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DOES ACCESS TO INFORMATION TECHNOLOGY MAKE PEOPLE HAPPIER?

INSIGHTS FROM WELL-BEING SURVEYS FROM AROUND THE WORLD

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Abstract

New information and communication technologies are changing productivity, development, and economic outcomes worldwide. In this paper, we explore the relationship between access to these technologies (cell phones, TV, and the internet) and subjective well-being around the world using pooled cross-sectional survey data from the Gallup World Poll for 2009-2011. We find that technology access is positive for well-being in general, but with diminishing marginal returns for those respondents who already have a great deal of access to these technologies. At the same time, we find some signs of increased stress and anger, including among cohorts for whom access to the technologies is relatively new. We also explore whether increased financial inclusion – through cell phones and mobile banking – has additional effects on well-being, using the Sub-Saharan Africa subset of our sample. We find that well-being levels are higher in the countries in Africa that have higher levels of access to mobile banking, but so also are stress and anger. All of our findings are in line with earlier research, which finds that the development process is often accompanied by high levels of frustration at the same time that it raises aggregate levels of well-being in the long run.

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CONTENTS

LIST OF TABLES

DOES ACCESS TO INFORMATION TECHNOLOGY MAKE PEOPLE HAPPIER?

INSIGHTS FROM WELL-BEING SURVEYS FROM AROUND THE WORLD

Carol Graham and Milena Nikolova

INTRODUCTION

Access to information and communication technology through cell phones, the internet, and electronic media has increased exponentially around the world. While a few decades ago cell phones were a luxury good in wealthy countries, our data show that today over half of respondents in Sub-Saharan Africa and about 80 percent of those in Latin America and Southeast Asia have access to cell phones. In addition to making phone calls and text messaging, cell phones are used for activities such as accessing the internet and social network sites.[1] Meanwhile, the launch of mobile banking gives access to these technologies an entirely new dimension, providing access to financial services in addition to information and communication technology. It is estimated that in Kenya, where the mobile banking "revolution" originated, there are some 18 million mobile money users (roughly 75 percent of all adults).[2] Given the expanding role of information technology in today's global economy, in this paper we explore whether this new access also enhances well-being.

Neither of the authors is an expert on information technology. The real and potential effect of information technology on productivity, development, and other economic outcomes has been studied extensively by those who are.[3] Building on past research on the economics of well-being and on the application of the well-being metrics to this particular question, we hope to contribute an understanding of how the changes brought about by information and communication technology affect well-being in general, including its non-income dimensions.

Our study has two related objectives. The first is to understand the effects of the worldwide increase in communications capacity and access to information technology on human well-being. The second is to contribute to our more general understanding of the relationship between well-being and capabilities and agency.[4] Cell phones and information technology are giving people around the world – and particularly the poor – new capabilities for making financial transactions and accessing other services which were previously unavailable to them. We explore the extent to which the agency effect of having access to these capabilities manifests itself through both hedonic and evaluative aspects of well-being.

We take advantage of the worldwide coverage of respondents in the Gallup World Poll (which interviews roughly 1,000 respondents in each of 122 countries per year), as well as the range of well-being questions there-in, to explore whether information and communication technologies have positive effects on well-being or, more colloquially, do they make people happier? Our underlying hypothesis is that they should enhance well-being, particularly for people in poor countries who have less access to a wide range of communications technologies, such as landlines. A second hypothesis is that these technologies could also increase stress and frustration at the same time, as they introduce so much new global information. In addition, we also look at whether and how increased financial inclusion through mobile banking affects well-being.

There is also the question of which dimension of well-being these technologies might enhance. Scholars of well-being distinguish between its hedonic dimensions, which encompass how people experience their daily lives – in essence, the quality of their lives at a specific point in time – and evaluative dimensions, which capture respondents' views of their lives as a whole. Which dimension of well-being respondents emphasize in part reflects their agency and capabilities. In the absence of the capacity to control their own lives, respondents (such as those who live in adverse conditions and/or have limited expectations) tend to focus on the hedonic dimension of well-being rather than on their lives as a whole.[5] The Gallup World Poll has questions designed to measure each of these dimensions of well-being.

We explore the effects of information and communication technologies (cell phones, internet, and television) on each of the well-being dimensions. Our priors were that the technologies would likely have positive effects on hedonic well-being, as they make simple daily tasks, such as communicating with family or responding to a job advertisement, much easier, particularly for people in remote locations with limited infrastructure, as in some developing countries. Such technologies also reduce search costs and asymmetric information and bring in new services such as e-banking. Thus, we posited that they could also have positive effects on life evaluations, as they provide new forms of agency via communications capability, new information, and even access to financial services. For example, mobile phones and the internet allow individuals to be active agents in the information search or the use of financial and other services, rather than passive consumers of information. These new capabilities may have both intrinsic and instrumental value in enhancing well-being.[6] As such, they are expanding the possibilities for people to be authors of their own lives through being active searchers of information or being able to independently conduct financial transactions. Yet, the latter channels could be more complex, increasing stress precisely because they introduce so much new information and change.

We find that technology access is positive in general for well-being around the world, but with diminishing marginal returns for those respondents who already have a great deal of access to these technologies. We also find some signs of increased stress and anger, including among cohorts for whom access to the technologies is relatively new, and for those who gain new access to financial services via mobile banking. The combination of higher levels of well-being and signs of frustration, such as stress and anger, accords with earlier findings about the well-being effects of the processes of economic change and development, in which surprisingly high levels of frustration coexist with significant income gains and other changes re-

lated to the development process (and/or are caused by them). While aggregate levels of well-being are consistently higher in contexts with higher levels of income, the process of change – including rapid rates of economic growth – is often associated with lower levels of well-being and high levels of frustration.[7]

What we do not know, given the paucity of panel data, is whether the lower levels of well-being trigger the search for change, or if the process of change lowers well-being, at least in the short term. Recent evidence from data on respondents who report intent to migrate from Latin America suggests that they have lower levels of life satisfaction (but are wealthier and more educated) prior to migrating, indicating that causality likely runs in both directions.[8] This so-called "frustrated achiever" effect seems to be present in the processes of change that new information technologies introduce or facilitate.

