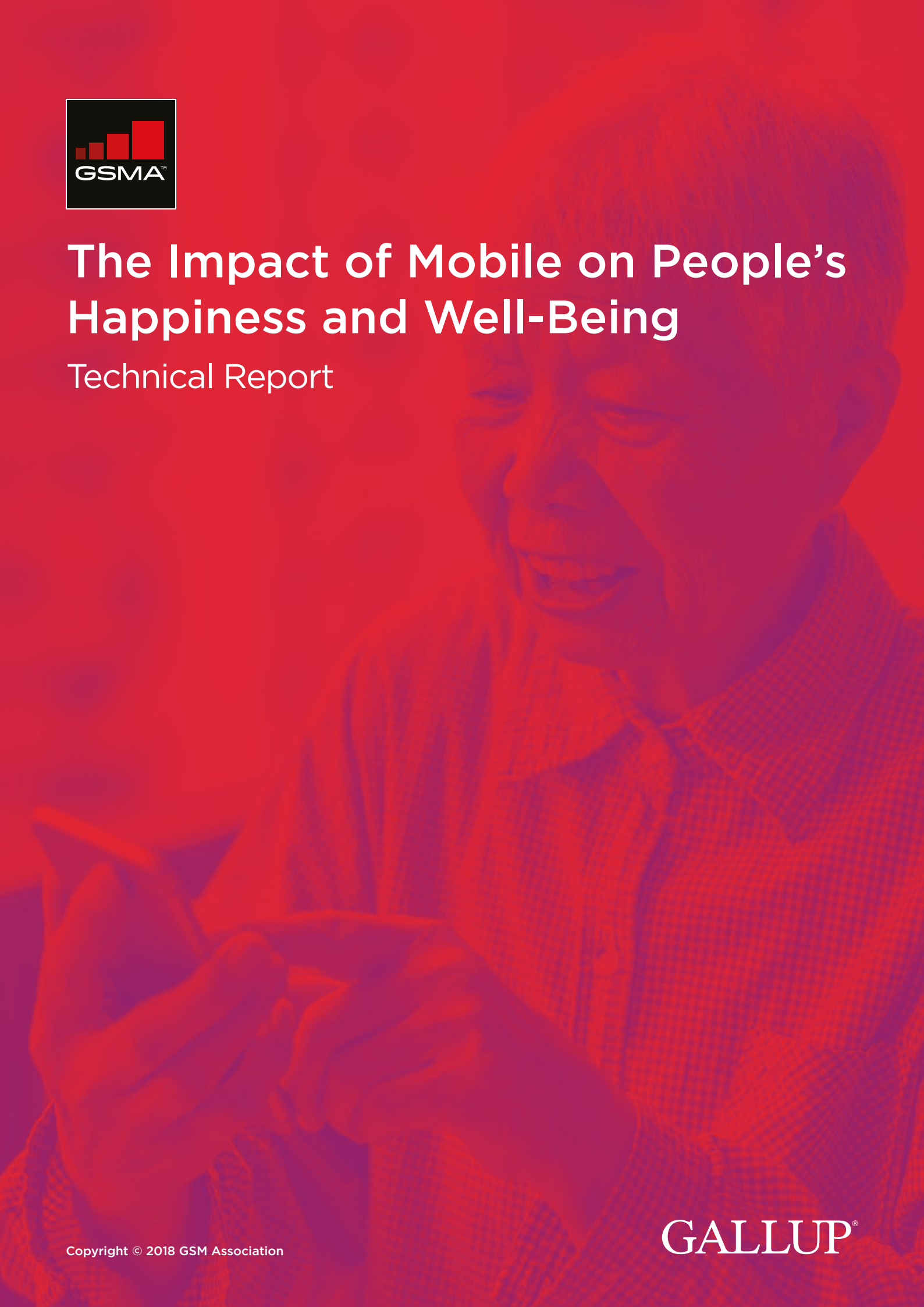

The Impact of Mobile on People's Happiness and Well-Being

Technical Report

The GSMA represents the interests of mobile operators worldwide, uniting nearly 800 operators with more than 300 companies in the broader mobile ecosystem, including handset and device makers, software companies, equipment providers and internet companies, as well as organisations in adjacent industry sectors. The GSMA also produces industry-leading events such as Mobile World Congress, Mobile World Congress Shanghai, Mobile World Congress Americas and the Mobile 360 Series of conferences.

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Executive Summary

This report is part of the GSMA's ongoing commitment to assessing the impact of the mobile industry on social and economic development for people around the world. This current report, based on data from 142 countries surveyed for the Gallup World Poll in 2016, provides a supporting assessment of the mobile industry's impact, using a complementary approach to measuring life quality as reflected in two types of Subjective Well-Being (SWB) indicators: 1) people's evaluations of their own lives (Evaluative Well-being), and 2) the balance of positive vs. negative emotions they experience, known as 'affect balance' (Experiential Well-being).

Key Findings

- Mobile phone ownership supplemented with internet access is associated with an improvement in peoples' lives, as evidenced by increases in both average life evaluations and net positive emotions.
- In the absence of internet access those who have a mobile phone give, on average, similar life ratings as those without one. However, in some regions a modest increase in average life evaluations is associated with mobile phone ownership only (i.e., without internet access) – including low-income countries, where there has historically been a lack of existing widespread fixed line communications infrastructure and where governments, non-governmental organisations and mobile operators have sought to provide vital services and information via cellular-only phones, which remain more prevalent than internet-enabled phones on much of the continent.
- Mobile phone ownership without internet access is associated with net positive emotions, particularly in upper-middle income countries, and in specific regions including East Asia, Post-Soviet Eurasia, Western Europe, Eastern Europe, and Latin America.

Approach

Global Prevalence of Mobile Phones and Internet Access

- Based on World Poll results representing more than 95% of the world's population, Gallup estimates that 82% of adults worldwide personally had a mobile phone in 2016. A majority, 55%, say they have a mobile phone but no landline phone in their homes, while 27% have both a mobile and landline phone. These results vary considerably by economic development level, but even among low-income countries[1] a majority of residents (56%) now have a mobile phone.
- Though internet access remains less prevalent than mobile phone ownership in many regions, a slight majority of residents worldwide (51%) now say they have access to the internet, whether on a computer or mobile device. The percentage who have both a mobile phone and internet access is only slightly lower at 48%, while just 3% worldwide have internet access but no mobile. Again, these results vary by economic development as 77% of residents in high-income countries have both a mobile phone and internet access compared to just 15% in low-income countries.

What is Subjective Well-Being?

- Subjective Well-Being (SWB) measures peoples' perceptions of the quality of their lives and experiences. These metrics have been developed to complement other indicators of well-being such as income, education and health. The rapidly expanding body of research on SWB has led to a growing consensus that it can be measured in ways that are both valid and reliable - a number of government agencies and international organisations now incorporate SWB measures among their benchmarks for social progress, including the OECD and the United Nations.
- Two widely used measures of SWB are captured in the Gallup World Poll that are the focus of this report: Evaluative Well-Being, which refers to an individual's overall evaluation of the quality of his or her life, and Experiential Well-Being, which refers to the frequency and intensity of positive and negative emotional experiences, such as happiness, stress and anger.
- SWB measures are particularly helpful indicators of progress for policy-makers because they can alert them to issues that other social and economic indicators might fail to identify. For example, in the years leading up to the Arab Spring, individuals in Egypt and Tunisia reported a marked decline in life evaluations despite strong progress on conventional indicators such as economic growth and the UN's Human Development Index.

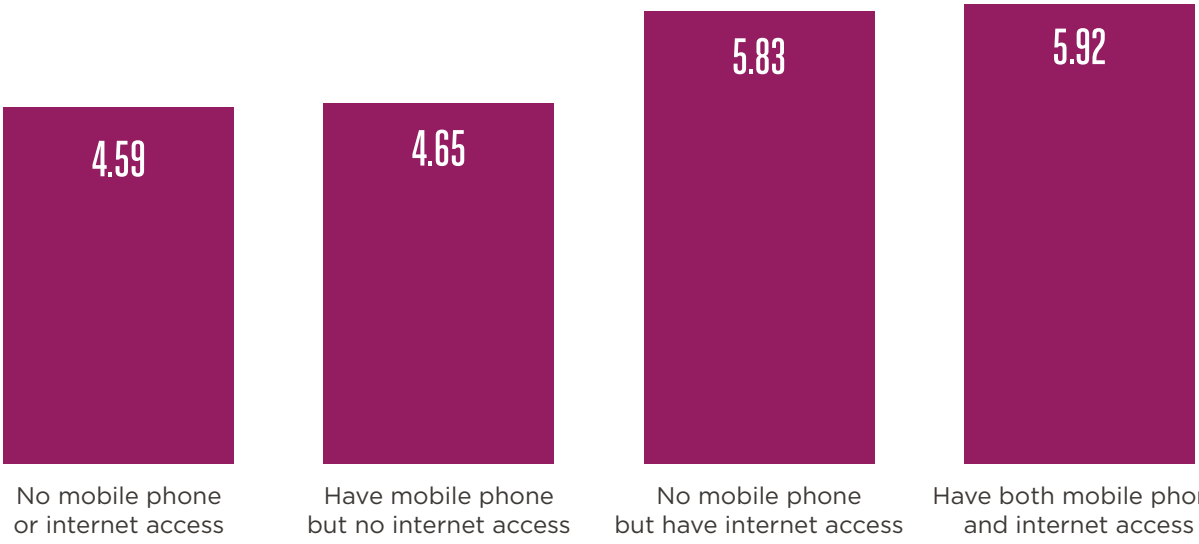
Evaluative Well-Being (Life Evaluation)

- The Gallup World Poll asks respondents worldwide to rate their lives on a 0-to-10 scale where zero represents the worst possible life and ten the best possible life. At the global level, average current-life ratings have been generally stable, remaining between 5.2 and 5.5 since tracking began in 2006. Average ratings vary by 2.5 to 3 scale points (for example, 4 compared to 6.5–7) between less economically developed regions and those with higher incomes and living standards and by about 5 scale points (2.8 in Central African Republic compared to 7.7 in Norway) between the countries with the lowest and highest current life rating.
- Descriptive results suggest the power of mobile phones to improve lives is largely attributable to their status as the primary device by which most of the world's residents access the internet. In the absence of internet access, those who have a mobile phone give similar life ratings as those without one (the differences are within the survey's margin of error).
- Internet access, however, is associated with an increase of about 1.3 points on the life evaluation scale – from an average of about 4.6 to about 5.9 – whether or not those with access also have a mobile phone.
- There are a few regions in which a modest increase in average life evaluations is associated with mobile phone ownership only (i.e., without internet access) – including, Eastern Europe and Sub-Saharan Africa.

1 As classified by the World Bank, https://datahelpdesk.worldbank.org/knowledgebase/articles/906519-world-bank-country-and-lending-groups.

Figure 1

Average Global Life Ratings by Connectivity Status, 2016



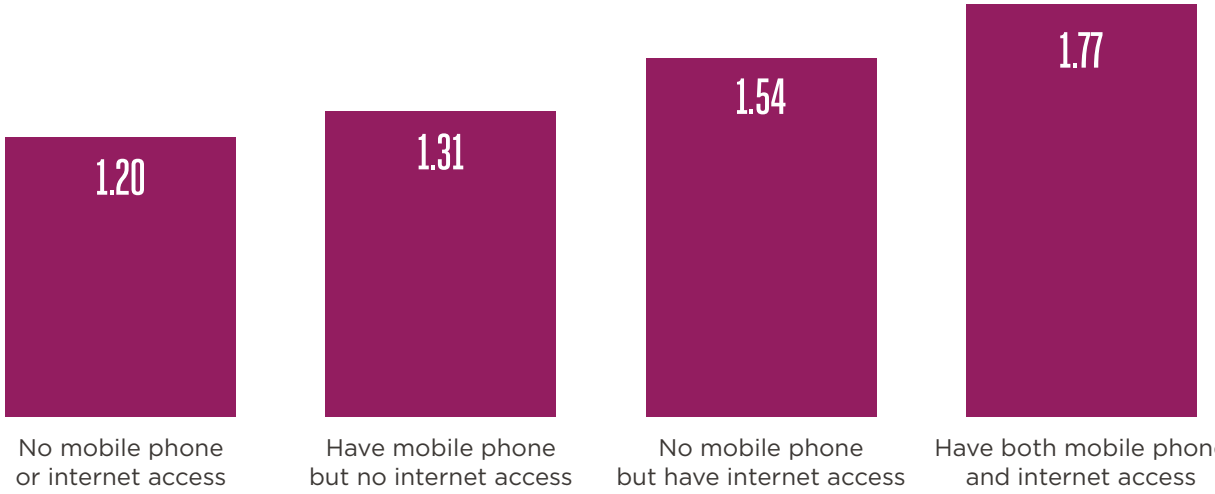
Source: Gallup World Poll

Experiential Well-Being (Affect Balance)

- The World Poll's experiential well-being indicators – composed of six questions on respondents' emotions (or "affect") the day before the interview – have also been largely stable over the past ten years. In 2016, 73% of residents worldwide said they experienced enjoyment for much of the previous day, while 20% said they experienced sadness for much of the day. For the current analysis, results from negative affect questions are subtracted from positive affect results to produce a single Affect Balance (AB) measure denoting the well-being experienced by individuals over the last day.
- Experiential measures of subjective well-being like Affect Balance vary less consistently than evaluative measures with material living standards, but negative emotions do tend to be more common in countries and regions that are subject to conflict and instability. Regionally in 2016, Affect Balance ranged from a high of 1.97 in East Asia to 0.93 in the Middle East/North Africa region. At the country level, it ranges by more than two full points between the lowest scoring country (Iraq at 0.09) and the highest scoring country (Iceland at 2.22).
- At the global level there are significant differences in Affect Balance scores by respondents' level of connectivity, as those with a mobile phone and internet access have significantly higher net positive emotions than those with neither. Further, mobile phone ownership is associated with higher Affect Balance scores even when internet access is held constant.

Figure 2

Affect Balance by Connectivity Status, 2016



Source: Gallup World Poll

Multivariate Analysis

This report concludes with a multivariate analysis that more closely examines the relationships between subjective well-being indicators and mobile phone ownership and internet access while controlling for income and a range of other potentially confounding variables. While this produces more robust estimates than summary statistics, the analysis is unlikely to control for all relevant factors that drive SWB (omitted variable bias) and it also does not fully address the potential bi-directional (or simultaneous) relationship between SWB and mobile phone ownership or internet access. This approach could therefore potentially overestimate the impact of mobile on well-being. Analysis is therefore carried out using several models and we focus on whether results are statistically significant across a range of specifications, rather than placing too much weight on the size of the estimated impact. Using statistical techniques such as Ordinary Least Squares (OLS) regression and Propensity Score Matching (PSM), the analysis finds that:

- The effect of mobile phone access alone on Life Evaluation is limited and not significantly different from zero as other well-being covariates are added to the model. However, in certain regions – for example low-income and high-income countries, as well as specific regions including the Middle East and North Africa, Eastern Europe, Western Europe and East Asia – we do find that mobile phone access is associated with a statistically significant increase in average life evaluations.
- There is a small but significant positive effect of mobile phone ownership on Affect Balance, especially in upper-middle income countries, and in specific regions including East Asia, Post-Soviet Eurasia, Western Europe, Eastern Europe, and Latin America.
- The combined effect of mobile phone ownership and internet access is significant for both Life Evaluation and Affect Balance, and consistent across all model specifications. This is particularly true with regard to Life Evaluation, and the effects are particularly strong in certain regions including Sub-Saharan Africa, Eastern Europe and South Asia. The results are generally consistent with the proposition of a greater well-being dividend in areas where mobile information technologies represent a greater impact in terms of access to new services.

Given that strong causal attributions cannot be drawn from this analysis due to the limitations discussed, future research that explores further quasi-experimental approaches to minimise omitted variable bias and simultaneous causality is encouraged. Policy and regulatory differences across countries are often a good source of natural experiments to approximate random assignment to mobile and internet access and could provide additional important insights into the impact of mobile access on people's well-being.

Introduction

The GSMA is committed to leading mobile-industry efforts to promote a higher quality of life for people around the world (GSMA, 2017). For over a decade, the GSMA Mobile for Development team has worked with mobile operators, technology innovators, the development community and governments to demonstrate the power of mobile to deliver socio-economic impact in emerging markets through commercial solutions, impacting over 30 million people in 49 countries. In 2016, the mobile industry became the first to come together in support of the UN Sustainable Development Goals (SDGs), which aim to end poverty, protect the planet and ensure that all people enjoy peace and prosperity.

In 2017, the association released its second Mobile Industry Impact Report, which documents the industry's contributions to achieving the SDGs. This current report provides a supporting assessment of the mobile industry's impact, using a complementary approach to measuring life quality in the form of including subjective well-being (SWB) metrics. Specifically, the analysis investigates the relationships between access to mobile phone and the internet on the one hand, and respondents' life evaluations and emotional states on the other.

This report is based on data from the Gallup World Poll (GWP), a global research project conducting nationally representative surveys annually since 2006, in a minimum of 140 countries and more than 145 languages. After an initial review of the literature on SWB measurement and the effects of mobile Information and Communications Technology (ICT) on life quality, the report presents descriptive results, from the World Poll, including ten-year trends for well-being measures and access to mobile and internet technology. It concludes with a multivariate analysis that more rigorously investigates the relationships between the SWB and ICT connectivity status, based on the most recent complete wave of World Poll data, including 142 countries surveyed in 2016.

PART 1

Literature Review
What is the Value of Well-Being Metrics?

Well-being is a broad term used to connote a positive state of human existence, characterised by physical and mental health as well as subjective qualities such as happiness and a sense of security. The latter aspects are referred to more specifically as subjective well-being (SWB), and encompass "a broad category of phenomena that includes people's emotional responses [...] and global judgements of life satisfaction."

