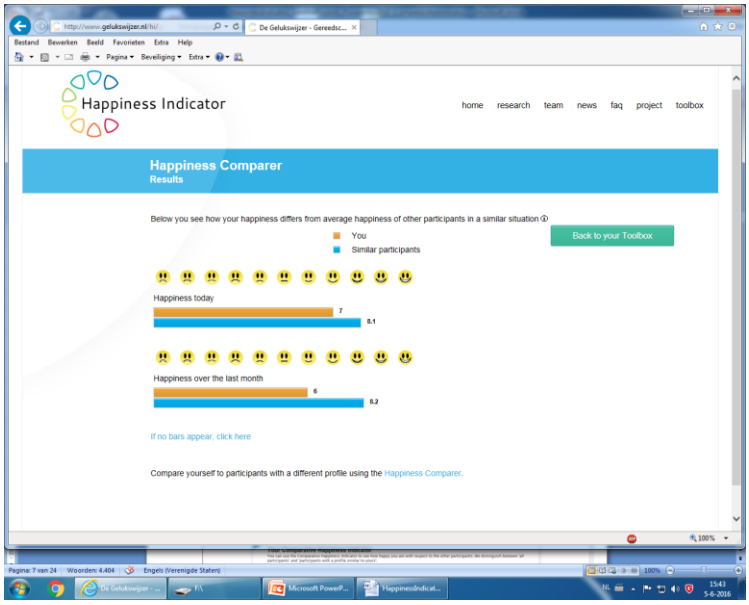
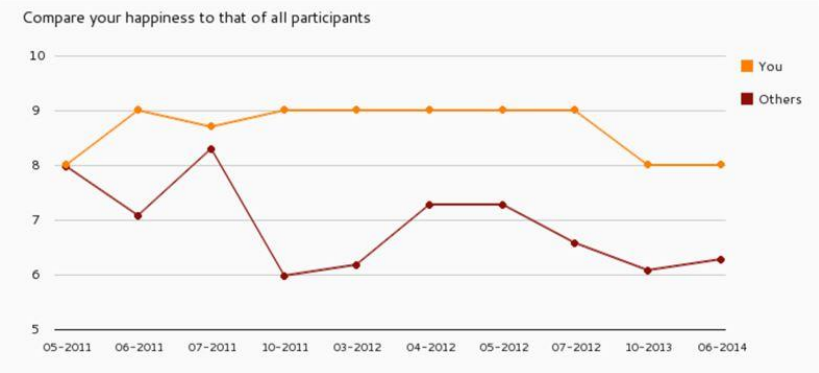


Figure 3
Example of a comparison over time



1.4.2 Happiness Diary

The Happiness Diary (Figure 4) comprises an internet application of the Day Reconstruction Method (DRM) developed by Kahneman, Krueger, Schkade, Schwarz & Stone (2004).[11] Participants are first asked to record everything they did the day before, such as eating, completing household tasks, working and resting. They also state how much time they spent on each activity, where the activity was carried out (e.g., at home or at work) and with whom (e.g., alone, with a partner, with family, or with colleagues). Happiness during the activities is indicated on a scale ranging from 0 (very unhappy) to 10 (very happy), similar to that shown in Figure 1. As Figure 5 shows, participants can use this scale to indicate how happy they felt during each activity.

This diary also provides participants with instant feedback in the following ways:

Feelings during each activity
The program generates an at-a-glance overview that shows the activities during which the participant felt the least and most comfortable (see Figure 6). This overview can help participants allocate their time optimally.

Comparison with other participants
This part of the program also provides instant comparison with other participants with similar life situations (see Figure 6). This comparison can help when the participant is making choices, for example, when deciding whether to look for a new job. The fact that a person does not feel great at work is in itself not a reason to change jobs, because most

[11] For a recent review of this method, see Diener & Tay (2014). Others studies that have applied DRM to the study of happiness include Kahneman et al. (2006), Oishi et al. (2009), Knabe et al. (2010), and Hendriks et al. (2014).

people feel one point less happy at work than at home. However, if your difference between work happiness and home happiness is greater than that of similar participants, it is most likely worthwhile to look for a better job.

Feelings throughout the total activity pattern.
The average happiness level of the day is calculated based on the time spent on each activity. This helps participants to assess more accurately their own happiness level; if the daily averages obtained with the Happiness Diary differ substantially from the global estimates made on the Happiness Comparer, the latter estimates may be biased.

