

The Exploring Happiness Index: Methodology Paper

Everyone is different and what makes each of us happy is also different. Some people are career-driven, others live for the social scene and some are highly family-orientated. Despite this, we all also have a lot in common – we all value our health, both mental and physical, the quality of our personal relationships matters a lot and we all like to have something to do that makes us feel worthwhile. It is these basic fundamentals that we use to build our index. We take evidence-based research on the main determinants of life satisfaction (which is taken as being synonymous with happiness) to bring together a group of components that we all have in common and these become the building blocks of the index. The evidence behind this is explained in [Section 1](#).

But given that everyone is different, we feel that it is important that this is reflected in our index. Consequently, we have created the functionality to allow users to personalise the index, based on their own circumstances and preferences. Users are able to choose how important each of the components that make up the index are to them, and as a result the weights within the index will shift to reflect that. Users are also able to compare their own personalised score with the default score, which is the value when all of the weights are equal to the default calibration. If a user's personalised score is higher than the default score, then this may suggest that the user has greatest satisfaction with elements of their life that are also the most important to them. We explain all the mechanics of the index in [Section 2](#).

A final difference between all of us that we needed to consider was the different stages and circumstances for each of us in our lives. Our base calibration is built towards the most common 'individual type' – an employed worker. Using data for the UK, approximately half of the UK's population are in work, with about 42% of these being paid employees and 7% being self-employed. The index in its current form is designed to measure adult life satisfaction and is therefore not applicable for children aged 15 or younger (19% of UK population).¹ The index will adjust to account for those that are carers or parents, students, retired or unemployed. [Section 3](#) outlines the base calibration of the index and [Section 4](#) describes how we adjust this to account for the different stages of life and circumstances.

So that's the concept, but what is the purpose?

We see the main benefit from using this index being that it allows users to be better informed about themselves, and this has multifaceted knock-on benefits. If you were

¹ See [people in work](#) and [population data](#) from the Office of National Statistics.

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asked, “how happy are you now compared with six months ago?”, we imagine that most people would find that quite a difficult question to answer. This index allows you to answer that question as you track your happiness through time. But you may wonder why the answer to that question is helpful? Well, if we assume that each individual’s overall objective in life is to maximise their own happiness, then when making important decisions that will impact your happiness, it is highly likely that it would be helpful to be well informed about how happy you are now and how happy you have been in the past. The index even allows you to break this down to understand which parts of your life are contributing towards the latest trends in your overall life satisfaction.

There is also a significant amount of research available which points to the benefits of self-reflection on mental health. This has been shown for self-reflection in a number of forms (e.g. from expressive writing to gratitude journaling), across various life stages and as an effective treatment for those with diagnosed mental illnesses.² Our view, which we intend to robustly test in the future, is that users of the index will be able to build resilience to mental health illnesses through the method of self-reflection that this index requires.

Lastly, we think that this index could be used alongside other data that people use to track themselves, such as their fitness or sleep, to give an overarching view of how their life has been going lately. For example, users would be able to compare whether times they do lots of exercise tend to lead to an improvement in their happiness or not. Consequently, whether it’s improving the amount of information you have about yourself to make better decisions, or building resilience through self-reflection, or simply adding another tracker to your list, we think this index has something for everyone. Now let’s see how we built it.

Section 1: Components of the Exploring Happiness Index

There are six main components that make up the index. Within these there are sub-components which draw out more direct elements of the main component. For example, in the ‘Work’ component we separate out the responsibilities of your job from the relationships that you have with your colleagues. In this section we will provide a qualitative overview of the current evidence available to outline the motivation for including these components and sub-components within the index. [Section 3](#) will detail the quantitative evidence which led to the final calibration.

Our index focuses primarily on what we call internal factors, meaning elements of our life that we have a level of control over. We mainly choose to exclude external

² [Baikie and Wilhelm \(2005\)](#), [Wood et al \(2010\)](#), [Krupan et al \(2013\)](#) or [Flinchbaugh et al \(2011\)](#).

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factors, those that we have little control over, such as the level of income inequality or the level of corruption within a country. While these factors are likely to be useful in explaining the divergence of happiness across different sets of people, they are not as helpful in the context of our index. This is for three main reasons. First, users will find it much harder to assess these external factors – most people don't know what their countries Gini coefficient is (i.e. a measure of inequality within a country).³ Second, many of these factors are extremely slow moving and therefore not that helpful for users looking to make inferences across weeks and months. And third, external factors don't align well with the benefits of the index, such as allowing more well-informed decisions or being a useful mental health tool.

Family relationships

Families are a complex and hugely important part of our lives. There are several key relationships involved and on top of this, much of the nature of these relationships has been changing more recently. In the UK, the gap between the female and male employment rates has decreased from 40 percentage points in the early 1970's to being just 7 percentage points today.⁴ Many more people now find their partners online⁵ and same-sex couples are subject to much less prejudice and find it easier to live freer and happier lives.⁶ Lastly, fewer people are choosing to marry than in the past, divorces are more common and children are more likely to live with their parents for much longer.⁷ Most of these changes are seen to be progressive and all else equal, are likely to lead to improvements in life satisfaction. As a whole, families are less restrictive and society is less judgemental, meaning people have greater freedom to make choices without fearing the consequences. However, this does not diminish the importance of family life for our life satisfaction. The difference in family situations have been shown to explain a significant portion of the variance in life satisfaction.⁸

We split this component into two subcomponents: "Family relationships" and "Romantic relationships". For family relationships, the types of relationships will

³ Therefore, if you were to apply these external factors then they would not be subjective variables. They would be pre-determined, based on the observed relationship with life satisfaction (for the weight) and the variable would then need to be transformed to a scale of 1-10 to be consistent with the other components of the index. Whilst this would likely not be that useful for individual users, it would still be possible to do this with the data that we will have available in our database, since alongside their scores each user will provide their age, country of origin and gender when they create an account (this is all the data we collect on users, it is very important to us that their users privacy is respected). Therefore, for research purposes the index could be adjusted to include external factors.