The common aspect of these phenomena is that they are measured using individuals' own perceptions of the quality of their experiences, and therefore do not rely on independent judgements by researchers or others regarding the requirements for a "good life." Further, SWB indicators are more holistic measures than any single objective indicator can be in that they reflect the combined impact of a multitude of circumstances on people's lives. Thus, they serve as useful supplements to more traditional, objective indicators of living standards such as income and education levels, helping researchers assess the effect of these circumstances on individuals' emotional health and life satisfaction.

However, this does not imply that SWB should be taken as an all-encompassing measure superseding all other well-being indicators. Because SWB indicators rely on self-reported data, they are subject to various response biases, frame-of-reference effects and other factors that affect data comparability and measurement error. Thus, the OECD Guidelines on Measuring Subjective Well-Being caution that SWB data "need to be interpreted with care and used to complement rather than replace other indicators of well-being."

Interest in SWB has Surged Among Academics and Policy-Makers

Research on SWB has expanded dramatically over the past 30 years, across a number of fields. Though the topic has historically been studied by psychologists (Diener, 1984), the number of economics articles published on SWB has increased tenfold since the 1990s (Flesche et al., 2012). During that time, researchers have compiled a body of evidence demonstrating that 1) SWB can be measured using statistically sound and replicable procedures (see page 11 in this report) and 2) SWB indicators diverge at times from more traditional, objective well-being metrics in ways that can have important consequences for people's preferences and behaviour (see box, page 10 in this report).

Research on the determinants of SWB across international contexts is still in its early stages. In reviewing the empirical literature on the topic, Oishi (2010) concluded that the factors affecting SWB vary to some extent among different cultures. Nonetheless, there is strong evidence that cross-cultural similarities far outweigh the differences. Tov and Diener (2013) and Helliwell et al. (2009) all note the universal importance of fulfilling basic human needs, such as having access to food, shelter and safety, social needs for supportive relationships and personal growth needs such as autonomy and personal freedom. Income is also a universal determinant, in spite of significant heterogeneity in the impact of income across different populations.

Their application in the context of social and economic outcomes has helped subjective measures of life quality gain traction among policy makers as valuable complements to traditional indicators such as GDP. Particularly since 2009, when the Stiglitz-Sen-Fitoussi Commission published a landmark report on the need for improved measures of well-being and social progress, a number of national governments and international organisations such as the United Nations and the Organisation for Economic Cooperation and Development (OECD) have joined the dialogue on SWB. In 2013, the OECD cited "widespread acknowledgement that measuring subjective well-being is an essential part of measuring quality of life alongside other social and economic dimensions" in releasing the OECD Guidelines on Measuring Subjective Well-Being.

While some reservations remain (den Haan et al., 2017), subjective well-being is increasingly accepted as a reliable indicator of individual and societal welfare (Krueger & Schkade, 2007, Oswald & Wu, 2010), as well as a key policy objective and area of research (Dolan & White, 2007). A growing number of government agencies and international organisations incorporate SWB measures among their benchmarks for progress, including:

- UK Office for National Statistics
- United Arab Emirates Ministry of State of Happiness
- U.S. Bureau of Labor Statistics – American Time Use Survey
- French National Institute of Statistics and Economic Studies
- Statistics Canada
- New Zealand General Social Survey
- United Nations Development Programme Human Development Report
- OECD Better Life Index
- Legatum Prosperity Index

SWB is also a central component of Gallup's own leadership model for successful societies, and other consulting firms have also incorporated it into their growth strategies (Beal et al., 2015). More than a decade of World Poll research in over 160 countries has allowed Gallup researchers to help confirm that subjective measures such as life evaluations are closely related to a range of positive societal conditions such as economic development, environmental health and political freedom (Diener & Tay, 2015).

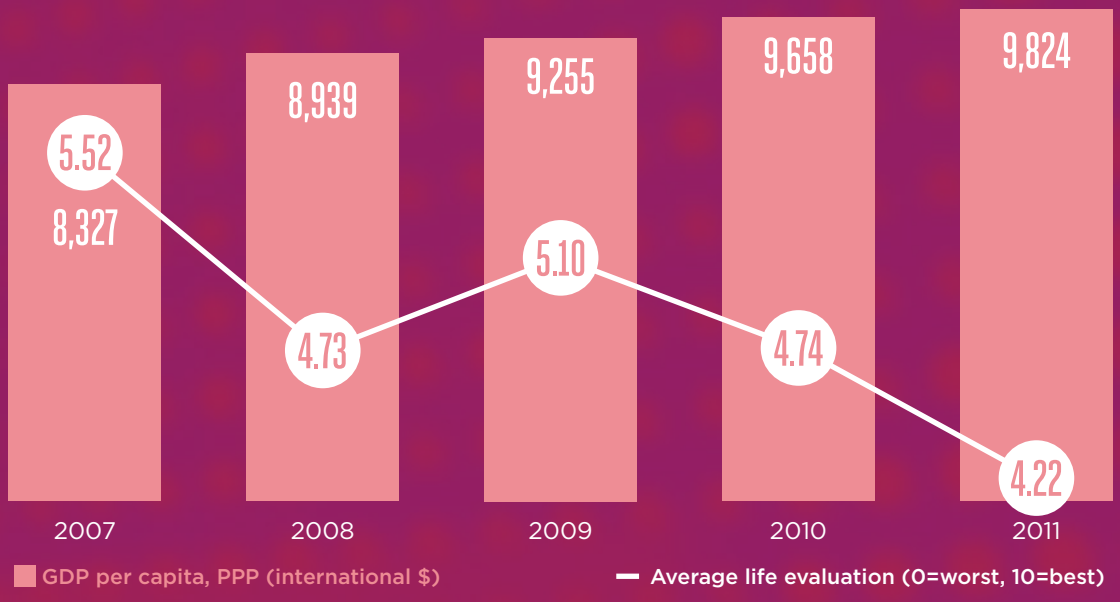
Box 1

SWB indicators provide vital information that may not be reflected in objective well-being measures

The 2011 uprisings that became known as the Arab Spring offer a compelling case of the value in tracking subjective indicators of life quality as a complement to traditional objective measures of material living standards. Though Tunisia and Egypt enjoyed healthy economic growth in the years leading up to the Arab Spring, Gallup results indicated residents' average life evaluations were falling in both countries. The divergence was particularly notable in light of previous research showing that globally, life evaluations are highly correlated at the country level with per-capita GDP. The subsequent unrest in these countries revealed widespread discontent with the status quo – discontent that had far-reaching social and political consequences.

Similarly, the widespread frustration in the United Kingdom that led to the population's momentous decision to leave the European Union was far more clearly reflected in their life ratings than in the country's traditional economic indicators. Amid slow but steady GDP growth, Britons' average ratings of their current lives—as well as their predicted ratings for their lives in five years—fell significantly between 2013 and 2015, rebounding only somewhat in 2016 just prior to the Brexit vote.

Despite rising per-capita income, Egyptians' average life evaluations were falling just before the Arab Spring



Approaches to Measuring Well-Being

Gallup's research has focused on two types of subjective well-being measures, often referred to as evaluative and experiential. **Evaluative well-being** refers to an individual's overall evaluation of the quality of his or her life, a reflective assessment made by what Daniel Kahneman refers to as the "remembering self" (Kahneman, 2011). Some researchers have noted that the mental process used to evaluate one's life is similar to that used when making a judgement about one course of action over another – and therefore the concept is somewhat similar to economists' definitions of utility (OECD, 2013). **Experiential well-being** refers to the frequency and intensity of positive and negative emotional experiences, such as happiness, stress and anger. In contrast to evaluative well-being, experienced well-being is based on an individual's emotional state at a particular point in time; it is an expression of the "experiencing self".

While these two concepts are related, they represent different theoretical perspectives on well-being and, as Kahneman notes, different mental processes. The two types of measures may diverge at the individual level because judgements made by the remembering self and experiencing self are subject to different psychological biases[2] (Kahneman & Krueger, 2006). At the societal level, evaluative and experiential indicators may be influenced differently by cultural factors; for example, an analysis of 40 OECD countries found that Asian countries tended to rank higher using affect balance (experiential) measure relative to life satisfaction, while the opposite was true for several European countries.

Given these differences it may be important to consider both types of measures, as a 2013 report from The National Research Council (NRC) of the National Academies in the U.S. argues: "Although life evaluation, positive experience, and negative experience are not completely separable—they correlate to some extent—there is strong evidence that multiple dimensions of subjective well-being coexist. Experiential well-being is distinctive enough from overall life evaluation to warrant pursuing it as a separate element in surveys; their level of independence demands that they be assessed as distinct dimensions" (NRC, 2013, p. 19).[3]

Evaluative Well-Being

Evaluative well-being is generally found to be closely related to income and other common indicators of material living standards such as poverty and household consumption measures. A recent analysis of Gallup World Poll data from 153 countries confirmed that material well-being was the main determinant of SWB across ten geopolitical regions and that respondents' feelings about their household income[4] was the survey item most predictive of overall life evaluations (Diego-Rosell et al., 2016).

This conception of SWB is influenced by a broader range of factors than the balance of positive and negative emotions, as normative ideas about what makes a "good life" enter into respondents' considerations. Thus, life evaluations vary more among and within countries and regions than do emotions. Life ratings can also be measured in a relatively straightforward manner using large-scale population surveys, with the results easily comprehended by policy makers and the general public (Office of National Statistics, 2011). As noted above, however, since they are based on a retrospective assessment of subjects' experiences, life evaluations are subject to various biasing factors associated with recall.

Evaluative well-being is commonly measured simply by asking individuals to consider the quality of their lives – or some specific aspect of their lives – and assigning a scale value to it. The Gallup World Poll uses a 0-to-10 "ladder" scale based on the Cantril Self-Anchoring Striving Scale (Cantril, 1965). Respondents are asked to envision a ladder with steps numbered zero to ten, with zero representing the worst possible life for them and ten the best possible life. They first use this scale to evaluate their lives in the present, and then to predict the "rung" on which their lives will be five years in the future.

The Gallup World Poll's life evaluation data is used in a number of high-profile country-level quality of life assessments, including the OECD Better Life Index and Legatum Prosperity Index. This question is also the primary item used to underpin the World Happiness Report.

2 For example, Kahneman and other researchers have demonstrated that people tend to judge an experience largely based on how they felt at its peak (or most intense point) and at its end, rather than the average of how they felt at every moment of the experience. Thus, to the extent that memories are distorted records of real-time experiences, evaluative methods may be less reliable indicators of the true balance of positive and negative feelings in people's lives.

3 The OECD Guidelines on Measuring Subjecting Well-Being offers perhaps the most extensive discussion of the conceptual basis for the different types of SWB indicators, as well as the advantages and disadvantages associated with each and best-practices for measuring them. They are available at http://dx.doi.org/10.1787/9789264191655-en.

4 As measured by the following question: *Which one of these phrases comes closest to your own feelings about your household's income these days? Living comfortably on present income, getting by on present income, finding it difficult on present income, or finding it very difficult on present income.*

Experiential Well-Being

From a utilitarian perspective, it makes intuitive sense to define well-being as the presence of positive emotions and the absence of negative ones. Further, measures of subjects' emotional states denote psychological resilience or vulnerability in ways that may not be reflected in more evaluative life quality measures.

However, it is widely acknowledged that emotional states are difficult to measure because they are best captured as they occur. Measurement ideally involves experience sampling methods through which subjects are asked to record their current emotional state at several times during the test period. However, such intensive methods are often impractical; surveys commonly use respondents' assessment of their predominant emotional state during some recent period. Gallup World Poll respondents are asked whether or not they experienced several specific emotions "a lot of the day" during the previous day – including enjoyment, worry, sadness, stress and anger.

Given the multidimensional nature of data on individuals' emotional states, the results can be reported in different ways. The multiple items on emotional affect are often aggregated in some fashion, though doing so poses some risk of information loss. Typically, items used to gauge positive emotions are combined into a single "positive affect" score for each individual, while negative emotions are combined into a negative affect score. In some cases, as for this report, these scores are then further combined by subtracting negative affect from positive affect to produce a single "affect balance" score for each respondent.

Validity and reliability of SWB indicators

Over the last two decades, the rapidly expanding body of research on subjective well-being has led to a growing consensus that it can be measured in ways that are both valid and reliable (Krueger & Schkade, 2007, Oswald & Wu, 2010). Question items are valid if they actually measure the underlying construct they are intended to measure, while they are reliable if they produce similar results when asked under similar circumstances.

Measures of both evaluative and experiential well-being have been subjected to extensive reliability tests over the years. For example, in a meta-review of multiple item indicators of life satisfaction, Diener (2011) finds a relatively high degree of convergence, implying they are all measuring a similar underlying construct.[5] Even comparing differently worded life evaluation measures from different surveys has been found to yield generally similar results; for example, Bjornskov (2010) reports a 0.75 correlation between the Gallup World Poll's Cantril Ladder life evaluation results and the life satisfaction question from the World Values Survey for results from over 90 countries. The OECD notes that while there have been fewer studies of the reliability of emotional affect measures, the available evidence is largely consistent with the results for life satisfaction (OECD, 2013).

Validity is difficult to establish for subjective indicators, simply because there is no objective measure of the underlying concept with which to compare the results (OECD, 2013). However, a number of studies have demonstrated that SWB indicators have strong convergent validity with regard to other proxy measures of the same concept. Frey and Stutzer (2002) found that respondents' own life satisfaction ratings correlated well with ratings of their subjective well-being from friends and family. Several studies have established that people behave in ways consistent with their SWB response; for example, people who rate themselves as happy smile more (Diener, 2011).

Other studies have focused on the construct validity of SWB measures – that is, whether the resulting data conform to established theories about well-being. A large body of literature now attests that SWB measures generally relate as would be expected to socioeconomic factors such as living standards (Sacks, Stevenson & Wolfers, 2010), as well as to individual life circumstances, such as health status or social contact (Dolan, Peasgood & White, 2008). In sum, tests of convergent and construct validity have consistently supported the notion that both evaluative and experiential SWB indicators provide valid information.

5 Diener (2011) reports a Cronbach's alpha for multiple item measures of between 0.8 and 0.96; a value of 0.7 is the common standard for acceptable convergence.

Effects of Information and Communication Technology (ICT) on Well-Being

Impact of ICT on Economic Development and Poverty Alleviation

Research on the well-being effects of access to the internet and other forms of ICT has produced mixed results. Since internet access is far more prevalent in industrialised countries than in much of the developing world, most studies to date have focused on the relationships between internet use and psychological health in developed-world settings. As mobile phones and data networks have swept across the developing world in recent years, however, they have been accompanied by a rapidly growing body of literature on how ICTs are changing life in those regions.

One of the most publicised studies is a 2009 World Bank report on the economic impact of several new forms of ICT between 1980 and 2006, using data from 120 countries (Qiang & Rossotto, 2009). The report testifies to the macroeconomic impact of high-speed data networks, finding that each 10% increase in broadband penetration is associated with a growth benefit of 1.38 percentage points in developing countries and 1.21 points in developed countries. The report concludes that "broadband clearly deserves a central role in national development strategies", urging governments to help create the conditions needed to realise the potential of internet technologies through regulatory and policy reforms as well as targeted investments (p. 45).

A number of other longitudinal studies have similarly concluded that increased penetration of broadband and/or mobile phone services boosts a country's subsequent rate of economic growth. Qiang et al. (2009) and Scott (2012) each used decades of global trend data starting in 1980 to estimate the GDP growth increase associated with the spread of high-speed internet access. Their results were very similar; each estimated that a 10% increase in broadband penetration increases per-capita GDP by 1.2 percentage points in high-income countries and just over 1.3 percentage points in low/middle-income countries. A 2012 study by Deloitte and the GSMA found that a 10% increase in mobile phone penetration increases average annual per-capita GDP growth by 0.65 percentage points.

Galperin and Viecens (2017) provide a more recent review of empirical studies assessing the impact of internet technologies on various dimensions of development. The authors note that it remains difficult to unambiguously measure the developmental benefits of internet use for two interrelated reasons: 1) individuals and firms most likely to effectively appropriate internet technologies are those that already had certain advantages, such as higher education levels and a greater capacity to innovate, and 2) because the positive effects of internet dissemination on economic and political processes grow exponentially as it spreads through society, it is easier to detect the benefits in developed countries than in those with less advanced economies (p. 1).

Nonetheless, using the available evidence Galperin and Viecens describe four possible mechanisms through which internet technologies may benefit the poor in a society by either accelerating economic growth or reducing income disparities: 1) by increasing firm productivity; 2) by improving the coordination of markets (particularly labour markets); 3) by strengthening social and human capital; and 4) by promoting inclusive political institutions. Residents of low-income countries may be most likely to directly experience the benefits of internet use for building human and social capital.

Impact of ICT on Subjective Well-Being

This multiplicity of possible effects – both direct and indirect – make it difficult to assess the true impact of ICT on subjective well-being. In the developed world, recent studies on the use of mobile phones and the internet have produced mixed results. In one of the few cross-national studies on the topic, Lohmann (2013) finds that the internet has a negative impact on subjective well-being among 29 European countries surveyed annually between 2004 and 2009. This effect is indirect since stated material aspirations in the World Values Survey are strongly related to computer access in areas with advanced internet infrastructure. The study also finds that people who regularly use the internet as a source of information derive less satisfaction from a rise in income.

Results from the Lohmann study align closely with Frey et al.'s (2007) finding that watching television increases material aspirations, which in turn reduces life satisfaction. However, Kavetsos and Koutroumpis (2011) find that ownership of devices, including fixed and mobile phones, as well as broadband penetration levels are associated with significantly higher levels of self-reported life satisfaction in 29 European countries.

The effects of ICT use in developing countries is complicated by the fact that many vital information and services are now available via mobile devices, making it difficult to distinguish between the effects of the delivery mechanism and the services themselves. Nonetheless, some scholars have constructed frameworks for analysing the specific micro-linkages by which ICTs affect people's lives. Such studies highlight the many idiosyncratic factors at the community level that shape residents' relationships with the new information and communication tools. As Gigler notes, "The manner by which people interact with technologies and the way they adapt them to the local socioeconomic, political, and cultural context of their communities are critical for assessing the impact of new technologies on people's individual and collective well-being" (Gigler, 2015, p. 4).

