A Cost–Benefit Analysis of the COVID-19 Lockdown in Ireland

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1 Introduction

The Irish people have experienced over 400 days of lockdown, 200 of which were under the most severe "Level 5" restrictions. It tops the polls in Europe and comes third overall across the world in terms of lockdown stringency (University of Oxford, 2020).Consequently, there is strong evidence that the lockdown is having profoundly negative effects across many areas of life. The restrictions have reduced consumer spending and commercial output, reduced and limited access to medical care and increased the number of people unemployed.

The Economic and Social Research Institute (ESRI) forecast a total budget deficit of €46 billion (-3.8% GDP) from 2020 to 2022 (McQuinn et al, 2021). The top industries negatively affected include Distribution, Transport, Hotels and Restaurants (-16.7%), Professional, Admin and Support Services (-15.5%), Construction (-16.7%) and Arts, Entertainment and Other Services (-54.4%) (CSO, 2021). Furthermore, household savings of disposable income increased from 12.2% to 23.7%, with overall household consumption down by -9% (€9.2 billion) from 2019 to 2020.(CSO, 2021)

In February 2020, the unemployment rate stood at 4.9%. This is among the lowest rates on record and less than half of the median (11.7%) since 1983 (McQuinn et al., 2021)(OECD, 2021). However, the COVID-adjusted unemployment rate was 24.8%. This means that 80% of those unemployed at that time were receiving the Pandemic Unemployment Payment (PUP). COVID-adjusted unemployment peaked at 30% in April 2020, the highest rate on record (CSO, 2021). Following an easing of restrictions in September 2020 the COVID-adjusted unemployment decreased to 15.7%. This rose to 25.1% in January 2021 following the reintroduction of stringent public health restrictions. As of April 2021, over 75% of those unemployed are receiving the PUP support, as as unemployment stands at 5.6% and the COVID-adjusted unemployment at 22.4%

The medical and healthcare industry has also been significantly disrupted. The Irish Hospital Consultants Association (IHCA) has raised significant concerns as hospitals are experiencing a 100 percent increase in inpatient waiting lists and a total of 883,727 are now awaiting care nationally (IHCA, 2021). From March to June 2020, there were 15,472 (44%) fewer biopsies performed compared to 2019 (Crowley & and Hughes, 2021).

Lockdown has also had a dramatic impact on mental wellbeing. In early December 2020, the Primary Care Reimbursement Service (PCRS) reported a 30% increase in the prescription of antidepressants compared to 2019 (Crowley & and Hughes, 2021). The volume of visits to the HSE mental health content on yourmentalhealth.ie rose by 490% between March and July 2020. (Crowley & and Hughes, 2021). These insights indicate that the lockdown is having a harmful impact on the wellbeing of the Irish people.

“Improving and supporting the health and wellbeing of the people of Ireland is central to the work of Government” (Government of Ireland, 2021,p1). The recent creation of the Healthy Ireland Strategic Action Plan 2021-2025 aims to support this effort. Yet, the government's assessment of the benefits and costs of the lockdown has never been brought to the attention of the public. Still to this day, a country’s performance is measured by Covid-19 related deaths and cases without consideration for the broader impact on lives and the wellbeing of the nation, and the sustainability of the policy (Joffe, 2020). Making decisions without an assessment of human welfare is “to make policy in a vacuum”. (Miles et al., 2020, p68). Consequently, the aim of this paper is to illustrate that such an analysis is possible, and the methodology should be implemented by the government when assessing outcomes that are not obviously comparable.

This paper starts by detailing the methodology used to create the cost–benefit analysis, including an overview of the concept of the Quality-Adjusted Life Year (QALY) and the Well Being Year (WELLBY) and their application in measuring wellbeing-related outcomes. The concept and definition of wellbeing is also explored. Next, a detailed analysis of the costs and benefits of implementing the lockdown is presented. This includes the benefits of saving lives as a result of stringent restrictions as well as the costs, measured in the number of lives lost through the impact on public wellbeing, as a result of negative GDP growth, social isolation, and surplus unemployment. Next, the paper assesses the results of the final cost–benefit analysis and the implications of the analysis are then explored. Finally, the paper will finish with a conclusion, summarising all the key points raised throughout the paper.

2 Methodology

The analysis presented in this paper calculates and compares the potential benefits and costs of the lockdown in Ireland. To compare the outcomes of policies, it is necessary to use a common metric. Hence, the number of Wellbeing Years (WELLBYs) is used. This metric is analogous to the Quality-Adjusted Life Years (QALY) metric which has been used successfully in the National Health service in the UK for over 20 years (Layard et al., 2020).

Three scenarios have been outlined in this cost–benefit analysis. The Probable Scenario will use the most recent evidence produced by leading academics in their field. The Generous and Conservative Scenarios will account for potential challenges to those estimates by adjusting their impact accordingly. This will allow for a critical assessment of the benefit and cost of the lockdown. For this analysis, the estimated costs of lockdown assume a full recovery to a 2019 baseline by the end of 2022 at the latest (i.e. unemployment, budgeted GDP etc.).

Wellbeing

Wellbeing is recognised as a determinant of longevity. It is considered to be an important component in the successful management of a healthy lifestyle and chronic illness (Chida, 2008).The concept of wellbeing can be difficult to define precisely. In part, this is because people's understanding of wellbeing will vary in different contexts (White, 2008). Notwithstanding, "Doing well - feeling good" is a definition put forward by Nic Marks founder of the Centre for Wellbeing in the UK, who's emphasis is on advancing wellbeing as a focus of government policy (Marks et al., 2008). Evidence indicates that the actions we take and the way we think has the greatest impact on our wellbeing (Huppert, 2009). "Doing well" expresses the material aspect of welfare or standard of living. "Feeling good" conveys the subjective aspect of personal perceptions and levels of satisfaction (White, 2008).

With support of the most up-to date evidence, Marks et al. (2008) posit 5 actions to promote wellbeing. First, to connect and build relationships with friends, family, colleagues and the local community. Second, to be active through exercise and physical activity. Third, to take notice and be curious of the world around us. Fourth, to keep learning by increasing responsibility at work, signing up for an educational course or setting a goal to achieve. And finally, to give to others by offering someone a gift, showing your appreciation and helping out in the community (Marks, 2008).
The experience of the lockdown has significantly limited our ability to undertake these actions. People have been isolated from those closest to them, restricted from accessing gyms and curtailed from exercising outside, confined to working and learning remotely and limited in their ability to show appreciation of others. Undoubtedly, the wellbeing of the nation has been affected.