Figure 4:
Example of a diary

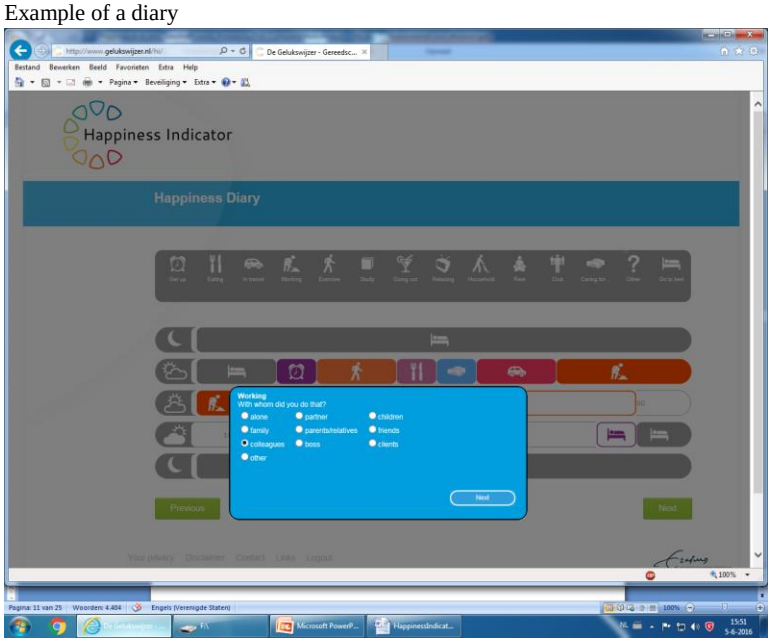


Figure 5

Rating of how happy the participant felt during each activity

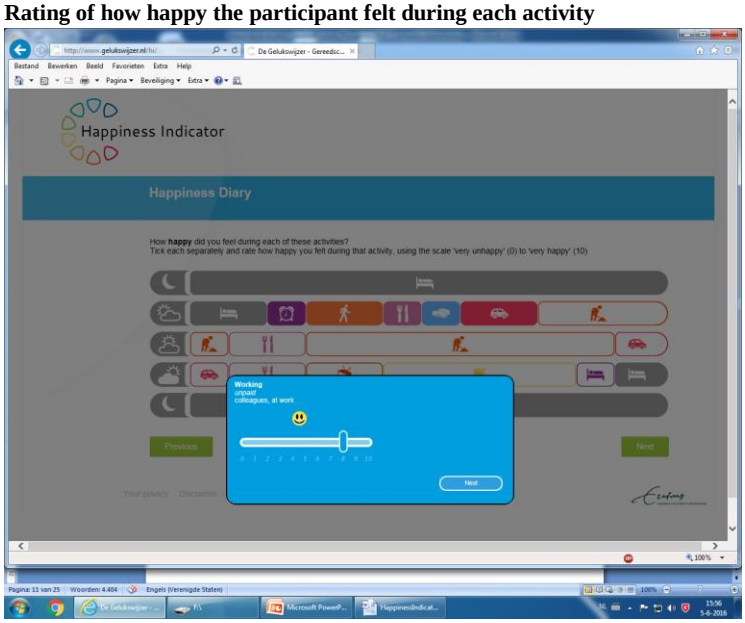


Figure 6

Example of a comparison of an individual's happiness profile with that of similar people

1.4.3 Other tools to work on happiness

The Happiness Indicator contains several more tools that are designed to provide participants with more insight into their situation, such as a personality test and a diagnostic questionnaire addressing how they experience their job. More of such tools will be added in the future and automatic referral to tools that seem suitable for particular participants is planned.

1.5 Long-term objectives

In the long-term, the Happiness Indicator is also expected to generate information that will be used in happiness education.

One such kind of information is how changes in daily behavior have worked out on the happiness of participants, for instance, whether doing more exercise has added to the happiness of the average participants and to what extent that effect differed across kinds of participants. Information of this kind will be published on the website. Next to on their own experience, individuals can therefore also orient on the experience of other participants and of similar participants in particular.

Likewise, the Happiness Indicator will generate information about long-term effects on happiness of major life choices, such as having children or early retirement. Often, individuals do not know how these life choices will turn out; consequently, it is helpful to know how similar people who have made a similar choice have fared. Gathering this information requires that a large number of people continue to use the Happiness Indicator at least once a year. Of course, the willingness of participants to do so depends on the effect of participation in the short run.

Information about effects on happiness of life style and of life-style change will be fed back to the participants, using e-mail messages and short reports on the website. The information will also be presented to public media, the life-style press in particular. Part of the information is expected to find its way into health education.

Still another application of the Happiness Indicator is to use it to assess the effects on happiness of interventions, such as medical or psychological treatment and organizational change. Follow-up is easy and control groups can be selected from the large pool of participants. There is still the problem that using the Happiness Indicator may have an effect on happiness by itself, and this effect must be subtracted from the effect of the intervention evaluated. It is for this reason also is worth knowing whether participants have become happier, and if so, by how much.

1.7 This paper

In this article, we give an account of the first study of the short-term effects of using the Happiness Indicator. The website has been operational since January 2011 and has attracted a sufficient number of participants to show the effect of repeated participation on their happiness. Is this effect positive, as we expect it to be? If so, what is the size of this effect, and does it differ across types of participants?

2 METHOD

2.1 Participants

Participants were, and continue to be, recruited using various channels, including different types of customer communications from the health insurer XX, social media (Facebook, LinkedIn, Twitter) and Dutch popular magazines (including 'Libelle' and 'Psychologie Magazine'). Since its start in January 2011, the Happiness Indicator has attracted 40,495 participants all of whom completed a profile and the Happiness Comparer at least one time. Of these 40,495 participants, 9,091 (22%) subsequently filled out the Happiness Diary at least once.

The average happiness of these visitors at the first time of participation was a 6.32 on scale 0-10, which is well below average life satisfaction scores reported in Dutch surveys[12]; 9 out of 20 people gave his or her monthly happiness a 6 or lower. This indicates that the Happiness Indicator particularly attracts individuals who are less happy than the average citizen is and probably for that reason would like to work on their happiness.

Most of these individuals (86%) only participated once; therefore, we could not ascertain whether those users became happier because of using the Happiness Indicator. Consequently, we limited this study to examining the effect of Happiness Indicator use for people who participated twice or more. A total of 5,411 participants met this criterion. Those individuals used the Happiness Indicator for an average of 233 days, measured as the difference between the first day and last day of use, where there were on average 3 months between participations.

When comparing the one-time and returning participants, it appears that the returning participants were slightly less happy on their first visit (6.24 vs. 6.34) and more likely to be female (78.0% vs. 73.7%) and older (e.g. of the returning participants 51.4% was between 40 and 60 years old vs. 43.4% for the one-time users. In addition, returning participants were more likely to have a chronic disease (32.8% in vs. 26.4%), richer (e.g. of the returning participants 38.4% had an income of more than 5000 euros per month compared to 30.7% of the one-time users), and higher-educated (e.g. of the returning participants 54.2% had a higher-vocational or university degree compared to 38.4% of the one-time users).

Frequency of participation

The participants in our sample completed the Happiness Comparer 2 to 35 times.[13] Each time, they had to indicate how happy they had felt over the past month (see Section 1.4.1). In addition, over 64% of the participants completed the Happiness Diary (see

[12] Average response to the question "How happy would you say you are?" was 7,9 in the Dutch sample of the European Social Survey in 2014.

[13] Individuals falling within the top 1% for the number of times of participation (35 or more) were considered outliers and were excluded from our analysis.

Section 1.4.2) at least once. It is possible that the participants also used other tools on the website, such as the personality test or the questionnaire about how they experienced their jobs; however, the use of these tools was not taken into account in this analysis given the very limited number of participants that filled out these tests.