Gigler constructs a theoretical framework for analysing the ways in which ICTs enhance human capabilities in six dimensions: informational, psychological, social, economic, political and cultural (p. 39). Given the many ways in which ICT use can affect people's lives, he emphasises the importance of assessing actual outcomes, such as the effects of internet use on people's incomes or their access to public services, rather than more easily measured outputs such as internet penetration rates (p. 7).

Carol Graham and Milena Nikolova at the Brookings Institution preceded the current study with a similar analysis of Gallup World Poll data from 122 countries in 2012. The authors posited that access to information and communication technology (including mobile phones, the internet and television)[6] would likely have a positive effect on hedonic (experiential) well-being by making routine tasks such as communicating with family easier, and on evaluative well-being by providing new forms of agency (similar to expanded capabilities in Gigler's framework).

Upon exploring the relationships in the data, Graham and Nikolova conclude that ICT access "is positive for well-being in general, but with diminishing positive returns for those respondents who already have a great deal of access to these technologies" (p. 3). They also detect higher levels of stress and anger among some cohorts of respondents who have recently gained access to the new technologies, consistent with previous research showing that early stages of economic change and development are often accompanied by increased frustration as societies adjust to the disruption of existing processes and overcome challenges in appropriating the new methods.

6 Prior to 2015, the Gallup World Poll tracked the incidence of these technologies at the household level: "Does your home have 1) a television, 2) access to the internet, 3) a mobile phone?" The current analysis uses data from 2016 on mobile phone ownership and internet access at the level of individual respondents.

PART 2

Descriptive Statistics

Summarising the Relationship Between Subjective Well-Being Metrics and Connectivity

In this section, we examine the relationship between subjective well-being metrics – how people evaluate their lives and current well-being – and their access to and ownership of mobile and other communication technologies. All data used for this analysis come from the Gallup World Poll. In most of the developing world, GWP surveys are conducted using in-person interviewing and an area sampling frame design. In the developed world, random-digit-dialling or a nationally representative list of phone numbers is used, generally including landline and mobile phones stratified by region. With some exceptions, all surveys, either telephone or face-to-face, are probability based and nationally representative of the resident non-institutionalised population aged 15 and older.[7]

7 See http://www.gallup.com/178667/gallup-world-poll-work.aspx for further methodological details.

As described before, in this study we consider evaluative and experiential measures of SWB (Diener, 2000): Life Evaluation and Experiential Well-Being. Life Evaluation (LE) is measured with the Cantril Self-Anchoring Striving Scale (Cantril, 1965). The question uses a scale from 0 to 10 and asks respondents:

> *Please imagine a ladder with steps numbered from zero at the bottom to ten at the top. Suppose we say that the top of the ladder represents the best possible life for you, and the bottom of the ladder represents the worst possible life for you. On which step of the ladder would you say you personally feel you stand at this time, assuming that the higher the step the better you feel about your life, and the lower the step the worse you feel about it? Which step comes closest to the way you feel?*

Experiential well-being is created using experiential measures of emotions, including three positive experience questions (smile or laugh, enjoyment, being treated with respect) and three negative experience questions (worry, sadness, anger). These measures were selected out of a larger list of affect measures in the GWP on the basis of providing the largest possible number of country/year observations while maintaining a balanced list of positive and negative measures. The questions are introduced as follows:

> *Now, please think about yesterday, from the morning until the end of the day. Think about where you were, what you were doing, who you were with, and how you felt:*

The positive affect questions are:

- Did you smile or laugh a lot yesterday?
- Did you experience the following feelings during A LOT OF THE DAY yesterday? How about enjoyment?
- Were you treated with respect all day yesterday?

The negative affect questions are:

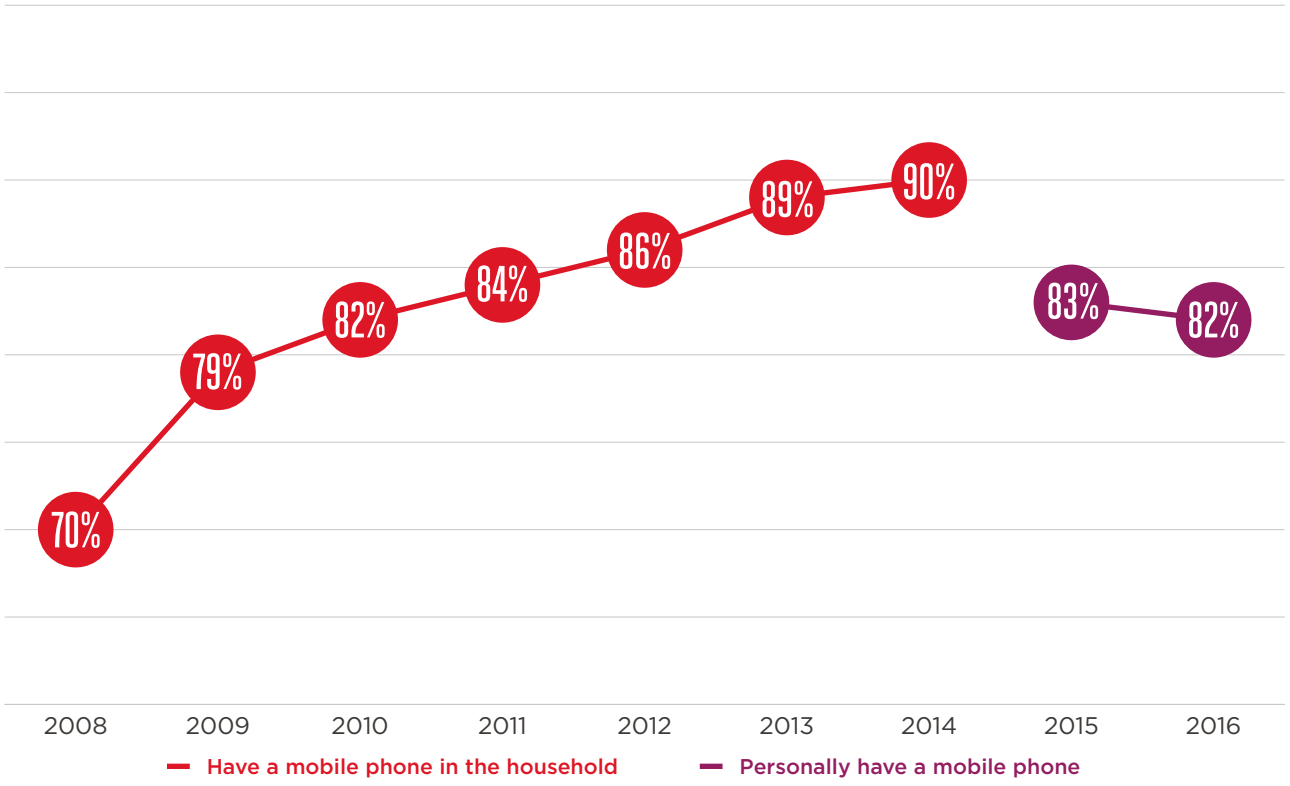
- Did you experience the following feelings during A LOT OF THE DAY yesterday? How about worry?
- How about sadness?
- How about anger?

Rise of Mobile Phone Ownership Worldwide

From World Poll surveys conducted in 142 countries representing more than 95% of the world's population during 2016, Gallup estimates that 82% of adults worldwide personally have some type of mobile phone. Prior to switching from a household indicator to an individual-level indicator in 2015, Gallup tracked a steady rise in the proportion of households with a mobile phone, from 70% in 2008 to 90% in 2014. Gallup's initial estimate upon the change to a question about personal ownership in 2015 was 83%, a figure that remained statistically similar in 2016 (Chart 1).

Chart 1

Global Rise in Mobile Phone Ownership, 2008–2016



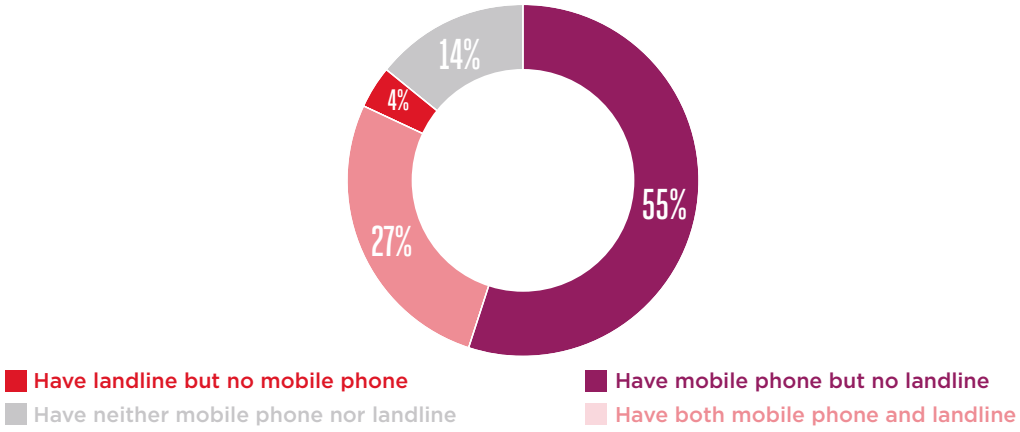
* In 2015, Gallup changed its measure of mobile phone ownership from a household indicator (*Does your home have a cellular/mobile phone?*) to an individual-level indicator (*Do you have a cell phone/mobile phone that you use to make and receive personal calls?*).

Source: Gallup World Poll

Mobile phones are superseding landline telephones in much of the developed world – particularly the United States, where just 48% of adults now say they have a landline in their homes, vs. 94% who say they personally have a mobile phone. In the developing world, mobile networks have obviated the need to build expensive landline infrastructure in order to connect remote and disadvantaged communities, so that mobile ownership is now far more prevalent than landline use. Worldwide in 2016, 55% of adults reported personally having a mobile phone but no landline in their homes, while another 27% say they have both. Just 4% have a landline but no mobile phone, while 14% have neither (Chart 2).

Chart 2

Prevalence of Mobile vs. Landline Phones Worldwide, 2016[8]



Source: Gallup World Poll

As indicated below (Table 1), these results vary substantially by global region, largely according to each region's level of economic development, which determines whether or not landline infrastructure had been established prior to the advent of mobile networks. Only in Australia/New Zealand, the U.S./Canada and Western Europe do more than half of residents report having landlines in their homes – and even in these regions, residents are now more likely to have a mobile with no landline than a landline but no mobile. Even in the two least developed regions, Sub-Saharan Africa and South Asia, at least six in ten residents now have a mobile phone, though very few have access to landlines. (See Appendix, Table 14, for country-level results on incidence of mobile phones and landlines).

Table 1

Prevalence of Landline vs. Mobile Phones by Global Region, 2016

	Have mobile phone but no landline	Have both mobile phone and landline	Have landline but no mobile phone	Have neither mobile phone nor landline
Australia/New Zealand	18%	70%	12%	0%
U.S./Canada	49%	43%	8%	0%
Western Europe	24%	66%	10%	0%
East Asia	57%	35%	4%	5%
Eastern Europe	58%	32%	6%	5%
Post-Soviet Eurasia	55%	36%	4%	6%
Middle East/North Africa	43%	44%	6%	8%
Latin America	52%	27%	6%	15%
Southeast Asia	70%	8%	1%	21%
South Asia	60%	14%	2%	25%
Sub-Saharan Africa	62%	4%	1%	34%

Note: Due to rounding, percentages may sum to 100% +/-1%

Source: Gallup World Poll

8 Landline access is measured using the following question: (WP17625) *Do you have a landline telephone in your home that you use to make and receive personal calls?*

Differences in development level are starker when countries are grouped by per-capita income level, according to the World Bank's current country classifications. Most residents in every category have a mobile phone, with proportions ranging from 56% in low-income countries to 90% in the high-income group. By contrast, landline incidence ranges from just 4% in low-income countries to 66% in high-income countries. Among low-income countries – all of which are in Sub-Saharan Africa except Afghanistan, Haiti and Nepal – 43% remain without either a mobile or landline phone (Table 2).

Table 2

Prevalence of Landline vs. Mobile Phones by Country Income Group, 2016

	Have mobile phone but no landline	Have both mobile phone and landline	Have landline but no mobile phone	Have neither mobile phone nor landline
Low-income countries	53%	3%	1%	43%
Lower-middle-income countries	63%	12%	2%	23%
Upper-middle-income countries	58%	32%	4%	7%
High-income countries	33%	57%	9%	0.4%

Note: Due to rounding, percentages may sum to 100% +/-1%

Source: Gallup World Poll

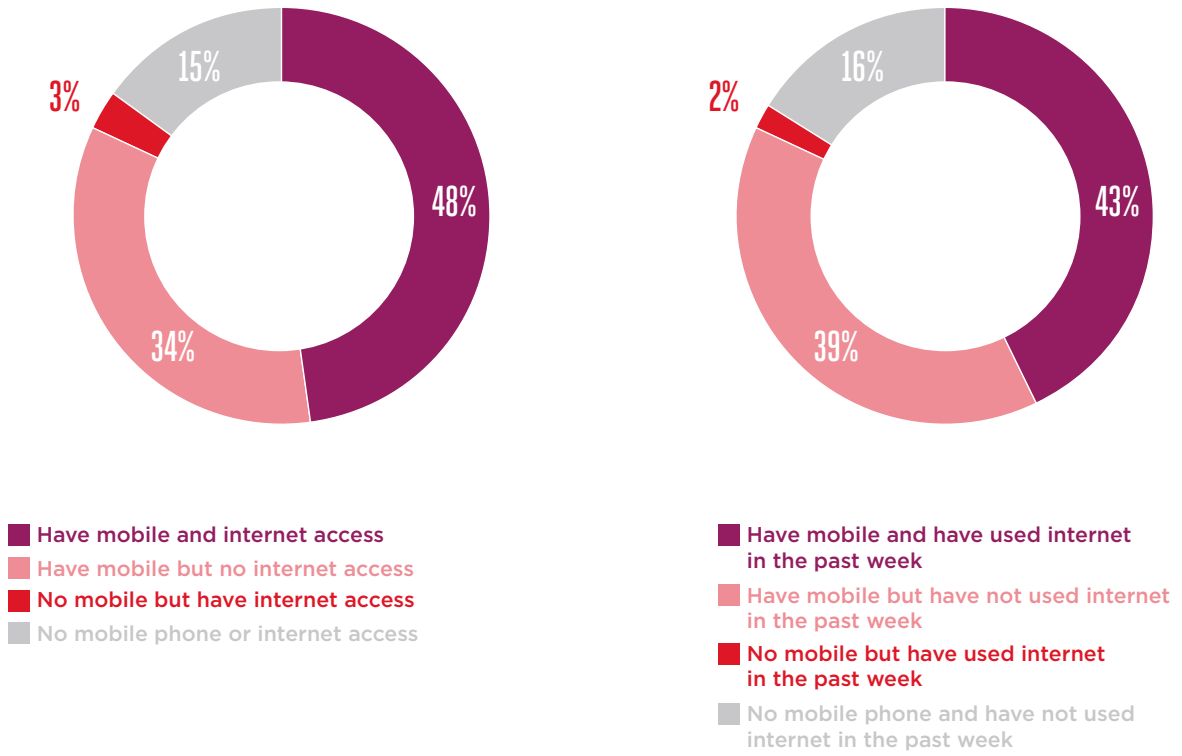
Mobile Ownership and Internet Access/Use

The tapering of the household indicator of mobile phone incidence between 2013 and 2014 and the stability of the personal indicator between 2015 and 2016 suggest that in many countries, especially those in the high and upper-middle-income groups, mobile ownership may be close to a saturation point. However, many mobile owners around the world still lack access to mobile internet services, including in some higher-income countries, and thus have cellular-only phones with more limited capacity for critical services such as banking and education.

According to Gallup's 2016 World Poll data, almost half of the world's adult population (48%) has both a mobile phone and internet access, while about one-third (34%) have a mobile but no access to the internet (via computer or mobile device). Three percent say they have internet access but no mobile, similar to the worldwide 4% who report having a landline only in the landline/mobile (Chart 3). The World Poll also asks respondents who report having access to the internet whether or not they have actually gone online in the past seven days. The vast majority say they have, so that substituting internet use for internet access in Chart 3 (right side) produces roughly similar results.

Chart 3

Connectivity Status: Mobile Phone Ownership and Internet Access/Use, 2016[9] [10]



Source: Gallup World Poll

Again, the regional results vary widely by region and economic development (Table 3). Residents in Australia/New Zealand, the U.S./Canada and Western Europe are most likely to say they have both a mobile phone and access to the internet, but this figure reaches a majority in all regions except Southeast Asia, South Asia and Sub-Saharan Africa. In the latter two regions, residents are most likely to say they have a mobile phone but no internet access (see Appendix, Table 15, for country-level results).

9 Internet access is measured using the following question: *Do you have access to the internet in any way, whether on a mobile phone, a computer, or some other device?*
10 Internet use is measured using the following question: *Have you used the internet in the past seven days, whether on a mobile phone, a computer, or some other device?*

Table 3

Connectivity Status by Global Region, 2016

	Have mobile phone and internet access	Have mobile but no internet access	Do not have mobile but have internet access	Do not have mobile phone or internet access
Australia/New Zealand	84%	4%	7%	6%
Western Europe	83%	8%	6%	4%
U.S./Canada	82%	10%	5%	3%
Eastern Europe	69%	20%	2%	9%
Post-Soviet Eurasia	65%	26%	1%	8%
East Asia	64%	28%	2%	6%
Latin America	53%	27%	4%	17%
Middle East/North Africa	51%	35%	2%	11%
Southeast Asia	38%	40%	2%	21%
Sub-Saharan Africa	23%	43%	2%	32%
South Asia	18%	56%	2%	25%

Note: Due to rounding, percentages may sum to 100% +/-1%

Source: Gallup World Poll

Again, separating countries by World Bank income group further highlights global differences in connectivity status by development level. Among the 45 high-income countries included in the study, more than three-fourths of residents (77%) have both a mobile phone and internet access, but this is true of just 15% of residents in the 23 low-income countries (Table 4). A substantial difference can be seen between lower-middle-income countries, where more than three-fourths of residents have mobile phones but just one-fourth have internet access, and upper-middle-income countries, where a majority of residents have both at this point.