DATA AND METHODS

The Gallup World Poll (GWP) is an annual survey run by the Gallup Organization which has covered roughly 120 countries worldwide since 2005. The survey has nationally representative coverage in most countries, ranging from more than 4,000 household interviews in China every year to 500 households in Puerto Rico. Because different individuals are interviewed each year, we have pooled cross-sections of data rather than a panel. The surveys are face-to-face in countries where telephone coverage is limited, and by telephone in those where it is universal (primarily the OECD countries). GWP includes a range of tried and true well-being questions, which capture dimensions ranging from positive and negative affect, to living experiences, life satisfaction, and best possible life evaluations. For the distribution of respondents in GWP across regions and segregated by income quintiles, see Table 1.

Our empirical analysis uses the GWP data and either logistic or ordered logistic regression models to explore the effects of access to information technology on both evaluative and hedonic well-being. We chose four different well-being measures as our dependent variables: the Cantril ladder question on the best possible life (bpl), which is an evaluative question[9]; and three hedonic questions which capture both positive and negative experiences: smiling yesterday, experiencing stress yesterday, and experiencing anger yesterday. As the responses to these questions are categorical and ordinal rather than cardinal in nature, the usual approach is logit or probit estimation. We ran ordered logits for the bpl question, which is measured on a 10 point scale, and logits for the three affect questions, which are binary variables.

Our focal independent variables include measures of access to information and communication technology. GWP queries respondents about home access to: landlines, cell phones, television, and the internet. Because the distribution of landlines presents a slightly different demographic than that of the other technologies (both in terms of age and in terms of infrastructure limitations in developing economies), we focus our analysis on cell phone ownership rather than landlines. For the distribution of technology access across our respondents and regions, see Table 2.

Our basic specification explored the well-being of individual *i,* in year *t,* residing in country or region *r,* conditioned on the usual socioeconomic and demographic traits, such as age, age squared, household income (in international dollars), employment status, marital status and gender, an interaction for marriage status and gender, education (i.e., whether respondent has at least a high school degree or not), employment status (i.e., whether the respondent is employed full-time or not), living in an urban area or not, whether the respondent has a child or not, whether the respondent learned or did anything interesting the previous day, household size, and access to four information technologies: landlines, cell phones, TV, and the internet, and controls for the region or country in which the respondent lives, year dummies, and an error term. The formal empirical model is as follows:

$$Y_{itr} = \beta_1 \text{landline}_{itr} + \beta_2 \text{cell phone}_{itr} + \beta_3 TV_{itr} + \beta_4 \text{internet}_{itr} + \gamma' X'_{itr} + \lambda' Z'_{itr} + \mu_r + \tau_t + \varepsilon_{itr}$$

where X'_{itr} is a vector of observed individual-level variables such as gender, age, marital status, and others, Z'_{itr} is a vector of person-specific observed household-level variables such as household size, household location, and others; γ' and λ' are coefficient vectors,

μ_r represents controls for region or country, τ_t represents controls for time (year of survey), and ε_{itr} is the stochastic error term.

Because all income data in GWP are Purchasing Power Parity (PPP) adjusted, we kept a linear specification of income rather than converting it to a log. The continuous annual household income variable is in international dollars (ID). The measure is very highly correlated with the World Bank's per capita GDP (PPP-adjusted) - a Pearson's coefficient of 0.94. Furthermore, the ID measure of income is comparable across individual respondents, communities, regions, countries, and global regions. To construct the ID, local currencies are divided by PPP ratios from the World Bank's Individual Consumption Expenditure by Household or the CIA World Fact Book. The PPP values are adjusted for inflation and are in 2009 PPP. For respondents who answered the continuous income question, the annual income in local currency is divided by the PPP ratio. For respondents who reported an income bracket, the midpoint of each bracket is taken and then divided by the PPP ratios. Both continuous and bracket income data are adjusted to reflect annual estimates. The distribution was truncated at the top, trimmed for income values larger than $300,000 ID, and thus there is also less of a need to log-transform it. As a robustness check, we ran our baseline regressions with log income; the basic results for the technology variables held.

A secondary line of inquiry in our analysis explored the additional well-being effects that might come from the new access to financial services that cell phones and other technologies are bringing to users in the developing world, who previously lacked such access. Financial exclusion – i.e., lack of formal bank accounts, debit and credit cards, and lack of formal access to capital and venues for saving – is a serious problem in developing countries. To illustrate: under a quarter of adults in Sub-Saharan Africa have a formal financial account, compared with 50 percent of adults globally and 90 percent of adults in high-income economies.[10] Financial exclusion has been cited as "one of the defining characteristics of poverty," and less than one in four adults living on less than $2 a day have a formal account at a financial institution.[11] By offering basic financial services to the poor, e-transfer programs such as M-PESA are often promoted as "banking the unbanked." As such, financial inclusion through access to mobile transactions may be valuable not only instrumentally but may also enhance people's agency and well-being.

In this instance, we merged the GWP data with that from the 2012 World Bank's Global Financial Inclusion Index data covering 148 countries on how people manage financial transactions and risk.[12] The data also have information on the number and nature of financial transactions that respondents make with information technology and are aggregated at the country level. We include a variable that captures the percentage of adult population using their cell phones for financial transactions in our standard well-being regressions. For each country, we constructed a variable based on the percentage of the adult population who used cell phones to pay bills, receive money, and send money. Our hypothesis was that there was likely to be an additional effect on well-being if mobile technology also provided previously unavailable access to financial systems for respondents in poor countries. Increased mobile banking is likely to have positive spillover effects, which increase with the penetration and use of mobile banking. We suggest that at the individual level, such spillover effects are likely to manifest themselves as enhanced well-being. These regressions are for 2011 only, which is the sole year available for the World Bank Findex data.