Personal characteristics

The average age of the participants was 45 years (SD = 14), and 78% of the participants were women. Regarding employment, 68% of the participants had a job, and the participants worked an average of 4 days (SD = 1.26) or 29 hours a week (SD = 11.86). Over a quarter of the participants (28.9%) worked in health care institutions and welfare institutions, 13.8% worked in the business or financial sector, 13.4% worked in education, 9.5% worked for the government, 6.1% worked in retail, 4.9% worked in the cultural sector, 4.1% worked in the catering industry, 2.2% worked in the transportation sector, and 17.1% worked in other sectors. The participants' level of education varied: 34.1% of the participants had a higher vocational education (HBO), 23.0% had a university degree, 6.1% had a pre-university education (VWO), 19% had a senior secondary vocational education (MBO), 11.7% had a preparatory secondary vocational education (VMBO), 7.5% had senior general secondary education (HAVO), and 2.7% had only attended a basic school. In terms of household income, 27.1% of the participants had a relatively low family income (€ 0-2499 per month), 34.5% had an average family income (€ 2500-4499 per month), and 38.4% had a relatively high family income on average (>€ 5000 per month). The participants' living situations also varied: 43.2% were single or divorced with no children living in the household, 27.9% of the participants cohabited with their partner and no children, 10.4% cohabited with their partner and had children, 2.7% were single parents with children, and 15.8% had some other living situation (e.g., a communal group, living with parents or student group housing).

It should be noted, that data collected online has some well-known limitations, one of which is representativeness of the sampling. However, given the goal of the Happiness Indicator, representativeness is not really a problem. The Happiness Indicator gathers information *on* particular people *for* particular people, in this case mainly *on* and *for* well-educated women, interested in getting happier than they are. Representativeness for the general population is therefore not necessary. This point is discussed in more detail in section 4.5.

2.2 Descriptive Statistics

The means, standard deviations and inter-correlations of the variables used in this effect study are presented on Table 1. These descriptive statistics are based on 13.320 participations by 5.411 participants.

Inspection of the means shows that average happiness 'today' (6.89) is somewhat higher than retrospective happiness over the last month (6.61). This may mean that participants are more inclined to use the Happiness Indicator on good days and/or that they underestimated their happiness over the last month.

Table 1

Descriptive statistics and correlation matrix of most important variables in the analysis

	Mean	SD	1	2	3	4	5	6	7
1. Happiness Last Month	6.61	1.68	1.00						
2. Happiness Today	6.89	1.64	0.64	1.00					
3. Times Comparer Used	4.29	5.44	0.10	0.07	1.00				
4. Times Diary Used	2.91	5.60	0.11	0.07	0.68	1.00			
5. Number of Days Participating	93.31	198.3	0.04	0.04	0.24	0.01	1.00		
6. Days since Last Participation	90.24	177.4	-0.01	0.01	-0.15	-0.14	0.68	1.00	
7. Change Happiness Last Month	0.09	1.48	0.41	0.20	-0.03	-0.02	-0.03	-0.01	1.00

2.3 Analysis

In this study, we focused on the feeling of happiness in the past month, as measured using the second question shown in Figure 1. The research question was whether happiness in the past month increases with the repeated use of the Happiness Comparer and the Happiness Diary. As a first test, we assessed whether a participant's happiness had changed between their first and their last use of the Happiness Indicator, and, if so, by how many points to the positive or negative. As a next step, we performed a more sophisticated analysis taken from econometrics, which allowed a better estimate of the size and significance of the effects. A standard reduced-form happiness model was estimated (see also Di Tella, MacCulloch & Oswald 2003; Arampatzi, Burger & Veenhoven 2015):

$$H_{it} = \alpha_0 + \alpha_1 H_{i(t-1)} + \alpha_2 P_{i(t-1)} + \alpha_3 X_{i(t)} + \mu_i + \varphi_t + \varepsilon_{it},$$

where H is the self-reported happiness over the past month, at participation time t; P is a set of variables capturing the number of times the participant has used the Happiness Comparer and the Happiness Diary[14]; X is a set of control variables capturing happiness that day, the number of days the participant has already used the Happiness Indicator, and the number of days since the last use; μ_i is a vector of participant fixed effects to control for time-invariant participant characteristics, such as gender, marital status, income, and level of education; and φ_t is a vector of month and year dummies to capture time-related circumstances, such as the weather and economic situation. The lagged dependent variable $H_{i(t-1)}$ is included to allow for adjustment dynamics and to tackle serial correlation and avoid potential omitted variable bias. Please note that we use a *within-person* design, where we look at variation of happiness within persons and not between persons.

Commented [RV1]: M.i. kunnen we de analyse van verandering beter beginnen met Figuur 8
Dat is voor ons publiek van psychologen en coaches beter begrijpelijk dan de onderstaande econometrische analyse

Commented [RV2]: Met deze controles vegen we veel van het effect weg. Heb je dit stapsgewijs gedaan? Dan kunnen we zien of dat echt zo is

[14] Please note that our Happiness Diary variable is Winsorized at the 1% level.

We acknowledged that there is interdependence between the Happiness Comparer use and Happiness Diary use variables. To measure how large these influences might be, three versions of the model were estimated: version (i) only included the use of the Happiness Comparer variable; version (ii) only included the use of the Happiness Diary variable; and version (iii) included both variables. We prefer the third specification because it allowed us to capture the "direct" impacts of the Happiness Diary and Happiness Diary use variables on happiness.

3 RESULTS

An overview of the observed changes in last-month happiness following use of the Happiness Indicator is presented in Figures 7. The changes observed among participants who only had used the Happiness Comparer are shown in Figure 7a, while the pattern of change among participants who also used the Happiness Diary is shown in Figure 7b.

3.1 Happiness is changeable

First, we examined whether individual happiness fluctuates over time. This was found to be true. From Figure 7a we see that ……???????. From Figure 7b, it can be seen that among the users of the Happiness Diary, only some 30% remained evenly happy and some 20% experience changes of 2 points or more. The average monthly change was 0.09 point on scale 0-10, that is, about 1% of the possible range.

At first sight, this small change supports the 'set point' theory, which holds that happiness is a stable 'trait' (e.g. Cummins 2010). Yet cumulated over time such minor monthly changes can result in substantial alterations of happiness, such as these demonstrated in long-term follow-up studies, see for example Headey (2008).