Table 4

Connectivity Status by Country Income Group, 2016

	Have mobile phone and internet access	Have mobile but no internet access	Do not have mobile but have internet access	Do not have mobile phone or internet access
Low-income countries	15%	42%	2%	42%
Lower-middle-income countries	25%	50%	2%	23%
Upper-middle-income countries	60%	29%	2%	9%
High-income countries	77%	11%	4%	5%

Note: Due to rounding, percentages may sum to 100% +/-1%

Source: Gallup World Poll

Box 2

Key Findings Review

Rise of Mobile Phone Ownership Worldwide – Internet Access Rates Still Constrained

- Worldwide in 2016, 55% of adults reported personally having a mobile phone but no landline in their homes, while another 27% said they have both. Just 4% have a landline but no mobile phone, while 14% have neither.
- Many mobile owners around the world still lack access to mobile internet service, and thus have cellular-only phones with more limited capacity for critical services such as banking and education.
- According to Gallup's 2016 World Poll data, almost half of the world's adult population (48%) has both a mobile phone and internet access, while about one-third (34%) have a mobile but no access to the internet (via computer or mobile device). Three percent say they have internet access but no mobile, similar to the worldwide 4% who report having a landline only.
- Separating countries by World Bank income group further highlights global differences in connectivity status by development level. Among the 45 high-income countries included in the study, more than three-quarters of residents (77%) have both a mobile phone and internet access, but this is true of just 15% of residents in the 23 low-income countries. A substantial difference can be seen between lower-middle-income countries, where more than three-quarters of residents have mobile phones but just one-quarter have internet access, and upper-middle-income countries, where a majority of residents have both.

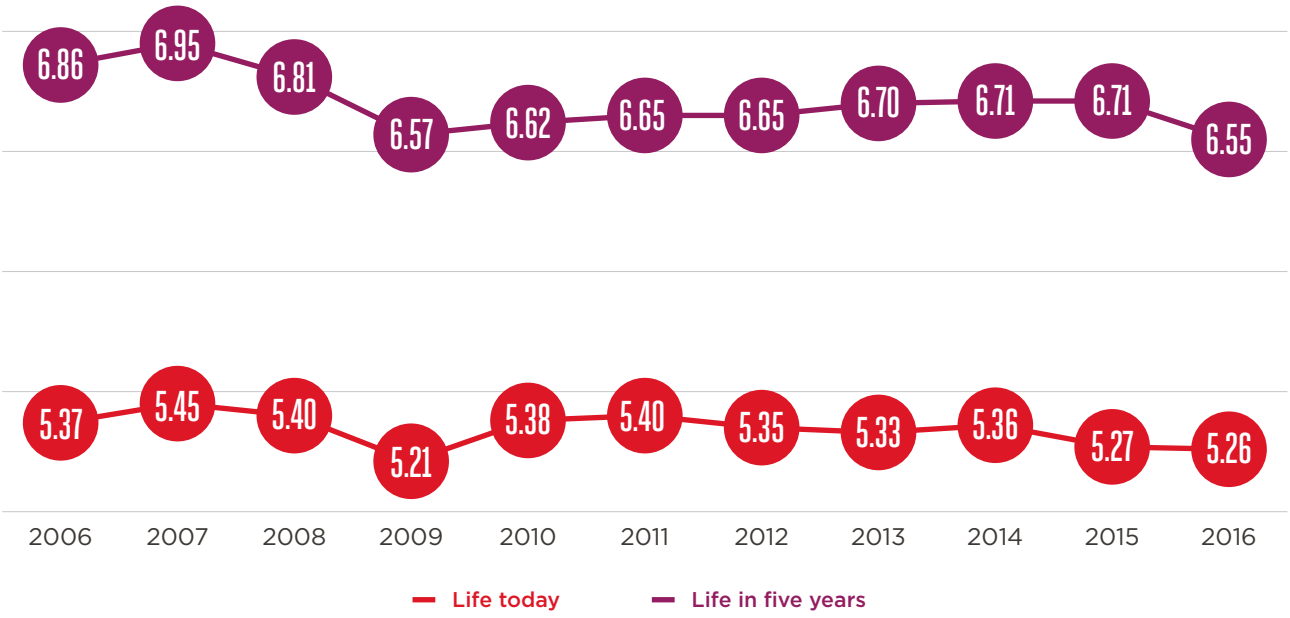
Trends in SWB Indicators from the Gallup World Poll

Evaluative Well-Being: Life Ratings

Average life evaluations have been very stable since Gallup began tracking this measure in 2006. The most notable change in current life ratings was a modest quarter-point decline from 5.45 in 2007 to 5.21 in 2009, after the onset of the global financial crisis. The crisis appeared to affect respondents' optimism about their future slightly more than their current life ratings; predicted scale points for life in five years fell from a global average of 6.95 in 2007 to 6.57 in 2009. Both trends rebounded somewhat in the years after the recession, then tapered slightly between 2014 and 2016. Overall, however, they have been remarkably consistent during an unusually tumultuous time for the global economy (Chart 4).

Chart 4

Average Life Evaluations Worldwide, 2006–2016



Source: Gallup World Poll

There has been a somewhat greater variation in life evaluations at the regional level, though even here residents' average ratings of their current lives have not changed by as much as a full point on the 0-to-10 ladder scale in any region (Table 5). Regional results from 2016 highlight the range with which average life evaluations tend to vary by the prevailing living conditions in a country or region; there are 2.5 to 3 scale points between the least economically developed region, Sub-Saharan Africa, and the most developed regions, Western Europe, the U.S./Canada and Australia/New Zealand. There is somewhat more variation among results at the country level, with about 5 scale points between the lowest average current-life rating (2.85 in the Central African Republic) and the highest (7.72 in Norway). Among all respondents worldwide in 2016, the standard deviation from the global mean rating of 5.29 is about 2.3 scale points.

Their overall stability notwithstanding, there have been a few notable regional shifts in Gallup's current-life ratings over the last decade, including a gradual increase among East Asians, from 4.62 in 2009 to 5.42 in 2016, driven primarily by a similar rise in China during that time. However, this is offset by a gradual decline in South Asia, from an average just over 5 in 2010 to 4.37 in 2016. This change is also predominantly due to the country with the region's by far largest population, India in this case, where residents' ratings of their current lives fell by more than a full scale point between 2006 and 2016.

Table 5

Life Evaluation Trends by Global Region, 2006–2016

	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Australia/ New Zealand	7.34	7.34	7.27	*	7.41	7.37	7.20	7.35	7.29	7.33	7.25
U.S./Canada	7.21	7.51	7.30	7.19	7.21	7.15	7.07	7.28	7.17	6.92	6.85
Western Europe	6.97	6.73	6.96	6.57	6.71	6.70	6.66	6.67	6.68	6.61	6.68
Latin America	6.25	6.16	6.29	6.69	6.55	6.61	6.66	6.75	6.54	6.24	6.21
Eastern Europe	5.34	5.80	5.55	5.49	5.33	5.33	5.43	5.38	5.51	5.70	5.80
East Asia	4.79	5.02	4.97	4.62	4.86	5.23	5.21	5.35	5.30	5.39	5.42
Post-Soviet Eurasia	4.97	5.19	5.43	5.17	5.22	5.32	5.49	5.42	5.63	5.53	5.42
Southeast Asia	5.14	5.31	5.07	5.32	5.45	5.46	5.30	5.11	5.50	5.16	5.18
Middle East/North Africa	5.26	5.61	5.11	5.22	5.12	4.93	4.89	4.80	5.31	4.99	5.04
Sub-Saharan Africa	4.35	4.67	4.55	4.48	4.40	4.57	4.64	4.25	4.18	4.41	4.37
South Asia	5.20	5.04	5.01	4.65	5.03	4.70	4.64	4.64	4.53	4.42	4.37

* Australia and New Zealand were not surveyed in 2009.

Source: Gallup World Poll

Dividing countries by income group more clearly demonstrates that average life evaluations are related to levels of social and economic development (Table 6). Among low-income countries the average rating has remained between 4 and 4.5 for the last decade vs. between 4.5 and 6 for middle-income countries, and between 6.5 and 7 among countries in the high-income group. These gaps demonstrate the considerable differences in income and living standards associated with even a single scale-point difference in average life ratings.

Interestingly, among 37 lower-middle income countries, average life ratings declined significantly from 5.01 in 2010 to 4.60 in 2015. This group of countries includes several with large populations that have experienced relatively rapid economic growth and rising income inequality, such as India, Indonesia and the Philippines. Such circumstances may be cases of what Graham and Lora (2009) termed "the paradox of unhappy growth"; the authors note that in the early stages of rapid economic expansion, average life evaluations tend to get worse before they get better. "There are a number of explanations for these findings, including the insecurity that is attached to rapidly changing rewards structures and macroeconomic volatility, and the frustration that rapidly increasing inequality tends to generate. [...] This suggests that people are often more content in low growth equilibrium than in a process of change which results in gains but instability and unequal rewards at the same time."

Table 6

Life Evaluation Trends by Country Income Group, 2006–2016

	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Low-income countries	4.01	4.42	4.16	4.15	4.05	4.31	4.28	4.16	4.11	4.20	4.07
Lower-middle-income countries	5.08	5.06	4.99	4.83	5.01	4.83	4.81	4.69	4.72	4.60	4.62
Upper-middle-income countries	5.05	5.25	5.27	5.06	5.20	5.43	5.48	5.55	5.59	5.55	5.52
High-income countries	6.77	6.82	6.72	6.57	6.67	6.70	6.58	6.66	6.61	6.54	6.55

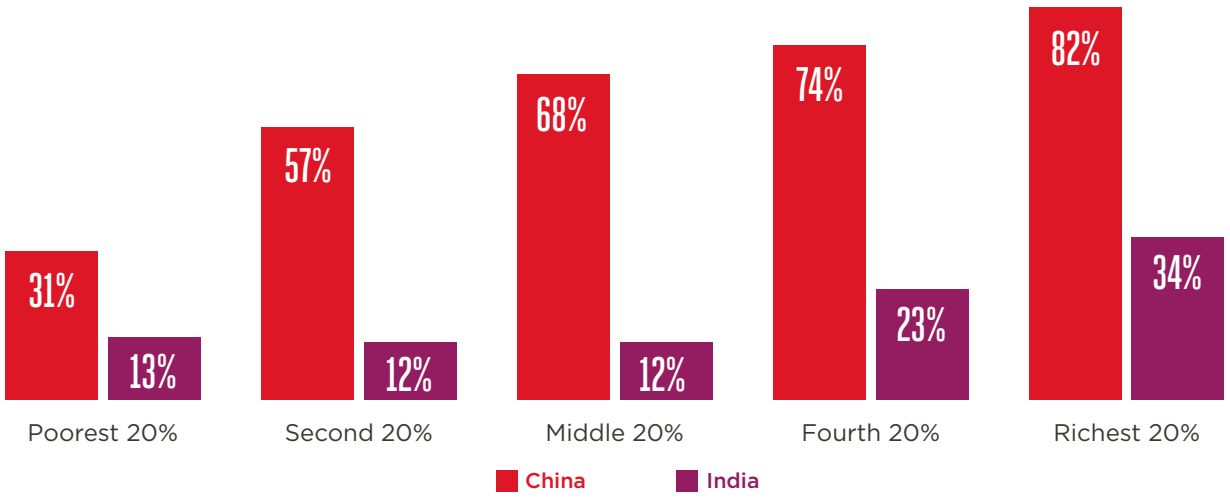
Source: Gallup World Poll

The divergence in life ratings between India and China is particularly noteworthy given that between them the two countries are home to more than 36% of the global population. The Chinese government – motivated in part by concerns about social instability – has invested heavily in infrastructure intended to alleviate poverty in the country's vast hinterlands. These initiatives include the express goal of providing broadband access to 90% of poverty-stricken regions and providing support for small online retailers in underdeveloped areas. Action in India has addressed the digital divide more slowly,[11] with hundreds of millions still unconnected.

In 2016, 92% of Chinese said they personally had a mobile phone and 64% said they had access to the internet; in India, the corresponding figures were 76% and 21%, respectively. Thus, while the internet is unquestionably more restricted in China than it is in India, it is likely providing economic and well-being benefits to a much larger share of Chinese. Dividing each country's population into income quintiles reveals that only among Chinese in the poorest group do less than half have a mobile phone and internet access. By contrast, only in the highest income quintile do more than one-fourth of Indians have both a mobile phone and internet access (Chart 5).

Chart 5

Percentage in China and India with a Mobile Phone and Internet Access, by Income Quintile



Source: Gallup World Poll

11 Notably, in early 2017 the Indian government unveiled a pilot project called Digital Village, a plan to provide free wi-fi to 1,050 poor villages in an effort to extend basic development services to rural areas. http://money.cnn.com/2017/01/30/technology/india-free-wifi-villages/index.html

Relationship between Life Ratings and Connectivity

We would expect access to mobile phones and the internet to be associated with higher life ratings at both the population level and the individual level. At the population level, access to these technologies (particularly the internet) can to some extent be taken as a proxy for broader economic and infrastructure conditions in a country or region. Thus, mobile phone/internet users are more likely than non-users to live in regions with higher living standards and better access to jobs and public services. We can control this relationship to some extent by separating results for countries in different income groups (as in Table 8 below) and more meticulously by controlling for socioeconomic characteristics, such as respondents' income and education levels, in the multivariate analysis.

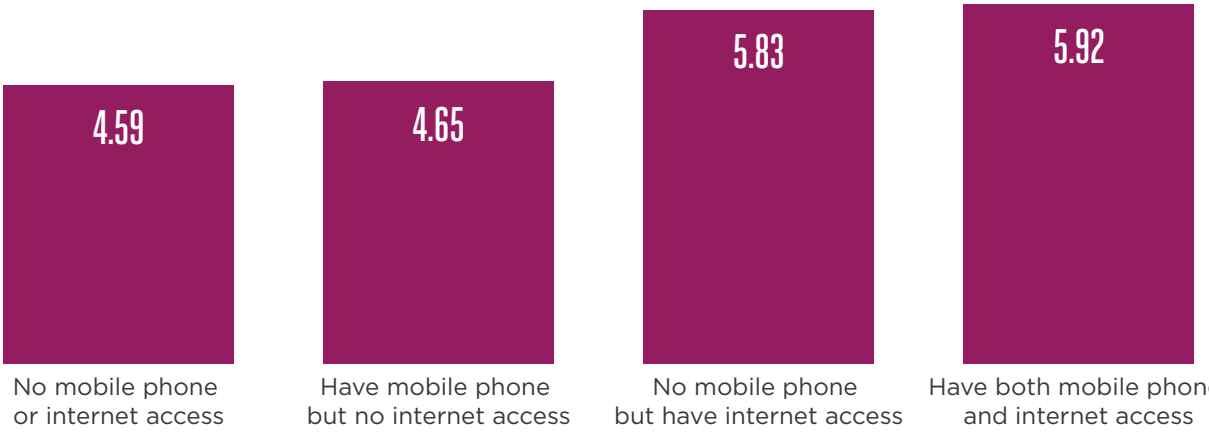
At the individual level, we might expect access to mobile phones and the internet to influence life evaluations to the extent that it expands what Gigler refers to as their "informational capability" – i.e., their ability to use information technology to "enhance their well-being in the economic, social, political and cultural dimensions of their lives" (Gigler, p.3) relative to those in their country or region without these capabilities.

Descriptive results suggest that the power of mobile phones to improve lives is largely attributable to their status as the primary device by which most of the world's residents access the internet. In the absence of internet access, those who have a mobile phone give similar life ratings as those without a mobile (the differences are within the survey's margin of error). However, internet access is associated with an increase of about 1.3 points on the life evaluation scale – from an average of about 4.6 to about 5.9 – whether or not those with access also have a mobile phone (Chart 6).[12]

To give the difference associated with internet access some context, countries with overall life evaluation averages close to 4.6 in 2016 were mostly low-income or lower-middle-income economies in Asia or Africa such as Bangladesh, Myanmar and Senegal. By contrast, those close to a 5.9 average were mostly in the upper-middle-income or high-income ranges, and included several post-Soviet transitional countries such as Russia, Latvia and Lithuania.

Chart 6

Average Global Life Ratings by Connectivity Status, 2016



Source: Gallup World Poll

Though the difference in average life evaluations between those with and without internet access is greater in some regions than others, in all regions it is substantially greater than the difference between those with and without mobile phones (holding internet access constant) (Table 7). In a few instances an increase in life evaluations is associated with mobile phone only (i.e., without internet access) – including in Sub-Saharan Africa, where there has historically been a lack of widespread existing fixed line communications infrastructure and where governments, NGOs and mobile operators have sought to provide vital services and information via cellular-only phones, which remain much more prevalent than internet-enabled phones on much of the continent.

12 An expanded set of connectivity categories including access to landline phones was also considered for this analysis but the results were not as informative, in part because landline access is largely consistent at the country level (i.e., most residents of developed countries have it while most residents of developing countries do not).

Table 7

Average Life Evaluations by Connectivity Status, Regional Results

	Do not have mobile phone or internet access	Have mobile but no internet access	Do not have mobile but have internet access	Have mobile phone and internet access
Australia/New Zealand	*	*	*	7.31
U.S./Canada	*	5.82	*	6.97
Western Europe	5.91	5.90	6.34	6.74
Latin America	5.84	5.79	6.39	6.54
Eastern Europe	4.68	5.00	5.85	6.2
Post-Soviet Eurasia	4.64	4.87	5.01	5.73
Southeast Asia	4.91	4.92	5.62	5.72
East Asia	4.97	4.94	*	5.65
Middle East/North Africa	4.34	4.58	4.85	5.47
Sub-Saharan Africa	4.01	4.31	4.79	5.08
South Asia	4.27	4.20	*	4.96

* Sample size too small for analysis

Source: Gallup World Poll

Results by country income group also associate the largest increase in average life evaluations with internet access, though, among low-income countries, there is a significant increase (from 3.83 to 4.02) associated with having mobile phones, even in the absence of internet access. Conversely, however, among residents of upper-middle-income countries who do not have internet access, those who have a mobile phone give significantly lower average life evaluations (5.04 vs. 5.31) (Table 8).