Quality Adjusted Life Years (QALY)

The QALY is used in health economic evaluations to quantify the health benefits of a prevention programme or medical intervention, and ultimately helps to allocate healthcare resources (Kind et al., 2009). It is accepted by health experts that a year of perfect health is equal to 1 QALY. A year of less than perfect health is rated between 0 and 1 QALY (NHS, 2020). For the purposes of this paper a total of 82 QALYs will equal a full statistical life of 82 years (i.e. life expectancy in Ireland) (Department of Health, 2020). The author recognises that an individual will not have 82 years of perfect health in their lifetime. However, there is no literature indicating the most probable average. Therefore, the estimated number of statistical lives lost and saved will be lower than expected.

In Figure 1 below, two interventions are compared in order to determine which has the greatest benefit. This is done by multiplying how long you live for by the quality of life derived from each intervention (Kind et al., 2009). Alternative A gives a quality of life of 0.8 and an additional 2 years, which is 0.8 X 2 = 1.6 or 1.6 QALYs. Alternative B offers a 0.6 quality of life and an additional 4 years, which is 0.6 X 4 = 2.4 or 2.4 QALYs. Alternative B, therefore, is the most beneficial option to choose.

On its own, the QALY does not illustrate the cost-effectiveness of the alternatives. Therefore, a cost per QALY also needs to be applied. Countries have varying costs per QALYs. For example, Ireland has an explicit cost per QALY of €45,000, Wales and England have an explicit threshold range of £20,000–£30,000 and Norway has an explicit threshold of NOK 500,000 (approximately €64,000) (Mahony & Coughlan, 2015). Variables that influence a country's cost per QALY include historical criterion; cost-benefit analyses; the value of a life; and GDP per capita (Mahony & Coughlan, 2015). Assuming that Alternative B has an additional cost of €50,000 over Alternative A. We can then divide the cost by the additional QALYs gained to determine the Cost Per QALY (Cost/QALY). In the example, this would be €50,000/1.6 QALYs = €31,320 per QALY. Each aforementioned country would approve this intervention based on their cost per QALY threshold.

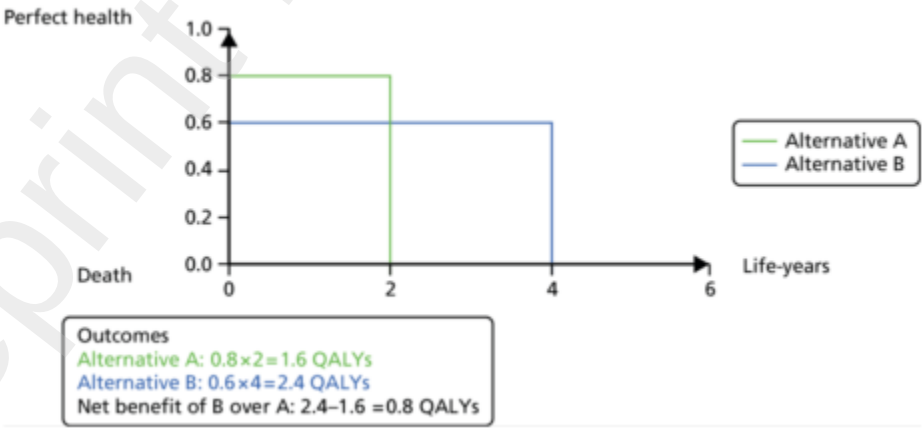

Figure 1. QALY Calculation *(Graves et al., 2016)*

Wellbeing Years (WELLBY)

Due to its sole focus on physical health, the QALY metric is not entirely suited for use when determining the impact of interventions on public wellbeing. (Johnson et al., 2016). Therefore, Layard (2016, p4) asserts that "an overarching variable (single or composite) that measures impact on people's wellbeing " can aid the government in making coherent choices between competing policies. Fortunately, the new science of wellbeing enables the evaluation of changes in human experience in terms of their impact on individuals' life satisfaction (Layard et al., 2020). This is done by asking people "overall, how satisfied are you with your life nowadays?" It is rated on a scale from 0 (not at all) to 10 (completely). Social scientists have been asking this question for at least 50 years. Research by the Economic Evaluation Policy Research Unit in Sheffield found that the life satisfaction rating correlates with measures of wellbeing, self rated health and quality of life (Layard, 2016)(Appendix 1 & 2).

Individuals that rate their life satisfaction 7 to 10 are seen as having progressive wellbeing. This is associated with a positive view of current and future life events. They have fewer diseases, report less sick days, less stress, and higher incomes and contentment (Harter & Gurley, 2008). Individuals that rate 4 to 6 are seen as having inconsistent wellbeing. These respondents are either finding it difficult in the present, or expect to struggle in the future. They experience more daily stress and have more than double the amount of sick days. (Harter & Gurley, 2008). Individuals that rate 1 to 3 are seen as having poor wellbeing. These respondents have a somber outlook on their current and future life. They are more likely to experience poverty, including lack of shelter and food, and are likely to experience more physical pain, sadness, and stress (Harter & Gurley, 2008).

The average life satisfaction rating across 40 countries that are part of the Organisation for Economic Co-operation and Development (OECD) is 6.5 out of 10. Ireland has a rating of 7 out of 10. (OECD, 2021). To use life satisfaction as a proxy for wellbeing in this analysis we must first convert this rating directly into a corresponding number of WELLBYs. Thus, a life satisfaction score of 7 out of 10 is worth 7 WELLBYS. We assume one regular year of perfect health or 1 QALY is worth 7 WELLBYs (Frijters et al., 2019). Therefore, to calculate the effect of an intervention or policy on wellbeing, the yearly increase or decrease in life satisfaction and number of people impacted must be known.

To give an example, let us assume that the government wishes to objectively quantify the impact on public wellbeing of 2 competing policies. Through assessment of associated literature, it is determined that life satisfaction is likely to increase by 0.5 points for a 1 year period. A total of 1 million people will be

impacted by Policy 1 at a cost of €2 billion. Therefore, we can calculate the wellbeing benefit as 500,000 WELLBYs (0.5 multiplied by 1 million people), 71,428 QALYS (500,000 WELLBYs divided by 7) and 892 statistical lives saved (71,428 QALYs divided by 82). The total cost per QALY is €28,000 (€2 billion divided by 71,428 QALYs)

For Policy 2, let us assume that life satisfaction increases by 1.5 points for a period of 6 months for 600,000 people at a cost of €1 billion. This equals a total of 450,000 WELLBYS (1.5 multiplied by 0.5 of a year multiplied by 600,000) 64,285 QALYS (450,000 divided by 7) and 782 statistical lives saved (64,285 QALYs divided by 82). The total cost per QALY is €15,555 (€1 billion divided by 64,285 QALYs)

These examples illustrate how differing interventions can be compared in terms of their impact on people's lives and wellbeing. This approach is not an exact science. However, it offers an objective means of comparing policies which are not clearly comparable. Therefore, we can make a robust attempt to evaluate how the lockdown has affected the overall quality of life of the population in terms of the impact to their wellbeing.