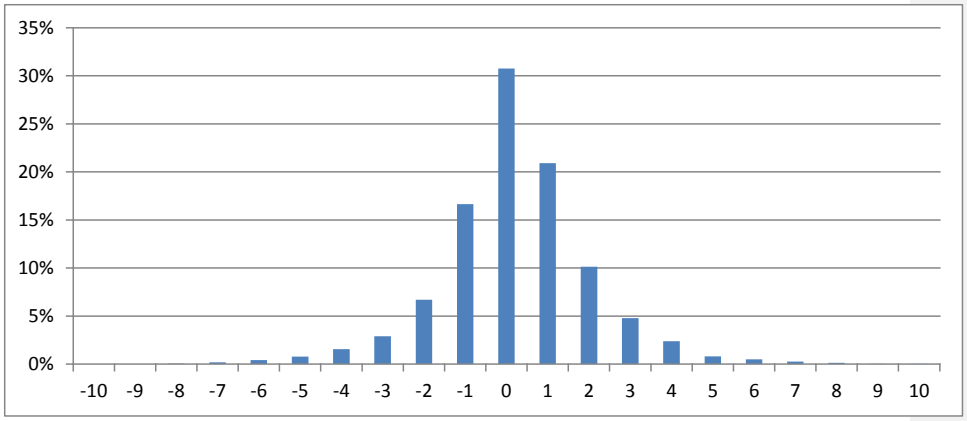
Figure 7a

Change in Happiness Today between First and Last Use of the Happiness Comparer (N = ??????)

Commented [RV3]: Hier graag staafdiagram invoegen van verandering in happiness-today

Figure 7b

Change in Happiness Last Month between First and Last Use of the Happiness Diary (N = ?????)



3.2 Happiness increases following repeated use of the Happiness Indicator

We considered whether individuals experienced an increase in monthly happiness following the use of the Happiness Indicator. As we can see from Figure 7a and 7b, there was more change to the positive than to the negative. This is confirmed using the econometric analysis reported in Table 2. In that analysis, all models were estimated using fixed-effects estimators and cluster robust standard errors.. Of the control variables included in the model (Table 1, Column 1), only happiness that day was statistically significant ($b = 0.314$, $SE = 0.016$, $p < 0.01$). Surprisingly, we did not find an effect of happiness of last month in the previous period (t-1) on happiness of last month in the current time period. However, it should be noted that this effect might be confounded by individual fixed effects and the Nickell bias induced by fixed-effects estimation. This is further explored below.

3.2.1 No effect of the Happiness Comparer

We examined whether there was an increase in monthly happiness over time because of repeated use of the Happiness Comparer. We observed a positive effect that did not reach statistical significance ($b = 0.008$, $SE = 0.005$, $p = 0.113$; Table 2, Column 2).

3.2.2 Significant effect of the Happiness Diary

We found a significant effect of use of the Happiness Diary ($b = 0.013$, $SE = 0.005$, $p < 0.01$; Table 1, Column 3), even when controlling for use of the Happiness Comparer ($b = 0.014$, $SE = 0.007$, $p < 0.05$; Table 2, Column 4).

How strong is this effect? Using the Happiness Diary ten times increased monthly happiness by approximately 0.14 points on a 0 to 10 scale when all other factors were held constant. However, less than 4% of the respondents completed the diary 10 times or more, and the average use was only 2.4 times.

The Happiness Comparer and Happiness Diary cannot be considered as substitutes in terms of their contribution to well-being. The participants who only used the Happiness Comparer and not the Happiness Diary did not profit more from the Happiness Comparer than the participants who used both tools (Table 2, Column 5).

We found decreasing marginal benefits of using the Happiness Comparer and Happiness Diary. In other words, the effect of repeated participation on monthly happiness decreases slightly with increasing use of the Happiness Comparer and the Happiness Diary. These interaction effects are shown in Table 3. When participants first begin to use the Happiness Indicator, one additional use of the Happiness Comparer increased happiness in the last month by 0.025; however, after using the Happiness Comparer 20 times, the marginal benefits of use become negligible (Table 3, Column 1) [15]. Given that most of the participants only used the Happiness Comparer a few times, it can be tentatively concluded that happiness increases for participants who repeatedly use the Happiness

[15] Our results do not change when we exclude the variable 'Happiness Today', which reflect current mood. These results are available upon request.

Comparer, but typically by less than 1%. A similar observation can be made regarding the Happiness Diary (Table 3, Column 2), although the squared term becomes insignificant when the squared terms of both the Happiness Comparer and Happiness Diary variables are entered into our model (Table 3, Column 3).

Table 2

Determinants of Happiness Last Month – Fixed Effects Estimation

	(1) Only Control Variables	(2) + Happiness Comparer	(3) + Happiness Diary	(4) Full Model	(5) + No diary use Effect
Times Happiness Comparer Used $_{t-1}$		0.008		-0.001	0.001
		(0.005)		(0.007)	(0.008)
Times Happiness Comparer Used $_{t-1}$ x No Diary Used					-0.010
					(0.012)
Times Happiness Diary Used $_{t-1}$			0.013***	0.014**	0.012*
			(0.005)	(0.007)	(0.007)
Happiness Last Month $_{t-1}$	0.024	0.023	0.022	0.022	0.022
	(0.020)	(0.020)	(0.019)	(0.020)	(0.020)
Days Using Happiness Indicator (x100)	0.156	0.126	0.119	0.121	0.123
	(0.146)	(0.149)	(0.148)	(0.150)	(0.149)
Days Since Last Use (x100)	-0.020	-0.012	-0.012	-0.013	-0.014
	(0.014)	(0.015)	(0.015)	(0.015)	(0.015)
Happiness Today	0.314***	0.314***	0.314***	0.314***	0.314***
	(0.016)	(0.016)	(0.016)	(0.016)	(0.016)
Respondent FE	Yes	Yes	Yes	Yes	Yes
Month-Year FE	Yes	Yes	Yes	Yes	Yes
Observations	13320	13320	13320	13320	13320
Number of Respondents	5411	5411	5411	5411	5411
Within R-Square	0.15	0.15	0.15	0.15	0.15
Between R-Square	0.26	0.29	0.30	0.29	0.29
Overall R-Square	0.27	0.29	0.30	0.29	0.29

Cluster-robust standard errors in parentheses ***p<0.01, ** p<0.05,* p<0.10.