Table 8

Average Life Evaluations by Connectivity Status among Country Income Groups

	Do not have mobile phone or internet access	Have mobile but no internet access	Do not have mobile but have internet access	Have mobile phone and internet access
Low-income countries	3.83	4.02	4.55	4.67
Lower-middle-income countries	4.42	4.38	5.04	5.21
Upper-middle-income countries	5.31	5.04	5.95	5.77
High-income countries	5.68	5.74	6.52	6.70

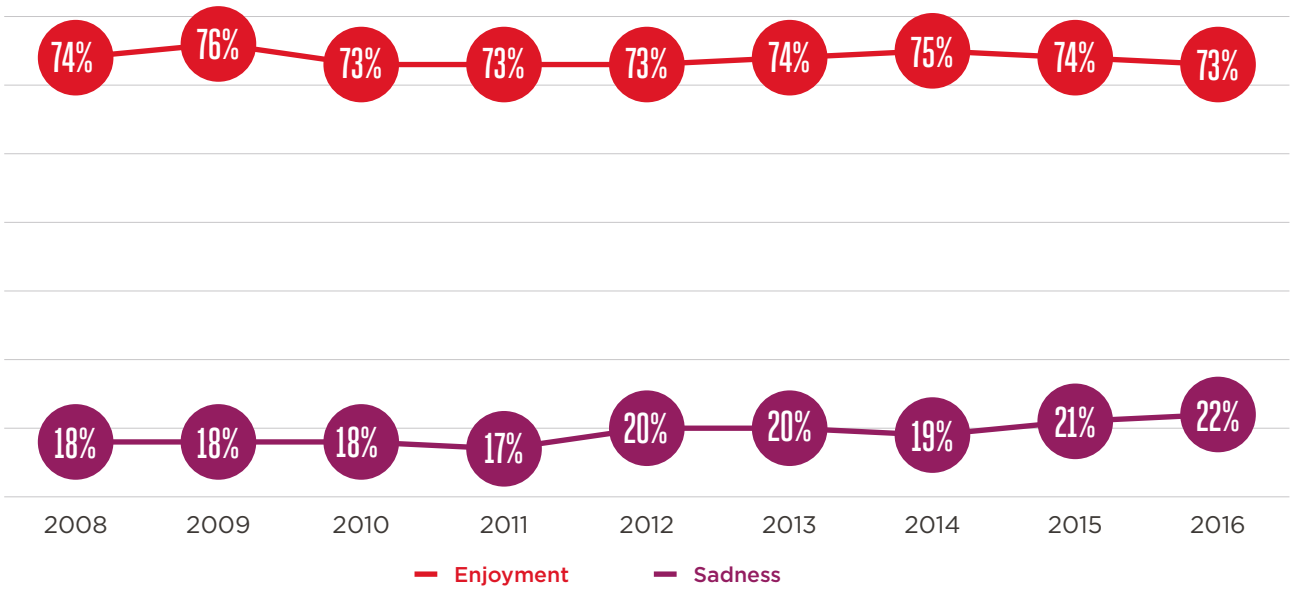
Source: Gallup World Poll

Experiential Well-Being: Affect Balance

The World Poll's experiential well-being indicators – comprised of six questions on respondents' emotional state the day before the interview – have been almost as stable at the global level as the life evaluation trends over the past ten years. In 2016, for example, 73% of residents across 142 countries said they experienced enjoyment for much of the previous day; the trend has been within three percentage points of that figure since 2008. The global incidence of sadness has also been largely stable during that time at a lower level of around 20%, though the trend has inched upward fairly consistently between 2011 and 2016 (Chart 7).

Chart 7

Percentage of Respondents Worldwide Who Experienced Enjoyment and Sadness the Previous Day, 2008–2016



Source: Gallup World Poll

For the purpose of this analysis, results from six of the World Poll's positive and negative affect questions are combined into a single indicator, called Affect Balance. Specifically, "yes" responses to the following three positive affect questions are combined in a Positive Experience Index.

- *Did you smile or laugh a lot yesterday?*
- *Did you experience enjoyment during A LOT OF THE DAY yesterday?*
- *Were you treated with respect all day yesterday?*

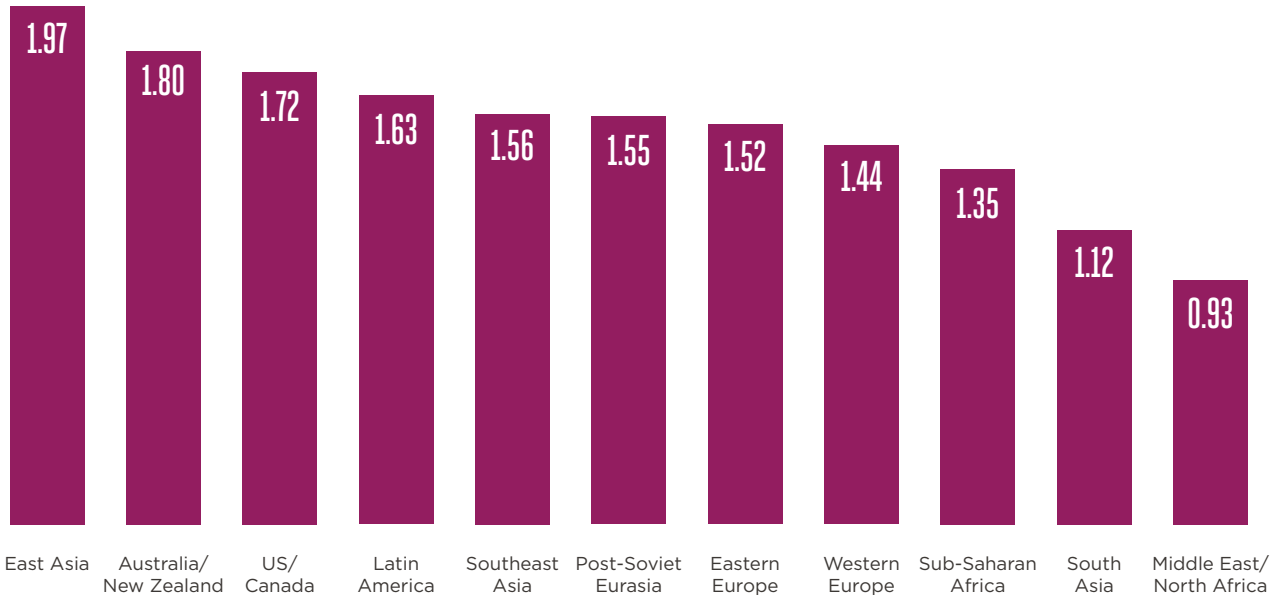
Similarly, "yes" responses to three negative affect questions are combined into a Negative Experience Index.

- *Did you experience worry during A LOT OF THE DAY yesterday?*
- *Did you experience sadness during A LOT OF THE DAY yesterday?*
- *Did you experience anger during A LOT OF THE DAY yesterday?*

The Affect Balance values are then derived by simply subtracting the Negative Experience scores from the Positive Experience scores. The global Affect Balance score for 2016 is +1.51, indicating positive emotions are substantially more prevalent than negative emotions worldwide. Regional results indicate this positivity is highest in East Asia (represented predominantly by China), followed by Australia/New Zealand and the U.S./Canada. The balance of positive emotions is lowest in the Middle East/North Africa region, much of which has long been plagued by conflict and social instability (Chart 8). As with life evaluations, country-level results vary more substantially on the Affect Balance measure, with more than two full points between the lowest- scoring country (Iraq at 0.09) and the highest-scoring country (Iceland at 2.22).

Chart 8

Affect Balance by Global Region, 2016



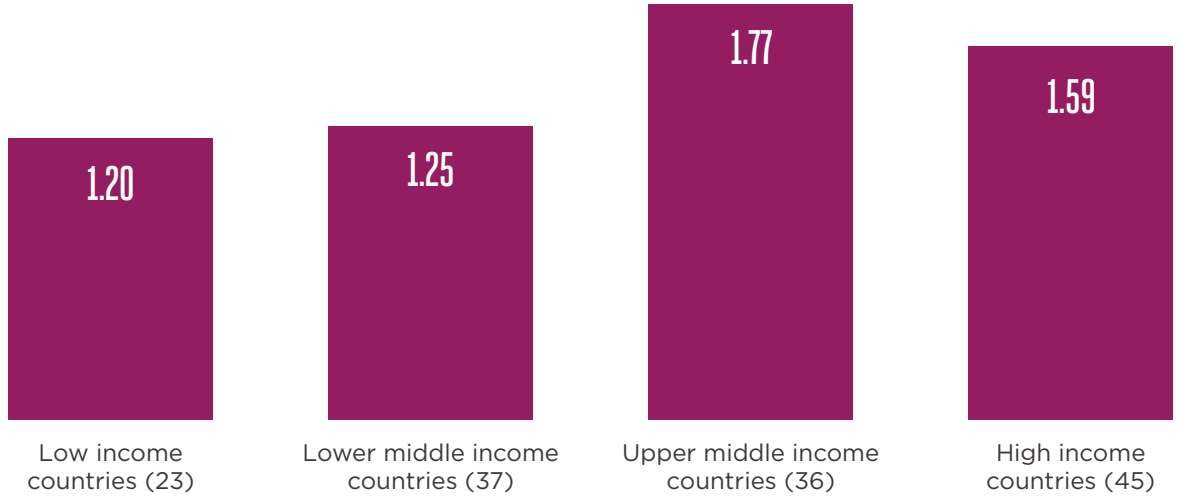
Source: Gallup World Poll

As previously noted, measures of emotional affect are not as highly related to material living standards as life evaluations generally are. That tendency is reflected in the finding that the level of net positive affect is similar in Western Europe (1.44) and Sub-Saharan Africa (1.35). Among countries at all income levels, positive emotions are more commonly reported than negative ones. The 2016 results do reveal that Affect Balance scores among low-income/lower-middle-income countries are significantly lower than those in the upper-middle-income and high-income groups, though this tendency does not hold for differences between the two lower-income groups or the two higher-income groups (Chart 9).

The lack of difference between average life ratings in low-income and lower-middle-income countries is consistent with the idea that frustration in the latter group with rising inequality and the disruption associated with rapid growth may help explain their declining life evaluations (page 20). Also notably, the average Affect Balance score is somewhat lower among high-income countries than among upper-middle-income countries; residents of high-income countries are somewhat less likely than those in the upper-middle-income group to say they experienced enjoyment for much of the previous day and somewhat more likely to say they experienced worry and sadness.

Chart 9

Affect Balance by Country Income Group, 2016



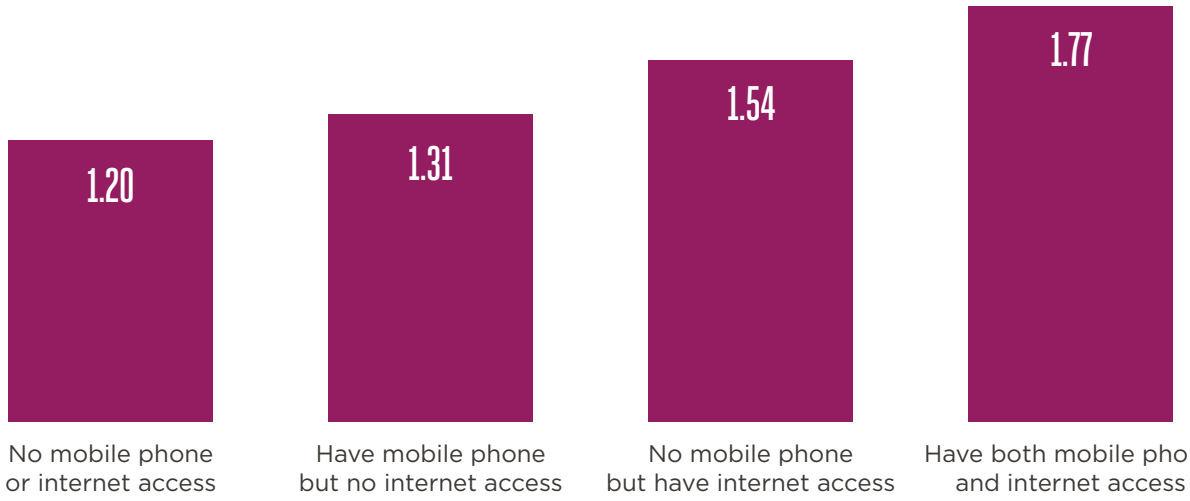
Source: Gallup World Poll

As noted above, experiential measures of subjective well-being vary less consistently than evaluative measures with material living standards. Nonetheless, at the global level there are significant differences by respondents' level of connectivity, as those with a mobile phone and internet access have significantly higher net positivity than those with neither.

Interestingly, among internet users worldwide, those who also have a mobile device score significantly higher in terms of positive affect than those who do not (Chart 10). Thus, in contrast to the relationships between connectivity and life evaluations, both internet access and mobile ownership (rather than internet access alone) may contribute to emotional well-being.

Chart 10

Affect Balance by Connectivity Status, 2016



Source: Gallup World Poll

Again, noting the countries associated with each level of Affect Balance provides some context by giving an idea of the corresponding differences in living conditions:

- Countries close to the 1.2 level (corresponding to individuals with no mobile phone or internet access) are mostly characterized by poor living conditions, and several struggle with social tensions and/or conflict. They include Bosnia and Herzegovina, Libya, Niger and Pakistan.
- Countries close to a 1.3 AB score (corresponding to individuals with a mobile phone but no internet access) have somewhat better living conditions on average, but some are characterized by cultural factors such as a legacy of oppression that may suppress positive emotions. They include Tajikistan, Azerbaijan, Vietnam and Bangladesh.
- Countries close to a 1.5 AB score (corresponding to individuals with internet access but no mobile phone) include several middle-income countries that have seen significant growth over the past 20 years, leading to relatively high levels of economic optimism. They include Brazil, Indonesia, Peru and Nigeria.
- Countries close to 1.8 AB score (corresponding to individuals with both mobile phones and internet access) tend to enjoy high living standards, social stability and an absence of violent conflict. They include Estonia, Australia, the United Kingdom and the United Arab Emirates.

There are interesting regional variations in the relationships between connectivity and affect measures. Positive affect varies most by connectivity status in Eastern Europe and Post-Soviet Eurasia (Table 9). Particularly in the latter region, of which Russia is by far the most populous country, having a mobile phone is associated with an increase in positive affect over and above the increase associated with internet access.

Table 9

Affect Balance by Connectivity Status, Regional Results

	Do not have mobile phone or internet access	Have mobile but no internet access	Do not have mobile but have internet access	Have mobile phone and internet access
East Asia	1.73	1.92	*	2.01
Latin America	1.36	1.40	1.47	1.84
Australia/New Zealand	*	*	*	1.82
SE Asia	1.27	1.47	1.80	1.79
U.S./Canada	*	1.25	*	1.78
Eastern Europe	0.81	0.96	1.67	1.76
Post-Soviet Eurasia	1.07	1.30	1.36	1.71
Western Europe	1.25	1.19	1.38	1.68
Sub-Saharan Africa	1.24	1.34	1.33	1.52
South Asia	1.02	1.04	*	1.43
Middle East/North Africa	0.76	0.66	1.14	1.15

* Sample size too small for analysis

Source: Gallup World Poll

Differences by country income group also indicate having a mobile phone is associated with higher Affect Balance scores independently of having internet access. Among residents without internet access in low-income, upper-middle-income and high-income countries, those who have mobile phones have an average Affect Balance scores about 0.2 points higher than those who do not have mobile phones (Table 10).

Table 10

Affect Balance by Connectivity Status, Results by Country Income Group

	Do not have mobile phone or internet access	Have mobile but no internet access	Do not have mobile but have internet access	Have mobile phone and internet access
Low-income countries	1.73	1.92	*	2.01
Lower-middle-income countries	1.36	1.40	*	1.84
Upper-middle-income countries	1.69	1.95	*	1.82
High-income countries	1.27	1.47	1.80	1.79

* Sample size too small for analysis

Source: Gallup World Poll

Box 3

Key Findings Review
The Relationship Between Subjective Well-Being Metrics and Connectivity

- Regional results from 2016 highlight the range with which average life evaluations tend to vary by the prevailing living conditions in a country or region; there are 2.5 to 3 scale points between the least economically developed region, Sub-Saharan Africa, and the most developed regions, Western Europe, the U.S./ Canada and Australia/New Zealand. There is somewhat more variation among results at the country level, with about 5 scale points between the lowest average current-life rating (2.85 in the Central African Republic) and the highest (7.72 in Norway).
- In the absence of internet access, those who have a mobile phone give very similar life ratings as those without a mobile. However, internet access is associated with an increase of about 1.25 points on the Life Evaluation scale, whether or not those with access also have a mobile phone.
- At the global level there are significant differences by respondents' level of connectivity, as those with a mobile phone and internet access have significantly higher net positivity than those with neither.
- Among internet users worldwide, those who also have a mobile device score significantly higher in terms of positive affect than those who do not. In contrast to the relationship between connectivity and Life Evaluation, both internet access and mobile ownership (rather than internet access alone) may contribute to higher Experiential well-being.

PART 3

Multivariate Analysis
A Closer Look at the Relationship Between Connectivity and Subjective Well-Being

In this section, we examine in more detail the relationship between connectivity and subjective well-being, in order to ascertain if the effects noted above in the more basic, descriptive analysis hold when controlling for other factors that may impact the relationship. In Part 2 we examined if there was a relationship between two variables: subjective well-being and connectivity. We found that in the absence of internet access, those who have a mobile phone give very similar life ratings as those without a mobile. However, internet access was associated with an increase of about 1.25 points on the Life Evaluation scale, whether or not those with access also have a mobile phone.