⁴ See [Labour Market Overview \(October 2020\)](#), Office of National Statistics.

⁵ [Rosenfeld and Thomas \(2012\)](#).

⁶ See [sexual identity data](#) from the Office of National Statistics.

⁷ See [historical living arrangements data](#) from the US census.

⁸ [Helliwell \(2003a\)](#).

vary depending on the user's current situation. But of course, the quality of these relationships will matter much more than their form. It has been shown that emotional development at sixteen is a better predictor of adult happiness than any set of educational qualifications. Whilst external factors do also play a part, a child's relationship with their parents is a key determinant of their emotional development. In particular, it has been shown that a mother's mental health is critical for the happiness and behaviour of her children.⁹ Having parents that are authoritative but also loving and appreciate of their children is therefore important for their future development. For parents, the relationships they have with their children matter for their own life satisfaction – not just directly but also through the impact that children can have on the parents' relationship.¹⁰

So, what about romantic relationships? Most people envisage themselves settling down with another person at some point in time, that might not be right now, and we make clear in our guidance that you don't need to be madly in love to score highly in this sub-component. You simply need to be fully content with your current situation. However, based on the evidence it is clear that romantic relationships play a significant role in an individual's overall life satisfaction. The best examples of this come from the household cohort studies in the UK, Germany and Australia, which track large groups of people through time.¹¹ The results show that those that enter a relationship with a partner receive a substantial positive endowment to their life satisfaction and this has limited habituation through time. In addition, where relationships have ended in separation or widowhood, there is also a substantial negative effect on life satisfaction, and while there is some level of adaptation, people rarely fully adapt to this change.

Financial situation

It should not be downplayed; your financial situation does matter for your life satisfaction. While there is good evidence to show that there is a marginal diminishing return to income for life satisfaction, it must not be forgotten that the first part of this curve is typically steep and upward sloping (See Figure 1). This means for all people above the initial spike, their income is playing a significant role towards their life satisfaction, regardless of whether they are close to the spike or much further along the flatter part of the curve.

The relationship between income and life satisfaction is one of the most well researched topics within the field of happiness economics. The common conclusions

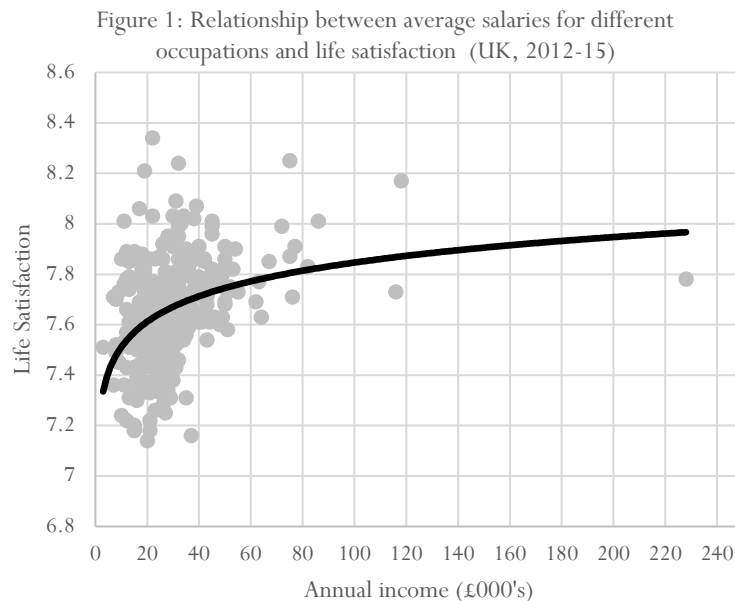
⁹ [A. E. Clark et al \(2018\)](#).

¹⁰ [Layard \(2020\)](#)

¹¹ This data is well analysed in [A.E. Clark et al. \(2018\)](#).

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tend to be that income does matter, but less than you may have anticipated, and it is certainly not the most important factor.



In our index, using this research as the basis of our calibration, the financial situation component has the fifth largest weight, out of six main components.¹² One of the main reasons for being lower down the pecking order is due to the impact of relative income. It has been shown that at the society level and holding prices constant, if everyone doubles their income, the positive endowment to life satisfaction is much smaller than if only your income doubled. Much of the positive effect of income on happiness is an effect of income relative to others.

We split this component into what we call ‘Current finances’ and “Safety net to shocks”. The current finances sub-component captures much of the income side, as we discussed above. A much less well researched topic is how wealth impacts individual life satisfaction. If you have two people earning the same wage but they have substantially different savings, the one with lower savings is probably more likely to worry about their financial situation. This is the basis of our safety net to shocks sub-component. Despite there being limited research, there is some evidence to show that household wealth can improve individual wellbeing by providing a safety net of protection against negative income shocks, and by its potential use as a collateral.¹³

¹² To be clear, this is before any choices have been made by users as to which variables are more or less important to them.

