Happiness Research Institute

leaps

Wellbeing Adjusted Life Years

A universal metric to quantify the happiness return on investment

SHORT REPORT

Let’s measure what matters

Over the last 10 years, the world is getting richer - but are we also getting happier? While wealth may be on the rise - so are sea levels, air pollution, and mental health problems. Despite continued economic growth, it seems we sometimes fail to convert our wealth into wellbeing. So where should we invest our resources to improve quality of life?

If we could choose between breakthrough innovations that could fundamentally change the world for the better, which one should we choose? Would it be better to develop a cure for Alzheimer’s or prostate cancer? Would it be better to reduce loneliness, diabetes, or air pollution? How can we produce the greatest happiness return for humankind?

In light of COVID-19, the need for evidence-based tools to weigh disparate consequences has never been more urgent. How are we to weigh the costs of disease against the benefits of economic output? How are we to weigh the threat of illness against the dangers of social isolation? This is not the first time that decision-makers have had to balance seemingly incomparable interests - and it will not be the last.

In this report, we lay the groundwork for a new metric to help us address these difficult questions. Wellbeing Adjusted Life Years: a common currency of impact based on evidence and experience to help us make better decisions that lead to better lives and a better world. A metric that can predict which leap for humanity would take us the furthest. For Leaps by Bayer, it is a starting point to begin moving beyond financial return and measure the happiness return on investment.

Because if there is one thing that defines humankind – it is our audacity and ability to push the boundaries of what is possible. To leap forward. To explore.

That is what this publication is about. To expand our understanding of wellbeing and push forward our ability to quantify it - or in the words of Galileo to “measure what is measurable, and make measurable what is not so.”

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EXECUTIVE SUMMARY

How can we create the greatest leaps for humanity?

Introducing a new measure of progress

Public and private institutions have conventionally evaluated their investments in terms of financial return, in the hope that maximising returns will produce cascading positive effects in society. However, recent paradoxes of progress have demonstrated that the two are not always so neatly aligned. In the modern world, raising general welfare requires a broader understanding of progress than the one given by standard financial indicators. Policymakers and investors have started to look for new ways to evaluate the impact and sustainability of their investments. Targets such as the Sustainable Development Goals (SDGs) have opened up new avenues of exploration, but on their own cannot always provide actionable guidance or priorities.

This report offers a new way to evaluate impact, one that reflects the lived experience of citizens and consumers. The metric we propose considers progress in terms of gains or losses in Wellbeing Adjusted Life Years (or WALYs). This approach, rooted in decades of research and extensively validated measures of subjective wellbeing, has two primary benefits relative to existing impact measures:

1. **WALYs are based on empirical measurements of human experience and therefore do not rely on fallible proxies and simplified assumptions about human nature.**
2. **WALYs can measure and model impact across social, economic, and environmental domains.**

A deeper understanding of health and wellbeing

This report takes its point of departure in healthcare. Disease is often one of the greatest sources of suffering in both high and low income countries. By offering WALY estimations of individual and societal wellbeing burdens for 16 diseases in 28 European countries, we find that depression and anxiety disorders are responsible for greater wellbeing losses on both an individual and societal level than almost any other illness under consideration. The main sample includes roughly 110,000 European adults (45 years or older) from 2006 to 2017 for a total of 250,000 observations. Parkinson's and Alzheimer's also prove to substantially burdensome on an individual basis. We then analyse 90 symptoms of disease, and find that the most important predictors of wellbeing across all disease groups also tend to be social and mental, not physical.

In turn, we demonstrate how public and private agents can use these estimations to inform decision-making and ensure the effectiveness of their investments. While cures are likely to provide more long-lasting gains, in some cases treating social and mental symptoms could potentially raise patient wellbeing to an equal or even greater degree. This paints a vastly different picture of health and disease than the one offered by conventional metrics. Our analysis strongly suggests that continuing with business-as-usual may lead us to undervalue potent sources of patient suffering and even disregard promising interventions to raise patient wellbeing.

Towards universal impact

In the final sections of this report, we broaden our view to consider how WALYs could be applied to domains other than healthcare as a universal key performance indicator. We do so by introducing a list of techniques capable of producing WALY estimates from complex domains and offer an in-depth case study of the wellbeing implications of air pollution.

Overall, this report demonstrates how Wellbeing Adjusted Life Years can be used to empirically assess the fundamental determinants of good lives by providing a common currency of impact across economic, social, and environmental domains.

WALYs offer a fresh perspective from which to consider the effectiveness of public and private investments, one that promises to shine new light on previously untapped opportunities and generate meaningful and lasting impacts on individual and societal wellbeing.

The full report and appendix can be downloaded at happinessresearchinstitute.com

How should we measure human progress?