However, there may be additional factors at play not yet accounted for, such as wealth, education, age, gender, etc. that may affect both subjective well-being and an individual's access to connectivity. This is known as endogeneity: the effect of external factors on both variables in a relationship, which therefore affect the relationship and in this case, may call the impact found above into question. Therefore, we undertake the following multivariate analysis in order to control for these external factors and test if the positive impact of internet access found above holds true, as well as investigate further nuances in the relationship.

Methods

Multivariate analyses allow to simultaneously assess the effect of multiple independent variables on a given dependent variable, even if the independent variables are correlated with one another. For example, multiple regression analysis allow us to determine if there is an association between mobile ownership and SWB, after keeping constant other confounding factors, such as wealth or education. In order to take a closer look at the relationship between connectivity and subjective well-being, the following analysis estimates the effect of mobile ownership and internet access on the two measures of SWB: Life Evaluation and Affect Balance. Mobile phone ownership is captured by the following variable:

WP17626. *Do you have a mobile phone that you use to make and receive personal calls?*

Additionally, it is important to estimate the incremental impact of having access to a mobile phone and the internet. While the GWP does not include a question on internet access through a mobile phone, it is well understood that the majority of people around the world access the internet through their phones. To compute the second independent variable of interest, the following variables are used to create, "mobile ownership and internet access":

WP16056. *Do you have access to the internet in any way, whether on a mobile phone, a computer, or some other device?*

If WP17626 = "Yes" and WP16056 = "Yes", then "Have mobile phone and internet access" = "Yes"

Individuals without access to a mobile phone or the internet are however likely to exhibit a variety of other features that make them prone to lower SWB. They are likely to be poorer and to have a diminished ability to cover other human needs or have access to relational goods. An increasingly exhaustive set of covariates is used in order to control for omitted variable bias (OVB).[13] We are however mindful that as we reduce the risk of OVB, we increase the risk of simultaneous causality: mobile ownership may be both a cause and a consequence of factors associated with SWB, such as socio-economic status: for example, individual wealth and education increase the probability of owning a mobile; but owning a mobile can also contribute to income generation and greater educational opportunities for individuals, increasing their socio-economic status, and the likelihood to adopt newer technologies. In our selection of covariates, we prioritise those where the risk of simultaneous causality is low and exclude those covariates where we expect that mobile ownership will have causal priority. The nested nature of our models aims to provide a range of estimates for the impact of mobile ownership that attempt to balance the risk of OVB with the risk of simultaneous causality.

The first basic control is annual per capita household income. Income is a major determinant of both SWB and mobile ownership. Although one of the ways in which mobile can drive improvements in Well-Being (WB) is through higher income, we consider that the potential for endogeneity is low, given the much larger expected effect of income on mobile ownership and SWB than the expected effect of mobile ownership on income. Income is transformed for international comparability into international dollars adjusted for purchasing power parity. The resulting income variable was then log transformed[14] to account for the marginal diminishing returns of income on SWB measures (e.g. Sacks, Stevenson & Wolfers, 2010).

13 Omitted variable bias (OVB) arises when a model incorrectly leaves out one or more important covariate. For example, excluding income in a model to estimate the effect of mobile ownership on SWB would lead to OVB, because income predicts both SWB and mobile ownership.

14 The logarithm of a number is the exponent to which a fixed number (the base), must be raised to produce that number. The logarithmic ("log") transformation of income is common in SWB research to account for the fact that the same monetary amount makes a greater difference at lower income levels, e.g. an increase in monthly income of $100 dollars has a much greater impact on the SWB of an individual earning $1,000/month, than on the SWB of an individual earning $10,000/month. The log transformation of income allows us to estimate the increase in SWB for a percentage change in income, rather than for a unit change of income, which will show diminishing returns.

Then universal needs are considered, as operationalised by Tay and Diener (2011), who in turn examined needs derived from Maslow (1954), Deci and Ryan (2000), Ryff and Keyes (1995), De Charms (1968) and Csikszentmihalyi (1988):

1. **Safety and security**
   - Felt safe walking alone
   - Did not have money and/or property stolen during the past 12 months
   - Were not assaulted during the past 12 months
2. **Social support and love**[15]
   - Have others they can count on for help in an emergency
3. **Feeling respected**[16]
   - Felt they were treated with respect
4. **Mastery**[17]
   - Had the experience of learning something
5. **Self-direction and autonomy**[18]
   - Experienced freedom in life

Technology access can arguably help fulfil some of these universal human needs. The most immediate effect of mobile telephony and the internet is to facilitate communication and increase social capital through increased connectivity with family and friends. As Chan (2015) shows, mobile use, including online and voice communication, are positively related to subjective well-being and bonding and bridging capital. Access to information technology also enhances mastery needs, as it facilitates the transfer of information (Graham & Nikolova, 2013). Finally, information technology may be a significant tool to overcome obstacles to freedom, particularly those having to do with press freedom and access to information, but also other rights such as gender rights (Wheeler, 2006). As with all other control variables in the model, there is some potential for simultaneous or reverse causality: Social capital could drive mobile take-up (e.g. people who have social support are more likely to get a mobile phone to stay in touch with friends and family). A similar argument could apply to mastery and autonomy.

Including fulfilment of these particular needs as control variables is however likely to remove variance in SWB outcomes that is rightfully accounted for by access to mobiles and the internet, so we only incorporate those needs where technology is only expected to play a minor or very indirect causal role, even if they may be correlated. This would be the case of basic needs for food and shelter, and safety and security. Unfortunately, some of the safety and security variables are not available for some very large countries such as China. In order to keep as many countries as possible in the sample, we limit our safety and security variables to "Were not assaulted during the past 12 months."

The items available for the human needs approach represent a relatively low threshold, meaning that any one need will be covered for most people. For this reason, a second theoretical framework based on well-being domain satisfaction is considered to account for confounding variables. We consider the five essential elements identified by Gallup (Rath & Harter, 2010), including:

1. **Purpose WB:** how you occupy your time or simply liking what you do every day.
2. **Social WB:** having strong relationships and love in your life.
3. **Financial WB:** effectively managing your economic life.
4. **Physical WB:** having good health and enough energy to get things done on a daily basis.
5. **Community WB:** engagement you have with the area where you live.

As in the case of the universal human needs framework, and keeping in mind the same cautions regarding simultaneous causality, technology access has a significant bearing on at least three of the five essential elements of SWB. In addition to the effects on Purpose and Social WB that we described above, the potential economic impact of information technology has been thoroughly explored and documented (e.g. Chandy & Kharas, 2012). Increased financial inclusion through mobile banking and payment services are particularly relevant (Demirgüç-Kunt & Klapper, 2012), but so is the potential that mobile phones offer to connect individuals to local and global commodity markets (e.g. Aker & Fafchamps, 2014), and labour markets (Aker et al., 2011). There is not, on the other hand, a strong prior to assume that access to information technologies may have a

15 Tay and Diener (2011) also include in their "Social support and love" needs the item "Experienced love yesterday", which is not available for this study's reference period.

16 Tay and Diener (2011) also include in their "Feeling respected and pride in activities" needs the item "Were proud of something yesterday", which is not available for this study's reference period.

17 Tay and Diener (2011) also include in their "Mastery" needs the item "Did what she or he does best at work". This item is excluded from the current study, as its inclusion would effectively eliminate from the sample those outside the employed population.

18 Tay and Diener (2011) also include in their "Self-direction and autonomy" needs the item "Choose how their time was spent", which is not available for this study's reference period.

significant impact on Physical[19] or Community WB. We select the following indicators of Physical and Community WB based on availability and a prior review of key determinants of SWB by Diego-Rosell et al. (2016):

- **Physical WB**
  - Health Problems
  - Feel Well-Rested
- **Community WB**
  - City: Quality Healthcare
  - Good place for immigrants
  - Satisfied with roads and highways

All needs and WB-related items are answered on a dichotomous yes/no scale. For the purposes of model estimation, needs were dummy coded, with yes = 1, and No/Don't Know/No Response = 0. Finally, we control in all models for a typical set of demographic factors that have an effect on SWB due to life circumstances, including age, age squared, gender, marital status, urban or rural setting, educational attainment, number of children in the household, and country. A commonly used control variable is the year of data collection, but in this analysis, we focus on the most recent wave of GWP data (2016), so this variable is not applicable. We do, however, control in our affect balance models for the day of the week, to account for the fact that most people experience more positive emotions and fewer negative emotions on weekends. After eliminating cases with missing data on any of the analysis variables, the final sample covers 11 broad regions of the world, with a total of:

- 138 countries and 138,240 individual respondents for the income and demos-only model,
- 134 countries and 133,510 for the income, demos and needs model, and
- 131 countries and 127,395 for the income, demos and needs and well-being model.

To estimate an unbiased impact coefficient of mobile ownership on SWB we follow recommendations from Ferrer-i-Carbonell and Frijters (2004) and Kristoffersen (2010), and estimate LE and AB using an OLS regression approach:

$$SWB = \beta_0 + \alpha D + \beta M + \varepsilon \quad (1)$$

Where β_0 is a constant term, D is a vector of control variables[20] with unknown coefficients α, M is our mobile ownership dummy variable with unknown coefficient β and ε is the unexplained part of the model. To provide a robustness check on the OLS estimates, we also estimate the effects on SWB using Propensity Score Matching (PSM), which does not require strong linearity assumptions (Rosenbaum & Rubin, 1983). We use nearest neighbour matching based on logit distance in propensity scores using R MatchIt package. Propensity scores are the true probability of unit i having access to a mobile phone, or a mobile phone and internet access, given covariates D_i, calculated via logistic regression, where Y is a dichotomous variable which is defined as:

Y = 0 for those without mobile/mobile & internet
Y = 1 for those with mobile/mobile & internet

And the probability of Y = 1 is given by:

$$Pr = \frac{1}{1 + exp\left[-(\beta_0 + \beta_i D_i)\right]} \quad (2)$$

Where β_0 is a constant term, and D_i is a vector of covariates with unknown coefficients β_i. Using one-to-one nearest neighbour matching with replacement, individuals in the group with no mobile/mobile & internet are chosen as matching partners for individuals in the group with mobile/mobile & internet that has the closest propensity score.[21] Observations that are not matched are not included in the analysis.

We expect this analytical approach to produce more robust estimates than bivariate summary statistics. However the analysis is unlikely to control for all relevant factors that drive SWB (omitted variable bias) and it also does not fully address the potential bi-directional (or simultaneous) relationship between SWB and mobile phone ownership or internet access. This approach could therefore potentially overestimate the impact of mobile on well-being. For these reasons, our analysis focuses on whether results are statistically significant across a range of specifications, rather than on precisely estimating the size of the impact.

19 While mobile phones and the internet can be powerful platforms to deliver health interventions, there is no evidence that simply having access to these technologies will have an effect on health.

20 See Table 16 in Appendix for a list of control variables.

21 All impact estimations take into account the multi-stage clustered nature of the sample, including the effect of sampling design in all variance estimations using Stata survey package ("svy") with linearization via Taylor series.

Results

Table 11 presents the survey-weighted coefficients, with their corresponding standard errors, for "Mobile" and "Mobile + Internet" under a series of increasingly stringent models, starting with model controlling for income and demographic factors, and then showing the effect of adding needs and WB domains. Since Life Evaluation and Affect Balance are in different scales, we also provide z-values for comparability.[22] The PSM approach was successful in eliminating differences in covariates between groups, however, some small differences remain (see Appendix, Charts 11–13). Given these remaining divergences after PSM, we include a third, further stringent estimation approach that uses the propensity score matched sample, and applies the same regression controls as in the OLS model (shown as PSM+OLS on Table 11).

In the interest of conciseness, Table 11 omits the regression coefficients for the control variables in the model. For reference, in the extended OLS model, we highlight the following regression coefficients of interest to provide a reference regarding relative effect sizes:

- **Income:** The coefficient for log of income is = .610, p<.01 for Life Evaluation. Log-transformed dependent variables can be interpreted in terms of the effect of a percent increase on Life Evaluation. Since we are using a base 10 log transformation, a tenfold increase in income rises Life Evaluation scores by .610 points. For Affect Balance, the effect of the log of income is coef. = .160, p<.01, which can be interpreted to say that a ten-fold increase of income rises Affect Balance by .160 points.
- **Food hardship:** Not having enough money for food in the last 12 months is associated with a coef. = -.423, p<.01 for Life Evaluation and coef. = -.307, p<.01 for Affect Balance. Since these are dummy variables, this coefficient can be interpreted to mean that not having money for food decreases Life Evaluation by .423 points and Affect Balance by .318 points.
- **Health:** Having serious health problems – defined as any health problems that prevent someone from doing any of the things people their age normally can do – is associated with a coef. = -0.322, p<.01 for Life Evaluation and coef. = -.290, p<.01 for Affect Balance. Since these are dummy variables, this coefficient can be interpreted to mean that having health problems decreases Life Evaluation by .322 points and Affect Balance by .290 points.
- **Education attainment:**
  - College vs. primary or less: Having a college education, relative to just having primary education or less, is associated with a coef. = .538, p<.01 for Life Evaluation and coef. = .234, p<.01 for Affect Balance. Since these are dummy variables, this coefficient can be interpreted to mean that having a college education increases Life Evaluation by .538 points and Affect Balance by .234 points.
  - College vs. secondary: Having at least some secondary education (excluding college education), relative to just having primary education or less, is associated with a coef. = .259, p<.01 for Life Evaluation and coef. = .122, p<.01 for Affect Balance. Since these are dummy variables, this coefficient can be interpreted to mean that having at least some secondary education increases Life Evaluation by .259 points and Affect Balance by .122 points.

As expected, we generally find smaller effects for mobile phone and mobile phone and internet access on SWB as the number of controls is increased. However, there is some variation regarding the effect of these technologies on SWB depending on the model specification and outcome variables:

- **Mobile phone access:**
  - Limited effects on Life Evaluation (LE) and not significantly different from zero as other well-being covariates are added to the model
  - Small but significant positive effect of mobile phone ownership on Affect Balance (AB).
- **Mobile phone and internet access:**
  - Significant effects on LE across all model specifications
  - Significant effects on AB across most model specifications

Of all three analytical approaches explored, OLS is the more standard approach in SWB research, and is generally better understood in the context of complex sample designs, and also shows the smallest standard errors. Focusing on the OLS results, we find that the effect of mobile phone access on Life Evaluation is small and not significantly different from zero as needs and well-being covariates are added to the model. We find on the other hand a small but significant effect on Affect Balance, with the more stringent model showing a coef. = 0.060, p<.10.

22 Z-values are computed by dividing the regression coefficient over its standard error, and are used to determine the statistical significance of the coefficient.

The effect of mobile phone and internet access, based on OLS results, is larger for both Life Evaluation and Affect Balance and similar for all model specifications, with coefficients ranging from 0.313 to 0.350 (all p <.01) for Life Evaluation, and 0.122 to 0.153 (all p<.01) for Affect Balance.

These results are somewhat counter to many of the U.S. studies finding a negative effect of information technology on SWB, but generally consistent with broader international research efforts (e.g. Graham & Nikolova, 2013) finding a generally positive effect of access to information technology on both Life Evaluation and Affect Balance. The discrepancies in the literature are associated with different geographic scopes, which highlights the importance of exploring heterogeneity of effects at the regional level. One possibility is that the well-being dividend of mobile and internet access is greater in areas where these technologies make a critical difference. For example, mobile technology in sub-Saharan Africa has allowed many individuals to leapfrog technologies and obtain access to services such as wireless communication, banking, or timely data from local commodity markets that were hitherto unavailable to most of the population. The impact of mobile technology in other parts of the world may have been more incremental, as most of the population may have already had access to those services.

In order to explore regional heterogeneities, we focus on the results from the OLS models. Table 12 shows the OLS coefficients for all model specifications by region, while Chart 11 (in the Appendix) displays the results of the more stringent income + demos + needs + WB model. Having access to a mobile phone has small effects on both Life Evaluation and Affect Balance across regions. While not statistically different from zero, the effect of mobile ownership on Life Evaluation and Affect Balance in the U.S./Canada veers into negative territory, in agreement with some of the U.S.-specific research on the negative effects of mobile use on SWB.

The effect of mobile and internet access on SWB are greater than those of mobile ownership alone, particularly in the case of Life Evaluation and particularly in regions such as Sub-Saharan Africa, Eastern Europe, and South Asia. The effect is sizeable for the U.S./Canada region too, although with much wider confidence intervals than in the other regions. These results are consistent with findings by Graham and Nikolova (2013) identifying a significantly positive impact of internet access across all regions, including the U.S./Canada. The results are also generally consistent with the proposition (Graham & Nikolova, 2013) of a greater well-being dividend in areas where mobile information technologies represent a greater impact in terms of access to new services.

The effects of mobile and internet access on Affect Balance are on the other hand less consistent with this proposition. We find that mobile ownership has a significantly positive impact in diverse regions, including Western Europe, Eastern Europe, Post-Soviet Eurasia, East Asia and Latin America, but we do not find significant effects in other regions. The effect of mobile and internet access on AB is more consistently positive across regions, but we find no significant impact across model specifications in Australia/New Zealand, South East Asia, or Sub-Saharan Africa.

Prior research has pointed out that the capabilities provided by information technology have a similar effect on SWB as other markers of development, such as economic growth and migration. These processes increase SWB, particularly expressed in terms of Life Evaluation, but may also be associated with higher levels of stress and frustration, particularly at higher income levels (Graham & Nikolova, 2013). We find, however, that the effects on Affect Balance do not necessarily correlate with income levels, as we fail to identify significant impacts on both developed regions such as Australia/New Zealand, and poorer regions such as Sub-Saharan Africa.