¹³ [Senik \(2014\)](#)

Health

The health of our bodies and minds is a broad component. It encompasses a significant portion of our lives as so many of our actions will have some degree of impact on either our bodies or our minds. Our health is therefore central to our wellbeing. As we become wealthier and live longer lives, more attention should be paid to improving the quality of our health, particularly our mental health. This will have a more or less direct influence on the quality of our lives. In advanced economies, mental health causes more misery than poverty does.¹⁴

We split this component into three sub-components, one that focuses on physical health and two for mental health. Starting with physical health, in recent centuries huge amounts of progress have been made in medical science, which have led to rapid increases in human life expectancy.¹⁵ That said, physical illnesses, and especially those that include a greater amount of physical pain, have been shown to have significant negative effects on individual life satisfaction. In most cases of physical illness, there is some level of adaptation through time (other than chronic pain). The evidence suggests that adaptation is much more difficult in the case of mental illnesses.¹⁶

Mental health explains not only more of the variance in life satisfaction than physical health, but also more than any of the other components in the index. This is why we have two mental health measures. By far the two most common mental health illnesses are classified as either anxiety disorder or depression. It is estimated globally that around 970 million people (or around 1 in 8 of us) had a mental or substance use disorder in 2017. Approximately 55% of these are classified as either anxiety or depression, and this would increase to around two-thirds if we remove substance use disorders.¹⁷ The sub-components are therefore split to have one that focuses on depression and the other on anxiety. The language for the depression sub-component is also broad by asking users about mental stability and resilience, with the aim being to also capture other slightly less common forms of mental illnesses such as bipolar disorder, eating disorders or schizophrenia.

Community and friends

Our communities and our friends provide us with the support that we need. When they work well, they make us feel needed and safe. They also provide us with a lot of joy, we are social animals after all. We have chosen three sub-components. Let's

¹⁴ [Layard \(2020\)](#)

¹⁵ [Roser, Ortiz-Ospina and Ritchie \(2013\)](#)

¹⁶ [Dolan and Metcalfe \(2012\)](#)

¹⁷ [Ritchie and Roser \(2018\)](#)

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start small and move outwards. The first sub-component is about our living environment. There is good evidence to show that stable, well designed housing is good for wellbeing.¹⁸ This is especially true for vulnerable people.¹⁹ We spend approximately two-thirds of our time in our homes and it is therefore essential for our overall life satisfaction that we make this a place that we enjoy being.²⁰

Next, is what we call “Safety in your community”, this is important because the quality of our communities is crucial for whether we feel safe and can influence how easy we find it to make friends. In addition, crime has also been shown to be one of the main ways in which other individuals’ behaviour can have a clear and direct influence on an individual’s life satisfaction.²¹ Relatedly, it has been shown that societies with high levels of trust have a positive association with life satisfaction.²² Being able to trust each other makes life easier.

Our third sub-component in this section is named “Support network and friends” and this looks to capture the influence of our friends on our life satisfaction. Our friends provide us with some of the closest relationships that we have. Our friends help to provide us with support and can therefore help to increase our resilience to negative events. This is true throughout our lifetimes but particularly so later in life. For older people, loneliness is the biggest single factor affecting their life satisfaction.²³ In terms of the health effects, being lonely is as bad for you as smoking is.²⁴ As we detail in [Section 4](#), the weight of this variable, alongside the others that make up this component, increases when a user selects that they are a retired person.

Work

Employment increases our sense of purpose and makes us feel happier. Therefore, it is unsurprising to find that in most studies it stands out as one of the most important determinants of how happy our lives are. However, it should be noted that many of us do not enjoy our work that much at present. Time-use studies have found that we are least happy when we are speaking with our bosses and there is little that we enjoy doing less than working.²⁵ This could be for a number of reasons, perhaps we don’t get on well with our co-workers or we find work monotonous and dull. Equally, it could just be that working isn’t always easy, it can be tiring and therefore

¹⁸ See [Housing and wellbeing: rapid scoping review \(2017\)](#), What Works Wellbeing

¹⁹ See [Housing for vulnerable people \(2018\)](#), What Works Wellbeing

²⁰ See [“How home design can impact our mental health?”](#), What Works Wellbeing

²¹ [A.E. Clark et al \(2018\)](#)

²² See [World Happiness Report \(2015\)](#)

²³ [Layard \(2020\)](#)

²⁴ [Holt-Lunsted et al \(2015\)](#)

²⁵ [Krueger et al \(2009\)](#)

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we feel a bit less happy doing this than seeing our friends or doing leisurely activities.

The work component of the index is where we have the highest amount of adjustments based on the user's current circumstances. As stated previously, the index is initially calibrated to fit the conditions of the most common individual type there is – an employed worker. When a user creates an account however, they can choose from 13 different individual types (see [Section 4](#) and [Annex 3](#)) and then the work component will change accordingly (i.e. if you are a student, the work component is replaced by a component named education and the sub-components focus on course enjoyment/intensity and how well they get on with their classmates). In this section, we only focus on the literature related to the employed worker, as this was what was used for the base calibration of the index.

Along with income, workplace wellbeing is one of the most well researched areas of happiness economics. This means we have a good amount of evidence with which to choose our sub-components. We have chosen three, and one related sub-component (work-life balance) that we instead choose to place within the leisure time component. There are common themes in wellbeing labour market analysis which distinguish the importance of autonomy, competence, culture and relatedness.²⁶

Starting with autonomy and competence, we capture these in our sub-component that we call 'role responsibilities'. The evidence has shown that workers enjoy roles with a high level of both variety and autonomy.²⁷ They get bored doing repetitive tasks and they need to feel that they are trusted to do a good job (and certainly like to be praised for good work). If a worker enjoys their role then they are on a good path to achieving overall job satisfaction. However, if you don't get on with your co-workers, then work can be quite a miserable place to be. The second sub-component therefore relates to co-worker relationships. This aims to capture relationships with an individual's manager and other workers within the organisation too. Individuals like to feel like they have a level of relatability with their colleagues and that they fit in. Good working relationships often come out as the most important factor in studies that focus on job satisfaction.²⁸

