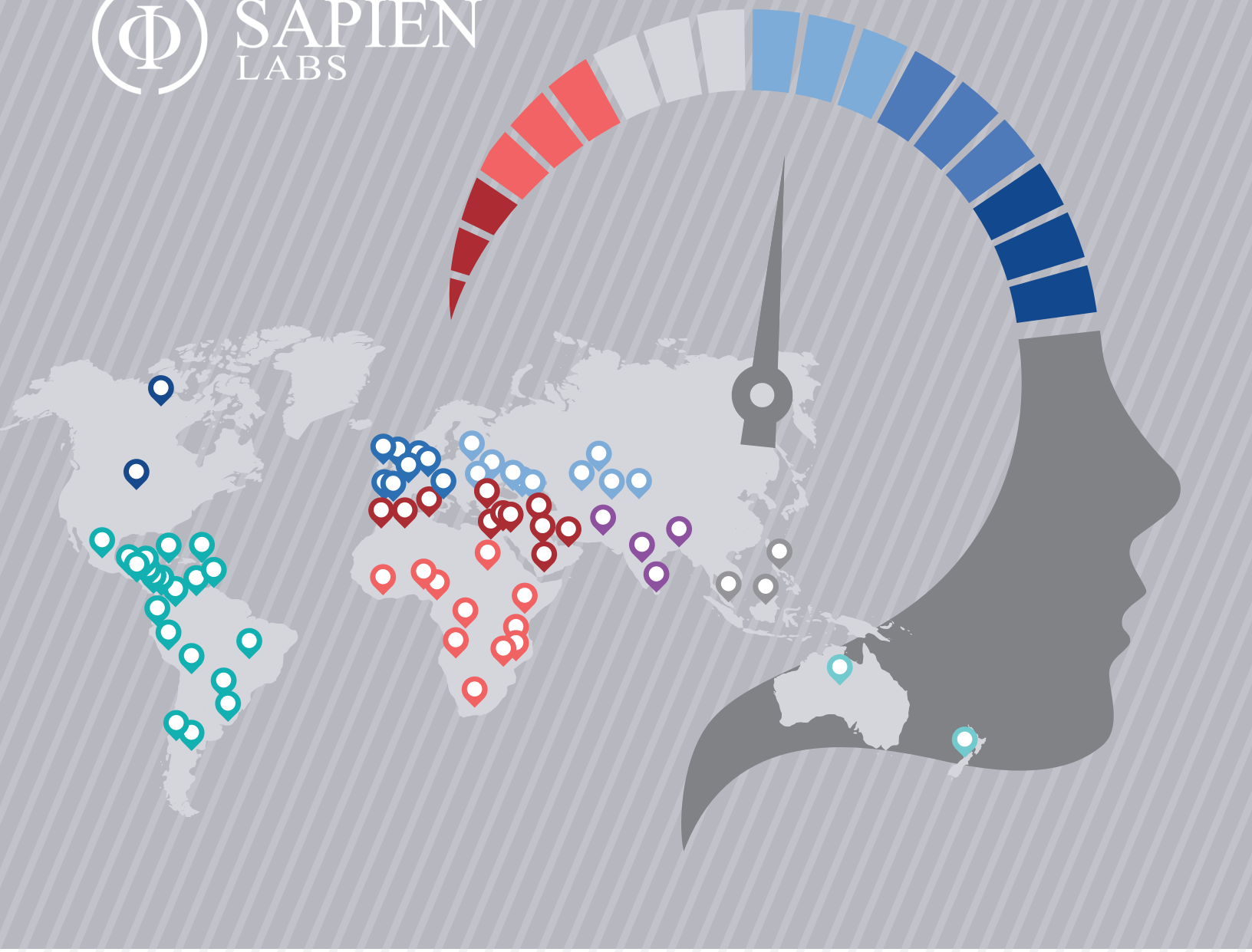
SAPIEN LABS



The Mental State of the World in 2023

A Perspective on Internet-Enabled Populations

A Publication of the Global Mind Project

March 4, 2024

Dear Reader,

This is our fourth annual Mental State of the World Report that provides a perspective on the Internet-enabled global population. In focus this year is one key trend – that the dramatic decline in mental wellbeing that occurred between 2019 and 2020, and continued into 2021 through the COVID-19 pandemic, continues to persist with no sign of recovery. The expectation may have been that once the lockdowns lifted and the threat of COVID-19 subsided that our collective mental health would begin a recovery towards its pre-pandemic levels. However, the data across 64 countries argues otherwise – that the effects of diminished global mental wellbeing have become a new normal. Indeed, many of the shifts that the pandemic brought about persist, from an increase in remote work to increased use of single use plastics, and could all have a contributing effect that must be studied and understood.

As mental wellbeing has remained largely static across the world since 2021, so too have the rankings of countries. At the top of the rankings are many Latin American and African countries while much of the core Anglosphere ranks in the bottom quartile. With national wealth indicators such as per capita GDP negatively correlated with average mental wellbeing scores (see our 2021 report), this year we have made substantial progress in our understanding of why this is so. Two key findings published in Rapid Reports in 2023 show that younger age of first smartphone ownership and ultra-processed food consumption are two major contributors to our mental health challenges. In wealthier countries, the age of first smartphone ownership is much younger and ultra-processed food consumption much higher. Other contributing factors are the relatively diminished family relationships in wealthier countries that are highlighted in our 2022 Annual Report.

In 2023 we also added four new languages – Russian, (Simplified) Chinese, Italian and Hebrew – to bring the total number of languages to 13. While data acquisition did not extend into Russia and China, this extended coverage to the Russian speaking populations of the former Soviet Republics and the Chinese diaspora of South East Asia. This year also marks a year where we have extended the validation of the MHQ and Global Mind data in various ways. This includes publications showing the consistency in the relationship between MHQ scores and productivity measures for all age groups, as well as establishing the representativeness of the Global Mind data for the United States by showing close alignment with the US Census Bureau surveys.

We continue to expand our global footprint and welcome contributions to this expansion and to furthering our understanding of the root causes of our diminished mental wellbeing so that we can develop informed strategies to reverse the decline.