RESULTS

Access to information technology and well-being

Access to information and communication technology among our respondents is, as expected, more uniform in the developed than in developing economies, particularly in terms of the internet. Still, as noted above, a high percentage of respondents in developing economies have access to cell phones and to television. [Table 2] Indeed, while a few years ago, access to cell phones and television might have proxied for wealth (above and beyond income) in developing countries, the widespread access today makes it more difficult to establish a clear and separate relationship (above and beyond income) between wealth and access to technology.[13] We explored the determinants of access in greater detail via regression analysis. We ran three separate regressions, with access to each of the three technologies (internet, cell phones, and TV) as the dependent variable (using a logistic regression specification, as access is a binary variable) and the usual socioeconomic controls, and region and year dummies as independent variables. In this instance, we find that access to technology is a concave function of age, peaking at 27 years for cell phones, 24 years for the internet, and at 42 years for television. Having at least a high school degree, higher levels of household income, being employed full time, living in an urban area, and larger household size are all correlated with cell phone, internet, and television access - none of which is surprising.[14]

The distribution of well-being across countries and regions, meanwhile, is also as expected and accords with the research of many scholars: evaluative well-being is higher in wealthy countries than in poor ones, and within countries, it is higher among wealthy respondents than among poor ones. Hedonic well-being shows less consistent patterns. In general, smiling yesterday has a much more modest relationship with income than does evaluative well-being.[15] In our analysis, the percentage of respondents reporting smiling yesterday is actually the highest in Latin America and the Caribbean, which is not the wealthiest region, and lowest in the Balkans. And stress is the highest in some of the wealthiest regions, such as North America and Australia and New Zealand. [See Table 3]

While we have four kinds of technology in our data set, the least consistent findings are for landlines. We believe this is a result of sampling issues particular to the Gallup World Poll which uses telephone surveys in countries in which telephone coverage is at least 80 percent or where the telephone surveys are customary and face-to-face interviews otherwise. Many respondents in the developing world do not have access to landlines due to supply constraints and to demographic issues (most respondents under the age of 30 rely on cell phones in general rather than landlines), both of which could affect the results. For example, mobile phones have "leapfrogged" landlines in Africa as the costs installation of wires for landline networks are prohibitive in sparsely-populated areas with vast distances and poor roads.[16] Thus, we limit our discussion to three of the technologies: cell phones, TV, and internet.

Our basic finding is all three of our technology variables have a significant and positive correlation with best possible life and with smiling, while both stress and anger are negatively correlated with access to information technology.[17] [Table 4] There is variation across regions, though, as well as across the well-being dimensions and across income levels. These results suggest that in the aggregate, information technology is positively associated with both aspects of well-being, above and beyond the effects of other

variables that could be associated with access to the technologies, such as higher levels of income.

There are a number of reasons why this could be so, and many of them accord with what we already know about well-being. Information technology facilitates communication; it is well established that social networks and family and friends are good for well-being. Information technology also expedites the transfer of information, and more educated and more informed respondents typically have higher levels of well-being than those with low levels of education. Furthermore, information technology is particularly important as a link to the labor market for respondents in poorer regions of the world, facilitating access to information about employment opportunities and job advertisements, and ease of responding to them. The employed have much higher levels of well-being than the unemployed in most countries around the world in which well-being has been studied.[18]

There is also some evidence that information technology may be particularly important to well-being where press and other freedoms are not guaranteed. For example, a 2006 study of the internet found that its positive effects are particularly important for women in contexts where gender rights are compromised.[19] A more recent survey found that Africa is a world leader in the domain of number of tweets.[20] "Tweeting" seems to be a "bottom up" communications revolution that is for the most part connecting Africans to Africans across countries, and is largely independent of involvement by governments or political leaders in the region.

Mobile phones may also be important for well-being in countries or regions where information from other sources is limited or costly.[21] For example, while more than half of Sub-Saharan Africans listen to the radio weekly, the radio programming provides limited range of information. Furthermore, newspapers are primarily read by urban readers, are expensive, and inaccessible to the illiterate. Aker and Mbiti (2010) reviewed the exponential growth of cell phone coverage in Africa and identified five channels through which they could enhance development and welfare: access to information which in turn reduces search costs and increases coordination among agents; improving firms' productive efficiency by allowing them to better manage supply chains; creating new jobs to address the demand for mobile-related services; facilitating communication among social networks, particularly in response to shocks; and facilitating the delivery of financial, agricultural, health, and educational services.

At the same time, the authors warn that the cell phone "revolution" can only complement but not substitute for progress in the provision of basic public goods and infrastructure, which are sorely lacking in the region.[22] This suggests not only the limits, but hints at possible related frustration that could come with new access to information in such contexts.

When we look across regions and compare wealthier regions to poorer ones, we find some important differences. Both TV and cell phones have a strong and positive correlation with reported well-being in the poorest regions: Sub-Saharan Africa, Latin America and the Caribbean, and Southeast Asia. Yet, TV and cell phones are insignificant in their relation with well-being in the wealthier regions in our sample: North America, some parts of Europe, and Australia and New Zealand. [Table 5] The internet is significant and positive across the board.

The benefits of information and communication technology for advancing agency and well-being are likely highest for those respondents in poor countries who

otherwise would have had limited access to the media and other forms of communicating in the absence of both TVs and cell phones. The information that they impart is likely more of a novelty and likely leads to a higher marginal utility than it does in wealthy contexts where there is already an overload of media information and information technology. It is possible that in the latter context, the information overload has a stress inducing affect.

For example, evidence from a longitudinal study in the United States suggests that the use of cell phones (but not internet) can lead to work worries spilling into the home, thereby increasing the overall feelings of stress and worry and decreasing satisfaction with family life. Moreover, another study from the United States shows that people who used the internet more experienced more stress. As with TV, this could be because in high-income countries, internet users diminish their social engagement and reduce their social ties and strong social ties buffer people from stress.[23] In addition, in most poor and middle-income households in the developing world, television watching time is a luxury. In contrast, there are many studies in the advanced economies which link high levels of television watching time with anomie, obesity, and lack of social and physical activities.[24]

To further test the proposition that information and communication technologies have differential impacts in poor and rich contexts, we added additional covariates to our standard specifications. In particular, we interacted household income with cell phone access and with internet access, respectively and included each of the interaction terms in a separate regression. In this instance, we find that the interaction terms are negatively correlated with the positive well-being variables (bpl and smile) and are positively correlated with the stress and anger variables (depending on the specification). In both instances, this suggests that the positive effects of access to technology are mitigated at higher levels of income, in keeping with the above discussion. [Table 6]