It's a question philosophers and scientists have attempted to answer for centuries, but in the last decade the debate has resurfaced as it has become evident that unprecedented economic development hasn't uniquely translated into better lives for all. While increases in income have brought about substantial improvements in longevity, health, and literacy, they have been accompanied by rising inequality, persisting poverty, and worsening climate change. **In many countries around the world, wellbeing levels have stagnated or even declined despite continued economic development.**

Take for example India. From 2006 to 2018, GDP per capita doubled in size, while the average life satisfaction of the population dropped from 5.35 to 3.82 on a 0 to 10-point scale, a staggering 25% decrease. Today, only 3% of the Indian population can be considered 'thriving' according to the Gallup World Poll, one of the lowest rates recorded around the world.[1] A similar pattern can be detected in China – a country that is perhaps the most impressive example of economic development and poverty reduction in human history. Between 1990 and 2010, GDP per capita swelled by a rate of fourteen, while average subjective wellbeing levels declined and suicide rates climbed to one of the highest in the world.[2]

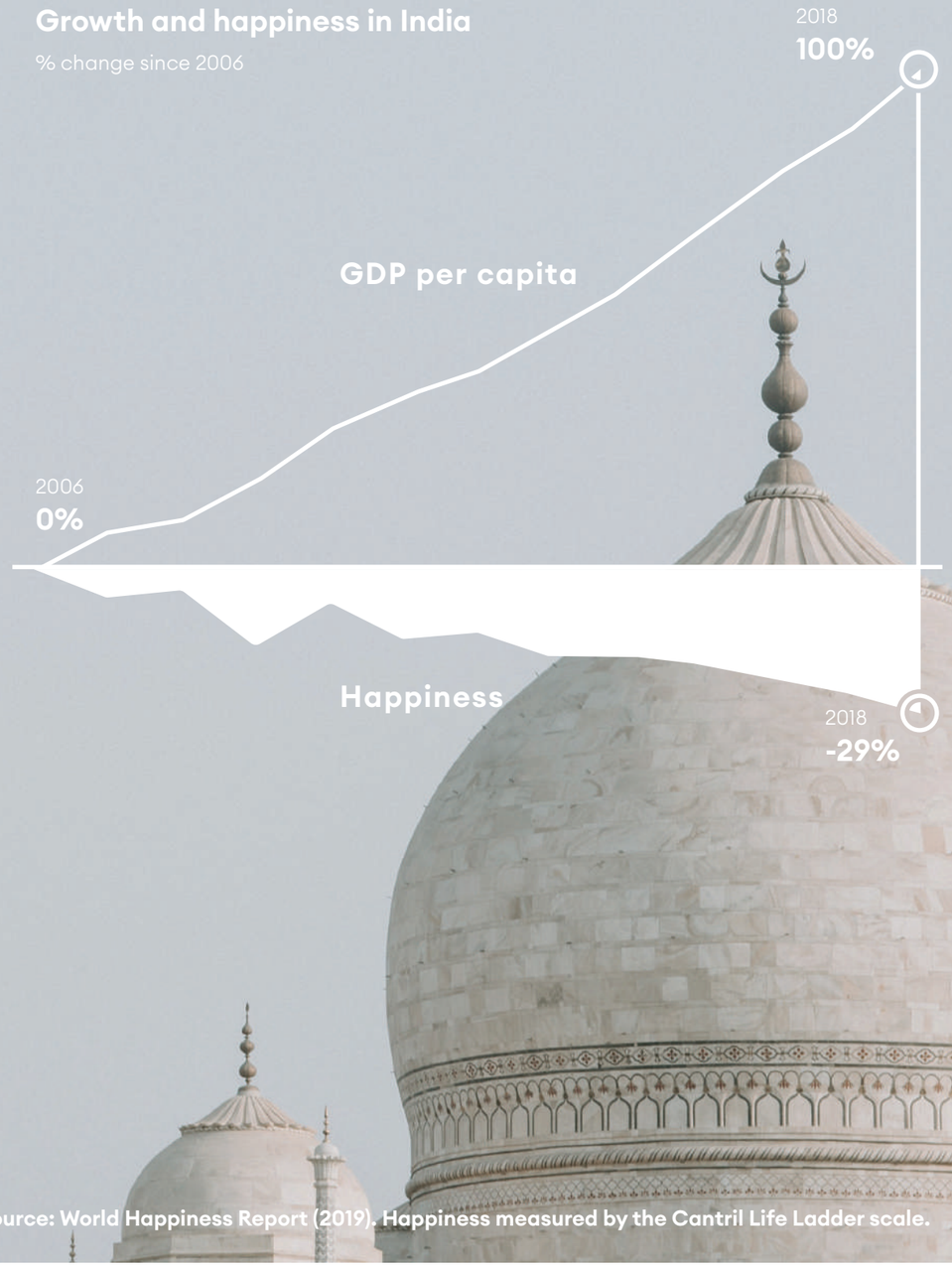
Many developed countries have also been subject to a decoupling of wealth and wellbeing. Steady economic growth and a record low unemployment rate in the United States haven't safeguarded the country against a rise of adolescent depression, suicidal ideation, and self-harm.[3] In Denmark, one of the world's happiest countries, the rise in GDP per capita since the financial crisis has also been accompanied by increasing loneliness, rising stress, and poor mental health.[4]

These **paradoxes of progress** have led to a growing dissatisfaction with the widespread use of conventional indicators as the default benchmarks of social progress.[5] In the modern world, it has become clear that **raising general welfare requires a broader understanding of progress than the one given by standard economic and financial indicators.**

As noted by the economist and Nobel laureate Joseph Stiglitz, "What we measure, affects what we do. If we focus only on material wellbeing – on, say, the production of goods...we become distorted in the same way that these measures are distorted; we become more materialistic."[6] **Today, governments around the world are being asked to do more than facilitate material wealth. They are being asked to ensure wellbeing.** This presents an entirely new challenge, and one that many institutions are currently ill-equipped to handle. Policymakers have started to look for new ways to evaluate the impact and sustainability of their investments.