Lastly, the importance of culture should not be underestimated and is captured in our company purpose sub-component. By way of an example, in an experiment that required labelling medical images, workers were divided into three groups. One group were informed that they were 'labelling tumour cells in order to assist medical researchers'; group number two were given no context for their work; and group

²⁶ [Layard \(2020\)](#)

²⁷ [A.E. Clark et al \(2018\)](#)

²⁸ [De Neve \(2018\)](#)

three were told their labels would be cast-off on submission. The first group did much more work than the other two and managed to maintain the same level of precision.²⁹ The study draws out the importance of meaning in our work – it helps us to feel like we are contributing to something larger than ourselves.³⁰

Leisure time

The leisure time component is not one that frequently comes out studies of the determinants of life satisfaction.³¹ But, as we show in [Section 3](#), what we have really done here is split out some of the work component and added in a bit extra on top. From the aforementioned studies of job satisfaction, work-life balance is the final factor that comes out time and time again as being important. This is especially true in developed countries.³² In addition, time use studies highlight that significant portions of our days are taken up by leisure time activities (e.g. relaxing, exercising, watching TV etc.) and that when we are doing these activities we tend to be relatively happy.³³ Our view is that it is consequently important that the index has the ability to capture these activities to gather an accurate reflection of an individual's life satisfaction.

We have two sub-components which aim to capture how much time is available to do leisure time activities and then how much enjoyment is taken from doing them. Of course, one of the biggest constraints on leisure time is how much time is spent working. For those that have a particular affiliation to a leisure time activity, if they also have a demanding career that pulls them away from this, you'd expect that this would have an impact on their life satisfaction.³⁴ The second sub-component is intentionally kept broad and refers both enjoyment and fulfilment of leisure time activities. It aims to capture some of the revolutionary research from Paul Dolan on the pleasure-purpose principle.³⁵ Dolan's theory begins from the standpoint that happiness is determined by how you allocate your attention. What you think about, tends to drive how you behave. And this in turn, determines your happiness. Using this logic, you can conclude that you will be happiest when you can allocate your attention as best you can. There are then two types of happy experiences to choose from: those that are purposeful and those that are pleasurable. They tend to be a

²⁹ [Chandler and Kapelner \(2013\)](#)

³⁰ For more work on meaning in work motivation see [Grant \(2008\)](#), [Chadi et al \(2017\)](#) and [Ariely et al \(2008\)](#)

³¹ Our hypothesis that this could also be due to the fact that leisure time activities are often separated into smaller components with these studies (e.g. exercising, volunteering, preparing food etc.) and therefore individually they seem less significant.

³² See [European social survey wellbeing data](#)

³³ [Kahneman et al \(2004\)](#)

³⁴ See Table 4.8 in [A.E. Clark et al \(2018\)](#). The largest change in life satisfaction is related to the impact of work on family life.

³⁵ See [Happiness by design, Paul Dolan \(2015\)](#).

trade-off in most cases, and typically we need a combination of the two to be truly happy. However, people will differ in their optimal relative balance of purpose and pleasure. This is why the second sub-component refers to both fulfilment and enjoyment of leisure time activities.

It seems appropriate to finish this section with Dolan's theory as it is consistent with the overarching concept of the index. Each of us are different in what drives us to be happy and this can lead to us having different objectives in life. But while we are not all aiming for the same targets, the similarities in our journeys through our careers and with our family's means we still have quite a lot in common too.

Section 2: The mechanics of the index

In this section we explain exactly how the index works in practice. We do this using the base calibration of the employed worker, the numbers of variables change slightly for other individual types, but the mechanics of the index remain the same. Any discussion of weights is saved for the next section. The starting point is taking together the six components into the following simple equation (1).

$$\sum_{i,j=1}^6 Y_i W_j = EHI \quad (1)$$

Where Y_i represents each of the components of the index, W_j are the weights attached to each of these components and i and j are both equal to 6. EHI simply stands for Exploring Happiness Index and can be equal to any value between 10-100.³⁶ To be clear, the components weights are not equal to one another. As discussed in the previous section, within each of the main components there a certain number of sub-components. In the default calibration (i.e. before any choices have been made about which of the variables in the index are more important to the user), the sub-components are an equal weight and therefore equation 1 can be re-written as:

$$\sum_{i,j,k=1}^n Y_{i,k} w_j = EHI \quad (2)$$

Where w_q are the weights attached to each of the subcomponents, k is equal to the number of subcomponents within each component, which in this case is between 2 and 3, both i and j remain equal to 6. This means that if component weight, W_j , is equal to 18% and there are three subcomponents, then each subcomponent would be

³⁶ There are no scores lower than 10 because for each subcomponent users are asked for a score between 1-10, we multiply the final index score by 10 to allow for easier inferences between 10-100.

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have an initial weight of 6% in the default calibration. Once the user has decided the level of importance of each component and subcomponent, equation (2) needs to be re-written as:

$$\sum_{p,q=1}^{15} x_p w_q = EHI \quad (3)$$

Where x_p are each of the sub-components of the index, w_q are the corresponding weights attached to these subcomponents and p and q are both equal to 15. [Annex 1 and 2](#) help to illustrate the differences between equations (2) and (3) in a visual form. It is important to make clear that we can take together equations (1) and (3) to obtain:

$$\sum_{p,q=1}^{15} x_p w_q = \sum_{i,j=1}^6 Y_i W_j \quad (4)$$

This shows that the summation of the component weights multiplied by the component variable scores should be equal to the summation of the subcomponent weights multiplied by the subcomponent variable scores. There is a sequential element to this though, since the subcomponents are a function of the components. This means that if the value of the component weight changes, then each of the subcomponent's weights will adjust to reflect this change. The opposite is not true, meaning component weights do not shift in response to changes in the values of the subcomponent weights. For each subcomponent the user is required to submit any score between 1-10. The final index score is multiplied by 10 to allow for easier inferences.