Tara Thiagarajan, Ph.D.
Founder and Chief Scientist

Jennifer Newson, Ph.D.
Lead Scientist, Cognitive and Mental Health

A report of the Global Mind Project

sapienlabs.org/global-mind-project

Advisory Committee

Dr. Jennifer Newson, Lead Scientist, Cognitive and Mental Health, Sapien Labs, USA (Project Lead)

Dr. Helen Christenson, Director and Chief Scientist, Black Dog Institute, Sydney, Australia

Dr. Pim Cuijpers, Full Professor, Faculty of Behavioural and Movement Sciences, Clinical Psychology, VU University Amsterdam, Netherlands

Dr. Eiko Fried, Assistant Professor of Clinical Psychology, Leiden University, Netherlands

Dr. Brandon Kohrt, Associate Professor of Psychiatry and Behavioral Sciences, George Washington University, USA

Dr. Vikram Patel, Professor, Department of Global Health and Population, Harvard University, USA and Adjunct Professor and Joint Director, Centre for Chronic Conditions and Injuries, Public Health Foundation of India, India

Dr. Joshua Seidman, Chief Research and Knowledge Officer, Fountain House, New York City, USA

Take part at sapienlabs.org/mhq

© Sapien Labs 2024

sapienlabs.org

EXECUTIVE SUMMARY 5

INTRODUCTION 6

Our collective mental wellbeing in 2023 6
Measuring mental wellbeing 7
The MHQ 7
What's in this report 8

THE MENTAL STATE OF THE INTERNET ENABLED WORLD 9

1. Global trends in mental wellbeing: 2019-2023 9
2. Global trends across age groups 11
3. How countries rank 12
4. Mental wellbeing trends across the 6 dimensions 14

INSIGHTS AND INTERPRETATIONS 17

The global trends of 2023 17
Explaining the rankings of countries 17
In conclusion 19

Appendix 1: THE MHQ ASSESSMENT AND SCORES 20

Appendix 2: DATA ACQUISITION AND ANALYSIS 23

REFERENCES 27

Executive Summary

This Mental State of the World Report is the annual report of the Global Mind Project and provides trends and insights on the mental wellbeing of Internet-enabled populations around the globe. In 2023, we collected data from over 500,000 respondents in 13 languages across 71 countries that spanned 9 regions. Data is collected using the MHQ assessment, a comprehensive online survey of cognitive and emotional capabilities that provides an overall mental wellbeing metric (the MHQ score) as well as multiple dimensional views that relate to the ability to navigate the normal stresses of life and function productively.

Key insights this year are as follows:

- **Mental wellbeing remained at its post-pandemic low with yet again no sign of movement towards pre-pandemic levels.** In 2023, at both a global level and at the level of individual countries, MHQ scores remained largely unchanged relative to 2021 and 2022, after a sharp drop during the pandemic years. This raises important questions about the lasting impact of the pandemic, and how shifts in the way we live and work and the amplification of existing habits (e.g. remote working, online communication, consumption of ultra-processed food, use of single-use plastics) have cumulatively pushed us into a space of poorer mental wellbeing.

- **Younger generations, particularly those under age 35, saw the steepest declines in mental wellbeing during the Covid-19 pandemic while those over 65 stayed steady.** With these declines persisting across all age groups, the pandemic amplified a pre-existing trend of poorer mental wellbeing for younger generations that is now visible across the globe.

- **As in previous years, several African and Latin American countries topped the country rankings, while wealthier countries of the Core Anglosphere such as the United Kingdom and Australia are towards the bottom.** This pattern suggests that greater wealth and economic development do not necessarily lead to greater mental wellbeing. In 2023, data from the Global Mind Project identified key factors that explain these patterns, such as getting a smartphone at a young age, frequently eating ultra-processed food and a fraying of friendships and family relationships, that are typically more prevalent in Internet-enabled populations of wealthier countries.

Overall, the insights in this report paint a worrying picture of our post-pandemic prospects and we urgently need to better understand the drivers of our collective mental wellbeing such that we can align our ambitions and goals with the genuine prosperity of human beings.

Introduction

Our collective mental wellbeing in 2023

The Mental State of the World report is the annual report of the Global Mind Project, an ongoing, comprehensive survey of the mental wellbeing of the Internet-enabled world. The objective of the Global Mind Project is to provide an evolving global map of mental wellbeing and enable deep insights into its drivers that can be used for more effective management of population mental wellbeing through evidence-based social policy and interventions.

Countries and regions that form part of the 2023 report

North America

Canada, United States

Western Europe

Belgium, France, Germany, Ireland, Italy, Portugal, Spain, United Kingdom

Eastern Europe and Central Asia (Russian-speaking)

Armenia*, Azerbaijan*, Belarus* , Georgia*, Kazakhstan*, Kyrgyzstan*, Republic of Moldova*, Tajikistan*, Ukraine, Uzbekistan*

Middle East and North Africa

Algeria, Egypt, Iraq, Israel* Jordan, Morocco, Saudi Arabia, Syria*, Tunisia, United Arab Emirates, Yemen

Oceania

Australia, New Zealand

Latin America and Caribbean

Argentina, Bolivia, Brazil, Chile, Colombia, Costa Rica, Dominican Republic, Ecuador, El Salvador, Guatemala, Honduras, Mexico, Nicaragua, Panama, Paraguay, Peru, Puerto Rico, Trinidad and Tobago, Uruguay, Venezuela

Sub-Saharan Africa

Angola, Cameroon, Cote d'Ivoire, Democratic Republic of Congo, Kenya, Mozambique, Nigeria, South Africa, Sudan*, Tanzania, Zimbabwe

South Asia

Bangladesh, India, Pakistan, Sri Lanka

South-East Asia

Malaysia, Philippines, Singapore

* Countries with under 1000 respondents

2023 was the 4th year of the project and consolidates responses from over 500,000 individuals collected during the year across 71 countries spanning 9 geographic regions (Core Anglosphere, Western and Eastern Europe, Latin America, Central, South and South East Asia and West and North Africa) and 13 languages [English, Spanish, French, Arabic, Portuguese (European and Brazilian), German, Swahili, Hindi, Italian, Russian, Hebrew and (Simplified) Chinese]. This includes an additional 7 countries and 4 new languages compared to 2022.

As of October 2023, there were 5.3 billion active Internet users worldwide, representing 65.7% of the global population. In countries like the United States where Internet penetration is >90%, the Global Mind data is closely representative of the general population and aligns with national census trends[1]. However, this is not so for countries in Asia and Africa where the Internet-enabled population are typically a minority and generally represent higher socioeconomic groups or those who have achieved greater levels of education. Trends reported here are not likely to be reflective of offline populations who typically live in a different context and therefore country level trends may differ substantially from the Global Mind trends.

Measuring mental wellbeing

This Global Mind project aligns with the World Health Organization (WHO) definition of mental wellbeing which is broadly the ability of an individual to handle the normal stresses and adversities of life and contribute productively to society[2]. The project therefore does not inform on traditional views of happiness or life satisfaction but rather provides a more comprehensive and economically relevant perspective across the breadth of emotional, social and cognitive capabilities.

To this end, the project utilizes the Mental Health Quotient, or MHQ[3,4], which captures perceptions of 47 aspects of mental capability and functioning on a life impact scale. Thus, individual judgement of how much a mental aspect impacts our ability to function must necessarily be within our individual context. For one person this may mean being able to carry out a particular type of knowledge work, while for another it may mean managing a household or performing physical labor. Furthermore, each person will have in their own mind what appropriate functioning looks like. Thus, mental wellbeing, as we measure it, inherently reflects an individual's sense of how their inner state impacts their ability to function within their life context rather than an absolute of human mental function.

In addition, the assessment captures information on demographics, lifestyle factors, friend and family dynamics, and traumas and adversities, providing a rich context for understanding key drivers and risks.