In order to explore these differences further, we present OLS coefficients for all model specifications by World Bank income groups in Table 13. Having access to a mobile phone has small effects on both Life Evaluation and Affect Balance, although we find somewhat stronger effects for Life Evaluation at both ends of the income distribution, with coef. = 0.099 (p<.10) in low-income countries, and coef. = 0.153 (p<.10) for high income countries the most stringent model specification. However, these coefficients are not statistically significant according to the usual conventions (p<.05). The effect of mobile ownership on Affect Balance is only statistically greater than zero in upper-middle income countries (coef. = 0.121, p<.05). Mobile and internet access has small to medium-sized effect on Life Evaluation in all regions, with the strongest effect in high-income countries (coef. = 0.426, p<.01), and the weakest effect in upper-middle-income countries (coef. = 0.177, p<.01). The effect of mobile and internet access on Affect Balance is only significantly higher than zero for upper-middle (coef. = 0.147, p<.01) and high-income countries (coef. = 0.219, p<.01).

Box 4

Key Findings Review

A Closer Look at the Relationship between Connectivity and Subjective Well-Being

- The results indicate that mobile and internet access are associated with an increase in Subjective Well-Being measured by both Life Evaluation and Affect Balance.
- Mobile ownership has a significantly positive impact on how people felt in the last day (Affect Balance) in upper-middle income countries and certain regions, including Western Europe, Eastern Europe, Post-Soviet Eurasia, East Asia, and Latin America, but the results do not reveal significant effects in other regions.
- While mobile ownership alone does not drive a significant increase globally on Life Evaluation, there are some regions where a relationship exists (notably, MENA, Western Europe, Eastern Europe, and East Asia) as well as a modest association in low- and high-income countries.

Table 11

OLS, PSM and PSM+OLS Coefficients for Mobile and Mobile + Internet

	PSM			OLS			PSM+OLS		
	Coef.	St.Err	Z-value	Coef.	St.Err	Z-value	Coef.	St.Err	Z-value
Mobile									
Life Evaluation									
Income + Demos	-0.049	0.064	-0.773	0.099**	0.048	2.058	0.073	0.058	1.256
Income + Demos + Needs	-0.091	0.063	-1.460	0.069	0.048	1.452	0.078	0.053	1.461
Income + Demos + Needs + WB	-0.015	0.062	-0.234	0.077	0.047	1.623	0.118**	0.055	2.142
Affect Balance									
Income + Demos	0.098**	0.047	2.068	0.116***	0.035	3.277	0.136***	0.045	3.002
Income + Demos + Needs	0.017	0.053	0.329	0.0881**	0.036	2.454	0.097*	0.050	1.948
Income + Demos + Needs + WB	0.030	0.054	0.560	0.0604*	0.036	1.682	0.110**	0.047	2.335
Mobile+Internet									
Life Evaluation									
Income + Demos	0.137*	0.072	1.916	0.350***	0.045	7.865	0.267***	0.064	4.152
Income + Demos + Needs	0.132*	0.072	1.828	0.313***	0.047	6.688	0.227***	0.068	3.348
Income + Demos + Needs + WB	0.202***	0.070	2.894	0.339***	0.049	6.947	0.298***	0.067	4.454
Affect Balance									
Income + Demos	0.133***	0.040	3.359	0.153***	0.035	4.422	0.194***	0.039	4.987
Income + Demos + Needs	0.067	0.046	1.442	0.133***	0.035	3.833	0.103**	0.046	2.254
Income + Demos + Needs + WB	0.048	0.055	0.872	0.122***	0.030	4.040	0.099*	0.050	1.968

*** p<0.01, ** p<0.05, * p<0.1, All models include Country dummies.

Source: Gallup World Poll

Table 12

OLS Coefficients for Mobile and Mobile + Internet by Region

	Western Europe	Eastern Europe	Post-Soviet Eurasia	Australia/ N.Z.	East Asia	SE Asia	South Asia	Latin America	U.S./ Canada	Middle East/ N. Africa	Sub-Saharan Africa
Mobile											
Life Evaluation											
Income + Demos	.280***	.312***	.148	.577**	.029	.078	.081	.057	.013	.313***	.143*
	(.095)	(.113)	(.114)	(.239)	(.165)	(.138)	(.093)	(.106)	(.23)	(.114)	(.077)
Income + Demos + Needs	.263***	.282***	.133	.487**	.051	.090	.067	.041	-.335	.304**	.133*
	(.093)	(.108)	(.112)	(.225)	(.161)	(.142)	(.091)	(.105)	(.232)	(.12)	(.078)
Income + Demos + Needs + WB	.227**	.256**	.093	.261	.324*	.109	.078	.001	-.320	.285**	.124
	(.091)	(.104)	(.117)	(.189)	(.184)	(.139)	(.09)	(.1)	(.241)	(.128)	(.078)
Affect Balance											
Income + Demos	.209**	.175**	.296***	.268	.239***	.108	.025	.185***	-.039	.069	.077
	(.092)	(.08)	(.072)	(.185)	(.082)	(.073)	(.086)	(.065)	(.147)	(.084)	(.049)
Income + Demos + Needs	.199**	.155**	.286***	.226	.240***	.058	.007	.172***	-.309*	.050	.060
	(.092)	(.076)	(.072)	(.185)	(.084)	(.073)	(.086)	(.063)	(.175)	(.091)	(.046)
Income + Demos + Needs + WB	.170**	.136*	.197***	.013	.295*	.096	.018	.111*	-.234	.009	.058
	(.085)	(.07)	(.063)	(.166)	(.154)	(.068)	(.077)	(.06)	(.181)	(.093)	(.041)
Mobile+Internet											
Life Evaluation											
Income + Demos	.351***	.513***	.323***	.520**	.210*	.327**	.439***	.203**	.740***	.292***	.443***
	(.077)	(.075)	(.092)	(.219)	(.107)	(.13)	(.124)	(.097)	(.267)	(.082)	(.092)
Income + Demos + Needs	.281***	.405***	.253***	.388*	.193*	.287**	.371***	.131	.639*	.250***	.407***
	(.074)	(.073)	(.087)	(.2)	(.106)	(.143)	(.127)	(.094)	(.347)	(.087)	(.093)
Income + Demos + Needs + WB	.227***	.365***	.189**	.240	.173	.287**	.333***	.107	.649**	.242**	.380***
	(.073)	(.073)	(.087)	(.164)	(.138)	(.14)	(.127)	(.091)	(.308)	(.094)	(.093)
Affect Balance											
Income + Demos	.261***	.434***	.281***	.099	.159*	.000	.178*	.259***	.327**	.213***	.052
	(.068)	(.061)	(.062)	(.168)	(.083)	(.061)	(.1)	(.058)	(.166)	(.059)	(.054)
Income + Demos + Needs	.214***	.354***	.240***	.034	.138*	-.021	.177*	.206***	.174	.195***	.011
	(.067)	(.059)	(.064)	(.17)	(.082)	(.064)	(.097)	(.057)	(.202)	(.062)	(.052)
Income + Demos + Needs + WB	.161***	.323***	.167***	-.090	.146	-.005	.025	.148***	.276	.178***	-.008
	(.062)	(.055)	(.06)	(.145)	(.11)	(.059)	(.086)	(.053)	(.179)	(.065)	(.048)

*** p<.01, ** p<.05, * p<.10, (Design-adjusted standard errors in parenthesis)

Source: Gallup World Poll

Table 13

OLS Coefficients for Mobile and Mobile + Internet by Country Income Groups

	Low Income	Lower Middle Income	Upper Middle Income	High Income
Mobile				
Life Evaluation				
Income + Demos	0.0989*	0.0782	0.0386	0.305***
	(0.0578)	(0.0713)	(0.100)	(0.0863)
Income + Demos + Needs	0.0979*	0.0687	0.0329	0.184**
	(0.0558)	(0.0706)	(0.100)	(0.0859)
Income + Demos + Needs + WB	0.0963*	0.0738	0.0461	0.153*
	(0.0552)	(0.0707)	(0.0872)	(0.0863)
Affect Balance				
Income + Demos	-0.0255	0.0468	0.231***	0.200***
	(0.0488)	(0.0593)	(0.0545)	(0.0665)
Income + Demos + Needs	-0.0235	0.0272	0.220***	0.124*
	(0.0478)	(0.0593)	(0.0553)	(0.0739)
Income + Demos + Needs + WB	-0.0100	0.0440	0.121**	0.108
	(0.0431)	(0.0547)	(0.0544)	(0.0723)
Mobile+Internet				
Life Evaluation				
Income + Demos	0.337***	0.398***	0.231***	0.543***
	(0.0713)	(0.0807)	(0.0745)	(0.0839)
Income + Demos + Needs	0.266***	0.370***	0.180**	0.448***
	(0.0694)	(0.0817)	(0.0758)	(0.114)
Income + Demos + Needs + WB	0.253***	0.339***	0.177***	0.426***
	(0.0683)	(0.0821)	(0.0644)	(0.105)
Affect Balance				
Income + Demos	0.0522	0.112*	0.181***	0.314***
	(0.0600)	(0.0586)	(0.0559)	(0.0573)
Income + Demos + Needs	0.0103	0.109*	0.142***	0.229***
	(0.0593)	(0.0578)	(0.0547)	(0.0693)
Income + Demos + Needs + WB	-0.00559	0.0404	0.147***	0.219***
	(0.0534)	(0.0509)	(0.0398)	(0.0616)

*** p<.01, ** p<.05, * p<.10, (Design-adjusted standard errors in parenthesis)

Source: Gallup World Poll

Conclusions

The current analysis suggests that on average, having access to a mobile phone alone provides a small boost to daily lived experiences, as measured by a suite of affect measures over the last 24 hours, but does not affect the evaluations that individuals make about their lives as a whole.

Given the near-universal rates of mobile penetration in many countries, basic mobile access may be considered a "hygiene" factor in these markets, something that is taken for granted, even if its absence would be greatly disruptive, though it is not obvious that this is driven by satiation in richer countries, which show, if anything, somewhat higher effects. Cultural factors are likely at play as well, as we find evidence suggesting greater impact in certain regions (e.g. Eastern Europe, Middle East and North Africa, and Sub-Saharan Africa).

Instead, the results suggest that the well-being potential of information technologies is realised when mobile access is complemented by internet access, when considering Life Evaluations and Affect Balance metrics particularly in regions such as Sub-Saharan Africa, Eastern Europe and South Asia. The results are generally consistent with the proposition of a greater well-being dividend in areas where mobile information technologies represent a greater impact in terms of access to new services.

The present analysis is based on large sample sizes, a broad geographic coverage and robust set of controls and model specifications. However, this analysis presents some limitations. More specifically, data availability constraints meant that some controls to account for the effect of access to basic human needs for safety and security could not be included in the models. The absence of key variables in specific geographies also meant that some countries had to be excluded from the sample, most notably China, in the case of the extended models including controls for income, demographics, needs and Well-Being factors.

Finally, it is worth noting that strong causal attributions cannot be drawn while all the limitations associated with non-experimental, cross-sectional regression analysis apply. To this end, exploration of further quasi-experimental approaches to minimise omitted variable bias and simultaneous causality is encouraged. Policy and regulatory differences across countries are often a good source of natural experiments to approximate random assignment to mobile and internet access and can provide additional important insights into the impact of mobile access on people's well-being.

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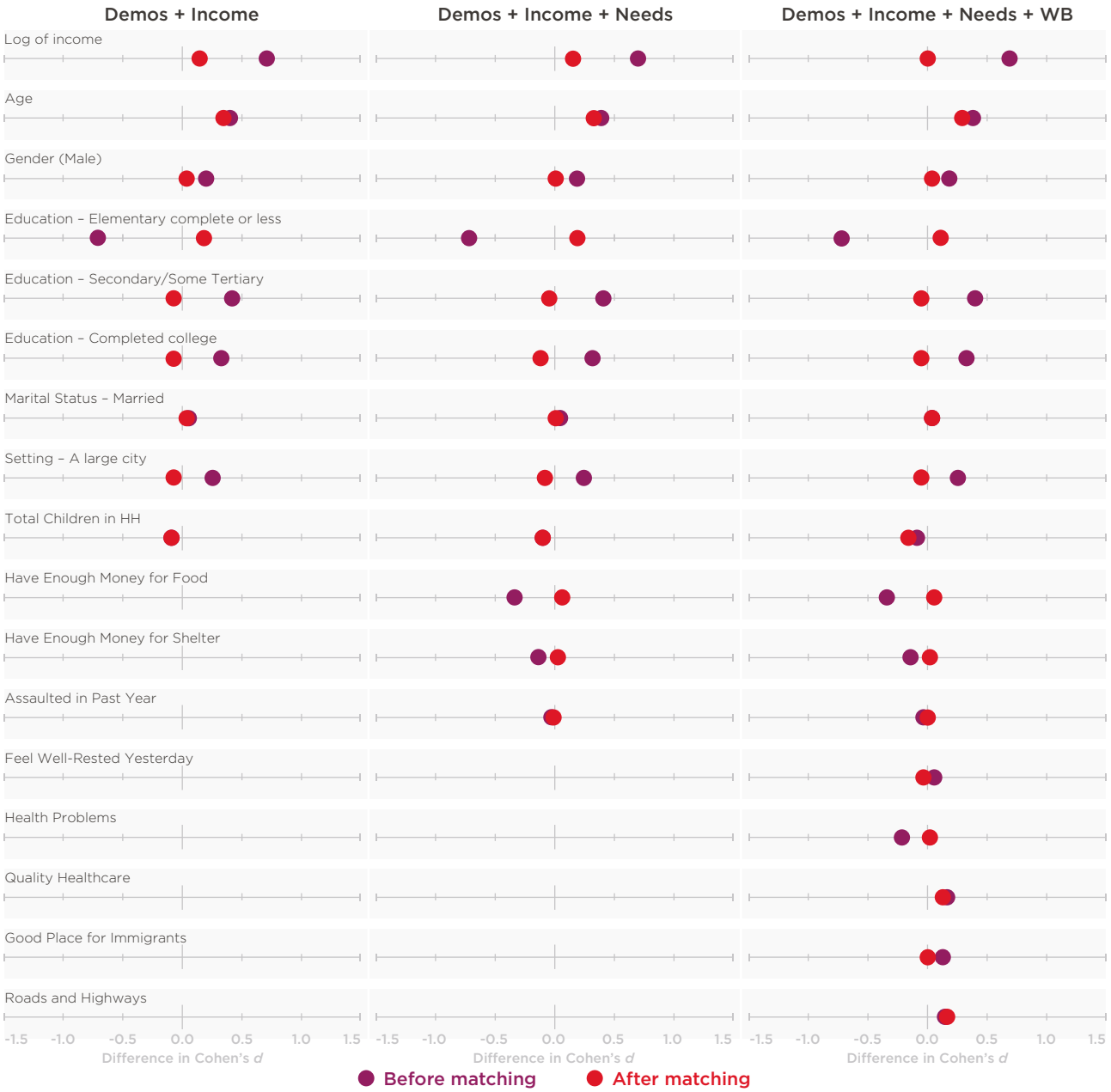
Appendix

Chart 11 shows the standardised mean differences in covariates (expressed as Cohen's *d*) between those with access to a mobile phone and those without it, for the total unweighted sample. Sampled individuals with access to a mobile phone tend to be more affluent, older, better educated, and less likely to experience health problems. Although the PSM algorithm minimised most differences, some discrepancies remain in terms of age (Cohen's *d* = 0.28) after matching on the full set of 17 covariates.

Chart 11

Dot plot of standardised mean differences for covariates before and after propensity score matching (Mobile)

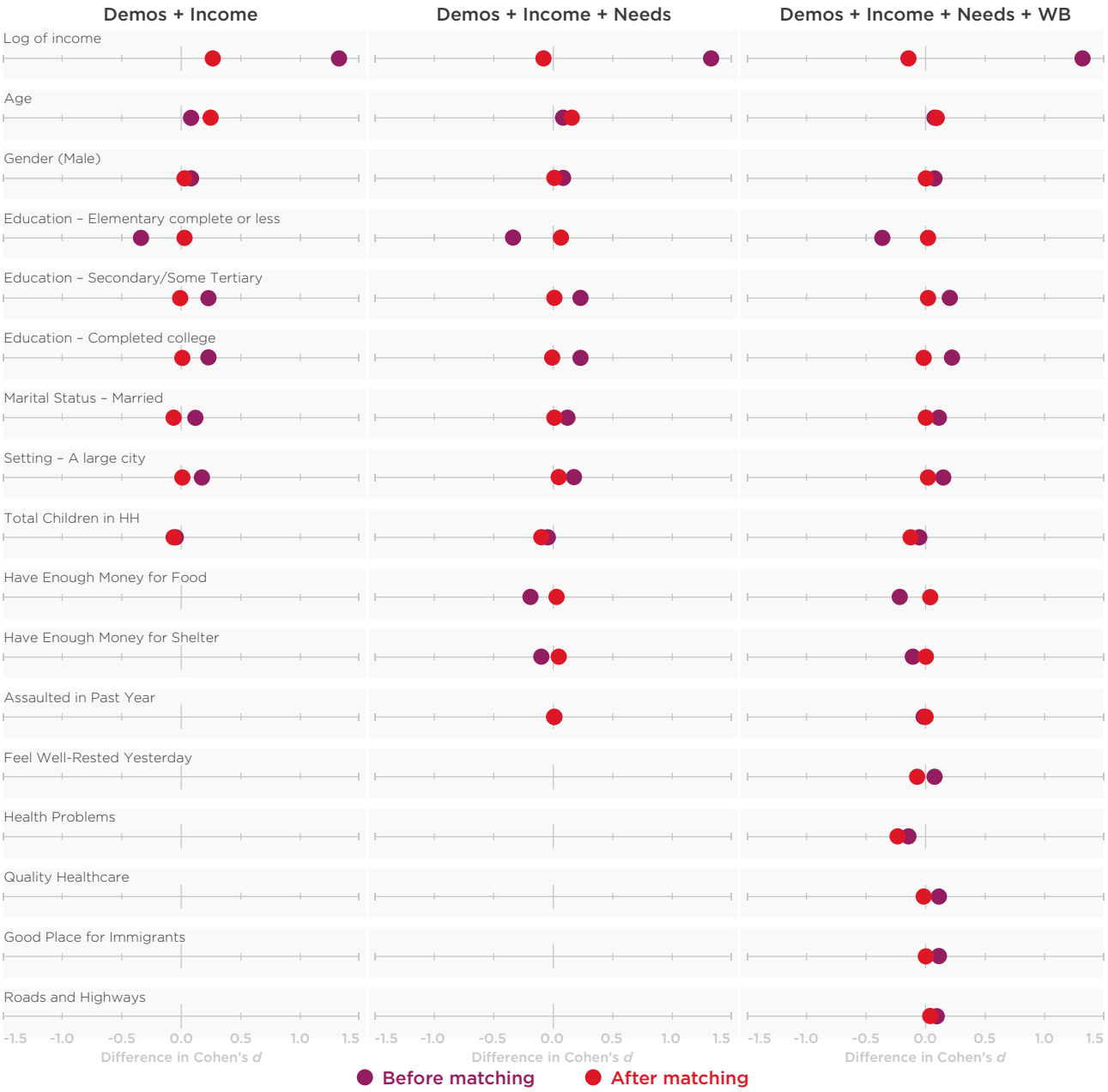


Source: Gallup World Poll

Chart 12 shows the equivalent differences between those with access to a mobile phone and the internet and those without it, for the total unweighted sample. Sampled individuals with access to a mobile phone and the internet tend to be much more affluent, better educated, and less likely to experience health problems. The PSM algorithm over-adjusted on income and age (both Cohen's *d* = -0.28) and could not eliminate differences in health status (Cohen's *d* = -0.50) after matching.