It is also important to explain how the weights shift in response to the choices about the importance of each component and subcomponent within the index for the user. The approach is very similar for both the components and the subcomponents but not exactly the same, so let's take both in turn. Starting with the components, there are six variables with six different starting weights. Users have the option to choose between the following options: "N/A", "Low", "Medium", or "High". The default choice is "Medium". If the user chooses "N/A" then the component weight will shift to zero. If the user chooses "Low", then the component weight is multiplied by 0.75, and if the user chooses "High", then the component weight is multiplied by 1.25.³⁷ The resulting weights then need to be rebased so the sum of all the weights is equal

³⁷ The calibration of these values requires a good degree of judgement given the number of possible outcomes it is hard to know what a 'reasonable' shift looks like. We took comfort from the fact that when shifting just one of these component weights, several of the components remained within the 95% confidence interval bands from the main studies that we based our calibration on.

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to 100%. This is done by dividing these adjusted weights by the sum of the adjusted weights. For example, assume a component starting weight is 20% and that the user values this component as “High”, the weight will then shift to 25% ($20\% \times 1.25$). But, the sum of all the new weights is now equal to 105%, this means we now need to divide 25% by 105% to get the new weight that will be used – this is equal to 23.81 %.

For the sub-components the shift is slightly larger than with the component weights, if a user chooses “Low” then the weight is multiplied by 0.5 and if a user chooses “High” then the weight is multiplied by 1.5. The resulting weights are then rebased in the same way as we do for component weights (see example below). We took the judgement that there was likely to be a greater level of variability in the strength of user’s preferences across the sub-components, than there is for the component weights. In addition, the confidence that we have for the component weights is far higher, as this has been calibrated to be consistent with the evidence. Due to a lack of evidence, sub-component weights in the default calibration start as an equal split of the component weight. It was therefore deemed appropriate to have a larger shift for the subcomponent weights, due this difference in the confidence level of the calibration.

Lastly, let’s finish with a simple example that brings this altogether. So, continuing as we were before, our component weight is now 23.81%, as the user chose this weight to be of high importance to them. Now let’s assume within this component there are three subcomponents. This means, initially each subcomponent weight is equal to 7.94%. Now assume that the user changes one variable to be of low importance, one to be of medium importance and one to be high. This means we multiply the first variable by 0.5 to obtain of 3.97% and the third variable by 1.5 to obtain a weight of 11.91%. The second variables weight remains 7.94%. Perhaps an easier way to think about it was that initially we had the following vector $\left[\frac{1}{3}, \frac{1}{3}, \frac{1}{3}\right]$, in terms of each of the subcomponents being a third of the component weight. Following the user’s choices, these weights have shifted to $\left[\frac{1}{6}, \frac{2}{6}, \frac{3}{6}\right]$, multiplying each of these fractions by the component weight will give the same values that we calculated above.

Section 3: Base calibration

As stated previously, the base calibration of the index is centred around the typical circumstances of a full-time employed worker. In [Section 1](#), we outlined the evidence that drove us to select the components that make up our index. We did this by drawing on research from a wide range of sources. For the calibration however, we have primarily drawn on the analysis from “*The Origins of Happiness*” (hereafter ‘TOH’), which is a seminal book from a group of happiness economists and was published in 2018. Their analysis combines cohort studies from the UK, Germany,

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the USA and Australia to provide results on both a point-in-time basis and at different intervals in time too. This allows us to understand the extent to which there is a level of adaption to life changes that are known to influence life satisfaction at one point in time.

Table 1 below gives an overview of the process that we took to calibrate the index. Using several studies from TOH that looked at the influence of the components in this table on life satisfaction, we have included the average results for each of these individual variables. An assumption that we took is that is that the selected variables account for all of the observed variance in life satisfaction. Of course, there will be other variables that influence life satisfaction, but this allows us to generate weights that add up to 100%. Another option would be to do the following:

$$U \cdot A + \sum_{i,j=1}^6 Y_i W_j = EHI \quad (5)$$

Where U is a weight that accounts for the variance in life satisfaction that is not explained by components, Y_i , and consequently $U + W_j$ would be equal to one. The A term would simply be the average life satisfaction within a country, meaning this index would have both a fixed and a varying component. Our view was that this would be less helpful for users as it would simply reduce the level of variance within the index without adding much value. Consequently, to obtain our weights we simply divide the overall input for a component by the total change that these components explain. For the remainder of this section we explain some of the judgements that were taken for each of the 6 components when we did this.

Component	Variables	Δ in LS	Overall input	Weight
Financial situation	Income	0.2	0.4	12%
	Wealth	0.2		
Health	Physical Health	0.2	0.9	25%
	Mental Health	0.7		
Family relationships	Partnered/separated/widowed	0.5-0.7	0.7	20%
Work	Unemployed (vs. employed)	0.3-1.0	0.65	19%
Leisure time	Work life balance	0.2-0.5	0.35	10%
Community & friends	Support network / friends	0.2	0.5	14%
	Safety	0.3		
Total			3.5	100%

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Starting with the financial situation component, there are several studies within TOH that looked at the effect of income on life satisfaction and on a cross sectional basis the most frequent finding was that, on average, a doubling of income would increase life satisfaction by 0.2 points. The results are similar across countries, with the increase varying between 0.16-0.31 points across the UK, USA, Germany and Australia. As stated in [Section 1](#), we took the judgement that the financial situation component should include wealth as well as income. In a paper from Senik (2014) that looked at the relationship between wealth and happiness, it was found that household wealth was as least as important to life satisfaction as income is. This meant we applied a 0.2-point change for wealth, as well as income, meaning the cumulative overall input for this component was 0.4, leading to a final weight equal to 12%.