3 The Benefits of Lockdown

The primary aim of lockdown is to reduce the number of preventable deaths (Dowd et al., 2020). Therefore, to determine the benefit it is necessary to estimate the potential number of lives saved by the lockdown. First, the infection fatality rate (IFR) of COVID-19 is needed to determine the proportion of the population that will die if infected with COVID-19. Data from more than 338 seroprevalence studies across 90 countries up to February 2021 estimated the global IFR to be ~0.15% (Ioannidis, 2021). Second, the number of remaining healthy years that were lost as a result of dying from COVID-19 must be known (i.e. QALYs). Based on data from the UK, this is 2.5 if there are substantial comorbidities and 4.9 if there are limited or no comorbidities (Briggs, 2020). Finally, the percentage of deaths prevented by lockdown must be projected. There is much debate surrounding the efficacy of lockdown in preventing deaths. Moreover, there is a growing body of evidence showing that COVID-19 deaths per million were not associated with the stringency of lockdown or more severe nonpharmaceutical interventions (Chaudhrya et al., 2020) (Homburg et al., 2020) (Hunter et al., 2020) (Rice et al., 2020) (Altman, 2020) (Nell et al., 2020) (Larochelambert et al.,2020). However, for the purposes of this paper we will assume that the lockdown is highly effective at preventing deaths.

For the benefit calculation, the Generous Scenario will assume an IFR rate of 0.3% (double the expected), 5 QALYs lost per COVID-19 death and 100% of deaths prevented due to lockdown (highest

figure of loss expected). The Probable Scenario will assume an IFR of 0.15%, 4 QALYs lost per COVID-19 death (the average figure of loss expected) and 50% of deaths prevented due to lockdown. We can calculate the QALYs, statistical lives and WELLBYs that lockdown has saved by multiplying the following factors:

QALY Benefit

Population **X** Infection Fatality Rate **X** QALYs Lost Per Death **X** Lockdown Deaths Prevented

Statistical Lives Benefit

Quality-Adjusted Life Years (QALYs) **/** 82

WELLBY Benefit

Quality-Adjusted Life Years (QALYs) **X** 7

Metric	Scenario	
	Generous	**Probable**
Population of Rep of Ireland	4,977,440	4,977,440
Infection Fatality Rate (IFR)	0.30%	0.15%
QALYs Lost Per Death From COVID	5	4
Lockdown Deaths Prevented	100%	50%
Quality-Adjusted Life Years (QALYs)	**52,263**	**14,932**
# of Statistical Lives Saved (1 Life = 82 QALYs)	**637**	**182**
Wellbeing Years (WELLBYs)	**313,579**	**89,594**

Table 1. Benefit Calculation - Lives saved as a result of lockdown

The Conservative Scenario generates a benefit of 52,263 QALYs, 637 statistical lives saved, and 313,579 WELLBYs. The Probable Scenario generates a benefit of 14,932 QALYs, 182 statistical lives saved, and

89,594 WELLBYs. Next, the costs of lockdown will be calculated in respect to the negative impact on people's wellbeing from reduced government spending, unemployment and isolation.

4 The Costs of Lockdown

Throughout the pandemic, the Irish government imposed severe restrictions on social contact and healthcare, labour, and economic activity (Irish Government, 2021). These restrictions have had a profoundly negative impact on the generation of gross domestic product (GDP), the mental wellbeing of the population, the number of people employed, and the execution of medical interventions and diagnostics. This analysis will not focus on the latter element, as accessing and confirming the veracity of this data would be extremely challenging at this time. A bespoke analysis on this topic would be beneficial once data is made available.

Impact on Public Wellbeing Due to a Reduction in Government Spending

In this section, we'll assess how the decrease in forecasted GDP impacts the government's ability to invest in critical areas such as public healthcare and wellbeing initiatives. Studies show that there is a statistically significant positive relationship between life expectancy, and GDP per capita (Jaba et al., 2014) and government spending on health care in developed countries (Reynolds & Avendano, 2018, Duba et al., 2018) (Heuvel & Olaroiu, 2017). To perform this calculation, the following information is required: GDP deficit in Euro, percentage of government spending to GDP, percentage of total government spending on healthcare and the cost per QALY.

The ESRI forecasts a total GDP deficit of €46bn (-3.8%) from 2020 to 2022 due to the lockdown (Mc Quinn et al., 2021). Such a sharp and unexpected reduction in GDP will mean that the Irish government will have significantly less to spend on public healthcare and initiatives to promote wellbeing. Even without a hard lockdown, Sweden experienced a negative GDP of -2.8% in 2020. Although they are expected to recover with forecasted growth of 3.3% GDP in 2021; Ireland is expected to see a negative GDP of -4.7% in 2021 (OECD, 2021) (Mc Quinn et al., 2021). It is questionable how the Irish economy would perform had the lockdown not been implemented.

In 2019, Irish government spending to GDP was 25%; the lowest it has been since 1959. (OECD, 2020). From 2010 to 2019, on average, the government committed 25% of its total budgetary spending to healthcare. The median was 33% between 1995 and 2019 (OECD, 2020).With this information, and using the cost per QALY of €45,000, we can estimate the impact of a reduction in government spending on the population's wellbeing.

The Conservative Scenario will assume a GDP deficit of €23bn (50% lower than expected), government spending to GDP of 25%, spending on healthcare of 25% and a cost per QALY of €22,500 (50% lower than Ireland's explicit threshold). The Probable Scenario will assume a GDP deficit of €46bn, an increase in government spending to GDP from 25% to 33% to support increased investment and economic growth following the lockdown, spending on healthcare of 25% and a cost per QALY of €45,000. We can calculate the QALY, statistical lives cost and WELLBY cost due to reduced government spending as follows:

QALY Cost

GDP Deficit **X** % Government Spending to GDP **X** % Government Spending on Healthcare **/** Cost per QALY

Statistical Lives Cost

QALYs **/** 82

WELLBY Cost

QALYs **X** 7

	Scenario	
Metric	**Conservative**	**Probable**
Projected Budget Deficit	€23,000,000,000	€46,000,000,000
Government Spending to GDP	25%	33%
Government Spending on Healthcare	25.0%	25%
Cost per QALY	€22,500	€45,000
Quality Adjusted Life Years (QALYs)	**63,889**	**84,333**

# of Lives Lost (1 Life = 82 QALY)	**779**	**1,028**
Wellbeing Year (WELLBYs)	**447,222**	**590,333**

Table 2. Lockdown Cost - Impact on Public Wellbeing Due to a Reduction in Government Spending

The Conservative Scenario generates a cost of 63,889 QALYs, 779 statistical lives, and 447,222 WELLBYs. The Probable Scenario generates a cost of 84,333 QALYs, 1,028 statistical lives, and 590,333 WELLBYs. The cost analysis will continue with an estimation of the impact of social isolation on wellbeing.