Chart 12

Dot plot of standardised mean differences for covariates before and after propensity score matching (Mobile & Internet)



Source: Gallup World Poll

Chart 13

OLS Regression Coefficients by Region and World Bank Income Groups (Income + Demos + Needs + WB model)

Error bars represent the design-adjusted 95% CI.

Source: Gallup World Poll

Table 14

Prevalence of Landline vs. Mobile Phones by Country, 2016

	Have mobile phone but no landline	Have both mobile phone and landline	Have landline but no mobile phone	Have neither mobile phone nor landline
Afghanistan	63%	3%	1%	33%
Albania	72%	15%	2%	11%
Algeria	49%	37%	3%	11%
Argentina	46%	36%	10%	8%
Armenia	46%	48%	4%	3%
Australia	19%	68%	13%	0%
Austria	51%	42%	7%	0%
Azerbaijan	17%	67%	9%	8%
Bahrain	81%	19%	0%	0%
Bangladesh	68%	1%	0%	31%
Belarus	12%	75%	10%	4%
Belgium	31%	66%	3%	0%
Benin	63%	2%	0%	35%
Bolivia	65%	25%	2%	8%
Bosnia and Herzegovina	37%	46%	15%	2%
Botswana	75%	12%	1%	12%
Brazil	59%	26%	5%	10%
Bulgaria	70%	19%	6%	6%
Burkina Faso	61%	2%	1%	36%
Cambodia	73%	4%	0%	23%
Cameroon	68%	1%	0%	31%
Canada	23%	53%	24%	0%
Central African Republic	41%	1%	0%	58%
Chad	44%	2%	1%	54%
Chile	56%	38%	3%	4%
China	64%	28%	3%	5%
Colombia	54%	32%	5%	9%
Congo Kinshasa	50%	1%	1%	48%
Congo Brazzaville	71%	2%	0%	28%
Costa Rica	53%	39%	4%	4%
Croatia	12%	75%	12%	1%
Cyprus	48%	43%	8%	0%
Czech Republic	84%	9%	2%	5%
Denmark	72%	26%	3%	0%

	Have mobile phone but no landline	Have both mobile phone and landline	Have landline but no mobile phone	Have neither mobile phone nor landline
Dominican Republic	55%	28%	5%	12%
Ecuador	42%	41%	9%	9%
Egypt	64%	20%	2%	15%
El Salvador	56%	21%	4%	20%
Estonia	67%	31%	1%	1%
Ethiopia	38%	2%	0%	59%
Finland	94%	6%	0%	0%
Gabon	80%	5%	1%	15%
Georgia	50%	35%	8%	7%
Germany	13%	74%	13%	0%
Ghana	70%	4%	0%	26%
Greece	24%	65%	9%	2%
Guatemala	60%	14%	2%	24%
Guinea	62%	1%	0%	38%
Haiti	63%	9%	2%	26%
Honduras	70%	10%	2%	18%
Hong Kong	10%	81%	9%	0%
Hungary	56%	34%	5%	5%
Iceland	19%	78%	3%	0%
India	60%	17%	2%	21%
Indonesia	69%	5%	1%	25%
Iran	6%	83%	11%	0%
Iraq	93%	6%	1%	0%
Ireland	26%	63%	10%	0%
Israel	29%	66%	5%	0%
Italy	32%	62%	6%	0%
Ivory Coast	77%	5%	1%	17%
Japan	8%	78%	14%	0%
Jordan	81%	8%	1%	10%
Kazakhstan	37%	54%	4%	5%
Kenya	85%	3%	0%	12%
Kosovo	75%	12%	1%	12%
Kuwait	65%	34%	1%	0%
Kyrgyzstan	78%	15%	2%	6%
Latvia	80%	14%	3%	4%
Lebanon	39%	51%	6%	4%

	Have mobile phone but no landline	Have both mobile phone and landline	Have landline but no mobile phone	Have neither mobile phone nor landline
Lesotho	67%	3%	1%	29%
Liberia	48%	3%	0%	49%
Libya	68%	32%	0%	0%
Lithuania	81%	13%	3%	3%
Luxembourg	18%	74%	8%	0%
Macedonia	43%	44%	8%	6%
Madagascar	26%	1%	0%	73%
Malawi	46%	3%	1%	50%
Mali	57%	1%	0%	42%
Malta	5%	86%	10%	0%
Mauritania	71%	4%	1%	25%
Mauritius	27%	61%	9%	3%
Mexico	37%	30%	6%	28%
Moldova	8%	77%	13%	3%
Mongolia	90%	8%	0%	2%
Montenegro	52%	42%	4%	1%
Morocco	72%	14%	1%	13%
Myanmar	69%	3%	0%	27%
Nepal	69%	6%	0%	25%
Netherlands	27%	61%	12%	0%
New Zealand	10%	83%	8%	0%
Nicaragua	69%	8%	2%	21%
Niger	46%	3%	4%	47%
Nigeria	76%	3%	0%	21%
Northern Cyprus	45%	45%	10%	0%
Norway	67%	32%	1%	0%
Pakistan	56%	1%	1%	41%
Palestinian Territories	49%	33%	6%	12%
Panama	56%	27%	4%	14%
Paraguay	73%	8%	1%	19%
Peru	53%	17%	5%	24%
Philippines	73%	9%	1%	18%
Poland	68%	23%	6%	4%
Portugal	29%	65%	7%	0%
Romania	59%	27%	5%	9%
Russia	59%	36%	2%	3%

	Have mobile phone but no landline	Have both mobile phone and landline	Have landline but no mobile phone	Have neither mobile phone nor landline
Rwanda	52%	1%	0%	47%
Saudi Arabia	58%	37%	6%	0%
Senegal	70%	5%	0%	24%
Serbia	14%	74%	10%	2%
Sierra Leone	47%	2%	1%	51%
Singapore	15%	79%	5%	1%
Slovakia	79%	12%	3%	7%
Slovenia	35%	59%	6%	0%
Somalia	78%	10%	0%	12%
South Africa	69%	14%	1%	16%
South Korea	24%	70%	6%	0%
South Sudan	19%	11%	3%	67%
Spain	16%	76%	8%	0%
Sweden	37%	54%	9%	0%
Switzerland	20%	66%	14%	0%
Taiwan	4%	86%	10%	0%
Tajikistan	73%	6%	1%	20%
Tanzania	64%	1%	0%	35%
Thailand	83%	9%	1%	7%
Togo	61%	6%	1%	33%
Tunisia	68%	20%	3%	10%
Turkey	12%	76%	13%	0%
Turkmenistan	25%	60%	5%	10%
Uganda	59%	8%	1%	33%
Ukraine	59%	26%	6%	8%
United Arab Emirates	65%	35%	0%	0%
United Kingdom	19%	74%	7%	0%
United States	52%	42%	6%	0%
Uruguay	43%	46%	7%	4%
Uzbekistan	63%	17%	4%	17%
Venezuela	47%	27%	11%	15%
Vietnam	64%	12%	3%	22%
Yemen	43%	7%	3%	48%
Zambia	55%	8%	3%	34%
Zimbabwe	76%	5%	0%	19%

Note: Due to rounding, percentages may sum to 100% +/-1%

Source: Gallup World Poll

Table 15

Connectivity Status by Country, 2016

	Have mobile phone and internet access	Have mobile phone but no internet access	Do not have mobile phone but have internet access	Do not have mobile phone or internet access
Afghanistan	14%	53%	2%	32%
Albania	45%	42%	2%	11%
Algeria	51%	35%	2%	12%
Argentina	63%	18%	4%	14%
Armenia	73%	20%	3%	4%
Australia	83%	4%	7%	6%
Austria	88%	5%	4%	3%
Azerbaijan	58%	26%	0%	17%
Bahrain	92%	8%	0%	0%
Bangladesh	13%	57%	0%	31%
Belarus	70%	17%	1%	12%
Belgium	87%	10%	1%	3%
Benin	11%	53%	1%	35%
Bolivia	60%	30%	1%	9%
Bosnia and Herzegovina	60%	23%	4%	13%
Botswana	35%	52%	1%	12%
Brazil	60%	25%	3%	12%
Bulgaria	64%	24%	1%	11%
Burkina Faso	14%	49%	1%	36%
Cambodia	26%	51%	1%	22%
Cameroon	21%	48%	3%	28%
Canada	72%	3%	18%	7%
Central African Republic	7%	35%	1%	57%
Chad	5%	40%	0%	54%
Chile	68%	25%	2%	5%
China	62%	30%	2%	6%
Colombia	56%	30%	4%	10%
Congo Kinshasa	15%	36%	3%	46%
Congo Brazzaville	20%	52%	2%	26%
Costa Rica	78%	14%	3%	6%
Croatia	70%	18%	2%	11%
Cyprus	71%	21%	1%	7%
Czech Republic	79%	14%	2%	5%
Denmark	93%	5%	1%	1%

	Have mobile phone and internet access	Have mobile phone but no internet access	Do not have mobile phone but have internet access	Do not have mobile phone or internet access
Dominican Republic	55%	28%	6%	12%
Ecuador	55%	27%	6%	12%
Egypt	36%	48%	1%	15%
El Salvador	44%	32%	3%	21%
Estonia	83%	14%	1%	2%
Ethiopia	6%	34%	1%	59%
Finland	91%	9%	0%	0%
France	75%	8%	10%	8%
Gabon	47%	38%	2%	14%
Georgia	53%	32%	4%	11%
Germany	40%	4%	4%	2%
Ghana	21%	53%	2%	24%
Greece	64%	25%	1%	10%
Guatemala	35%	39%	2%	24%
Guinea	16%	47%	1%	37%
Haiti	30%	42%	3%	25%
Honduras	38%	42%	3%	18%
Hong Kong	82%	9%	2%	7%
Hungary	72%	18%	2%	8%
Iceland	96%	1%	2%	1%
India	19%	58%	2%	21%
Indonesia	30%	44%	0%	25%
Iran	50%	39%	2%	8%
Iraq	48%	51%	0%	1%
Ireland	81%	9%	8%	2%
Israel	84%	11%	3%	3%
Italy	82%	12%	4%	2%
Ivory Coast	19%	63%	0%	18%
Japan	67%	19%	3%	12%
Jordan	64%	26%	4%	7%
Kazakhstan	67%	24%	3%	7%
Kenya	48%	39%	2%	11%
Kosovo	72%	15%	6%	7%
Kuwait	90%	9%	0%	1%
Kyrgyzstan	49%	43%	2%	6%
Latvia	76%	18%	1%	5%
Lebanon	82%	8%	3%	8%

	Have mobile phone and internet access	Have mobile phone but no internet access	Do not have mobile phone but have internet access	Do not have mobile phone or internet access
Lesotho	19%	51%	0%	29%
Liberia	13%	38%	2%	47%
Libya	61%	39%	0%	0%
Lithuania	70%	24%	1%	5%
Luxembourg	85%	7%	4%	4%
Macedonia	72%	15%	4%	9%
Madagascar	5%	21%	1%	73%
Malawi	13%	37%	1%	50%
Mali	16%	42%	1%	41%
Malta	75%	16%	2%	7%
Mauritania	21%	54%	2%	23%
Mauritius	54%	33%	2%	10%
Mexico	43%	23%	4%	29%
Moldova	70%	14%	4%	11%
Mongolia	65%	33%	0%	2%
Montenegro	71%	24%	1%	4%
Morocco	39%	47%	1%	13%
Myanmar	35%	38%	1%	27%
Nepal	26%	49%	0%	25%
Netherlands	86%	2%	7%	5%
New Zealand	89%	3%	5%	3%
Nicaragua	31%	46%	3%	20%
Niger	4%	45%	3%	48%
Nigeria	28%	51%	2%	19%
Northern Cyprus	66%	24%	2%	8%
Norway	95%	5%	1%	0%
Pakistan	17%	41%	1%	41%
Palestinian Territories	45%	36%	5%	13%
Panama	52%	30%	2%	16%
Paraguay	52%	29%	1%	18%
Peru	36%	35%	5%	25%
Philippines	50%	31%	2%	17%
Poland	73%	17%	2%	8%
Portugal	73%	20%	1%	6%
Romania	61%	26%	2%	11%
Russia	75%	21%	1%	4%
Rwanda	12%	41%	2%	46%

	Have mobile phone and internet access	Have mobile phone but no internet access	Do not have mobile phone but have internet access	Do not have mobile phone or internet access
Saudi Arabia	82%	13%	5%	1%
Senegal	27%	49%	2%	23%
Serbia	68%	20%	1%	11%
Sierra Leone	11%	38%	1%	50%
Singapore	85%	9%	2%	5%
Slovakia	75%	15%	1%	9%
Slovenia	81%	13%	2%	4%
Somalia	17%	71%	1%	12%
South Africa	50%	33%	3%	14%
South Korea	80%	14%	2%	3%
South Sudan	5%	25%	1%	70%
Spain	87%	5%	5%	3%
Sweden	83%	8%	5%	5%
Switzerland	80%	6%	8%	6%
Taiwan	79%	11%	2%	8%
Tajikistan	20%	59%	2%	19%
Tanzania	17%	48%	1%	35%
Thailand	46%	46%	2%	6%
Togo	13%	54%	2%	32%
Tunisia	46%	41%	3%	10%
Turkey	67%	21%	3%	9%
Turkmenistan	67%	18%	1%	14%
Uganda	27%	40%	4%	29%
Ukraine	60%	25%	3%	11%
United Arab Emirates	90%	10%	0%	0%
United Kingdom	87%	6%	5%	2%
United States	83%	11%	3%	3%
Uruguay	68%	21%	2%	9%
Uzbekistan	28%	52%	1%	20%
Venezuela	43%	31%	9%	18%
Vietnam	40%	35%	5%	20%
Yemen	18%	32%	0%	50%
Zambia	27%	37%	3%	34%
Zimbabwe	29%	52%	2%	17%

Note: Due to rounding, percentages may sum to 100% +/-1%

Source: Gallup World Poll

Table 16

Control Variables in Multivariate Analysis

Control variable	WP Qtag	Question-wording	Codes
Age	WP1220	Please tell me your age.	Write in:_____ 99. 99+ 100. (Refused)
Gender	WP1219	(Coded directly, not asked)	1 Male 2 Female
Education Attainment	WP3117	What is your highest completed level of education?	1 Completed elementary education or less (up to 8 years of basic education) 2 Secondary - 3 year Tertiary (9–15 years of education) 3 Completed four years of education beyond 'high school' and/or received a 4-year college degree. 4 (DK) 5 (RF)
Marital Status	WP1223	What is your current marital status?	1 Single/Never been married 2 Married 3 Separated 4 Divorced 5 Widowed 6 Domestic partner 7 (DK) 8 (Refused)
Urban/Rural	WP14	Do you live in ...?	1 A rural area or on a farm 2 A small town or village 3 3A large city 4 (DK) 5 Refused) 6 A suburb of a large city
Day of the week	WP1255	(Coded directly, not asked)	1 Monday 2 Tuesday 3 Wednesday 4 Thursday 5 Friday 6 Saturday 7 Sunday
Number of children in the household	WP1230	How many children under 15 years of age are now living in your household?	00 None Write in:___ 97 97+ 98 (DK) 99 (Refused)
Food access	WP40	Have there been times in the past 12 months when you did not have enough money to buy food that you or your family needed?	1 Yes 2 No 3 (DK) 4 (Refused)

Control variable	WP Qtag	Question-wording	Codes
Home access	WP43	Have there been times in the past 12 months when you did not have enough money to provide adequate shelter or housing for you and your family	1 Yes 2 No 3 (DK) 4 (Refused)
Assault	WP118	Within the last 12 months, have you been assaulted or mugged?	1 Yes 2 No 3 (DK) 4 (Refused)
Feel well-rested	WP60	Now, please think about yesterday, from the morning until the end of the day. Think about where you were, what you were doing, who you were with, and how you felt. Did you feel well-rested yesterday?	1 Yes 2 No 3 (DK) 4 (Refused)
Health problems	WP23	Do you have any health problems that prevent you from doing any of the things people your age normally can do?	1 Yes 2 No 3 (DK) 4 (Refused)
City: Quality Healthcare	WP97	In the city or area where you live, are you satisfied or dissatisfied with the availability of quality healthcare?	1 Yes 2 No 3 (DK) 4 (Refused)
Good place for immigrants	WP106	Is the city or area where you live a good place or not a good place to live for immigrants from other countries?	1 Yes 2 No 3 (DK) 4 (Refused)
Satisfied with roads and highways	WP92	In the city or area where you live, are you satisfied or dissatisfied with the roads and highways?	1 Yes 2 No 3 (DK) 4 (Refused)

Source: Gallup World Poll

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