For the health component, the vast majority of studies show that the influence of mental health on life satisfaction is larger than physical health. This was the motivation for including two mental health subcomponents within health component. The values in Table 1 show that, on average, having a physical illness decreases life satisfaction by 0.2 points and being diagnosed with either anxiety or depression decreases life satisfaction by 0.7 points. This meant the cumulative overall input was 0.9, leading to a final weight equal to 25% - the largest default weight in the index.

For the family relationships component, the evidence shows that for being partnered relative to being single, on average, increases life satisfaction by 0.6 points. However, being separated or widowed relative to being partnered, on average, decreases life satisfaction by 0.7 and 0.5 points, respectively. This is why the range of 0.5-0.7 is used in Table 1. We took the judgement to take the upper bound of this range since all of these variables relate only to romantic relationships, but this component also includes relationships with family members too. The evidence on the impact of having children on life satisfaction is noisy and would not be relevant for all users so this was not included here. It also becomes quite messy to try to measure the impact of other family members (parents vs. no parents or siblings vs. no siblings) meaning the upper bound of the partnered evidence was the most preferred option. This means the overall input is equal to 0.7, leading to a final weight of 20%.

For the work component much of the analysis focuses on measuring the impact of being employed, relative to being unemployed, on life satisfaction. There is a fair amount of variation across countries. In Australia, the decrease, on average, in life satisfaction from being unemployed is just 0.3 points compared with 1.0 points in Germany. The UK and the USA lie within this range. Consequently, we took the midpoint of this range to give an overall input equal to 0.65 and a final weight of 19%. And then for leisure time, from studies that looked at various elements of workplace quality and how they influence life satisfaction, it was found that, on

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average, work-life balance variables lead to a shift in life satisfaction of between 0.2 and 0.5 points. Therefore, we chose the midpoint of this range, meaning the overall input is equal to 0.35 and the final weight is 10%.

The final component of the index, 'Community & friends', is the only component that includes some external factors. The component is made up of three sub-components which aim to capture, your living situation, how safe you feel where you live and the support network of friends that you have around you. We have split the calibration of this in half as there isn't as much empirical evidence, especially on an individual life satisfaction basis, for these sub-components. In the first half we look at the effect of crime to capture both community safety and our living environment. Michalos and Zumbo (2000) studied quality of life in the city of Prince George, British Columbia.³⁸ They found that victims of crime reported lower measures of overall life satisfaction (5.4 versus 5.6 on a 7-point scale). We normalise this to our 10-point scale to receive a 0.3-point change in life satisfaction. In the second half of this calibration, we look at the effect of friendships. Helliwell, Huang and Wang (2016) showed that answering yes to the question of whether you have friends you can count on whenever you need them, increases life satisfaction, on average, by 0.2 points.³⁹ Taking all these together we obtain a 0.5-point overall input which equates to a 14% weight in the index.

This calibration is not without its faults. We have chosen to use changes in life circumstances and how they affect life satisfaction as the basis of the calibration. A downside of this is that for some of the variables the size of the change requires a level of judgement. For example, we have used a doubling of income to show the income effect. This is how the results tend to be reported in most studies and without a good reason to pick any other rate of change, we chose to leave it like this. Of course, our results would have been quite different if we chose an increase in income of 1/3 or 300%, and there isn't really a clear right answer to that problem.

In addition, as Table 1 shows there can be a relatively wide variance in the results, depending on a number of different factors. We have used our judgement in these circumstances, such as choosing mid-point of the results for how being unemployed impacts life satisfaction. This all means that the precision of the index is far from perfect. However, we are relatively confident in the ordering of the components in the index (i.e. ranking components from the largest weight to the smallest weight). We are even more confident that our index captures the correct components for measuring life satisfaction. Therefore, taking these points together means we are confident that the current calibration is in the right ballpark. We will look to refine this over time, ideally using data that we receive from our own users.

³⁸ See [Michalos and Zumbo \(2000\)](#)

³⁹ See [Helliwell, Huang and Wang \(2016\)](#)

Section 4: Adjustments to the base calibration

When a user creates their account, they will choose from a list of 13 different individual types, in order to have a set of components for their index that is most applicable to their current circumstances. [Annex 3](#) gives an overview of what each of these individual types are, the components that make up each individual type and their corresponding weights in the index. You'll see that by looking at this table that the majority of the changes relate to the different circumstances of peoples working lives. Some of us are students, some are full-time parents, while others manage work and care at the same time.

We have seven what we call "singular" individual types and then six "mixed" individual types. Mixed just means you split your working time being two different types of activities, while singular means you either don't need to split your working time or you don't work at all. We try to make clear in the user guidance on the website that even if you are a parent, but you work full-time, then you should still be a singular individual type, and not one of the mixed individual types. Only users that work part time or are students that also work, should choose one of the mixed individual types. The only exception to this rule is if the user is both an employed worker and a self-employed worker.