Growth and happiness in India

% change since 2006



Source: World Happiness Report (2019). Happiness measured by the Cantril Life Ladder scale.

The role of private organizations

Similar shifts have also been underway in the private sector. As business operations have become globally distributed, their societal, environmental, and economic impact has increased substantially. In response to these changes, attention has begun to shift from shareholders to stakeholders. Businesses around the world are adopting notions of 'shared value' in an effort to ensure that economic profitability also creates value for society.[7] In 2019, the Business Roundtable, representing chief executive officers from many of the most powerful American companies including Apple and Amazon, redefined the purpose of the company away from delivering value to shareholders in favour of delivering value to consumers, employees, and communities.[8]

This broadening view of private sector obligations to society has inspired a new generation of investment tools including Corporate Social Responsibility (CSR), Environment, Social, and Governance (ESG) and perhaps most notably the Sustainable Development Goals (SDGs). However, while these metrics have opened up important new avenues of exploration, they cannot always provide actionable guidance or priorities on their own.[9] **Although firms place increasing emphasis on social value creation, no harmonised social impact indicator has yet been developed to help them prioritize or evaluate the success or failure of their investments.**

A new measure of progress

This report offers a new way to evaluate the outcomes of public policies and private investments, one that reflects the lived experience of citizens and consumers. The metric we propose considers progress in terms of gains or losses in **Wellbeing Adjusted Life Years (or WALYs).**

This approach is rooted in decades of research and extensively validated measures of subjective wellbeing. WALYs have two primary benefits relative to existing impact measures:

1. **WALYs are based on empirical measurements of human experience and therefore do not rely on fallible proxies and simplified assumptions about human nature.**
2. **WALYs can measure and model impact across social, economic, and environmental domains.**

This report demonstrates how Wellbeing Adjusted Life Years can be used to empirically assess the fundamental determinants of good lives by providing a common currency of impact across domains. WALYs offer a fresh perspective from which to consider the effectiveness of public and private investments, one that promises to **shine new light on previously untapped opportunities and generate meaningful and lasting impacts on individual and societal wellbeing.**

In the coming years, the need to direct human activity towards sustainable pursuits of individual wellbeing will only become more urgent. Many nations around the world are already reeling from the destabilising effects of a diminishing sense of meaning in people's lives, a trend that is likely to be exacerbated by rising automation and climate change. Tackling these challenges requires a new approach, one that gives

central importance to measuring, tracking, targeting, and improving subjective wellbeing over time and across generations.

The model we propose is therefore designed to enable paradigm-shifting advances in impact investment and policymaking by identifying wellbeing scarcities and market opportunities that conventional metrics are blind to. Ultimately, it is the goal of this report to provide public and private decision-makers, investors, and institutions with an evaluative tool capable of directing energy and investment towards improving wellbeing and facilitating greater leaps for humanity.

Would it be better to invest in treating diabetes or reducing air pollution?

With limited resources, the matter of where to allocate resources becomes not only a practical concern but an ethical one as well. In this report, we will demonstrate how **WALYs can put seemingly incommensurable outcomes on the same scale by analysing their actual and potential net effects on human wellbeing.** The final output is a universally applicable cost-benefit metric that can be used to assess the **Happiness Return on Investment** where benefits are combined into a single unit of effect: Δ Wellbeing / Δ Cost. To illustrate the promise of this approach, in this short report, we will address the question of whether it would be more cost-effective to invest in improving health or reducing air pollution from the perspective of wellbeing.

However, this short summary will necessarily omit a number of important concerns and considerations. The full report offers additional theoretical justifications, empirical evaluations, case studies, and practical guidance for using WALYs as a decision-making tool. **The full report can be downloaded here: happinessresearchinstitute.com.**

A deeper understanding of quality of life

No matter where in the world we look, health is one of the most important determinants of wellbeing. However, current healthcare metrics often rely heavily on stated preferences that are not reflective of patient experience. **WALYs can deliver value to the health investment sector by shining new light on patient subjective wellbeing. This patient-centred approach can help to uncover hidden sources of unhappiness, reveal new market opportunities, and guide investments towards wellbeing scarcities.**

The health industry is also one of the largest and fastest growing industries in the world. In 2016, more than 7.5 trillion US dollars was spent on healthcare, almost 10% of global GDP, and in many countries substantially more.[10] For the last two decades, health-related expenditures have grown at a rate of 4% per year, even faster than the 2.8% annual growth rate of the global economy.[11] **Faced with mounting responsibilities and expanding budgets, stakeholders in both the public and private sector are increasingly relying on economic evaluations to make effective resource allocation and investment decisions.**

To understand the limitations of conventional approaches to measuring social impact in the health sector, imagine that a medical supplier is deciding which medical technology to design, or an investor is considering which medical treatment to invest in. Relying exclusively on Return On Investment (ROI) metrics would likely guide decisions towards investment strategies that produce the largest financial returns, but not necessarily ones that produce the largest social impact or return on wellbeing.