Impact on Wellbeing Due to Social Isolation

Social relationships are an important predictor of wellbeing over the course of a person's life span (Diener & Oishi, 2006), but may be particularly pertinent for older adults (Tan et al., 2020). Furthermore, those who are more satisfied with their lives report better physical and self rated health, and lower incidence of long-term conditions (Siahpush et al., 2008) Loneliness has been described as "the unpleasant subjective feeling that occurs when a person's social environment is deficient in some important way, either quantitatively or qualitatively" (Tan et al., 2020). Loneliness has been strongly associated with poor self-rated health, reduced physical ability, multiple comorbidities (Shankar et al., 2013), and decreased subjective wellbeing (Jessen et al., 2017).

To determine the impact of social isolation on wellbeing the following must be known: the decrease in life satisfaction as a result of the lockdown and the period of time in lockdown. Since April 2020, the CSO has released four publications assessing the "Social Impact of COVID-19". The data has been combined with the results of 2 reports measuring similar metrics from 2013 and 2018. This is the best data available for Ireland as there is no longitudinal data being captured currently. The reports illustrate numerous deeply concerning mental health trends. In February 2021, 57.1% of all respondents reported that their mental health/wellbeing has been negatively affected by the lockdown. Nearly three in four (74.4%) younger adults believe that the lockdown has negatively affected their mental health. Overall life satisfaction has dropped from 8.1 in 2018 to 5.8 in February 2021. This is the lowest score recorded since this indicator was first collected in 2013 (CSO, 2021).

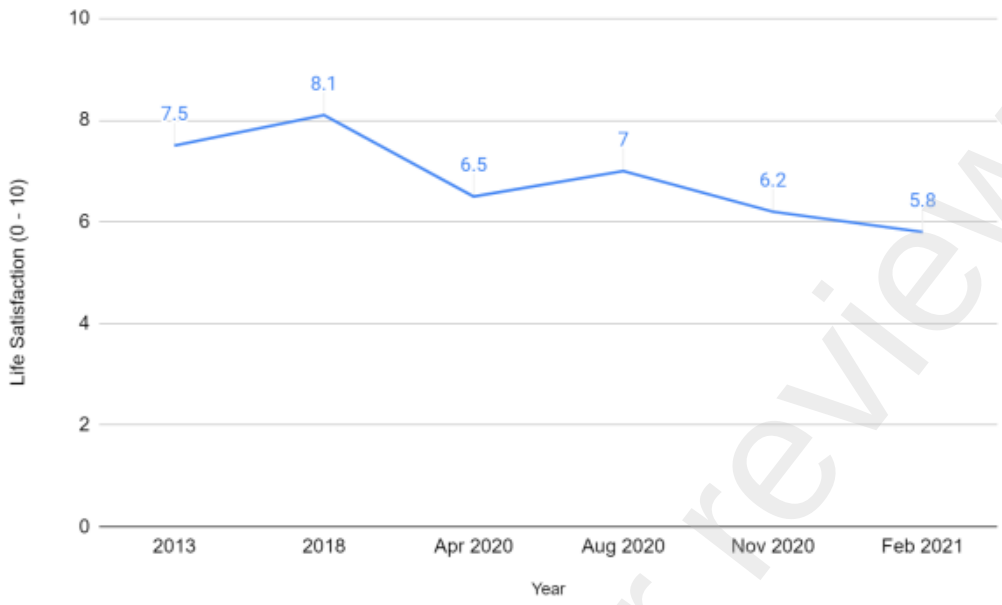

Fig. 2 Mean Life Satisfaction in Ireland

In the four-week period following their interview, respondents were asked how often they felt 'downhearted or depressed', and 'lonely', ranging from 'none of the time' to 'all of the time'. From April 2020 to February 2021, there was a 196% increase (5.1% to 15.1%) in the proportion of people who responded to feeling "downhearted or depressed" "all" or "most of the time". From 2018 to February 2021, there was a 459% increase (2.7% to 15.1%) (CSO, 2021). A similar picture can be seen when assessing the impact of the lockdown on loneliness. From April 2020 to February 2021, there was a 93% increase (6.8% to 13.1%) in the proportion of people who responded to feeling "lonely" "all" or "most of the time". From 2018 to February 2021, this was a 274% increase (3.5% to 13.1%) (CSO, 2021). It is evident that the lockdown has had a profoundly harmful impact on the mental health of many people in Ireland.

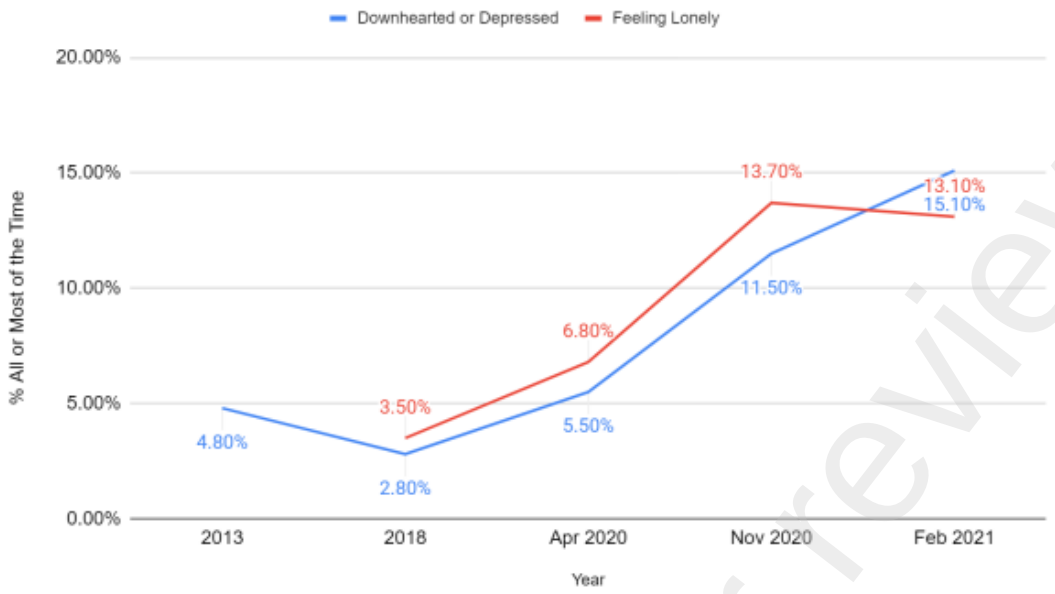

Fig. 3 "Downhearted or Depressed" and "Lonely" - "All" or "Most of the Time"

To complete this analysis, a value for the social isolation cost in WELLBYs must be determined. This is done by taking the delta of the public life satisfaction rating before and after lockdown started. In the case of the data above, this would be 8.1 (2018) for the rating before lockdown and 6.3, the average of the ratings throughout 2020 following the lockdown. This equals 1.8 WELLBYs. However, the veracity of the data is questionable given the significant gaps between surveys. A series of weekly or monthly data is required to pinpoint the specific impact of lockdown. Therefore, it is necessary to look to the Office of National Statistics in the UK. The Opinions and Lifestyle Survey is completed weekly and has not changed in methodology since the pandemic. This offers the most reliable measure of the impact on life satisfaction. It is reasonable to apply their findings to our national situation, since the UK and Ireland are comparable in terms of lockdown stringency (Oxford Covid 19 Stringency Index) and life satisfaction scores (OECD Better Life Index score of 8.1 for Ireland and 7.6 for the UK) and European Quality of Life score of 7.7 for the both Ireland and the UK).