Table 3

Determinants of Happiness Last Month – Fixed Effects Estimation – Squared Terms

	(1) Squared Term Happiness Comparer	(2) Squared Term Happiness Diary	(3) Full Specification
Times Happiness Comparer Used $_{t-1}$	0.026**	0.000	0.021*
	(0.012)	(0.007)	(0.013)
Times Happiness Comparer Used $_{t-1}$ Squared	-0.001***		-0.001***
	(0.000)		(0.000)
Times Happiness Diary Used $_{t-1}$	0.011*	0.033***	0.020
	(0.006)	(0.011)	(0.013)
Times Happiness Diary Used $_{t-1}$ Squared		-0.001**	-0.000
		(0.000)	(0.000)
Happiness Last Month $_{t-1}$	0.019	0.020	0.019
	(0.019)	(0.019)	(0.019)
Days Using Happiness Indicator (x100)	0.101	0.108	0.100
	(0.149)	(0.149)	(0.149)
Days Since Last Use (x100)	-0.009	-0.010	-0.008
	(0.015)	(0.015)	(0.015)
Happiness Today	0.313***	0.314***	0.313***
	(0.016)	(0.016)	(0.016)
Respondent FE	Yes	Yes	Yes
Month-Year FE	Yes	Yes	Yes
Observations	13320	13320	13320
Number of Respondents	5411	5411	5411
Within R-Square	0.15	0.15	0.15
Between R-Square	0.31	0.30	0.31
Overall R-Square	0.30	0.30	0.30

Cluster-robust standard errors in parentheses ***p<0.01, ** p<0.05,* p<0.10.

3.2.3 *Nickell bias and reverse causality*

One potential problem with the fixed-effects estimation presented above is that the presence of a lagged[16] endogenous variable in the model induces autocorrelation. Nickell (1981) has indicated that in this context, fixed-effects estimates tend to be downward biased, and the use of this technique typically results in an underestimation of the coefficient of the lagged dependent variable. If the other independent variables in the model are correlated with the lagged dependent variable, their coefficients may also be biased. The Nickell bias is particularly pertinent when the time dimension of the panel is short and the number of individuals is large. Given that our sample is generally characterized by a large *N* (many individuals), a small *T* (limited number of time points), and a very small coefficient for our lagged dependent variable, the results described in

[16] Here, the lagged value of a variable is the value of a variable at the previous measurement point.

the previous section might be biased. The system generalized method of moments (GMM) developed by Arellano and Bover (1995) and Blundell and Bond (1998) addresses the issue by instrumenting the variables in the regressions with their lagged levels and lagged first differences.[17]

Table 4
Determinants of Happiness Last Month – System GMM Estimation

	(1) Baseline Specification	(2) Squared Term Happiness Comparer	(3) Squared Term Happiness Diary	(4) Full Specification
Times Happiness Comparer Used $_{t-1}$	0.002	0.001	0.004	0.003
	(0.006)	(0.006)	(0.005)	(0.005)
Times Happiness Comparer Used $_{t-1}$ Squared		-0.000		-0.000
		(0.000)		(0.000)
Times Happiness Diary Used $_{t-1}$	0.015**	0.015**	0.017***	0.015**
	(0.007)	(0.007)	(0.006)	(0.006)
Times Happiness Diary Used $_{t-1}$ Squared			-0.001*	-0.000
			(0.000)	(0.000)
Happiness Last Month $_{t-1}$	0.140***	0.138***	0.142***	0.142***
	(0.024)	(0.024)	(0.024)	(0.024)
Days Using Happiness Indicator (x100)	0.029	0.024	0.005	0.009
	(0.022)	(0.023)	(0.023)	(0.023)
Days Since Last Use (x100)	-0.023	-0.017	-0.019	-0.016
	(0.020)	(0.021)	(0.020)	(0.021)
Happiness Today	0.454***	0.444***	0.440***	0.437***
	(0.048)	(0.048)	(0.046)	(0.047)
Respondent FE	Yes	Yes	Yes	Yes
Month-Year FE	Yes	Yes	Yes	Yes
Observations	13320	13320	13320	13320
Number of Respondents	5411	5411	5411	5411
AR(2) test (p-value)	0.07	0.07	0.06	0.06
Sargan test (p-value)	0.54	0.52	0.88	0.87
Difference-in-Sargan test (p-value)	1.00	1.00	1.00	1.00

Cluster-robust standard errors in parentheses ***p<0.01, ** p<0.05,* p<0.10.

System GMM estimation has two additional advantages. One, using the lagged levels and lagged first differences of the variables as internally generated instruments, system GMM addresses the issue of reverse causality, in which happy individuals might be more or less

[17] Another solution would be to estimate the model using the first-differenced generalized method of moments (difference GMM), a technique developed by Arellano and Bond (1991). However, Bond et al. (2001) note that in many empirical applications, the performance of difference GMM is disappointing, and the estimates of difference GMM are often implausible because the lagged levels are often poor instruments for first differences. Hence, this technique was not used in this study.

likely to use the Happiness Indicator. Two, the time-invariant individual characteristics in the fixed-effects estimation can be correlated with the other independent variables; GMM models address this problem by using a first-difference estimation.

The results of our GMM estimation[18] are shown in Table 4 for the baseline specifications in Table 2 and 3. System GMM use did not lead to different conclusions regarding the effect of repeated Happiness Comparer and Happiness Diary use on happiness.[19] Two differences regarding our fixed-effects estimations stand out. One, our fixed-effects estimation was subject to Nickell bias in that the coefficient of the lagged endogenous variable became positive and significant. Two, the size of the main effect for Happiness Comparer use became much smaller, and we did not find evidence of decreasing marginal returns for the use of the Happiness Comparer. Hence, we concluded that only use of the Happiness Diary adds substantially to happiness

3.2.4 Selection Bias and Propensity Score Matching

A related potential problem with respect to our results is that a possible observed effect of the Happiness Indicator tools can be attributed to selection and not to the interventions. Differences in the change in average monthly happiness, measured as the change in happiness between first and last use of the Happiness Indicator, between frequent and infrequent users can be contingent on characteristics that affected whether or not an individual used the Happiness Indicator frequently. Propensity score matching (Rosenbaum & Rubin, 1983; Caliendo & Kopeinig, 1983) provided a way to reduce this selection bias by comparing the change in happiness between the first and last use of the Happiness Indicator of frequent Happiness Indicator users and infrequent users who were as similar as possible in all other respects (Becker & Ichino, 2002). After we applied propensity score matching using the kernel method and matching on several personal characteristics[20] within our data, our main conclusions did not change[21]: more frequent users of the Happiness Diary showed a larger increase in happiness compared to

[18] In this estimation, we also allowed the independent variables to be endogenous.