Imagine that an investor is considering whether to invest in a new treatment for malaria or diabetes. Given the relatively large prevalence and high mortality rate of malaria in low income countries, investing in a treatment would likely have a much higher social impact, but lower profit potential as the target population may not be able to afford even modestly priced treatments.[12]

If the goal is to create social impact and maximise wellbeing, we need more than financial metrics to ensure the effectiveness and efficiency of our investments. While financial sustainability is undoubtedly essential for the continued ability of an investor to support socially impactful programmes and products, delivering true value to consumers, citizens, and societies requires a much broader perspective.

In response to many of the shortcomings associated with financial metrics, two of the most influential ways to evaluate costs and benefits of interventions in the health sector rely on the calculation of **Quality Adjusted Life Years (QALYs)** and **Disability Adjusted Life Years (DALYs).** Both tools provide a common currency by which to compare a wide variety of medical interventions in terms of their impact on longevity and quality of life. Longevity is measured in terms of the number of potentially added life years. Quality of life is based on public preferences regarding various health states.

However, despite their widespread implementation, QALYs and DALYs have become increasingly controversial in recent years. Neither QALYs nor DALYs factor in how patients of various diseases actually experience their lives. Instead, they are rooted in public perceptions they may or may not hold true to reality. **By rooting health evaluations in patient self-reports, WALYs can therefore offer a much needed new approach to evaluating health outcomes in terms of patient experience.**

Measuring outcomes in healthcare

Disability Adjusted Life Years

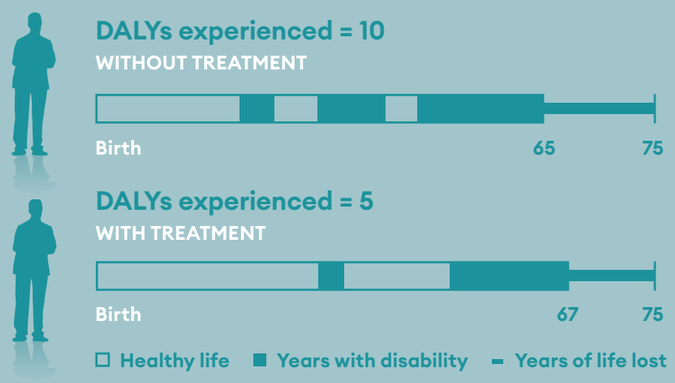
To calculate DALYs, the **general public** is presented with **lay descriptions of diseases and disabilities,** and asked to decide which ones are more severe than others.

Which of the following health states has a higher level of disability?

Depression | Parkinson's

General public

Using these responses, researchers **assign weights to each disease and disability** on a scale from 0 (perfect health) to 1 (death). **Potential new treatments and interventions can then be assessed in terms of DALYs saved.**



Finally, the **cost-effectiveness** of new treatments can be estimated in terms of **cost per DALY saved.**

Treatment cost	€60,000
DALYs saved	5
Cost per DALY	€12,000

Quality Adjusted Life Years

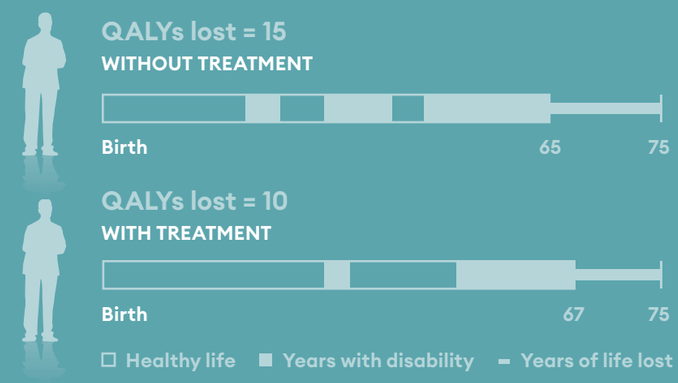
To calculate QALYs, the general public is generally asked to imagine **how many healthy life years they would be willing to give up** to avoid living ten years with a given disease or disability.

How many healthy life years are equivalent to ten years in the following health state?

Depression

General public

Researchers can use these responses to determine which **diseases and disabilities the public considers to be better or worse** than others on a scale from 0 (perfect health) to 1 (death). In this case, treatments are then assessed in terms of QALYs gained.



The **cost-effectiveness** of new treatments is estimated in terms of **cost per QALY gained.**

Treatment cost	€60,000
QALYs gained	5
Cost per QALY	€12,000

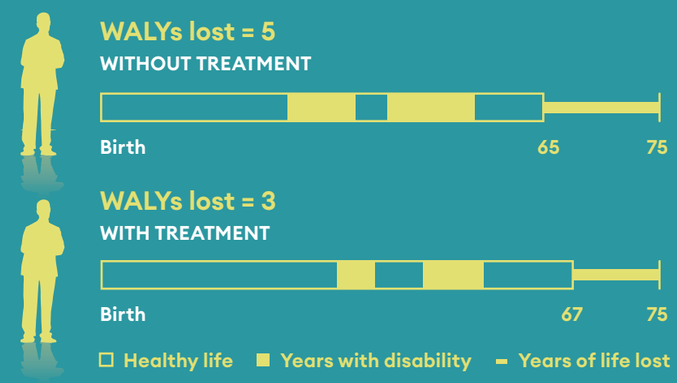
Wellbeing Adjusted Life Years

In this report, we propose measuring health gains and losses in terms of Wellbeing Adjusted Life Years. To calcuate WALYs, **patients themselves are asked to report on their own experienced quality of life.**

How satisfied are you with your life?