The interaction term for income and cell phones is negative for the bpl and smile variables, and positive for stress. The interaction term for income and the internet is negative for bpl and smile variables, and positive for both stress and anger. Again, these results suggest that in wealthier contexts, or for wealthier respondents in the sample, information technology can contribute to stress in addition to its contribution to well-being. Not surprisingly, stress levels are particularly high in some of the wealthiest regions such as North America, coexisting with generally higher levels of well-being. [See Table 3] We also ran the same regressions for the sample as a whole, with the same specifications and interactions but without country or region dummies, to test if the mitigating effects of income held when we treated the sample as a worldwide distribution as well as one broken down by regions, and our results were essentially unchanged.[25]

In order to explore the extent to which our results varied specifically by income level, we ran our baseline regressions with the sample broken down into income quintiles, including region dummies. In this case, the percent of respondents in poorer regions such as Sub-Saharan Africa, Southeast Asia, South Asia, and Latin America is higher in the poorest quintiles, while that of respondents from Europe, North America, and Australia and New Zealand is higher (relative to their overall representation in the sample) in the richest quintiles. [See Table 1] Thus, the results by quintiles may be difficult to interpret as one is comparing poor and rich respondents from very different contexts, and the regional distribution varies across the quintiles. Nevertheless, they are suggestive.

In the baseline specification with best possible life as the dependent variable, the size of the income coefficient drops as income levels increase – i.e., going from quintile one to quintile five.[26] Thus, while the importance of technology to well-being seems to increase as one moves from richer to poorer regions, the importance of income to well-being decreases as one moves from richer to poorer quintiles.

We do not find consistent patterns in the strength of the technology coefficients across income quintiles. The coefficient estimates on both cell phones and TV access on best possible life decrease in magnitude from the poorest to the richest quintile, in keeping with the hypothesis that technology access should have the highest marginal effects where it is scarcest. Yet, the pattern for internet access is slightly different, with the coefficient of internet access being the strongest (and roughly similar) for the poorest and richest quintiles compared to the middle ones. We do not have a clear or intuitive explanation for this.

The results for anger and stress are also suggestive, if not completely consistent. Cell phones are associated with higher levels of stress and increased anger for the poorest quintile only, while they are associated with lower levels of anger for quintiles four and five (as is access to the internet).[27] In this instance, it could be that because cell phones provide the poor with new information and access, they also raise expectations and bring on associated frustration. This is suggestive of earlier research, which finds rising levels of frustration among upwardly mobile urban respondents – the so-called "frustrated achievers."[28]

An obvious channel through which access to technology could have positive well-being effects is by enhancing agency through providing new knowledge and learning. GWP asks respondents if they learned anything new or did anything interesting the day before (with possible answers being yes and no). We ran a separate logistic regression with learning as a dependent variable and the usual socioeconomic and demographic controls, an optimism control (the smiling variable), our technology access variables, and region and country dummies on the right-hand side (plus an error term). We find, not surprisingly, that access to technology is positively correlated with learning. All three technology access variables (as well as landlines) are positively correlated with learning, with the strongest coefficient being for the internet. [Table 7]

People learn less as they age, which is not a surprising finding. Women report to learn less than men, and married women learn even less, as do respondents with children in the household. Those respondents who are employed full-time, have higher levels of education, and higher levels of income are more likely to report to have learned the day before. The region dummies, meanwhile, suggest that compared to the EU, respondents in non-EU Europe, North America, Australia and New Zealand, Latin America and the Caribbean, Southeast Asia and Sub-Saharan Africa are more likely to report learning, while those in the Balkans, the Commonwealth of Independent States, South and East Asia, and Middle East and North Africa are less likely to report learning (not shown).

Learning is also positively correlated with well-being. [Table 4] At the same time, the positive technology-learning link may help explain some of the stress and anger findings, particularly in the lower income quintiles. While learning is generally positive, it can also produce frustration among poorer cohorts by providing new information about material goods or opportunities they do not have – and related changes in expectations.

Access to technology and financial services and well-being

Most of our findings suggest that the benefits of access to information technology are greatest for those respondents who obtain new access to information and other benefits, and that they taper off for respondents with higher levels of income and access, likely because of decreasing marginal returns on the one hand, and stress related to information overload on the other. One increasingly important role that cell phones and other smart phone technologies are playing in very poor contexts, and in particular in Sub-Saharan Africa, is providing access to financial services for those who would not otherwise have them. There are obvious obstacles and costs to carrying out financial transactions, particularly in places (such as Sub-Saharan Africa, Latin America, and other developing regions) where distance to financial centers, crime, and unpredictable economic environments are risk factors.[29]

Using the Findex data in addition to our GWP data, we created a merged data set in which we explore access to credit and debit cards, bank accounts, and usage of mobile phones for financial transactions. Simple cross tabulations show that a small percent of the total Findex sample use cell phones to receive or send money and to pay bills (the mean for the total sample for these three variables combined is 5 percent).

As explained above, we created a country-level variable - "mobile" showing the average percentage of adults using cell phones to either send money, receive money, or to pay bills. The highest percent of adults using mobile transactions were in Sub-Saharan Africa (10 percent). We also looked at Latin America and South Asia, the two other strictly developing regions in our sample where mobile technology might be relevant to enhancing financial services. In the end, we excluded these regions; only 1.2 percent of adults in Latin America and 1.5 percent of adults in South Asia fell into our "mobile" category. Interventions to introduce mobile banking are much more recent in these regions than they are in Africa, and less necessary because financial sectors are more developed. We excluded two other potential regional candidates as well: the Middle East and North Africa region includes very wealthy, capital-deep countries such as Qatar, while East Asia includes Japan. Thus, we restricted our econometric analysis to a comparison across countries in Sub-Saharan Africa, where there is substantial cross-country variance in the extent of mobile banking.

We ran our baseline regressions for Sub-Saharan Africa only, with socio-demographic and economic controls, the access to technology variables, and country controls on the right-hand side, and our four well-being variables on the left-hand side (in respective regressions). The standard errors are clustered at the country level. We included our "mobile" variable in addition to the technology access variables, as well as country dummies. [Table 8] Our "mobile" variable is positively correlated with both best possible life and with smiling, suggesting that in addition to access to technology, there are positive effects that come from the availability of mobile transactions in Sub-Saharan Africa. In a region with very limited financial sector depth, this suggests that the technologies that are giving people new capability to access financial services have some positive relationship with well-being. Financial exclusion (i.e., lack of formal saving and borrowing mechanisms) may mean inability to invest in health and human capital or lack of consumption smoothing which are capability deprivations acting

to perpetuate current and inter-generational poverty. Financial inclusion through mobile banking provides opportunities to saving and borrowing, which mitigates these capability deprivations and enhances agency and well-being.