[19] Please note that system GMM assumes that the internally generated instruments are exogenous (tested with the Sargan test) and that the error term was not serially correlated (tested with the AR2 test). In addition, there should be no correlation between the unobserved individual fixed effects and the instruments, a factor that can be tested with the difference-in-Sargan test. The test statistics, provided in Table 3, show that there were no problems.

[20] Models were estimated using both the Gaussian kernel and 5-nearest neighbor estimators. We choose for these matching estimators because we have many comparable untreated participants in our sample (Caliendo and Kopeinig, 2008). For both matching estimators, individuals are matched using a probit model including the following matching variables: gender, age, marital status, financial situation, job security, education level, having a chronical disease, happiness at first time usage, and timing between usages. The models were estimated using the psmatch2 command in Stata (Leuven and Sianesi, 2003). For the sake of brevity, these results are not presented here, but are available upon request from the authors.

[21] One of the assumptions of assumptions of propensity score matching is the assumption of common support, which implies that participants with the same characteristics have a positive probability of being both frequent and infrequent users of the Happiness Indicator. Here, a rule of thumb in the literature is that bias for the variables in the matched samples are all below the 10%-threshold (D'Agostino, 1998). For all, estimations, the common support assumption was not violated.

infrequent users, whereas frequent use of the Happiness Comparer did not affect the participants' well-being.

3.3 Effect is larger among those who initially were the least happy

Further analysis of the use of the Happiness Diary indicated that the effect of use was larger for the participants who were less happy at the first use of the Happiness Indicator. This analysis is shown in Table 5. The participants who were initially the happiest profited less from participation compared with the participants who were initially the least happy. Using the Happiness Comparer or the Happiness Diary 10 times resulted in a 0.3-point increase the happiness of the people who scored 4 on their first use, whereas on average, no effect was found for people who were relatively happy (7 or higher) at the start. The coefficient of the interaction effect between the number of times the Happiness Diary was used and happiness at first use became insignificant when both interaction effects were entered into our model. Here, it should be noted that the zero-order correlations between happiness at the start and the number of times that the Happiness Comparer and Happiness Diary were used were very low (0.02). These results were confirmed when the models were re-estimated using system GMM.

3.4 No differences in effect across participant types

We examined whether the increase in monthly happiness with repeated participation differed according to participant's background (with respect to differences in age, gender, income level, and education level). We found no evidence of heterogeneity in the effect of the Happiness Comparer or Happiness Diary across groups.

Table 5

Determinants of Happiness Last Month – Fixed Effects and System GMM Estimation - Effect for Unhappy vs. Happy People at Start. Fixed

	Fixed Effects			System GMM		
	(1) Interaction Term Happiness Comparer	(2) Interaction Term Happiness Diary	(3) Full Specification	(1) Interaction Term Happiness Comparer	(2) Interaction Term Happiness Diary	(3) Full Specification
Times Happiness Comparer Used $_{t-1}$	0.099***	0.000	0.090***	0.068***	0.004	0.081***
	(0.022)	(0.007)	(0.031)	(0.010)	(0.004)	(0.020)
Times Happiness Comparer Used $_{t-1}$ * Happiness Last Month at Start	-0.016***		-0.014***	-0.010***		-0.013***
	(0.003)		(0.005)	(0.001)		(0.002)
Times Happiness Diary Used $_{t-1}$	0.016**	0.096***	0.028	0.013**	0.063***	0.001
	(0.007)	(0.019)	(0.028)	(0.005)	(0.011)	(0.028)
Times Happiness Diary Used $_{t-1}$ * Happiness Last Month at Start		-0.013***	-0.002		-0.009***	-0.002
		(0.003)	(0.004)		(0.002)	(0.003)
Happiness Last Month $_{t-1}$	0.001	0.008	0.001	0.180***	0.209***	0.190
	(0.019)	(0.019)	(0.019)	(0.022)	(0.022)	(0.022)
Days Using Happiness Ind.(x100)	0.141	0.135	0.142	0.003	0.007	0.004
	(0.150)	(0.151)	(0.150)	(0.021)	(0.020)	(0.020)
Days Since Last Use (x100)	-0.013	-0.014	-0.013	-0.009	-0.006	-0.012
	(0.014)	(0.014)	(0.014)	(0.020)	(0.020)	(0.020)
Happiness Today	0.310***	0.311***	0.310***	0.712***	0.692***	0.675***
	(0.016)	(0.016)	(0.016)	(0.048)	(0.044)	(0.046)
Respondent FE	Yes	Yes	Yes	Yes	Yes	Yes
Month-Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	13320	13320	13320	13320	13320	13320
Number of Respondents	5411	5411	5411	5411	5411	5411
Within R-Square	0.16	0.15	0.16			
Between R-Square	0.19	0.23	0.19			
Overall R-Square	0.18	0.22	0.18			
AR(2) test (p-value)				0.12	0.06	0.08
Sargan test (p-value)				0.24	0.05	0.09
Difference Sargan test (p-value)				1.00	1.00	1.00

Cluster-robust standard errors in parentheses ***p<0.01, ** p<0.05,* p<0.10.

4 DISCUSSION

This first exploration of the effect of using the Happiness Indicator confirmed our expectation that increased awareness of one's own happiness contributes to the likelihood of one finding a more satisfying way of life. Still the findings give rise to the following questions:

4.1 Causal effect?

Possibly, the observed gain in happiness following use of the Happiness Indicator is due to other causal effects than the greater awareness of one's happiness postulated in section 1.3.1 of this paper. The following alternative causes could be involved:

4.1.1 Spontaneous recovery from a temporary dip?

Happiness Indicator participants are probably occupied with their own happiness to an above-average degree. Would these people have become happier without using the Happiness Indicator? We are familiar with the 'waiting room effect' described in psychotherapy[22], A part of that effect is seen in spontaneous healing and another part in sharper problem awareness, i.e. there is something wrong with me, and consequent coping. In our case, the problem lies not in sharper awareness, because that is what the Happiness Indicator aims to promote, but in spontaneous recovery, in this case, overcoming a dip in happiness, one that one would have over-mounted anyway.

Difference with observed gains in control groups in effect studies of happiness trainings

In effect studies, this possibility of spontaneous improvement is commonly handled using 'control groups', typically randomly assigning part of the applicants to a waiting list or a placebo treatment. The Happiness Indicator does not have such a control group, but we can learn from other studies.