Patients

The severity of diseases and disabilities are then assessed in terms of how patient experience on a scale from 0 (lowest wellbeing) to 1 (highest wellbeing). Treatments can then be assessed in terms of their effects on patient wellbeing.



The **cost-effectiveness** of new treatments is now estimated in terms of **cost per WALY gained.**

Treatment cost	€60,000
WALYs gained	2
Cost per WALY	€30,000

The wellbeing burden of disease

When calculating QALYs and DALYs, because utility weights for health states are derived from public preferences, mental health can often be undervalued. When promoted to imagine what life must be like with any number of health conditions, most people tend to assume that physical disabilities have more negative effects on quality of life than they actually do.[13] For most people, it is simply much harder to imagine the effects of mental illness or social isolation.

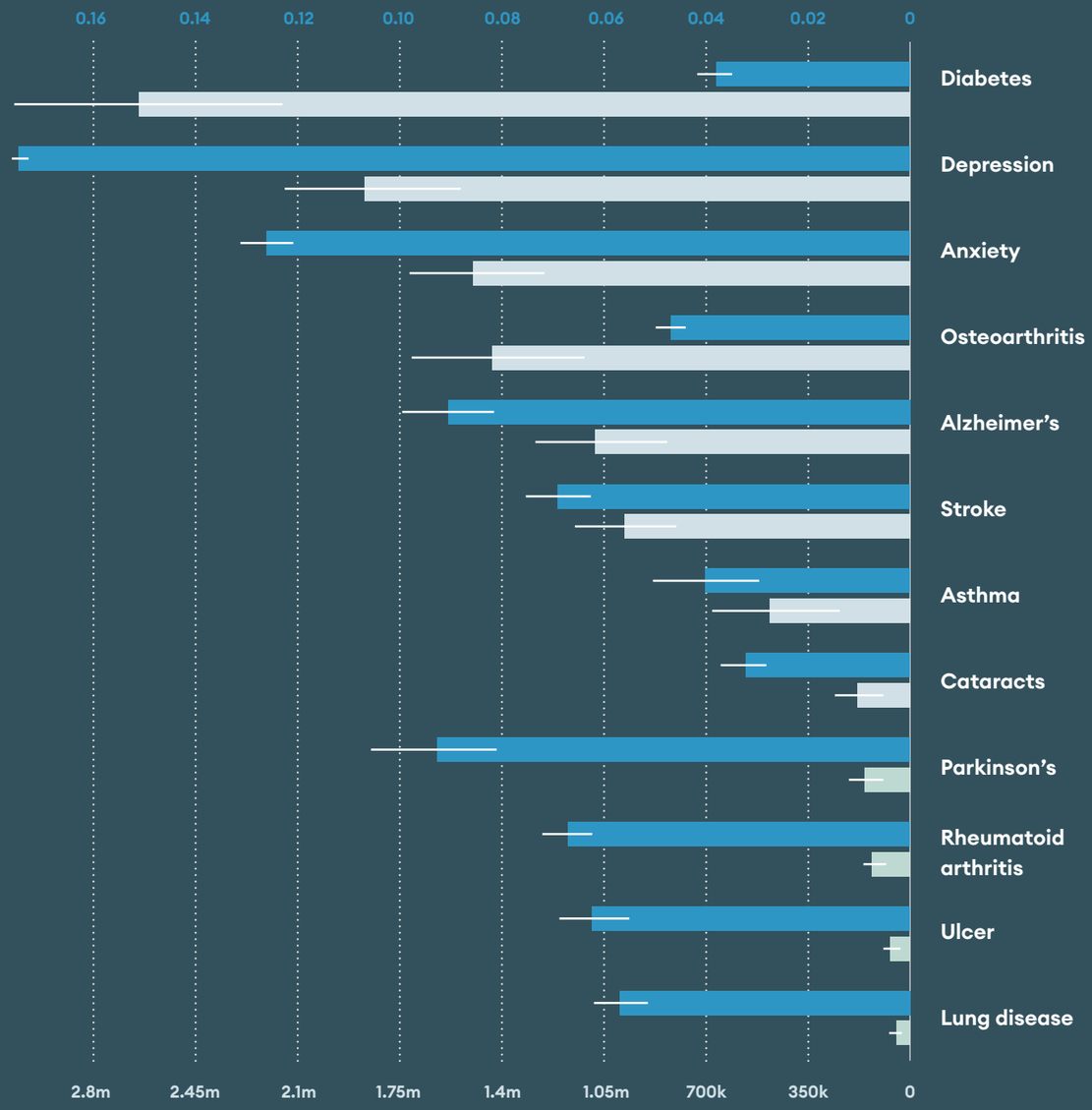
However, **a growing body of evidence has begun to demonstrate the profound significance of poor mental and social health relative to physical health.**[14] One recent analysis of 15,184 hospital patients in Wales found that anxiety and depression had degrading effects on self-assessed quality of life that were ten times as severe as extreme pain.[15] Struggling to walk, even being bedridden, had no effect at all. This result was later replicated in a similar analysis of American adults.[16] Another widely cited meta-analysis found that loneliness and social isolation posed mortality risks equivalent to smoking 15 cigarettes per day.[17]

As long as subjective wellbeing measures are not embedded into our investment tools, we may continue to be blind to fundamental determinants of experienced wellbeing. There is an immense amount of unhappiness in the world that remains untreated and populations in need that remain underserved. This uncharted territory can be revealed by Wellbeing Adjusted Life Years.