The ability to use mobile transactions likely enhances agency, as individuals can now send and receive money on their own, without the need for intermediaries such as friends, bus drivers, and others. For example, in 2006, prior to the introduction in M-PESA in Kenya, the most common way of sending funds was through friends (over 50 percent), followed by the post office (20 percent), and bus (20 percent). Banks, Western Union, and checks accounted for less than 10 percent each.[30] Of course, we cannot control for causality, and it may be that those respondents with higher levels of well-being are more likely to be users of the mobile banking options, but there is no intuitive explanation for why that would be the case.

At the same time, our "mobile" variable is positively associated with both anger and stress. As in the case of many of our findings discussed above and elsewhere, as with frustrated achievers, new capabilities and challenges associated with the development process can also be associated with frustration. This could be because mobile banking is not a substitute for formal financial inclusion: evidence from Kenya's M-PESA shows that it is people with higher socioeconomic status and are banked that are more likely to make advantage of the program. In addition, because it does not pay interest and thus increases the opportunity cost of holding idle e-float, M-PESA is not really a savings account.[31]

While our country controls account for time-invariant heterogeneity, of course, it is also possible that our mobile variable is picking up time-variant unobservable differences across these countries that are above and beyond those captured by our country dummies. As a means to explore this, we ran our regressions in separate specifications with and without country dummies. We find slight differences on the mobile coefficients on bpl with and without the country controls, with a slightly stronger relationship when the dummies are included. We find much stronger effects for the coefficients of mobile on stress and anger, meanwhile, (increasing in both) when we include the country dummies. As such, we think this is modest evidence that our "mobile" variable is picking up some effects which are above and beyond those of unobservable differences across countries.

This is an initial exploration into the well-being effects of a new phenomenon related to information technology, and it is limited to one region only. Still, our results suggest that the access and capabilities that mobile banking provides are associated with both higher levels of well-being and with higher levels of stress and anger. It is quite plausible that a new technology that facilitates novel access to the financial system could result in both, on the one hand by making financial transactions easier and more available and facilitating business transactions, but on the other hand making them a constant part of everyday life, which might also be negative in the hedonic or daily experience sense. This within-region finding is in keeping with the pattern across regions, where the wealthier regions have higher levels of well-being but also higher levels of stress than do the poorer ones.

CONCLUSIONS

This is, as far as we know, the first attempt to evaluate the well-being effects of access to a range of information technologies worldwide. Our priors were that the technologies were likely to have generally positive effects, particularly where they were likely to have the highest marginal returns in terms of new access to information and related capabilities, and diminishing marginal returns in places where there is already an information technology overload.

Our baseline findings bear this out, with the effects of the technologies being most positive in the poorer regions where they are scarcest, and the effects of some of them being negligible in those places where they were most common. We also find some evidence of lower levels of well-being and increased stress and anger among cohorts with higher levels of income, where the technologies are likely to be more common, as well as higher levels of stress and anger among poor cohorts where the technologies are novel – as is the information that is associated with them. Information technology access is, not surprisingly, also positively correlated with reporting to have learned something the day before, which may not be completely irrelevant to the stress and anger channel at the same time that it is associated with higher levels of positive measures of well-being.

Information technology is serving a new role by furnishing access to banking in some poor countries, with an explosion of mobile banking in Sub-Saharan Africa. We explored the potential relationship between access to mobile banking (above and beyond technology access) and well-being for Africa, and find that well-being levels were higher in countries that have higher levels of access to mobile banking, but so also are stress and anger. The new capabilities that mobile banking provides may be associated with higher levels of stress and frustration, in the same way that so many other markers of the development process, such as upward income mobility and migration, seem to be.

In summary, our basic findings are that technology access is positive for well-being around the world in general, but with diminishing marginal returns for those respondents who already have a great deal of access to those technologies. We also find some signs of increased stress and anger, including among cohorts for whom access to the technologies is relatively new. The combination of increased aggregate levels of well-being and signs of frustration, such as stress and anger, accords with our earlier findings about the well-being effects of the processes of economic change and development around the world (the frustrated achievers). Perhaps it should not be a surprise that information technology, which is playing an increasingly important role in that process, has similar effects.

TABLES

Table 1: Distribution of Respondents by Region and Income Quintile, 2009-2011						
	Overall	Poorest Quintile	Quintile 2	Quintile 3	Quintile 4	Richest Quintile
European Union	17.15	1.31	3.69	9.83	20.89	36.73
Balkans	4.57	1.35	4.91	4.88	6.73	2.20
Europe-Other	0.22	0.03	0.00	0.02	0.11	0.73
Commonwealth of Independent States	8.68	6.61	10.09	11.18	10.59	3.83
Australia and New Zealand	0.81	0.01	0.01	0.43	0.63	2.98
Southeast Asia	4.79	7.73	6.18	3.94	3.96	3.70
South Asia	6.63	12.02	13.66	6.94	3.22	0.60
East Asia	5.42	3.66	4.32	5.17	5.32	9.07
Latin America and the Caribbean	9.97	7.03	11.54	14.63	12.75	4.60
North America	1.30	0.07	0.06	0.27	0.89	4.76
Middle East and North Africa	21.87	12.06	20.95	25.71	25.54	27.93
Sub-Saharan Africa	18.60	48.12	24.58	17.01	9.36	2.87

Source: Gallup World Poll Data, 2010-2012
Notes: All statistics are for 2009-2011 and show the percentage of respondents for each category. Columns 2-7 show the regional distribution within each income quintile and the percentages are based on the numbers respondents who provided a response to the household income question.