Looking across the singular individual types you will notice that for a self-employed worker, a full-time parent or carer, a person who is unemployed but seeking work and a student, the calibration remains the same as the base calibration, despite components (and subcomponents) within the index being different. The main reason for this is that there is little evidence available to suggest that significant adjustments should be made to the calibration to account for these changes. For the remaining two singular individual types (a retired person and an unemployed person not seeking work) the work component is removed without any new component being added in its place, meaning the remaining 19 percentage points need to be reattributed across index in a sensible way.

For the individual type that is unemployed but not looking for work, the largest change is the to leisure time component, which increases by 11 percentage points. This is due to having considerably more "free time" than those that are working. Within the leisure time component, the sub-component related to work-life balance is also removed. An 11-percentage point increase was chosen because it then allows for an even 2 percentage point increase for each of the four remaining components in the index.

For the individual type that is retired, we chose to increase the health, community and friends and leisure time components all by 5 percentage points each. Leisure time was increased by this amount for the same reason as above – having greater

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amounts of free time. The other two components were increased by this amount due to the evidence showing that loneliness is one of the main determinants of low life satisfaction in elderly people. It was therefore deemed appropriate to capture the social and the health (primarily mental health) effects of this, by increasing the weights of these components. The remaining 4% was split evenly between the two remaining components.

Lastly, for the mixed individual types we took a relatively simple and consistent approach to adjusting the calibration. Taking both the work and leisure time components together we obtain a weight equal to 29%. It is difficult to ascertain whether the components related to work, care or education should have higher or lower weights than one another. This meant we choose to equally weight these components in each of the mixed individual type calibrations. In order to keep this simple and clear we reduced the weight of the leisure time component to 9% and split the remaining two work related components, to give two weights equal to 10%. This is true for all of the mixed individual types, except for the employed and self-employed worker, where we decided there was no reason to make any adjustments for this individual type relative to the base calibration.

Works Cited

- Andrew E. Clark, Sarah Flèche, Richard Layard, Nattavudh Powdthavee, and George Ward. 2018. *The Origins of Happiness: The Science of Well-Being over the Life Course*. Princeton University Press.
- Baikie, K., & Wilhelm, K. 2005. "Emotional and physical health benefits of expressive writing." *Advances in Psychiatric Treatment* 11 (5): 338-346.
- Chadi, Adrian & Jeworrek, Sabrina & Mertins, Vanessa. 2016. "When the Meaning of Work Has Disappeared: Experimental Evidence on Employees' Performance and Emotions." *Management Science* 63 (6).
- Chandler, Dana & Kapelner, Adam. 2013. "Breaking monotony with meaning: Motivation in crowdsourcing markets." *Journal of Economic Behaviour & Organisation* 90: 123-133.
- Dolan, Paul and Metcalfe, Robert. 2012. "Measuring subjective wellbeing: recommendations on measures for use by national governments." *Journal of social policy* 41 (2): 409-427.
- Dolan, Paul. 2014. *Happiness by Design: Finding Pleasure and Purpose in Everyday Life*. London: Penguin .
- European Social Survey. 2018. *ESS on Wellbeing*.
<https://www.europeansocialsurvey.org/findings/wellbeing.html>.
- Flinchbaugh, C. L., Moore, E. W. G., Chang, Y. K., & May, D. R. 2012. "Student Wellbeing interventions: The effects of stress management and gratitude journaling in the management education classroom." *Journal of management education* 36 (2): 191-219.
- Grant, Adam. 2008. "Does Intrinsic Motivation Fuel the Prosocial Fire? Motivational Synergy in Predicting Persistence, Performance, and Productivity." *Journal of Applied Psychology* 90 (1): 49-58.
- Helliwell, John F and Huang, Haifang and Wang, Shun. 2016. "New Evidence on Trust and Well-being." *National Bureau of Economic Research*.
- Helliwell, John. 2003a. "How's life? Combining individual and national variables to explain subjective well-being." *Economic Modelling* 20 (2): 331-360.
- Helliwell, John, Richard Layard, and Jeffery Sachs. 2015. *World Happiness Report* .
https://s3.amazonaws.com/happiness-report/2015/WHR15_Sep15.pdf.
- Holt-Lunstad, Julianne & Smith, Timothy & Baker, Mark & Harris, Tyler & Stephenson, David. 2015. "Loneliness and Social Isolation as Risk Factors for Mortality: A Meta-Analytic Review." *Perspectives on Psychological Science* 227-237.
- Kahneman, D., Krueger, A, Schkade, A, Schwarz, N, & Stone, A. 2004. "A survey method for characterising daily life experience: a day reconstruction method." *Science* 306 (5702): 1776-1780.
- Kamenica, Emir & Prelec, Dražen. 2008. "Man's Search for Meaning: The Case of Legos." *Journal of Economic Behavior & Organization* 67 (3-4): 671-677.