By offering WALY estimations of individual and societal wellbeing burdens for 16 diseases in 28 European countries, we find that **depression and anxiety disorders are responsible for greater wellbeing losses on both an individual and societal level than almost any other illness under consideration. Parkinson's and Alzheimer's also prove to substantially burdensome on an individual basis.** On an individual level, diabetes proves a relatively minor source of suffering. However, when viewed from a societal perspective, the wellbeing burden of diabetes grows substantially primarily because it is so widespread.

Our analysis uses SHARE data on the life satisfaction of more than 100,000 European adults over the age of 45.[18] To estimate the wellbeing burden of disease on a societal level, prevalence and mortality estimates for each disease were drawn from the Global Burden of Disease study.[19]

Individual and societal wellbeing burdens of disease in Europe (2017)



■ WALYs lost INDIVIDUAL ■ WALYs lost POPULATION

WALYs lost (individual) = 1 - (Actual wellbeing / Potential wellbeing). Actual wellbeing is given by the average life satisfaction of the patient group. Potential wellbeing is given by the average life satisfaction of healthy counterparts, estimated using OLS regressions of SHARE data from 2005 - 2017 (n ≈ 200,000). Control variables included in each regression for gender, age, marital status, number of children, employment, education, country, wealth, income, and year. Sample includes adults over the age of 45 from 28 European countries. WALYs lost (population) = WALYs lost (individual) x Prevalence + Deaths. Prevalence and mortality estimates for each disease are drawn from Global Burden of Disease data. Additional details are provided in the full report and in the online appendix.

Symptoms of wellbeing

WALYs can also be employed to ask the following question: **which symptoms have the greatest impact on patient wellbeing?**

In the preamble to the constitution of the World Health Organization, health is defined as "a state of complete physical, mental and social wellbeing."[20] Currently, the impact of symptoms on quality of life are most often assessed using three patient questionnaires: the EQ-5D, the SF-36, and the HUI. However, while these instruments cover numerous aspects of physical wellbeing, they fall relatively silent on mental and social wellbeing.

Of the 20 categories used to assess quality of life across all three questionnaires, 13 pertain to physical wellbeing while only 5 cover mental wellbeing. Social wellbeing is only explicitly addressed once, in the SF-36. However, by failing to sufficiently account for mental and especially social wellbeing, these instruments may be failing to capture the most important determinants of patients' quality of life.

Using SHARE data, we analysed which symptoms are the most important predictors of subjective wellbeing across patient populations. Overall, we find that **symptoms affecting social and mental wellbeing prove to be significantly more important to patient self-reported wellbeing than physical symptoms, and yet remain mostly unaddressed and untreated.** Of the top 20 symptoms we identified, ten relate to mental wellbeing, three relate to social wellbeing, and seven relate to physical wellbeing. These leading symptoms can be grouped into six overarching categories: self-sufficiency, depression/anxiety, vitality, optimism, engagement, and loneliness.

We can also estimate WALY burdens associated with each symptom category at both individual and societal levels. In the latter case, we take into account symptom prevalence rates across different disease groups and evaluate the potential effects of treatments targeted to alleviate them. Once again, these estimates rely on SHARE data and are therefore only representative for patients over the age of 45 in Europe.

Out of the six primary symptom categories under consideration, depression/anxiety emerges as the largest predictor of wellbeing losses at a population level for almost every disease group. However, for patients with Alzheimer's, Parkinson's, stroke, and stroke, self-sufficiency becomes slightly more important. Fatigue also proves to be a significant contributor to wellbeing loss, primarily because it is so widespread.

Although loneliness can be one of the largest predictors of suffering at an individual level, more patients report feeling sad or depressed than report feeling lonely, resulting in a greater wellbeing burden associated with the former. This dynamic serves as a reminder that wellbeing losses can look quite different depending on the perspective taken. For example, if the goal of a particular organisation is to raise wellbeing among as many Parkinson's patients as possible, then it would seem appropriate to address difficulties performing usual activities. However, at an individual level, Parkinson's patients struggling with severe loneliness are likely to be worse off than those struggling with any other individual symptom. They may be therefore the most in need of help.

In turn, these estimations can be used to inform decision-making and investments. **While cures are likely to provide more long-lasting gains, in some cases treating social and mental symptoms could potentially raise patient wellbeing to an equal or even greater degree.** Our analysis therefore suggests that continuing with business-as-usual may lead us to undervalue potent sources of patient suffering and even disregard promising interventions to raise patient wellbeing.