The MHQ

The MHQ assessment is offered as an online anonymous survey that takes approximately 15 minutes to complete and provides respondents with a comprehensive report with tailored self-care and help-seeking

recommendations via email. It also delivers a score (the MHQ) that positions individuals on a spectrum from Distressed to Thriving. This score has been demonstrated to relate systematically to productivity in work and life as well as clinical burden[3,5] (see also Appendix 1). It is therefore a functionally relevant metric that can help inform on both the mental wellbeing and the functional capacity of populations.

Six dimensional scores of *Mood & Outlook, Social Self, Drive & Motivation, Adaptability & Resilience, Cognition,* and *Mind-Body Connection* are also computed using subsets of the 47 assessed items to provide a more granular view.

The scores are reported on a scale that is divided into positive and negative components. The positive range of the scale represents the spectrum of normal functioning and is a 200-point scale calibrated to a mean of 100 based on pre-pandemic responses in 2019, similar to the IQ scale. The negative range of the scale represents mental wellbeing scores associated with a negative impact on the ability to function and is associated with clinical level risks and challenges.

Respondents in each country are recruited through digital advertising targeting a broad range of demographic groups in the general population. Country averages are then computed by constructing weighted averages of the results for each demographic group. You can learn more about the MHQ and its scale in Appendix 1.

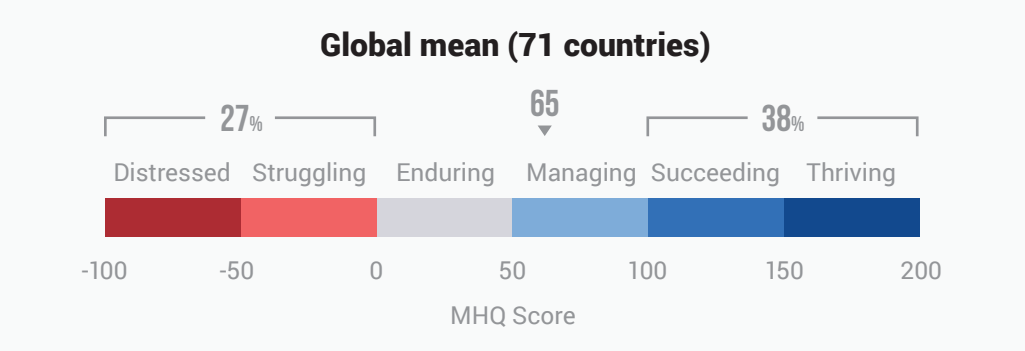
What's in this report

In this report we highlight mental wellbeing trends over time as well as the relative mental wellbeing of 71 countries.

The descriptive analysis in this report represents the tip of the iceberg. The data from the Global Mind Project is freely available for academic research and we hope that it will be of value to researchers who are interested in understanding the relationships between changing environmental and sociocultural trends and mental outcomes. To find out more about how to access the data, visit our Researcher Hub.

1. Global trends in mental wellbeing: 2019-2023

The average MHQ score across the 71 countries measured in 2023 was 65 on the 300-point MHQ scale. Across the spectrum of mental wellbeing, 27% of respondents were Distressed or Struggling (MHQ scores of below 0), while 38% were Succeeding or Thriving (MHQ scores above 100). This is nearly identical to the global figures from last year.

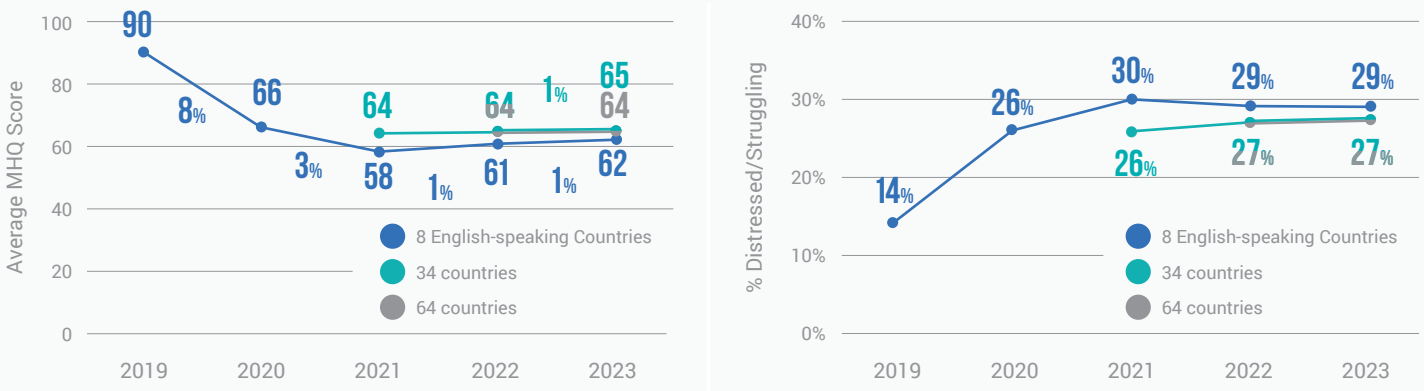


The average MHQ score across the 71 countries measured in 2023 was 65 on the 300-point MHQ scale with 27% Distressed or Struggling and 38% Succeeding or Thriving.

Of these 71 countries, 8 English-speaking countries have been tracked since 2019 with an additional 32 countries tracked since 2021 and 64 since 2022 (Figure 1). Across the 8 English-speaking countries, the average MHQ declined by 8% (24 MHQ points) between 2019 and 2020, coincident with the onset and global spread of the Covid-19 pandemic. In 2021, the average MHQ for these countries declined a further 3% (8 MHQ points).

Since 2021, the average MHQ, as well as the percentage of respondents who are Distressed or Struggling, has shown little change, regardless of whether we look across these 8 original English-speaking countries, the 32 countries tracked since 2021, or the 64 tracked since last year. This suggests that while the declines in mental wellbeing seen during the Covid-19 pandemic have been halted, there has since been no recovery back to pre-Covid-19 levels.