In February 2020, in the UK, life satisfaction was rated as 7.3. Life satisfaction dropped to a low of 6.4 in January 2021, with an average of 6.8 from March 2020 to January 2021 (ONS, 2021). Therefore, a value of 0.5 WELLBYs per person per year will be used to represent the impact of social isolation on the public. This is the delta between 7.3 (February 2020) and 6.8 (March 2020 to January 2021 average). A weighting of 0.54 will also be applied to the final calculation. This is to account for Ireland being in level 5 lockdown for ~200 days or 54% of a full year (200/365). This assumes life satisfaction is impacted only during the lockdown period. Furthermore, those who were made unemployed due to the lockdown

(surplus unemployment) will be removed from the analysis . This was approximately 325,000 people in 2020. This stops the potential for double-counting and facilitates the proceeding section, which will assess the impact of unemployment separately.

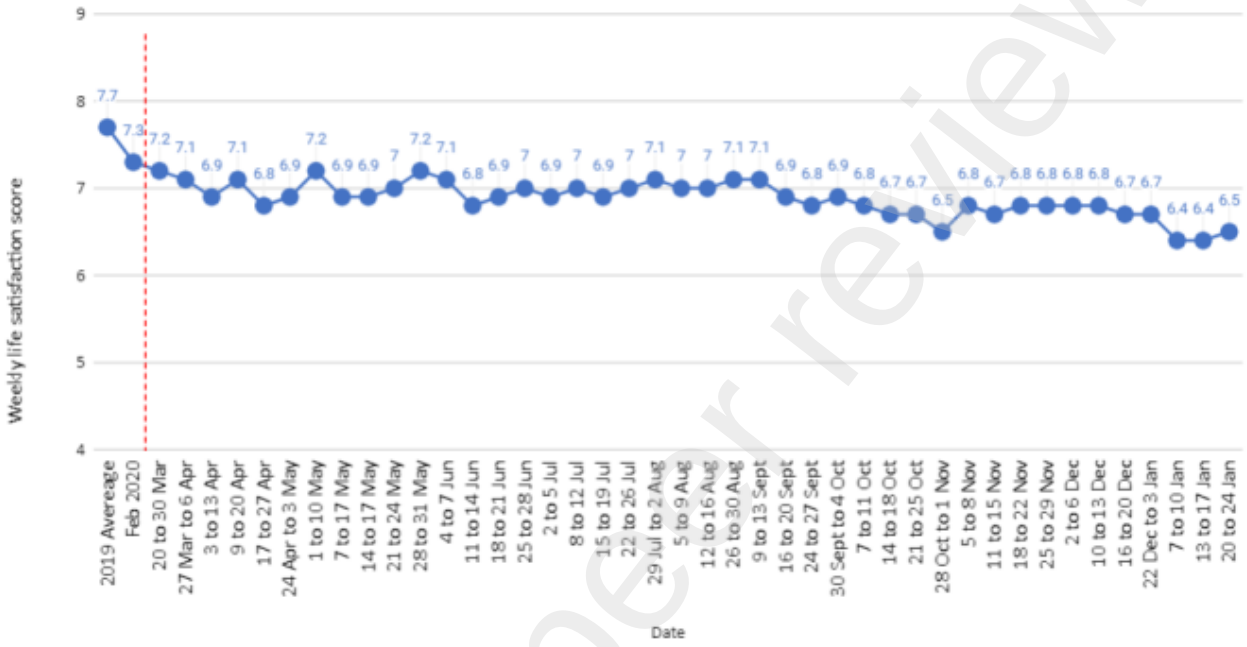

Fig. 4 ONS Weekly Opinions and Lifestyle Survey - Life Satisfaction

We can calculate the cost of QALYs, statistical lives and WELLBYs as a result of social isolation as follows:

WELLBY Cost

Life Satisfaction decrease due to lockdown **X** % of Year In Level 5 Lockdown **X** (Population - Surplus # Unemployed)

QALY Cost

WELLBYs **/** 7

Statistical Lives Cost

QALYs / 82

Metric	Scenario	
	Conservative	Probable
Reduction in Life Satisfaction due to Social Isolation	0.3	0.5
% of Year in Level 5 Lockdown	54%	54%
Population	4,977,440	4,977,440
Surplus Unemployment in 2020	325,000	325,000
Quality Adjusted Life Years (QALYs)	**89,726**	**179,451**
# of Lives Lost (1 Life = 82 QALY)	**1,094**	**2,188**
Wellbeing Year (WELLBYs)	**628,079**	**1,256,159**

Table 3. Lockdown Cost - Impact on Wellbeing Due to Social Isolation

The Conservative Scenario generates a cost of 89,726 QALYs, 1,094 statistical lives and 628,079 WELLBYs. The Probable Scenario generates a cost of 179,451 QALYs, 2,188 statistical lives and 1,256,159 WELLBYs. Next, this paper will assess the impact unemployment has on wellbeing.

Impact on Well-being Due to Increased Unemployment

There is a highly consistent negative association between unemployment and wellbeing (Helliwell et al, 2021). Illustrating this point, a 15-year longitudinal study involving 24,000 individuals in Germany found that participants did not completely return to their previous levels of satisfaction, even after they were re-employed. Furthermore, people who had experienced unemployment in the past were not more resilient to its negative effects if reoccurring subsequently (Lucas, 2004).

According to the International Labour Organization (ILO), global working hours declined by 17.3% in Q2 of 2020, which is equivalent to 495 million full-time jobs lost (Cotofan et al., 2021). By the end of the year,

the loss of hours was four times greater than during the recession in 2009 (Cotofan et al., 2021). In 2017, the World Happiness Report found that unemployed individuals are 0.6 points less satisfied on a scale from 0–10, compared to those working full-time. However, the 2021 report found that unemployment predicts a 1.3-point decline in life satisfaction (Cotofan et al., 2021). The report asserts that employment status is "one of the most important predictors of subjective wellbeing during the pandemic". (Cotofan et al., 2021, p167).