Table 2: Technology Access by Region, 2009-2011

	World	European Union	Balkans	Europe-Other	Commonwealth of Independent States	Australia and New Zealand	Southeast Asia	South Asia	East Asia	Latin America and the Caribbean	North America	Middle East and North Africa	Sub-Saharan Africa
Landline in Home	0.486	0.777	0.676	1.000	0.603	0.985	0.340	0.163	0.739	0.421	0.891	0.573	0.080
	(0.500)	(0.416)	(0.468)	(0.000)	(0.489)	(0.123)	(0.474)	(0.369)	(0.439)	(0.494)	(0.312)	(0.495)	(0.267)
Cell Phone in Home	0.810	0.896	0.904	0.888	0.800	0.920	0.813	0.730	0.919	0.764	0.841	0.904	0.615
	(0.392)	(0.305)	(0.295)	(0.315)	(0.400)	(0.271)	(0.390)	(0.444)	(0.273)	(0.424)	(0.366)	(0.294)	(0.487)
Television in Home	0.850	0.978	0.986	0.932	0.982	0.993	0.895	0.664	0.983	0.918	0.980	0.962	0.472
	(0.357)	(0.148)	(0.119)	(0.252)	(0.131)	(0.086)	(0.307)	(0.472)	(0.129)	(0.274)	(0.140)	(0.190)	(0.499)
Internet Access in Home	0.349	0.687	0.480	0.772	0.259	0.863	0.255	0.490	0.546	0.185	0.845	0.428	0.067
	(0.477)	(0.463)	(0.500)	(0.420)	(0.438)	(0.344)	(0.436)	(0.215)	(0.498)	(0.388)	(0.362)	(0.495)	(0.250)

Source: Gallup World Poll Data, 2010-2012
Notes: The table displays means of the proportion of respondents reporting technology access in the home for the world and by region. All statistics are for 2009-2011. The standard deviations are in parentheses.

Table 3: Well-Being and Affect Experiences by Region, 2009-2011													
	World	European Union	Balkans	Europe-Other	Commonwealth of Independent States	Australia and New Zealand	Southeast Asia	South Asia	East Asia	Latin America and the Caribbean	North America	Middle East and North Africa	Sub-Saharan Africa
Best Possible Life (0=worst; 10=best)	5.448 (2.176)	6.271 (2.124)	5.121 (2.041)	7.491 (1.668)	5.075 (1.960)	7.390 (1.751)	5.440 (1.798)	4.873 (2.018)	5.384 (2.024)	6.222 (2.425)	7.431 (1.867)	5.500 (2.155)	4.470 (1.843)
Smiled Yesterday	0.705 (0.456)	0.721 (0.449)	0.562 (0.496)	0.751 (0.433)	0.592 (0.492)	0.792 (0.406)	0.790 (0.407)	0.660 (0.474)	0.765 (0.424)	0.845 (0.362)	0.835 (0.372)	0.660 (0.474)	0.698 (0.459)
Experienced Stress Yesterday	0.284 (0.451)	0.311 (0.463)	0.281 (0.449)	0.319 (0.466)	0.139 (0.345)	0.323 (0.467)	0.273 (0.445)	0.267 (0.442)	0.301 (0.459)	0.290 (0.454)	0.422 (0.493)	0.405 (0.491)	0.215 (0.411)
Experienced Anger Yesterday	0.198 (0.399)	0.162 (0.369)	0.292 (0.454)	0.133 (0.340)	0.172 (0.378)	0.141 (0.348)	0.190 (0.392)	0.244 (0.430)	0.137 (0.344)	0.160 (0.367)	0.152 (0.359)	0.308 (0.462)	0.157 (0.364)

Source: Gallup World Poll Data, 2010-2012
Notes: The table displays means of the well-being and affect variables for the world and by region for 2009-2011. Best Possible Life measures the respondent's assessment of her current life relative to her best possible life on a scale of 0 to 10, where 0 is the worst possible life, and 10 is the best possible life. Smiled Yesterday, Experienced Stress Yesterday, and Experienced Anger Yesterday are binary variables coded as 1 if the respondent experienced this type of affect and 0 otherwise.The standard deviations are in parentheses.

Table 4: Regression Analysis of Well-Being and Affect, 2009-2011				
Variables	(1) BPL	(2) Smile	(3) Stress	(4) Anger
Landline in Home (1=Yes)	0.301***	0.154***	0.029**	-0.000
	(0.008)	(0.012)	(0.011)	(0.013)
Cell Phone in Home (1=Yes)	0.378***	0.257***	-0.033**	-0.035**
	(0.010)	(0.012)	(0.013)	(0.015)
TV in Home (1=Yes)	0.541***	0.282***	-0.048***	-0.107***
	(0.011)	(0.016)	(0.016)	(0.018)
Internet in Home (1=Yes)	0.619***	0.176***	-0.028**	-0.095***
	(0.010)	(0.013)	(0.013)	(0.015)
Age	-0.039***	-0.039***	0.050***	0.034***
	(0.001)	(0.002)	(0.002)	(0.002)
Age squared/100	0.038***	0.028***	-0.060***	-0.045***
	(0.001)	(0.002)	(0.002)	(0.002)
Female (1=Yes)	0.076***	0.105***	0.108***	0.011
	(0.010)	(0.015)	(0.015)	(0.016)
Married (1=Yes)	0.108***	0.127***	-0.074***	-0.028
	(0.011)	(0.015)	(0.015)	(0.017)
Married and Female (1=Yes)	0.054***	0.047**	-0.033*	-0.006
	(0.013)	(0.019)	(0.019)	(0.021)
High School Education or Higher (1=Yes)	0.203***	-0.073***	0.035***	-0.054***
	(0.009)	(0.014)	(0.013)	(0.016)
Household Income (in 10,000s of ID)	0.165***	0.035***	-0.019***	-0.037***
	(0.002)	(0.003)	(0.003)	(0.003)
Employed Full Time (1=Yes)	0.103***	0.037***	0.142***	-0.046***
	(0.007)	(0.010)	(0.010)	(0.012)
Urban Area (1=Yes)	0.049***	-0.123***	0.079***	0.084***
	(0.007)	(0.010)	(0.010)	(0.011)
Child in Household (1=Yes)	-0.103***	0.009	0.064***	0.145***
	(0.007)	(0.011)	(0.010)	(0.012)
Household Size	-0.023***	-0.010***	0.005*	0.027***
	(0.002)	(0.003)	(0.003)	(0.003)
Learned or Did Something Interesting Yesterday (1=Yes)	0.457***	1.199***	-0.264***	-0.252***
	(0.007)	(0.010)	(0.009)	(0.010)
Regional Dummies	Yes	Yes	Yes	Yes
Year Dummies	Yes	Yes	Yes	Yes
Observations	301,516	266,851	268,919	269,054
Pseudo R-squared	0.069	0.104	0.039	0.026