We looked for earlier studies among self-selected participants in wellbeing trainings that involved a control group in which change in happiness was assessed and we subjected these findings to a mini meta-analysis. We used the Bibliography of Happiness[23], which lists some 90 studies on the effects on happiness of individual level interventions on wellbeing, of which 10 were among self-selected participants and had a control group[24]. The observed changes in happiness among these controls are reported in table 6.

The changes are typically small and mostly negative, the average decline of happiness in these control groups is 3,8% of the possible scale ranges. So, denying treatment to people who seek treatment lowers these people's happiness. If spontaneous recovery exists at all, it is apparently an exception rather than the rule.

[22] Waiting for treatment often appears to be conducive to spontaneous healing.
[23] Bibliography of Happiness, section Rf02.08 'Psychological training/therapy'
[24] We did not consider studies that rewarded participants with money or course credits

This means that the observed rise in happiness following use of the Happiness Indicator is unlikely to have happened without use of this tool. It can also mean that the observed rise in happiness since start is an underestimation of the total effect. Below in section 4.5, we will see that frequent use of the Happiness Diary raises happiness 1,4% of the scale range. If using this tool has also prevented a 3,8% decline, the net effect is about 5% .

Table 6

Observed changes in happiness in the control group of studies among self-selected participants in trainings for greater wellbeing

Intervention	*Control condition*	*Measure of happiness*	*Change happiness in % possible range*	*Time*	*Study*
Acts of kindness	no intervention	SWLS	-1,2%	10 days	Buchanan & Bardi 2010:236
Positive event recall	Randomly assigned to neutral	SHS	-14.3%	10 weeks	Chancellor et al. 2015:881
Well-being training	Waiting list	Single questions: 'How happy are you right now?' 'How satisfied are you right now?'	-13,5% -7,6%	11 weeks	Feicht et al. 2013: 7
Meditation training	Waiting list	mDES	-3,7%	6 weeks	Fredrickson et al. 2008: 27
Strenghts training	Placebo excercise	AHI	+3,2%	6 month	Gander et al. 2013: table 2
Irrational beliefs discussion	Waiting list	Affectometer 1	0,0%	6 weeks	Lichter et al. 1980: 60
Well-being website	Placebo treatment	PWI-A SWLS PANAS OTH-Pleasure	- 1,8% +1,6% -0,0% -2,0%	3 months	Mitchell et al. 2009: 752
Employee wellbeing	No intervention	SWB	-13,2%	6 weeks	Page & Vella-Brodrick 2013: 1017
Strengths training	Waiting list	SWLS	0,0%	10-14 weeks	Proyer et al. 2013: 283
Mindfulness training	Waiting list	SWLS	-0,3%	8 weeks	Shapiro et al. 2005: 171
Average			**-3,8%**		

Difference in gains between participants who used and did not use Happiness Diary
Another way to assess whether the observed gain in happiness was caused by greater awareness of one's happiness, is to compare the gains made by participants who used only the Happiness Comparer with the gains in happiness made by participants who also used the Happiness Diary. The latter spend more time monitoring their happiness and are thus likely to become more aware of how well they feel. Indeed, we found use of the Happiness Diary affected happiness more, than use of the Happiness Comparer did (cf. section 3.2) and we also found a stronger effect on happiness, the more often the Happiness Diary was used (cf. table 3).

4.1.2 Response shift?

It is conceivable that repeated use of the Happiness Indicator has led the participants to score themselves higher on the happiness scale even though their happiness remained unchanged. In the literature, this is known as a 'response shift'. Yet, previous follow-up research into happiness showed a reverse pattern; happiness was estimated to be lower at the second measurement, apparently because respondents had formed a clearer picture of what happiness is for them (e.g. VanLandighem 2012). Therefore, if response shift is involved at all, it is more likely to repress the happiness rating and thus under-estimate the effect rather than over-estimate it.

4.2 Causal paths

As noted in Section 1.3, we assume that a clearer view of their own happiness helps individuals find a more suitable lifestyle, which subsequently results in increased happiness. In this analysis, we cannot show that the observed effect followed the path of daily lifestyle adjustment. Further analysis of shifts in time allocation (see e.g. Knabe et al., 2013; Hendriks et al., 2014 for similar approaches) will provide more insight into this effect.

It is possible that other causal mechanisms are involved, such as greater acceptance of their current way of life by participants who see that they are better off than people in similar situations are.

4.3 Negative effects?

Schooler et al (2003) claim that the pursuit and monitoring of happiness can be self-defeating and the use of the Happiness Indicator for this purpose can therefore result in a loss of happiness. If so, such losses will have lowered the average positive effect.

The question is whether this happened among our participants. Inspection of the data does show cases of declining happiness. For our complete sample, we saw that for 29% of the participants there was a decline in happiness between the first and last use of the Happiness Indicator. At the same time, we observed no change in happiness for 31% of the participants and an increase in happiness for 40% (see Figure 7b). Negative effects

did occur in this selection of repeated users, but those affected negatively are outnumbered by the respondents who gained happiness in the period of using the Happiness Indicator. Possibly some one-time users became less happy after use and discontinued use for that reason.

The existence of negative effects on happiness is not surprising, it will be unpleasant to realize than one does not enjoy most activities very much, in particular if shown that comparable people take more pleasure in their lives. Though the Happiness Indicator may be a bitter pill to swallow in the beginning, its use is likely to make one feel better later. This long-term effect is another point to consider.

4.3 Sleeper effect?

In this study, the average difference between the first and the last use of the Happiness Indicator was 3 months, which means that we have observed the short-term effects of using this self-help tool. The long-term effects on happiness could be greater, in particular if one gains a greater awareness of one's happiness, which leads to major life-chances, such as taking another job or divorcing. Such decisions come with considerable delay, and so do the effects on happiness, which often are negative in the beginning. The Happiness Indicator is an ongoing project, and we hope to learn more about this topic in future analyses.

4.4 Variation in effect

In section 3.3, we reported that the effect of participation does not differ greatly according to socio-demographic background. However, this does not mean that the effect is the same for everyone.