Figure 1: **Mental wellbeing trends 2019-2022**



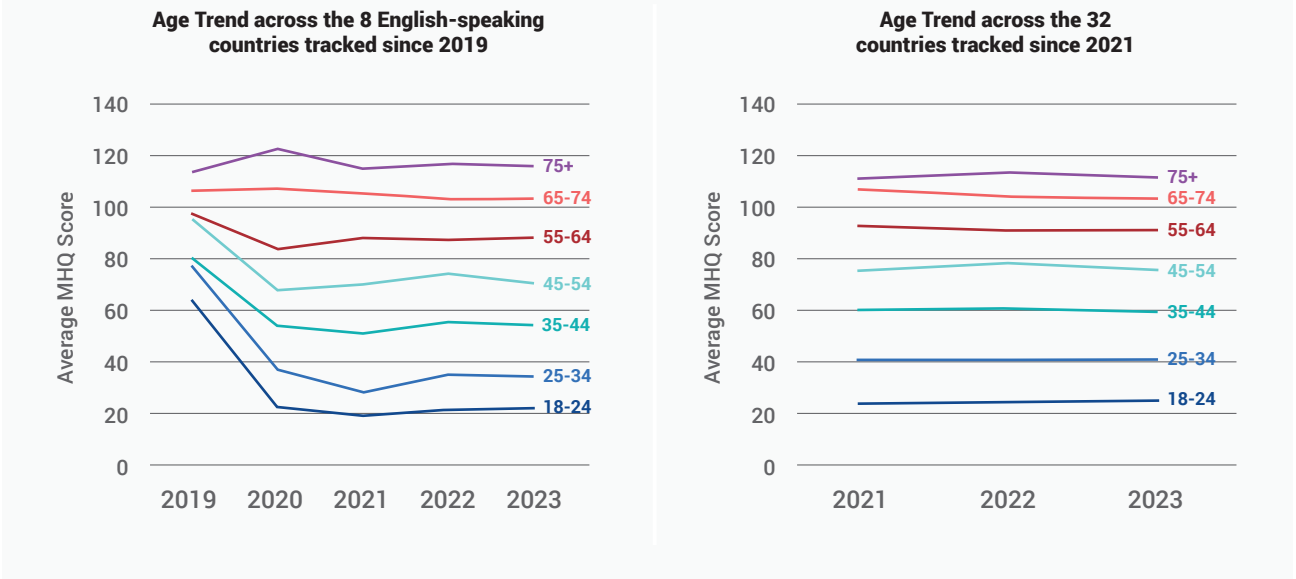
Since 2021, the average MHQ, as well as the percentage of respondents who are Distressed or Struggling, has shown little change, regardless of whether we look across these 8 original English-speaking countries, the 32 countries tracked since 2021, or the 64 tracked since last year.

2. Global trends across age groups

Now in the 4th year of the Global Mind Project, the most prominent and persistent trend we've seen in the data and presented in our 2022 report is decreasing MHQ scores in each younger age group, and a corresponding increase in the percentage of individuals who are struggling with significant mental health challenges. This trend is apparent in Internet-enabled populations of every country measured from Africa to Asia, Europe to the Americas[6], representing a departure from trends measured prior to 2010 where younger age groups always scored highest on surveys of happiness and mood and outlook factors[7].

Here we show the annual trends of MHQ scores since 2019 separated out for each age group, from 18-24 through to 75+ (Figure 2). For the 8 English-speaking countries, the steepest declines in mental wellbeing between 2019 and 2021 were in younger age groups, amplifying the disparity between younger and older age groups already present in 2019. Those aged 18-24 and 25-34 declined between 42 and 50 MHQ points or 14-17% of the scale (Figure 2, left) while ages 35-54 declined by 30-35 MHQ points and ages 55-64 by 15 MHQ points. In contrast, those 65+ did not see much decline over this period. Between 2021 and 2023, in these 8 countries, and across the 32 countries tracked during this time, there has been little change in MHQ scores across all age groups (Figure 2, right).

Figure 2: **Age-wise trends from 2019 to 2023**



3. How countries rank

Figure 3 shows the ranking of the 71 countries measured in 2023 based on MHQ scores that are a weighted average of each age and sex group in the proportion that they are represented in the country's population (see Appendix 2 for more information). Thus, differences in these demographics can play a role in the ranking position.

Within these parameters, Dominican Republic, Sri Lanka and Tanzania top the rankings with MHQ scores of 88 or higher (Figure 3, left). Brazil, South Africa, the United Kingdom and Uzbekistan (Russian Speaking) are at the bottom of the ranking, with MHQ scores ranging from 48 to 53. On the MHQ scale this represents a 14.3% difference between the top and bottom ranked countries. Views across broader geographic regions and languages are shown in the accompanying data tables. In the aggregate Spanish-speaking Latin American countries occupied the top half of the rankings while English-speaking South Asia, Russian-speaking Central Asia and countries of the Core Anglosphere occupied the bottom third.

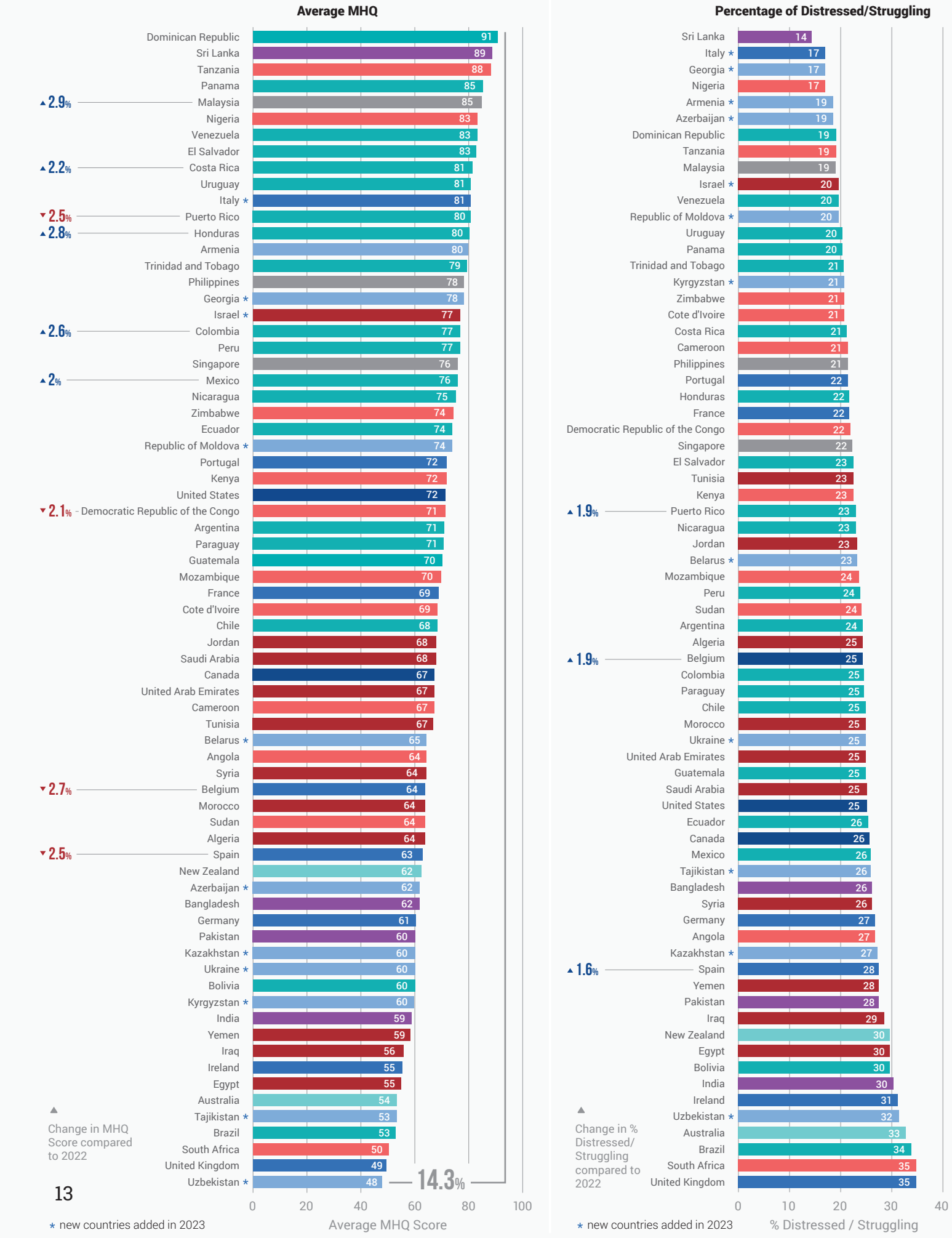
Dominican Republic, Sri Lanka and Tanzania top the rankings while Brazil, South Africa, the United Kingdom and Uzbekistan are at the bottom.