Exploring Happiness Index – Methodology Paper

- Krpan, K. M., Kross, E., Berman, M. G., Deldin, P. J., Askren, M. K., & Jonides, J. 2013. "An everyday activity as a treatment for depression: the benefits of expressive writing for people diagnosed with major depressive disorder." *Journal of affective disorders* 150 (3): 1148-1151.
- Krueger, Alan & Kahneman, Daniel & Schkade, David & Schwarz, Norbert & Stone, Arthur. 2009. "National time accounting: The currency of life." *National Bureau of Economic Research* 9-86.
- Layard, Richard. 2020. *Can we be happier? Evidence and Ethics*. London: Penguin.
- Max Roser, Esteban Oritz-Ospina and Hannah Ritchie. 2013. *Our World in Data: Life Expectancy*. <https://ourworldindata.org/life-expectancy>.
- Michalos, C., Zumbo, D. 2000. "Criminal Victimization and the Quality of Life." *Social Indicators Research* 245-295.
- Office of National Statistics. 2020. *ONS - Labour Market Overview, UK*. October . <https://www.ons.gov.uk/employmentandlabourmarket/peopleinwork/employmentandemployeetypes/bulletins/uklabourmarket/october2020>.
- . 2020. *ONS - People in Work*. December. <https://www.ons.gov.uk/employmentandlabourmarket/peopleinwork>.
- . 2020. *ONS - Population and Migration*. December. <https://www.ons.gov.uk/peoplepopulationandcommunity/populationandmigration>.
- . 2020. *ONS - Sexual Identity*. <https://www.ons.gov.uk/peoplepopulationandcommunity/culturalidentity/sexuality>.
- Ritchie, Hannah and Roser, Max. 2018. *Our World in Data: Mental Health*. <https://ourworldindata.org/mental-health>.
- Rosenfeld, M. J., & Thomas, R. J. 2012. "Searching for a mate: The rise of the internet as a social intermediary." *American Sociological review* 77 (4): 523-547.
- Sachs, Jeffrey. 2018. "Work and Wellbeing: A global perspective (Chapter 6)." In *Global Happiness Policy Report*, by Christian & Ward, George & Neve, Jan-Emmanuel & Blankson, Amy & Clark, Andrew & Cooper, Cary & Harter, James & Lim, Jenn & Litchfield, Paul & McKinnon, Ewen & Moss, Jennifer & Norton, Michael & Rojas, Mariano & Whillans, Ashley. Krekel. Global Happiness Council.
- United States Census Bureau. 2020. *Historical Living Arrangement of Adults*. December. <https://www.census.gov/data/tables/time-series/demo/families/adults.html>.
- What Works Wellbeing. 2017. "Housing and Wellbeing: Rapid Scoping Review." January. <https://whatworkswellbeing.org/resources/housing-and-wellbeing-rapid-scoping-review-appendices/>.
- . 2018. "Housing for Vulnerable People." May. <https://whatworkswellbeing.org/resources/housing-for-vulnerable-people/>.

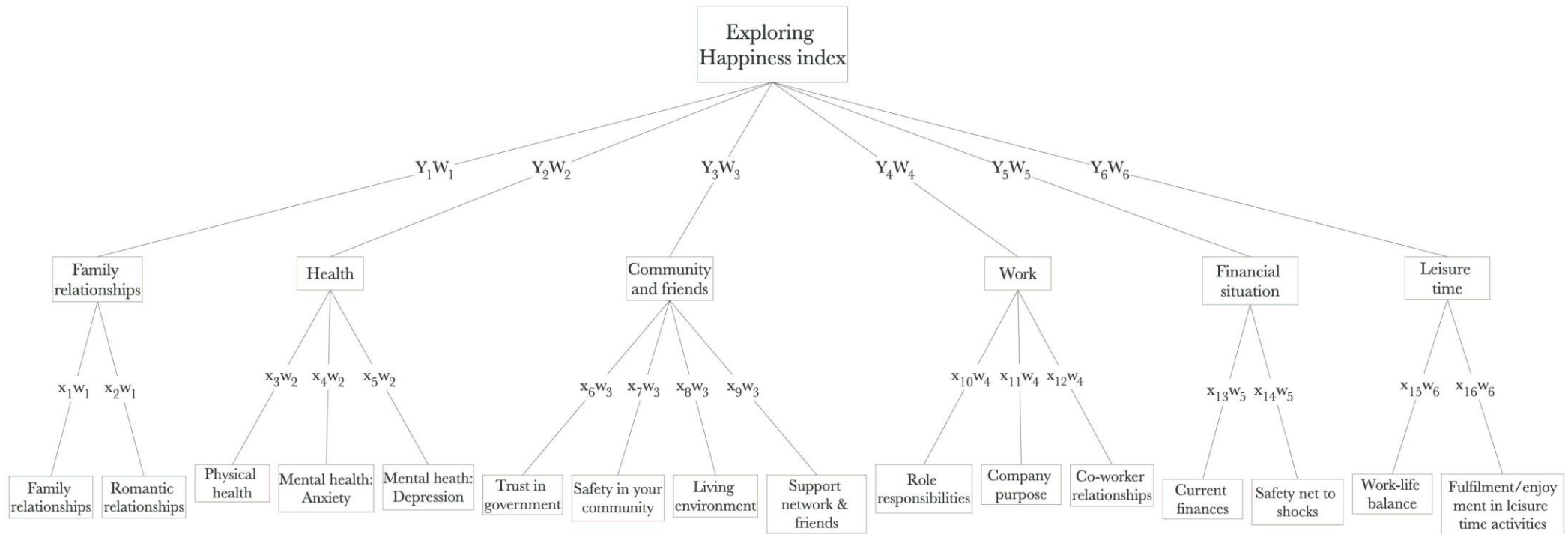
Exploring Happiness Index – Methodology Paper

—. 2020. "How design can impact our mental health." April.

<https://whatworkswellbeing.org/blog/how-home-design-can-impact-our-mental-health/>.

Wood, A. M., Froh, J. J., & Geraghty, A. W. 2010. "Gratitude and wellbeing: a review and theoretical integration." *Clinical Psychology Review* 30 (7): 890-905.

Annex 1: Exploring Happiness Index: Base calibration with default weights⁴⁰



⁴⁰ The Trust in government sub-component was eventually dropped. This diagram and the one in Annex 2 below are purely for illustrative purposes.

Annex 2: Exploring Happiness Index: Base calibration with personalised weights