Source: Gallup World Poll Data, 2010-2012
Notes: Robust standard errors in parentheses. All regressions use regional and year dummies. BPL = Best Possible Life. The dependent variable is BPL in (1), smiled yesterday in (2), experienced stress yesterday in (3), and experienced anger yesterday in (4). Best Possible Life measures the respondent's assessment of her current life relative to her best possible life on a scale of 0 to 10, where 0 is the worst possible life, and 10 is the best possible life. Smiled Yesterday, Experienced Stress Yesterday, and Experienced Anger Yesterday are binary variables coded as 1 if the respondent experienced this type of affect and 0 otherwise. All regressions are for 2009-2011. Model (1) is estimated using an ordered logistic regression, and models (2)-(4) are estimated using a logistic regression.
**** p<0.01, ** p<0.05, * p<0.1*

Table 5: Regression Analysis of Best Possible Life by Region, 2009-2011												
Variables	European Union	Balkans	Europe-Other	Common-wealth of Independent States	Australia and New Zealand	Southeast Asia	South Asia	East Asia	Latin America and the Caribbean	North America	Middle East and North Africa	Sub-Saharan Africa
Landline in Home (1=Yes)	0.214***	0.313***		0.210***	-0.181	0.305***	0.485***	0.343***	0.161***	0.061	0.384***	0.398***
	(0.024)	(0.044)		(0.027)	(0.248)	(0.038)	(0.040)	(0.034)	(0.024)	(0.098)	(0.018)	(0.030)
Cell Phone in Home (1=Yes)	0.390***	0.444***	-0.013	0.395***	-0.045	0.439***	0.372***	0.520***	0.192***	0.138	0.299***	0.291***
	(0.032)	(0.074)	(0.319)	(0.030)	(0.176)	(0.045)	(0.033)	(0.054)	(0.028)	(0.090)	(0.028)	(0.018)
TV in Home (1=Yes)	0.100	0.220	0.212	0.663***	0.050	0.887***	0.672***	0.542***	0.366***	0.076	0.542***	0.597***
	(0.061)	(0.174)	(0.265)	(0.083)	(0.509)	(0.056)	(0.033)	(0.107)	(0.047)	(0.178)	(0.044)	(0.019)
Internet in Home (1=Yes)	0.542***	0.551***	0.539**	0.419***	0.229*	0.353***	0.331***	0.536***	0.280***	0.243**	0.564***	0.325***
	(0.024)	(0.045)	(0.255)	(0.031)	(0.133)	(0.046)	(0.067)	(0.037)	(0.028)	(0.099)	(0.020)	(0.033)
Age	-0.081***	-0.066***	-0.019	-0.040***	-0.092***	-0.048***	-0.018***	-0.065***	-0.059***	-0.078***	-0.048***	-0.008***
	(0.003)	(0.007)	(0.023)	(0.004)	(0.013)	(0.005)	(0.005)	(0.005)	(0.003)	(0.010)	(0.003)	(0.003)
Age squared/100	0.078***	0.059***	0.035	0.031***	0.110***	0.048***	0.020***	0.068***	0.053***	0.088***	0.046***	0.005*
	(0.003)	(0.007)	(0.024)	(0.004)	(0.014)	(0.006)	(0.006)	(0.006)	(0.004)	(0.010)	(0.004)	(0.003)
Female (1=Yes)	0.075***	-0.036	0.501**	0.030	0.119	0.165***	0.084*	0.226***	0.107***	0.252***	0.175***	0.022
	(0.027)	(0.059)	(0.204)	(0.037)	(0.113)	(0.050)	(0.050)	(0.048)	(0.031)	(0.085)	(0.024)	(0.021)
Married (1=Yes)	0.191***	0.163***	0.393*	0.169***	0.302***	0.059	0.097**	0.323***	-0.014	0.330***	0.103***	0.123***
	(0.028)	(0.062)	(0.235)	(0.040)	(0.116)	(0.052)	(0.046)	(0.051)	(0.033)	(0.088)	(0.026)	(0.023)
Married and Female (1=Yes)	0.093***	0.101	-0.419	0.010	0.282**	-0.045	0.026	-0.048	0.031	0.105	0.094***	-0.029
	(0.034)	(0.076)	(0.287)	(0.046)	(0.141)	(0.061)	(0.059)	(0.057)	(0.042)	(0.111)	(0.031)	(0.029)
High School Education or Higher (1=Yes)	0.266***	0.351***	0.571***	0.144***	0.196***	0.361***	0.202***	0.340***	0.161***	0.198***	0.241***	0.339***
	(0.020)	(0.057)	(0.196)	(0.028)	(0.069)	(0.045)	(0.050)	(0.038)	(0.031)	(0.057)	(0.023)	(0.033)
Household Income (in 10,000s of ID)	0.124***	0.192***	0.058**	0.472***	0.064***	0.068***	0.771***	0.162***	0.162***	0.046***	0.105***	0.301***
	(0.004)	(0.039)	(0.026)	(0.021)	(0.014)	(0.008)	(0.040)	(0.012)	(0.012)	(0.009)	(0.006)	(0.016)
Employed Full Time (1=Yes)	0.202***	0.145***	0.243	0.082***	0.170**	0.048	-0.092***	-0.022	0.101***	0.222***	0.144***	0.131***
	(0.019)	(0.042)	(0.169)	(0.024)	(0.078)	(0.030)	(0.032)	(0.028)	(0.023)	(0.064)	(0.018)	(0.016)
Urban Area (1=Yes)	-0.040**	-0.012	-0.187	-0.082***	-0.408***	0.192***	-0.054*	0.100***	0.072***	-0.157***	0.044**	0.095***
	(0.017)	(0.040)	(0.160)	(0.027)	(0.075)	(0.034)	(0.031)	(0.032)	(0.023)	(0.055)	(0.018)	(0.018)
Child in Household (1=Yes)	-0.092***	-0.158***	-0.248	-0.067***	-0.107	-0.065**	-0.160***	-0.088***	-0.125***	-0.158**	-0.048***	-0.142***
	(0.020)	(0.041)	(0.172)	(0.025)	(0.080)	(0.031)	(0.029)	(0.028)	(0.023)	(0.066)	(0.017)	(0.019)
Household Size	-0.055***	0.002	0.141*	-0.011	0.021	0.003	-0.002	-0.058***	0.002	-0.016	-0.029***	0.001
	(0.009)	(0.014)	(0.082)	(0.008)	(0.027)	(0.009)	(0.007)	(0.011)	(0.007)	(0.013)	(0.004)	(0.004)
Learned or Did Something Interesting Yesterday (1=Yes)	0.503***	0.583***	0.330**	0.426***	0.545***	0.298***	0.472***	0.389***	0.376***	0.593***	0.376***	0.364***
	(0.017)	(0.039)	(0.145)	(0.023)	(0.071)	(0.028)	(0.029)	(0.026)	(0.022)	(0.060)	(0.015)	(0.015)
Country Dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year Dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	48,107	9,413	696	28,822	3,156	17,187	20,066	20,267	29,956	4,473	56,669	62,704
Pseudo R-squared	0.0967	0.0525	0.0219	0.0611	0.0308	0.0735	0.0566	0.0659	0.0404	0.0272	0.0665	0.0453