On the right of Figure 3 are the percentages of respondents who were Distressed or Struggling in each country. While the pattern is similar to average MHQ scores, there are some differences. Sri Lanka, Italy, Georgia and Nigeria have the lowest percentages of respondents who are Distressed or Struggling, (ranging from 14 to 17%). At the other end, Brazil, South Africa and the United Kingdom all show the greatest proportion of respondents who are Distressed or Struggling, ranging from 34-35%.

For the majority of the 64 repeat countries, there is little change in average MHQ scores, or the percentage of respondents who are Distressed or Struggling relative to 2022. Only 9 countries (see Figure 3, left) showed a gain or decline in MHQ scores of more than ±2.0% compared to last year with no countries showing a change greater than ±2.9%. The percentage of Distressed or Struggling (Figure 3, right) too was generally static. Only 3 countries had a change of over ±1.5%, with the maximum change being ±1.9%.

For the majority of the 64 repeat countries, there is little change in average MHQ score, or the percentage of respondents who are Distressed or Struggling relative to 2022.

Figure 3: **Mental wellbeing across countries**



4. Mental wellbeing trends across the 6 dimensions

The Global Mind Project also provides indices of various dimensions of mental wellbeing relating to specific aspects of mental function. These include *Social Self, Mood & Outlook, Adaptability & Resilience, Drive & Motivation, Cognition* and *Mind-Body Connection*. These indices or scores are constructed from subsets of items within the MHQ, and are reported on the same scale as the MHQ.

MHQ Dimensions

Mood & Outlook

Your ability to manage and regulate your emotions effectively and to have a constructive or optimistic outlook for the future.

Social Self

How you interact with, relate to and see yourself with respect to others.

Drive & Motivation

Your ability to work towards achieving your desired goals and to initiate, persevere and complete activities in your daily life.

Mind-Body Connection

The regulation of the balance between your mind and body.

Cognition

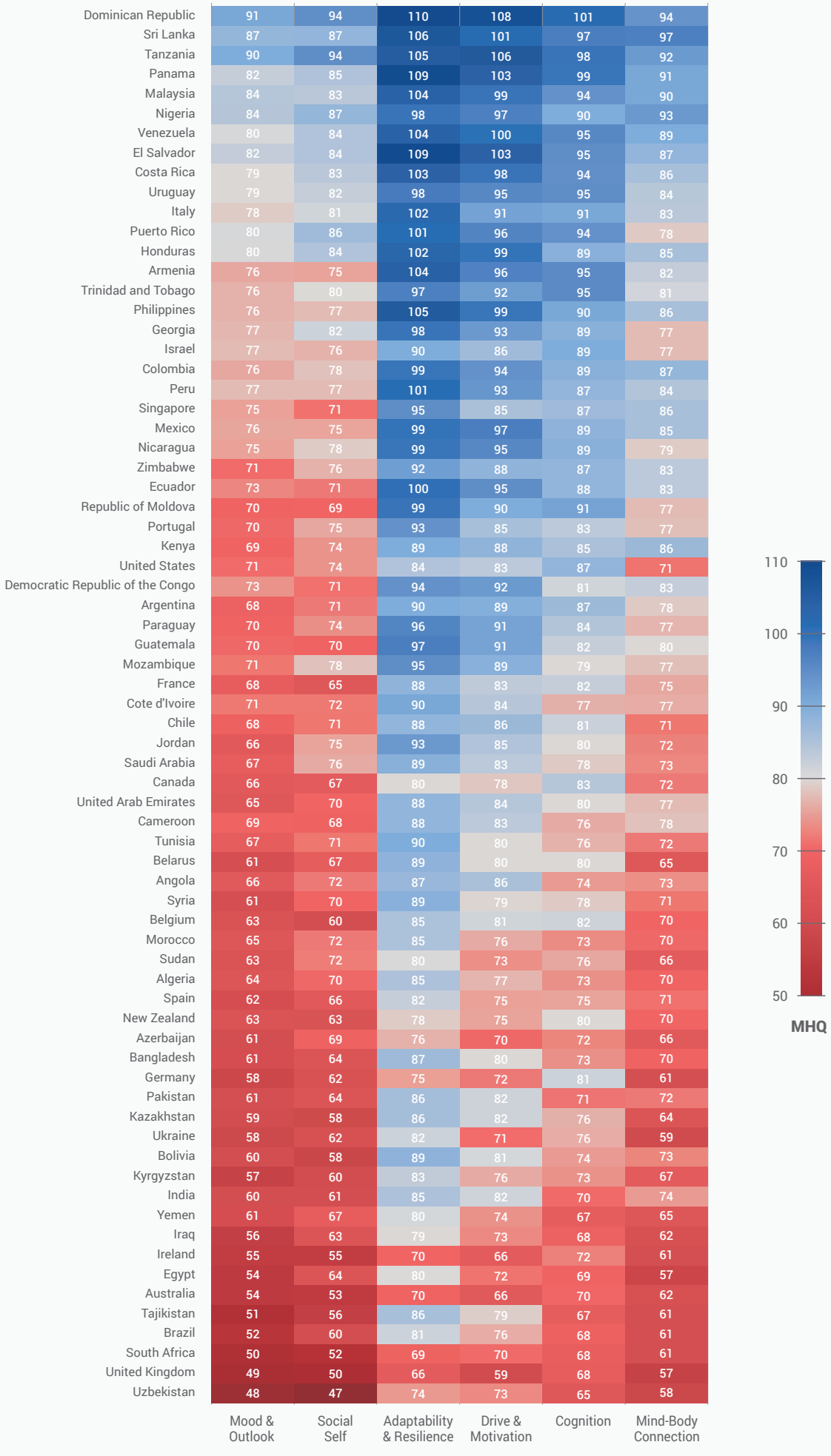
Your ability to perform basic cognitive functions, make sense of complex sets of events and situations and display a longer-term perspective in your thoughts and behavior.

Adaptability & Resilience

Your ability to shift your behaviour and outlook in response to changing circumstances and cope with the challenges and setbacks that you encounter.