In Ireland, the number of people unemployed rose from 125,000 by the end of 2019 to 450,000 by the end 2020 and is estimated to be 407,000 by the end 2021 and 181,000 by the end of 2022 (McQuinn et al, 2021). We can calculate surplus unemployment as the incremental number unemployed above the 2019 baseline. This is 325,000, 282,000, and 56,000 for 2020, 2021, and 2022, respectively. These figures will be used to calculate the total impact of unemployment on wellbeing

	2019	2020	2021	2022
Forecasted Unemployed	125,000	450,000	407,000	181,000
Surplus Unemployed		325,000	282,000	56,000

Table 3. Forecasted Surplus Unemployment

The Conservative Scenario will assume a 0.65 WELLBY per person per year of 'unemployment effect' (50% of the expected impact) and a surplus of 162,500, 141,000, 28,000 from 2020 to 2022 (both 50% lower than expected). The Probable Scenario will assume 1.3 WELLBYs per person per year of 'unemployment effect' and a surplus of 325,000 282,000 and 56,000 unemployed from 2020 to 2022. We can calculate the WELLBY cost due to increased unemployment as follows:

WELLBY Cost
Surplus unemployed for each year **X** Unemployment Impact on wellbeing

QALY Cost
WELLBYs / 7

Statistical Lives Cost
QALYs / 82

Metric	Scenario							
	Conservative				Probable			
	2020	2021	2022		2020	2021	2022	
Surplus # of People Unemployed	162,500	141,000	28,000		325,000	282,000	56,000	
Unemployment Impact on Wellbeing	0.65	0.65	0.65		1.3	1.3	1.3	
				Total				**Total**
Quality Adjusted Life Years (QALYs)	15,089	13,093	2,600	**30,782**	60,357	52,371	10,400	**123,129**
# of Lives Lost (1 Life = 82 QALY)	184	160	32	**375**	736	639	127	**1,502**
Wellbeing Year (WELLBYs)	105,625	91,650	18,200	**215,475**	422,500	366,600	72,800	**861,900**

Table 4. Lockdown Cost - Impact on Wellbeing Due to Increased Unemployment

5 Analysis

The Generous Scenario shows a total benefit of 74,662 QALYs, 911 statistical lives and 522,531 WELLBYs. In contrast, the Conservative Scenario shows a total cost of 184,397 QALYS, 2,249 statistical lives and 1,290,777 WELLBYs. Even with the most favourable of circumstances afforded, the costs are 2.5 times greater than the benefits. This includes a cost of an additional 1,338 statistical lives.

Using the most Probable Scenario, the costs are 26 times greater, with an additional cost of 4,536 statistical lives. The cost of reduced government spending on its own is 5 times greater than the benefits. The cost of social isolation is 12 times greater. And the cost of unemployment is 8 times greater. An infection fatality rate of ~3.9% would be required to break even. COVID-19 would need to claim the lives of 1 in 25 who contract the virus. This is in stark contrast to the evidence pointing to an IFR of 0.15% or 1 in 6,666 killed.

It is important to iterate that the impact of reduced and postponed healthcare and medical diagnostics was not considered in this analysis. This will dramatically increase the cost and the resulting loss of lives and public wellbeing. These insights illustrate the sheer magnitude of the damage caused by lockdown.

Benefits of Lockdown	Scenario	
	Generous	Probable
Quality-Adjusted Life Years (QALYs)	74,662	14,932
# of Statistical Lives	911	182
Wellbeing Years (WELLBYs)	522,631	104,526
Cost of Lockdown	**Conservative**	**Probable**
Quality-Adjusted Life Years (QALYs)	184,397	386,913
# of Statistical Lives	2,249	4,718
Wellbeing Years (WELLBYs)	1,290,777	2,708,392
Benefit Minus Cost		
Quality-Adjusted Life Years (QALYs)	***-109,735***	**-371,981**
# of Statistical Lives (1 Life = 82 QALYs)	***-1,338***	***-4,536***
Wellbeing Years (WELLBYs)	***-768,145***	***-2,618,798***
Total Costs as a % of Total Benefits	**247%**	***2591%***
# Of Times Greater	***2.5X***	***26X***

Individual Costs as a % of Total Benefits		
Government Spending	**85.6%**	**564.8%**
Social Isolation	**120.2%**	**1201.8%**
Unemployment	**41.2%**	**824.6%**

Table 5 - Final Cost-Benefit Calculations

6 Implications

This section attempts to determine the significance of this analysis. First, an examination of the events and decisions that led to such a severe impact on wellbeing is given. Second, practical applications of the cost-benefit methodology are proposed.

There is overwhelming evidence that the initial predictions of catastrophic deaths induced fear across the world (Caduff, 2020 & Ogbodo, 2020). On the 16th of March 2020, the Imperial College COVID-19 response team published modelling results which suggested that non-pharmaceutical interventions could significantly reduce mortality and demand for healthcare in the UK and USA. This outlined that without lockdown there would be 2.2 million deaths in the USA and 510,000 deaths in Great Britain by mid-April 2020 (Ferguson at al, 2020). They estimated that without lockdowns there would be 40 million deaths globally in 2020, noting that they “do not consider the ethical or economic implications" of implementing them. (Ferguson at al, 2020, p4)

As a result, many governments decided to enforce stringent lockdown measures. In their paper entitled “Explaining the homogeneous diffusion of COVID-19 nonpharmaceutical interventions across heterogeneous countries”, Sebhatu at al (2020) finds that in times of crisis, governments base their decisions on the actions of other nations. The stringency and type of interventions adopted by countries were closely associated with countries in the same region and not key metrics such as population >65 years old, the number of cases or deaths, or hospital beds per capita in the country.

Halpern et al (2020) develop the claim that during crises governments have a tendency to focus on efforts to save lives from a known cause; failing to see the opportunity to save more lives through alternative responses (identifiable lives bias). Immediate benefits are preferred to larger benefits in the future (present bias) (Halpern, 2020) and insistence to adhere to a hypothesis and disregard for multitudes of contrary evidence gravely deprive policy making of rationality and objectivity (anchoring bias) (Lieder, et al, 2017).

It can be argued that governments had little choice but to lock down when faced with the prospect of a highly infectious novel virus, limited data to make critical judgments and the supposed panacea that lockdown brought in China. However, data was available as early as March 2020 by leading epidemiologist John Ioannidis estimating an infection fatality rate of 0.15 - 0.2% (Ioannidis, 2020). This was the most critical piece of data needed to understand the lethality of COVID-19 and make conservative cost–benefit projections. All other data could have been inferred based on historic information and updated as new information became available. Instead, Irish government decided to

solely focus on Covid-19 deaths and cases which have had a harmful effect on people's mental and physical health, wellbeing and safety (Holmes et al, 2020).