The most important determinants of patient subjective wellbeing

Self-sufficiency
Usual activities

Depression/ Anxiety
Sad or depressed
Nervous
Wish to be dead
Past depression
Irritability

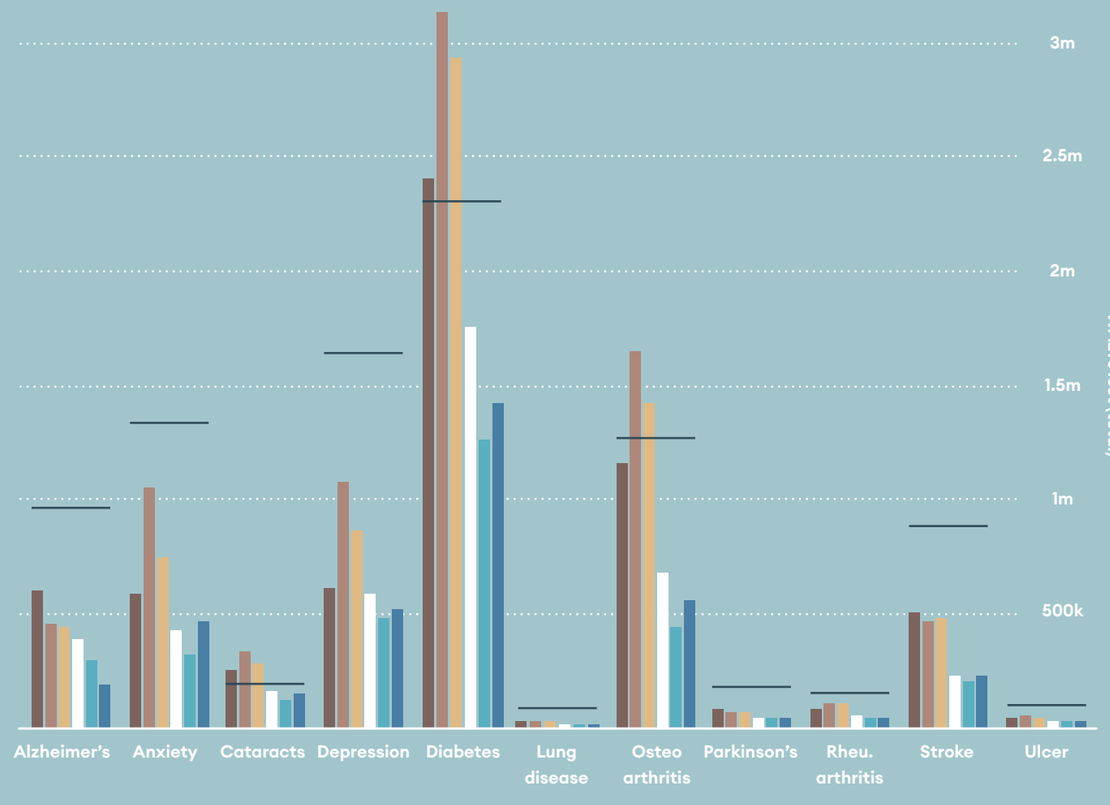
Vitality
Faint
Fatigue
Hands trembling
Trouble sleeping
Frailty

Optimism
Chances of living
Fear the worst
Hopefulness
Fear dying

Engagement
Enjoyment

Loneliness
Feels lonely
Isolated
Feels left out

Wellbeing lost due to symptoms of disease across patient groups



WALYs lost at a population level are estimated by multiplying individual WALYs lost for each symptom category with symptom prevalence rates for each patient population. Symptom prevalences estimated using SHARE data. Overall prevalence of each disease drawn from the Global Burden of Disease. Data from 2017 for individuals over the age of 45 in 28 European countries. Black bars indicate the total wellbeing burden associated with each disease. Self-sufficiency, vitality, optimism, and engagement symptom categories were reverse scored. Additional details are provided in the full report and in the online appendix.

Detecting invisible costs and opportunities

Potential wellbeing without pollution in European cities

Wellbeing assessed in terms of life satisfaction on a 4-point scale. Potential life satisfaction estimated using OLS linear regressions with individual data aggregated at the city level. Individual level controls included for employment, marital status, financial difficulties, gender, age, as well as satisfaction with access to green space, public transport, noise, city as a whole, cleanliness, house price, household size, and government commitment on pollution. Data from Eurobarometer and the World Health Organization.

While, so far, we have primarily focused on applications in healthcare, WALYs can also be scaled up to evaluate the Happiness Return on Investment in fields and domains ranging far beyond health. **It is the ultimate ambition of this project to develop a key performance indicator where costs and benefits are combined into a single unit of effect to enable value comparisons across domains.**

To better illustrate the potential of these opportunities, here we provide a case study of air pollution. By matching data on air quality with city residents' subjective wellbeing, WALYs can be used to assess both the benefits of clean air and costs of pollution for 71 European cities.

Addressing the pollution generated by the burning of coal and fossil fuels is poised to be one of the most important challenges of the 21st century. Projections carried out by the Intergovernmental Panel on Climate Change now indicate that average global temperatures will likely exceed 2°C above pre-industrial levels.[21] Climate change is already having substantial impact on weather patterns, water cycles, and international migrations.