Across all dimensions, *Adaptability & Resilience* and *Drive & Motivation* scored highest across most countries while *Mood & Outlook* and *Social Self* scored lowest. While aggregate scores for each of the 6 dimensions across individual countries broadly followed the trend of overall MHQ scores, there was also

Figure 4: **Mental wellbeing dimensions across countries**



some heterogeneity in the rankings for individual dimensions indicating that countries vary in their mental wellbeing profiles (Figure 4).

For example, towards the top of the country ranking, Tanzania and the Dominican Republic showed higher *Social Self* scores, while Mozambique, Jordan, Yemen, and Saudi Arabia also showed higher scores for this dimension relative to similarly ranked countries, and Singapore, Ecuador, Moldova and Belgium had lower scores for this dimension relative to similarly ranked countries. In addition, the United Kingdom, Ireland and Australia stood out has having lower *Drive & Motivation* scores while Bolivia, India, Pakistan and Kazakhstan had higher scores compared to similarly ranked countries. Similarly *Adaptability & Resilience* scores for Canada, Germany, Ireland, Australia, South Africa and the United Kingdom were lower compared to similarly ranked countries. In addition, the United States had lower *Mind-Body Connection* scores compared to similarly ranked countries while India, Pakistan and Bolivia showed higher scores for this dimension.

Insights and Interpretations

The global trends of 2023

The data presented here provides a barometer of the mental wellbeing of our global Internet-enabled society and its evolution over time. In 2023, mental wellbeing remained at its post-pandemic low with yet again no sign of movement towards pre-pandemic levels. The substantial decline of 25 MHQ points (~12.5% down the MHQ scale) that we measured across 8 countries primarily between 2019 and 2020, and to a smaller extent between 2020 and 2021, was more pronounced for each younger generation, amplifying a pre-existing trend of lower mental wellbeing in younger generations[8]. 18-24 year olds saw the steepest decline of 45 MHQ points with 31% more Distressed or Struggling while 25-34 year olds dropped 49 MHQ points with 31% more Distressed or Struggling. In contrast, the mental wellbeing of those aged 65 and over stayed steady through the pandemic.

In the aggregate, mental wellbeing scores and the percentage of the population Distressed or Struggling stayed steady relative to the previous year.

The lack of recovery across all age groups in these 8 countries, and the absence of change across the other 56 countries added since 2020, paints a discouraging picture of our post-pandemic prospects. It also raises some important questions about the residual impact of the pandemic. Is it that its psychological impacts, caused in part by social distancing and isolation, are permanent? Or is it that shifts in the way we live and work and the amplification of existing habits (e.g. remote working, online communication, consumption of ultra-processed food, use of single-use plastics) have cumulatively pushed us into a space of poorer mental wellbeing that means we can't collectively recover to those pre-pandemic levels? It is important that we work to understand why there is no recovery. As a collective humanity we otherwise risk normalizing a substantially diminished state of mental wellbeing that can have disastrous consequences for the long-term prospects of society.

Explaining the rankings of countries

With mental wellbeing remaining steady across almost all countries since 2021, the rankings too have remained relatively steady. Only 5 countries moved up the mental wellbeing scale by 2% or more while 4 moved down by 2% or more. As seen each year, countries at the top of the list are largely Latin American and African countries such as Tanzania, Nigeria, Venezuela, and the Dominican Republic, while the

wealthier countries of the Core Anglosphere such as the United Kingdom and Australia are towards the bottom.

This runs counter to our common perception that wealth enhances wellbeing. In our annual report for 2021 we showed that the average mental wellbeing scores of the Internet-enabled populations of countries were strongly and significantly negatively correlated with economic metrics such as per capita GDP and even the Human Development Index. Why is this so?

In 2023 we have begun to make progress towards answering this question. You can read more details in our published Rapid Reports but here are 3 key findings of particular significance and concern.

The first relates to the age at which a child gets their first smartphone. Across a sample of 27,969 respondents, we found that for today's 18-24 year olds, who are the first generation to be born into a world of smartphones and social media, the younger they were when they got their first smartphone the worse their mental health outcomes in adulthood. For example, 74% of female respondents aged 18-24 who got their first smartphone at age 6 had MHQ scores that fell within a Distressed or Struggling range. This decreased to 61% for those who acquired their first smartphone at age 10, and 52% for those who acquired their first smartphone at age 15. The impacts of owning a smartphone at a young age were especially pronounced for the dimension of *Social Self* and drove symptoms such as *Suicidal thoughts*, *Feeling detached from reality* and *Feelings of aggression towards others*. In countries that are generally at the top of the list in this report, and less developed countries in general, the average age that young people first own a smartphone is typically older (about 14/15 in Latin America and 16 in Sub Saharan Africa) while it's lowest in the Core Anglosphere (age 11). The age at which children first own a smartphone, and the way this consequently opens up their world to the internet and social media, therefore seems to be a key factor in declining mental wellbeing trends.

A second finding relates to the consumption of ultra-processed food. In this Rapid Report published earlier this year, based on a sample of 292,786 respondents, we showed that more frequent consumption of ultra-processed food results in substantially poorer mental wellbeing at all ages, with a broad impact on symptoms of depression and emotional and cognitive control. For example, we found that over half of those who eat ultra-processed food daily are Distressed or Struggling with their mental wellbeing, compared to just 18% of those who rarely or never consume ultra- processed food, an almost 3-fold increase. Similar to with the age of smartphone ownership, less developed countries tend to have lower ultra-processed food consumption while 60-70% of food consumption in Core Anglosphere countries like the United States and United Kingdom are ultra-processed[9,10].

A third factor discussed in our report last year are diminished family bonds. For example, across a sample of 407,959 respondents, we found that 10% of 18-24 year olds did not get along with any of their family and preferred not to see them compared to only 3% of the oldest generation. At the same time, the risk of mental health challenges in adulthood are four times lower if you have close family relationships.

Again, it was wealthier countries, such as those in the Core Anglosphere, that reported the lowest closeness to many adult family members (23%) and the least stable and loving childhood homes (39%).

Altogether this suggests that greater wealth and economic development does not necessarily lead to greater mental wellbeing, but instead can lead to consumption patterns and a fraying of social bonds that are detrimental to our ability to thrive. This cautions strongly against purely focusing on economic metrics as measures of human progress and wellbeing. Rather attention must be paid to how wealth is created and used to drive a path of holistic prosperity that is aligned with human wellbeing.

In conclusion

We point out again that the mental wellbeing scores we report reflect human ability to navigate the normal stresses of life and to function in a productive way and urge the reader to consider the consequences of a society diminished in this manner. The challenge we have ahead of us is to understand the drivers of our collective mental wellbeing such that we can align our ambitions and goals with the functional capacity and genuine prosperity of human beings.