To improve the response and management of similar threats in the future, the Irish government should now acknowledge and understand the biases that led to their irrational decision making. To reduce the effects of such biases, the government would benefit from the use of an objective cost-benefit approach when considering policy outcomes which impact the public wellbeing. The WELLBY metric allows for the comparison of different policies whose goals are not "obviously commensurable" (Layard et al, 2021, p198). The methodology and numbers are not exact, but it is more beneficial to use empirically sourced numbers while considering multiple outcomes than isolated metrics ignoring substantial context . Frijters et al. (2019) assert that "for wellbeing to become a practical goal of government decision-making, both cost-benefit analysis augmented by wellbeing data and wellbeing cost-effectiveness analysis need to be advanced."
The experience of the QALY illustrates that the calculations do not need to be perfect to be of utility (Layard, 2020). Therefore, the WELLBY is a common currency that can be used to balance trade-offs and enhance decision-making. Perhaps the wellbeing of the Irish public would be in a much better position had this approach been utilised by the government.

7 Conclusion

This paper assessed the benefits and costs of lockdown in Ireland. In doing so, the QALY and WELLBY metrics were introduced as a means of comparing the consequences of the lockdown policy. The concept and components of wellbeing were also examined. This allowed for an evaluation of the impacts of lockdown on lives and the overall quality of life of the population. Three scenarios were used to allow for a critical assessment of all assumed evidence, metrics, and data. It was illustrated that the QALY, WELLBY and statistical lives metrics can aid in policy decision making. The WELLBY could potentially become a leading metric for policy decision-making. It can offer governments an intuitive means of assessing and communicating decisions to the public.

The paper explored the benefit of lockdown by calculating the potential number of lives saved. This was done using the latest scientific literature to determine the infection fatality rate and QALYs lost per COVID-19 death. It was stressed that there is a growing body of evidence illustrating that COVID-19 deaths per million are not associated with lockdown stringency. Therefore, the projected benefits of the lockdown are likely inflated.

Following this, the cost of the lockdown was estimated with respect to the impact on public wellbeing due to restrictions in government spending and the impact of social isolation and unemployment. The findings showed that the lockdown has had a profoundly damaging effect on the public's life satisfaction and wellbeing. Given the cited significant association between satisfaction and wellbeing, the available evidence seems to suggest that there will be a measurable decline in physical health and self-rated health, and an increase of limiting long-term conditions.

Next, the paper presented the cost-benefit analysis. It showed that even with the most favourable circumstances, the benefits of lockdown have been dramatically outweighed by the costs. Analysis of the Probable Scenario illustrated an incremental cost of 371,981 QALYs and 2,618,798 WELLBYs. This equals an additional cost of 4,536 statistical lives of 82 years lost as a consequence of the lockdown policy. It was found that the costs of the lockdown are 25 times greater than the benefits. Furthermore, each of the individual costs taken on their own are greater than the total benefits of lockdown.

Finally, the implications of this analysis were addressed. On the basis of the evidence available, it is reasonable to assert that the Irish government focused on COVID-19 cases and lives lost to the exclusion of other important indicators. The available evidence seems to suggest that the government's public health response is disproportionate to the risk posed by COVID-19. The government seemingly ignored all of the robust data and evidence pointing to the much greater damage being caused by other factors. Subsequently, their failure to acknowledge and reevaluate their response to the COVID-19 pandemic can lead to additional harm to the Irish population in the future. In order to ensure the policy makers choose a legitimate approach to similar critical situations, they should leverage the wealth of evidence, data and resources available to them to assess the costs and benefits of policies which impact the lives and wellbeing of the public.

8 Limitations

This paper focused on the most pertinent benefits and costs of the lockdown. The calculations presented are based on the most reliable data projections available at the time. To improve the efficacy of the analysis, it is critical to reassess these calculations when the world progresses through the pandemic. Furthermore, the full impact and costs associated with a reduction in healthcare and medical diagnostics were not examined. The harm caused by such a drastic reduction of services and postponement of appointments is unknown. A thorough elevation of this area is urgently needed.

In the absence of reliable longitudinal data on the Irish population, data from the ONS in the UK was used as a proxy to calculate the cost of isolation. For the purposes of this paper, it was reasonable to apply this logic and approach given the similarities in life satisfaction rates prior to the beginning of the pandemic. However, to improve the accuracy and reliability of future research, access to similar data for the Irish population is needed. This would allow for a consistent and reliable assessment of important variables such as anxiety, life satisfaction and happiness.

Other cost-benefit analyses on lockdown have included additional benefits, such as an increase in lives saved due to a reduction in road deaths, improved wellbeing due to reduced commuting stress, and improved environmental conditions due to decreased CO2 emissions (Layard et al., 2020). Conversely, additional costs have also been explored by Layard et al (2020), such as the reduction in wellbeing due to loss of confidence in the government's actions and the closure of schools (Layard et al, 2020). The result of the analyses remains the same: lockdowns are significantly more costly. Notwithstanding, policy makers should balance the quality and quantity of data and evidence available when applying a cost-benefit approach to future evaluations.

A publication from the Irish government presenting their cost-benefit analysis of the lockdown would be beneficial. This should detail the methodology, metrics and calculations which were used to influence their decision making. In doing so, the nation can begin to understand how and why such decisions were made, reducing ambiguity and uncertainty, and building greater awareness on this topic. This also presents an opportunity for critique from entities which are external to the government. Thus, ensuring that the approach to similar emergencies in the future can be improved.

9 Conflict of interest

None to declare.

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11 Appendix

1. Impact of different measures upon life-satisfaction (0-10)

	Range of variable	Health improvement and Patient Outcomes		Multi Instrument Comparison		South Yorkshire Cohort over 65		Understanding Society	
		r	dLS/dX	r	dLS/dX	r	dLS/dX	r	dLS/dX
Wellbeing									
Worthwhile (ONS)	0-10	0.80	0.80	0.77	0.84	0.75	0.75		
Happy (ONS)	0-10	0.84	0.84	0.76	0.75	0.80	0.72		
Anxious (ONS)	0-10	0.60	0.53	0.32	0.30	0.50	0.35		
WB-VAS[14]	0-10	0.82	0.490			0.74	0.07		
GHQ									
GHQ	0-36							-0.49	-0.21
GHQ positive	0-18							-0.40	-0.42
GHQ negative	0-18							-0.48	-0.30
Health									
EQ-5D- 5L	(-0.6) - 1	0.63	5.65	0.39	4.56	0.44	3.79		
SF-6D (SF-12)[15]	0.3 -1	0.72	11.30	0.51	9.15			0.36	5.86
SF-6D (SF-36)	0.3 -1			0.48	9.22				
WEMWBS[16]	16-70					0.68	0.13		
SWEMWBS[17]						0.66	0.26	0.50	0.25
ICECAP-0[18]	0-1					0.63	8.77		
ICECAP-A[19]	0-1			0.65	9.71				
EQ-VAS15[15]	0-10	0.70	0.80			0.59	0.60		