It is possible that the effect differs according to psychological characteristics, such as personality. For example, previous diary research shows that (a) extraverted participants become (even) happier on a daily basis when they spend time on social and rewarding activities (Oerlemans & Bakker, 2014); (b) participants who score high on burnout become happier daily as a result of social activities and relaxation (Oerlemans, Bakker & Demerouti 2014), and (c) participants who score high on work addiction become more vital and recover better when they exercise (Bakker, Demerouti, Oerlemans & Sonnentag 2014).

As noted in section 3.3, relatively unhappy participants, i.e. participants with an average score below 7, benefit more from repeated participation in the Happiness Indicator compared with participants with a relatively high initial score for monthly happiness, i.e. participants that a 7 or higher. An evident explanation is that unhappy people are more motivated to change their way of life. However, this difference in happiness may also veil variations in personality and health. Hence, this finding requires further research.

4.5 Effect size

The observed increase in happiness that resulted from using the Happiness Diary ranged between 0.1 and 0.3 points on a scale of 0-10, i.e., approximately 1,5%. Is this a lot or a little?

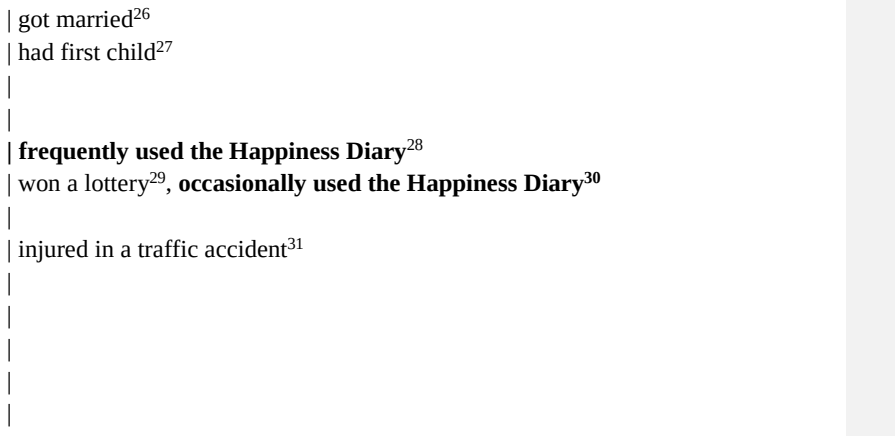
One way to answer this question is to calculate how much additional income is required to achieve the same happiness benefit. The use of a new method developed by Fujiwara, Kundra & Dolan (2014) indicates that a 1% increase in happiness equals an increase in annual income of € 297[25], so the 1,5% gain in happiness due to repeated use of the Happiness Diary is equivalent to an annual income increase of about € 450.

Another way of estimating the effects size is to compare with effects of real-life changes on happiness. To that end, we scanned the research literature for observed changes in happiness following major life events over periods of about a year. The best comparable findings are are presented in Figure 8. We selected changes Although the effect of using the Happiness Diary can be considered modest compared with these real-life changes, it is a relatively easy road to take in the pursuit of happiness.

As noted above in section 4.1.1, use of the Happiness Indicator may also have prevented a bigger decline of happiness in this group of people seeking to improve their happiness. Together the prevented loss and the achieved gain amount to some 5% of the scale range, which is substantial and equals the effect of getting married.

Figure 8

Effects of the Happiness Indicator and specific life events on happiness, measured using a 0-10 scale



[25]The effect of extra income on happiness was assessed on the basis of a study of lottery winners in the UK, where a comparison was made between the increase in happiness of winners of small and medium-sized prizes. This calculation assumed the average income in the Netherlands.

[26] One year before vs. one year after. Stutzer & Frey (2006)

[27] One year before vs. one year after. Stutzer & Frey (2006)

[28] This study.

[29] Winning vs. non-winning players. Kuhn, Kooreman & Soetevent (2011)

[30] This study

[31] Victim in last 2 years vs. the average population. Brorsson, Hays & Ifver. (1993)

- 0.8 | became unemployed involuntary[32]
|
|
- 1.0 | became widowed[33]

4.6 Is self-selection a problem?

This effect study was done among returning visitors to the Happiness Indicator website, not among a representative sample of the general population in The Netherlands. Self-selection bias may be an issue here, in that people who are more predisposed to consider the use of self-help websites (because they are less happy or of their attitude towards these kinds of interventions) are more willing than others to participate and to participate frequently. The observed positive effect can therefore not be generalized to all citizens of the Netherlands.

We do not see self-selection as a major problem. We did not and do not aim to develop a tool that will make everybody happy. We aim to serve a particular public, that is, people interested in raising their happiness and intellectually able to handle this tool. As noted in section 2.1, users of the Happiness Indicator were predominantly higher educated women, among which the least happy profited most. These people have much in common with members of a consumer association, who read a product test before buying that product.

Like any medicine, the Happiness Indicator should not be prescribed for everybody. Possibly, there are more groups for which the Happiness Indicator will work and it is a task for future research to identify these kinds of people.

4.7 Implications for further application of the Happiness Indicator

The Happiness Indicator encompasses two main tools: The Happiness Comparer and the Happiness Diary (cf. Section 1.4). Our analysis has shown that the use of the Happiness Comparer had little or no effect on happiness, but the use of the Happiness Diary did increase happiness. Should we therefore omit the Happiness Comparer? It is possible that doing so would not harm the short-term aim of the project, namely, increasing the participants' happiness. However, eliminating the Happiness Comparer would interfere with the project's long-term aim of monitoring the effects of major life choices on happiness. Although it may not substantially contribute to the participants' happiness, the Happiness Comparer is still a useful tool for follow-up. It may also function as a stepping-stone to the use of the Happiness Diary.

[32] Lost job in the last year, due to plant closure or dismissal. Hetschko (2014)
[33] Lost spouse in the last year (women), Williams (2003)

4.8 Use of the Happiness Indicator by colleagues

We welcome use of the Happiness Indicator technique by colleague researchers and practitioners. Now that the system has been developed, large-scale applications are possible at low cost. ‘Satellite projects’ will run on the same server at YY University. Variants tailored to specific interest can be made, if a common core of variables is maintained. Data will be added to a common pool, which all projects can use, among other things for comparison. For further information, please go to http://www.gelukswijzer/hi

5 CONCLUSION

This first study into the effect of using the Happiness Indicator confirms the expectation that participation has a positive effect on happiness. Repeated participation leads to a steady increase in happiness, especially when the Happiness Diary is used repeatedly. The effect of this intervention is positive but modest.

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