Appendix 1:

The MHQ assessment and scores

Understanding the MHQ

Data for the Global Mind Project is collected using an online assessment tool called the Mental Health Quotient (MHQ) that was developed at Sapien Labs. The MHQ is a unique comprehensive assessment of mental wellbeing comprised of 47 elements of mental feeling and function including both problems that include symptoms of 10 major disorders as well as positive aspects of mental function[4]. It uses these elements to provide an aggregate score to position individuals on a spectrum from Distressed to Thriving, as well as sub-scores across 6 broad functional dimensions.

The MHQ is freely available online, is anonymous, and takes ~15 minutes to complete. It is currently available in English, Spanish, French, Arabic, Hindi, German, Portuguese (European & Brazilian) Swahili, Hebrew, Russian, (Simplified) Chinese and Italian with additional translations planned for 2024 and beyond. In addition to the 47 scored questions, respondents answer questions relating to their demographics, life experience and lifestyle. To encourage thoughtful and honest responses, respondents receive an MHQ score along with tailored feedback on completion of the MHQ and can opt to receive a more detailed report with recommendations for action via email.

More information on the development and validation of the assessment can be found in peer reviewed publications here and here.

The MHQ scale

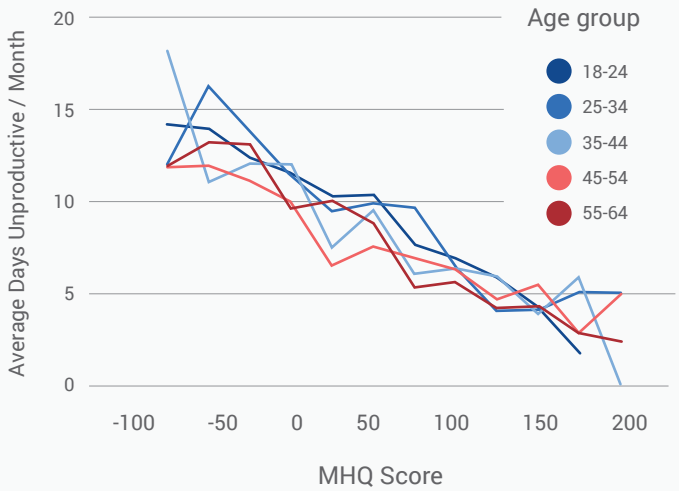
The MHQ positions individuals on the spectrum from Distressed to Thriving, spanning a possible range of scores from −100 to +200 where negative scores indicate a mental wellbeing status that has significant negative impact on the ability to function[3,5]. Importantly the MHQ score is not based on a simple averaging of question ratings but rather each individual rating is thresholded along the functional scale between positive and negative impact to function and nonlinearly transformed based on a ranked severity of implications. The positive range of the scale is modeled on the IQ scale. Positive scores, which are

largely normally distributed, are calibrated to a mean of 100 based on our original 2019 sample and can range from 1 to 200. Negative scores, on the other hand, have a long-tailed distribution. In order to ensure that overall average scores are not inordinately determined by the small number of individuals in the long tail, the negative scale was compressed to a smaller scale of 0 to -100 in order to mitigate the impact of negative scores on the population average.

Functional implications of the MHQ

The MHQ score has been demonstrated to relate systematically to the productive function of an individual in work and life[3,5]. For example, we have shown that the average number of days of work missed in the past month decreases systematically as MHQ scores increase (Figure A1). Cumulatively, when considering the total loss of life productivity as a function of MHQ score (taking into account both days of work missed and days that were less productive and assuming a range of 20% to 50% loss of productivity on less productive days) those with the lowest MHQ scores (between -75 and -100) had an overall reduction in life productivity of anywhere from 18-23 days per month on average. While those with the highest MHQ scores did not often miss a day of work, even this group reported a few unproductive days a month. Thus, the MHQ score is a good representation of behavioral loss of function and supports the use of the MHQ as an assessment of the productive capacity of a population, independent of any disorder classification. It also positions the MHQ as an important tool for companies and universities to be more strategic in their management of mental health and wellbeing.

Figure A1: **Relationship of MHQ score to productivity across age groups**



Relationship of the MHQ scale to clinical disorders

The MHQ elements map to diagnostic criteria for each of 10 major DSM-5 disorders[11,12]. Mapping individual profiles to these criteria has shown that MHQ scores relate systematically to clinical burden[3]. The percentage of people with clinical symptom profiles that aligned with any of 10 DSM-5 defined disorder criteria increased as the MHQ score decreased, such that 89% of those with scores in the Distressed range had symptom profiles that aligned with at least one of the 10 DSM-5 defined disorder compared to 0% for those with scores in the Succeeding or Thriving range. Similarly, the number of disorders per individual decreased systematically as MHQ scores increased with the average number of disorders per person at 3.8 for those in the Distressed group and 0.0 for those in the Succeeding and Thriving groups. Thus, the MHQ score is also reflective of the overall clinical burden of mental health.

Appendix 2:
Data Acquisition and Analysis

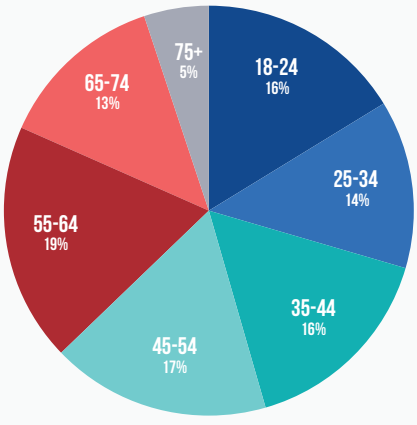
Data acquisition

518,064 respondents from around the world completed the MHQ assessment between 1st January and December 31st 2023. Data for the Global Mind Project is acquired by recruitment of participants through digital ads targeting a broad range of demographics. Recruitment was conducted via campaigns on Facebook and Google AdSense with an advertisement containing the copy 'Get your mental wellbeing score: Fast, Free, Anonymous' along with a start button linking to the start of the open survey (https://sapienlabs.org/mhq/).

The advertisements were regionally targeted towards a series of age-sex groups between 18 and 85 years using a broad range of interest keywords that had been optimized to ensure sufficient quotas in each age-sex group and broad geographic region. In addition, ads were managed dynamically in response to feedback on the demographic composition of respondents to further ensure sufficient representation across age and biological sex. Starts and completions were tracked for each advertisement within each source (Google and Facebook) using Google and Facebook Analytics and data from all new sources were analyzed for parity before a new advertisement or source was scaled and included.

Recruitment in 2023 focused on English, Spanish, French, Italian, German, Portuguese (European and Brazilian), Arabic, Swahili, Hindi, Hebrew, Russian and Chinese (Simplified) speakers across 71 countries. We note that Chinese (Simplified) speakers were recruited only outside of China (primarily South East Asia), while Russian speakers were recruited only outside of Russia across the former Soviet Republics.

Figure A2: **Distribution of sample by age groups**



The number of respondents for each targeted country is shown in the accompanying data tables.

Respondents spanned all age groups roughly equally (Figure A2) while the biological sex split was 54% female, 46% male. Those who answered that they were "Under 18" were unable to continue with the assessment and so were automatically excluded.