[14] Visual analogue scale (Four statistics are overrounded).
[15] Short Form 12 or 36 questionnaire
[16] Warwick Edinburgh Mental Well-Being Scale
[17] Shortened Warwick Edinburgh Mental Well-Being Scale
[18] Investigating Choice Experiments Capability Measure for Older people
[19] Investigating Choice Experiments Capability Measure for Adults

(Layard, 2016, p 9)

2. Domain satisfactions as predictors of life satisfaction, BHPS 1996-2009

Dependent variable: Life satisfaction	r	∂LS/∂X
Satisfaction with income of household	0.089	0.110
Satisfaction with flat/house	0.063	0.070
Satisfaction with job	0.041	0.086
Satisfaction with amount of leisure	0.055	0.070
Satisfaction with use of leisure	0.146	0.174
Satisfaction with spouse/partner	0.077	0.171
Satisfaction with social life	0.167	0.194
Satisfaction with health	0.138	0.172
Observations	107,501	107,501
R-squared	0.571	0.740

Robust standard errors in parentheses. Fixed effects included.

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

(Layard, 2016, p 9)

3. Impact of Events on Life Satisfaction

	Change	Effect on 0-10 Life Satisfaction	Dynamics	Key literature References	Confidence in effect and causality?
Work	From employment to Unemployment	**-0.46 (UK)** **-0.71 (Ger)**	Immediate effect higher, then reducing, but no full adaptation.	UK: [1] Tbl 4.2 Ger: [1] Tbl 4.2.	High. Large effects found in longitudinal studies, cross-sections, recession-related, and employment shock-related (plant closures).
	From unemployment to out-of-labour force	**+0.32 (UK)** **+0.57 (Ger)**	Unknown.	UK: [1] Tbl 4.2	Effect very robust in cross-section and panels, but causality unclear.
	From no commute to 1 hour car commute	**-0.012 (UK)** **-0.151 (Ger)**	Unknown.	UK: [2] Ger: [3]	Low. Findings disputed and causality unclear. No RCTs.
	From car commute to walking commute (time)	**Insig. (UK)** **Insig. (Ger)**	Unknown.	UK: [2] Ger: [3]	Low: results from fixed-effects, no RCTs.
Finances	Doubling of household income at the individual level	**+0.14 (UK)** **+0.5 (E-Ger)** **+0.3 (Sweden)**	Persistent effect with elation peak.	UK: [1] Tbl 2.1 E-Ger: [4a] Sweden: [4b]	High. Effect found in panels, cross-sections, and shock-related (lotteries). Size of effect disputed and income measurement problematic.
Education	Extra year of compulsory education	**-0.03 (UK)**	Persistent effects.	UK: [5]	High for UK, since effect found from 1972 UK compulsory school changes. Marginal result also found in other Western countries.
Relationships	From single to partnered/married	**+0.28 (UK)** **+0.1 (Ger)**	Permanent effect, with initial peak.	UK: [1] Tbl 5.2 Ger: [6]	High. Ubiquitous finding around the world.
	From never married to married at 50	**+0.2 (UK)**	Permanent effect, high initial peak.	UK: [1] Tbl 9.1	Medium: cohort study findings, so causality unclear.
	From partnered to separated	**-0.40 (UK)**	High initial effect, then some adaptation.	UK: [1] Tbl 5.2	High as found everywhere, but most find new partners so don't stay separated. Lone men suffer more.
Health	From healthy to poor physical health (self-rated)	**-1.08 (UK)** **-0.96 (Ger)**	Permanent effect, but initial peak as well.	UK: [7] , Tbl 4, column 2 Ger: [6][a]	High as found everywhere, including due to health shocks.
	From depression to full mental health (4 pts on a 0-12 scale)	**+0.71**	Permanent, little evidence of a peak.	UK: [1] Tbl 16.2	High as found everywhere, including large clinical trials.
Crime	A doubling of fear of crime	**~-0.30 (Europe)**[b]	Unknown	[8]	Medium: panel-data based, often replicated, but drivers of fear not exogenous.
	Victim of violent crime	**-0.40 (Australia)**	Effect largely in first year.	[9]	High, but specific: effects are for unanticipated events that were recorded.
Environment	Increase of 10 in SO_2 ($\mu g/m^3$)	**-0.08 (Ger)**	Unknown	[10]	High: effects driven by unanticipated changes in power plant emissions due to policy.
	Increase of 10 in PM_{10} ($\mu g/m^3$)	**~ -0.051 (US)**	Unknown	[11]	Medium to high: effects of air pollution sufficiently exogenous for single individual

	Increase of 1 hectare of green space within 1 kilometre around household	**+0.0066 (Ger) ~ +0.0031 (UK)[c]**	Seems permanent	Ger [12], UK [13, 14]	Medium to high: panel-data based but no clear-cut exogenous variation, similar results from studies in UK
	Increase of 1 hectare of vacant land (abandoned areas) within 1 kilometre around household	**-0.0395 (Ger)**	Unknown	[12]	Medium: panel-data based but no clear-cut exogenous variation
	Construction of wind turbine within 4 kilometres around household.	**-0.1405 (Ger)**	Seems temporary: effect disappears after five years	[15]	High: wind turbine construction exogenous for household in surroundings, difference-in-differences with treatment at multiple points in time.
	Being resident in the host city of the Olympic Games	**+0.1372 (UK)**	Temporary; effect disappears within a year (at the latest)	[18]	High: quasi-experimental difference-in-differences design; comparison of London (host city of 2012 Olympic Games) with other capitals in Europe in summers before, during, and after the Olympics
World of work	From full-time employed to part-time employed wanting more hours	**-0.174 (W. Europe)**	Largely permanent. Particularly strong effect for men.	[16]	Effect very robust in cross-section and panels, but causality unclear.
	From full-time employed to part-time employed *not* wanting more hours	**+0.066 (W. Europe)**	Largely permanent. Particularly strong effect for women.	[16]	Effect very robust in cross-section and panels, but causality unclear.
	Being in a white collar job (e.g. managers, officials, clerical or office workers) versus a blue collar job (e.g. construction, transport, farming)	**Approx. +0.80 (worldwide)**	Unknown.	[16]	Effect very robust in cross-section and panels, but causality unclear.
Various	From 0 to 8 portions of fruit and vegetables per day	**+0.20 (Aus)**	Effect lasts whilst treatment lasts.	[17]	Medium. Fixed-effect estimates consistent with small RCTs and public health campaign results, but magnitude very unclear

Notes: a) based on a 3-point change in a 1-5 self-reported measure of health. b) derived from the relative effect of fear of crime versus the effect from unemployment in a log-odds setting. c) Converted from 1-7 to 0-10 scale of life satisfaction. d) Converted from 1-3 to 0-10 scale of life satisfaction.

(Frijters et al., 2019)

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