Pollution has also been found to increase the incidence of respiratory infections, heart problems, lung cancer, asthma, chronic bronchitis, and many other negative health conditions.[22] It has even been linked to increased rates of depression and anxiety.[23] It is no surprise then that a burgeoning number of studies have begun to investigate the relationship between air pollution and subjective wellbeing.[24]

However, **it is often exceedingly difficult to tell whether progress brought about by transport and industry can outweigh the costs of air pollution.** In an attempt to address this question, we will follow an approach similar to the one laid out in previous sections to compare the subjective wellbeing of residents living in polluted cities to counterparts living in similar cities with better air quality. This analysis relies on life satisfaction data provided the Flash Eurobarometer and pollution data provided by the World Health Organization.[25]

We find for example that reducing pollution levels to zero in Kraków could increase average life satisfaction by 0.29 points on a 4-point scale. This would be equivalent to an increase of 0.09 WALYs per person. At the other end of the spectrum, reducing pollution levels to zero in the Danish city of Aalborg could increase resident life satisfaction by 0.09 points, equivalent to a gain of 0.02 WALYs per person.[26]

Using these numbers, we can also calculate the marginal rate of substitution for pollution – in other words, the increase in income necessary to compensate for the negative effects of air pollution. By comparing the relationship between income and life satisfaction to the relationship between pollution and life satisfaction, we find that **the wellbeing burden of air pollution in Kraków is roughly equivalent to a loss of €782 per year, or 15% in annual income for a household earning €5,000 per year (mean annual household income in Kraków).**

To give another example, in Hamburg life satisfaction lost due to pollution is 0.11 (on a 4-point scale) and mean annual household income is approximately €28,000. Using these inputs, **the wellbeing cost of air pollution in Hamburg is estimated to be equivalent to losing €1,897 per year per person (7% in annual income).** While pollution in Hamburg is lower than in Krakow, the absolute amount of income needed to compensate for its effects is greater. This is because the marginal utility of income becomes smaller as overall income gets larger.

As this analysis makes clear, the costs of urban air pollution can be substantial. In the most polluted European cities, WALYs lost due to pollution even approach average WALYs lost due to Alzheimer's or Parkinson's disease.

Towards a common currency of global impact

Widespread dissatisfaction with current economic and financial indicators has already spurred significant interest in developing new ways to measure progress. In this report, we seek to lay the theoretical and empirical groundwork for a new metric capable of measuring and modelling outcomes in public and private decision-making: Wellbeing Adjusted Life Years.

From analysing the wellbeing effects of crop enhancements, to isolating the effects of air pollution, to predicting the outcomes of medical interventions, **WALYs can help to quantify impact and qualify value in terms of experienced subjective wellbeing across a wide variety of domains. Grounding decision-making in subjective wellbeing can reveal uncharted market opportunities and guide innovation to address wellbeing scarcities.** However, a successful transition to measuring progress in terms of wellbeing requires a number of additional steps.

1 First, further research should seek to contribute domain specific insights in areas that have not been covered in this report. In the time of writing this, we at Leaps by Bayer and the Happiness Research Institute are in the process of estimating the potential WALY impacts of addressing ten major challenges facing humanity. These are the ten challenges that Leaps by Bayer focuses on addressing through their impact investment approach. Measuring the most important wellbeing burdens associated with each of these challenges can allow us to set goalposts and evaluate progress as we take steps towards alleviating them in the years to come. The results of this analysis are expected to be published in early 2021.

- 01 / Cure genetic diseases
- 02 / Provide sustainable organ replacement
- 03 / Reduce the environmental impact of agriculture
- 04 / Prevent and cure cancer
- 05 / Regenerate lost tissue function
- 06 / Reverse autoimmune diseases
- 07 / Cure through microbiome health
- 08 / Develop sustainable protein supply
- 09 / Eradicate insect-borne infections
- 10 / Drive transformational digital business models

2 Second, it is vital that existing insights from the subjective wellbeing literature are harmonised across domains to enable reliable comparisons. Following recent recommendations provided by Frijters, Clark, Krekel, and Layard (2019), a Database of Happiness Coefficients could be assembled to represent differences in subjective wellbeing due to any number of interventions and used to conduct reliable WALY estimations of past and future potential interventions.[27]

3 Thirdly, and perhaps most importantly, it is crucial that WALY estimates and underlying methodologies undergo continuous evaluation and revaluation from scientific experts and practitioners to ensure ongoing qualification, refinement, and improvement.

All of these steps can be initiated and implemented by investors, policy-makers, statistical agencies and academic researchers. Leaps by Bayer and the Happiness Research Institute are dedicated to bringing together stakeholders committed to improving and supporting wellbeing by offering WALY as a common currency for public and private decision-making.

The ultimate ambition of this endeavor is to facilitate new ways of measuring and realizing not just Return on Investment, but even more importantly, Return for Humanity. Evaluating investments and decisions exclusively in terms of financial return can no longer suffice. We need to move beyond financial indicators to more holistic understandings of human wellbeing, and we need new metrics to light the way. There is every hope that by making WALYs a success, we can foster more impactful investing, better policy making, and ensure sustainable improvements in subjective wellbeing for all.

Endnotes

1 Lall (2018)

2 Graham et al. (2017); Li & Raine (2014); Data on the Chinese GDP is provided by the World Bank.

3 Helliwell et al. (2019).

4 Statens Institut For Folkesundhed (2019).

5 Stiglitz et al. (2014).

6 Stiglitz (2018).

7 Porter & Kramer (2011).

8 Business Roundtable (2019).

9 De Neve & Sachs (2020)

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