Representativeness of the Global Mind data

The representativeness of the Global Mind data has been rigorously examined for the United States (US) sample[1]. National trends obtained from various rigorously stratified and randomly sampled US based surveys such as the American Community Survey and the Household Pulse Survey conducted by the US Census Bureau, and the American Trends Panel conducted by Pew Research Center, are closely mirrored in the Global Mind data for the US. This includes demographic factors of marital status and educational attainment, mental healthcare trends and friendship which represent a diverse range of variables.

Altogether this suggests that data obtained anonymously through a dynamically responsive online recruitment method aligns well with data obtained from identified participants recruited through rigorous probability sampling methods and can be reliably used to explore relationships between factors in the general population. While it is not possible to directly extrapolate these conclusions to all other countries, we note that the same methodology is used across the world suggesting similar outcomes. However, it must be noted that the Global Mind Project recruits only from the Internet-enabled population. With 94% of the US population Internet enabled, most of the population in the US are covered and may be invited to participate. In contrast, the Global Mind Project data will increasingly deviate from a nationally representative view with decreasing Internet penetration.

Data exclusion criteria

Only those respondents who stated that they found the MHQ easy to understand were included in the analysis. This exclusion criterion was applied by only selecting respondents who answered "Yes" to the final question in the MHQ which asks them "Did you find this assessment easy to understand?". In addition, those who completed the assessment in under 7 minutes were excluded (the minimum time needed to read and respond to the MHQ) and responses with a standard deviation of less than 0.2 (representing people who answered with the same value across all 47 rating items) were excluded. In addition, organic traffic (participants not responding to demographically targeted recruitment ads) were excluded in countries where organic traffic represented >10% of the sample and where organic traffic diverged from recruited traffic (12 out of 71 countries). This resulted in 419,175 data responses being available for the final analysis.

Computing average MHQ Scores for countries

The spread of respondents across age and sex groups was not an accurate representation of their proportion of the population in each country. Furthermore, the proportion of respondents in each age-sex group were not identical across countries. Thus, to enable a more representative view of a country's population, and more accurate comparisons between countries, scores were first computed for each age-sex group and then a weighted average score was computed based on the relative proportions of each group within individual countries. Analyses comparing age brackets were only weighted by sex, while conversely, analyses comparing sexes were only weighted by age. All population estimates and age- sex distributions that are utilized for these weightings were taken from the United Nations population estimates[13]. Note that in some countries (e.g. some Sub-Saharan nations such as Tanzania), the general population profile is generally younger, something that is also observed in the spread of respondents across age groups for these countries in this data. In some cases, there were no respondents over the age of 75 for these countries and therefore they are not represented in these older age groups.

We note that respondents across countries varied in terms of their education level and employment status. Education and employment levels are shown in the accompanying data tables.

Computing average MHQ Scores for regions

Computation of the regional MHQ and dimension scores were not a simple average across countries but were additionally weighted based on the proportion of Internet users within the country[14]. Thus, more populous countries or countries with larger Internet populations would have a greater contribution to these regional estimates. Where the Internet population may be larger than the particular language groups in the country in which the MHQ was offered (e.g. Belgium), the proportion of those language groups was used as the weighting factor rather than the proportion of Internet users.

Score Reporting in MHQ points and percentage differences

We typically report differences in terms of MHQ points and the corresponding percentage shift along a 300-point scale i.e. ((Value 1 – Value 2)/300) * 100. For instance, 75 points represents 25% of the 37 possible length of the scale. Thus a 75-point shift or difference between groups would be a 25% shift along this scale.

Statistical analysis

Statistics were computed by comparing groups using a standard t-test. P-values obtained were then corrected for multiple comparisons using a Bonferroni correction. All statistical tables showing these corrected p-values are provided in a supplementary download along with the report.

Limitations of sampling and data interpretation

Although respondents were similarly recruited across all countries, two key caveats must be highlighted. First, these samples may not reflect a true sample of any country's population and will be biased by those with language proficiency, Internet access and the willingness to spend 15 minutes completing an online assessment. Thus, results must be interpreted strictly in this context. Second, cultural differences in language usage and culture itself can significantly influence how people interpret and respond to each individual question. Any individual country's results will therefore reflect these differential effects of culture.

References:

1. Taylor J, Sukhoi O, Newson J, Thiagarajan T. Representativeness of the Global Mind Project Data for the United States. Published online December 22, 2023. Accessed December 22, 2023. https://osf.io/p9ur6

2. World Health Organisation. *World Mental Health Report: Transforming Mental Health for All.*; 2022.

3. Newson JJ, Pastukh V, Thiagarajan TC. Assessment of Population Well-being With the Mental Health Quotient: Validation Study. *JMIR Ment Health.* 2022;9(4):e34105. doi:10.2196/34105

4. Newson JJ, Thiagarajan TC. Assessment of Population Well-Being With the Mental Health Quotient (MHQ): Development and Usability Study. *JMIR Ment Health.* 2020;7(7):e17935. doi:10.2196/17935

5. Newson JJ, Sukhoi O, Thiagarajan T. MHQ: Constructing an aggregate metric of mental wellbeing. Published online 2023. Accessed December 18, 2023. https://osf.io/preprints/osf/d47qj

6. Sapien Labs. Mental State of the World 2022. Published online March 2022. https://mentalstateoftheworld.report/

7. Stone AA, Schwartz JE, Broderick JE, Deaton A. A snapshot of the age distribution of psychological well-being in the United States. *Proc Natl Acad Sci USA.* 2010;107(22):9985-9990. doi:10.1073/pnas.1003744107

8. CDC. *Youth Risk Behavior Survey: Data Summary & Trends Report.*; 2023. https://www.cdc.gov/media/releases/2023/p0213-yrbs.html

9. Juul F, Parekh N, Martinez-Steele E, Monteiro CA, Chang VW. Ultra-processed food consumption among US adults from 2001 to 2018. *Am J Clin Nutr.* 2022;115(1):211-221. doi:10.1093/ajcn/nqab305

10. Rauber F, Louzada ML da C, Steele EM, et al. Ultra-processed foods and excessive free sugar intake in the UK: a nationally representative cross-sectional study. *BMJ Open.* 2019;9(10):e027546. doi:10.1136/bmjopen-2018-027546

11. Newson JJ, Hunter D, Thiagarajan TC. The Heterogeneity of Mental Health Assessment. *Front Psychiatry.* 2020;11:76. doi:10.3389/fpsyt.2020.00076

12. Newson JJ, Pastukh V, Thiagarajan TC. Poor Separation of Clinical Symptom Profiles by DSM-5 Disorder Criteria. *Front Psychiatry.* 2021;12:775762. doi:10.3389/fpsyt.2021.775762

13. United Nations. World Population Prospects 2022. Published 2022. https://population.un.org/wpp/default.aspx

14. Data Reportal. Digital around the world. Published 2023. https://datareportal.com/global-digital-overview