Source: Gallup World Poll Data, 2010-2012

Notes: Robust standard errors in parentheses. All regressions use country and year dummies. BPL = Best Possible Life. The dependent variable is BPL, which measures the respondent's assessment of her current life relative to her best possible life on a scale of 0 to 10, where 0 is the worst possible life, and 10 is the best possible life. All regressions are for 2009-2011. All models are estimated using an ordered logistic regression. While Europe-Other in general includes Norway, Iceland, and Switzerland, there are no observations for 2010 and 2011, and only Switzerland was sampled in 2009, so the only country included in the Europe-Other regression is Switzerland in 2009.

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

Table 6: Regression Analysis of Well-Being and Affect with Interactions, 2009-2011								
Variables	(1) BPL	(2) BPL	(3) Smile	(4) Smile	(5) Stress	(6) Stress	(7) Anger	(8) Anger
Landline in Home (1=Yes)	0.296***	0.309***	0.151***	0.143***	0.031***	0.040***	-0.000	0.004
	(0.009)	(0.012)	(0.012)	(0.012)	(0.011)	(0.012)	(0.013)	(0.013)
Cell Phone in Home (1=Yes)	0.458***	0.373***	0.295***	0.247***	-0.062***	-0.023*	-0.031*	-0.031**
	(0.012)	(0.012)	(0.015)	(0.012)	(0.015)	(0.013)	(0.017)	(0.015)
TV in Home (1=Yes)	0.521***	0.534***	0.273***	0.271***	-0.041**	-0.036**	-0.108***	-0.103***
	(0.012)	(0.014)	(0.016)	(0.016)	(0.016)	(0.016)	(0.018)	(0.018)
Internet in Home (1=Yes)	0.627***	0.829***	0.181***	0.266***	-0.030**	-0.112***	-0.095***	-0.131***
	(0.010)	(0.039)	(0.013)	(0.017)	(0.013)	(0.016)	(0.015)	(0.019)
Cell Phone Access*Household Income (in $10,000)	-0.126***		-0.062***		0.043***		-0.007	
	(0.011)		(0.013)		(0.012)		(0.012)	
Internet Access*Household Income (in $10,000)		-0.120***		-0.066***		0.062***		0.027***
		(0.032)		(0.008)		(0.008)		(0.009)
Age	-0.039***	-0.044***	-0.039***	-0.038***	0.050***	0.050***	0.034***	0.034***
	(0.001)	(0.001)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
Age squared/100	0.037***	0.042***	0.028***	0.028***	-0.060***	-0.060***	-0.045***	-0.045***
	(0.001)	(0.001)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
Female (1=Yes)	0.078***	0.091***	0.106***	0.108***	0.107***	0.105***	0.011	0.010
	(0.010)	(0.011)	(0.015)	(0.015)	(0.015)	(0.015)	(0.016)	(0.016)
Married (1=Yes)	0.109***	0.122***	0.128***	0.130***	-0.075***	-0.077***	-0.028	-0.029*
	(0.011)	(0.012)	(0.015)	(0.015)	(0.015)	(0.015)	(0.017)	(0.017)
Married and Female (1=Yes)	0.053***	0.057***	0.047**	0.044**	-0.032*	-0.029	-0.007	-0.005
	(0.013)	(0.015)	(0.019)	(0.019)	(0.019)	(0.019)	(0.021)	(0.021)
High School Education or Higher (1=Yes)	0.202***	0.220***	-0.073***	-0.074***	0.035***	0.036***	-0.054***	-0.053***
	(0.009)	(0.011)	(0.014)	(0.014)	(0.013)	(0.013)	(0.016)	(0.016)
Household Income (in 10,000s of ID)	0.288***	0.256***	0.095***	0.090***	-0.061***	-0.073***	-0.030**	-0.059***
	(0.012)	(0.033)	(0.014)	(0.008)	(0.012)	(0.007)	(0.012)	(0.008)
Employed Full Time (1=Yes)	0.104***	0.114***	0.038***	0.034***	0.142***	0.146***	-0.046***	-0.045***
	(0.007)	(0.008)	(0.010)	(0.010)	(0.010)	(0.010)	(0.012)	(0.012)
Urban Area (1=Yes)	0.046***	0.046***	-0.124***	-0.130***	0.079***	0.086***	0.084***	0.087***
	(0.007)	(0.009)	(0.010)	(0.010)	(0.010)	(0.010)	(0.011)	(0.011)
Child in Household (1=Yes)	-0.102***	-0.102***	0.009	0.012	0.064***	0.061***	0.145***	0.144***
	(0.007)	(0.008)	(0.011)	(0.011)	(0.010)	(0.010)	(0.012)	(0.012)
Household Size	-0.024***	-0.024***	-0.011***	-0.011***	0.005**	0.006**	0.027***	0.027***
	(0.002)	(0.002)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)
Learned or Did Something Interesting Yesterday (1=Yes)	0.456***	0.491***	1.198***	1.198***	-0.264***	-0.262***	-0.252***	-0.252***
	(0.007)	(0.007)	(0.010)	(0.010)	(0.009)	(0.009)	(0.010)	(0.010)
Region Dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year Dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	301,516	301,516	266,851	266,851	268,919	268,919	269,054	269,054
Pseudo R-squared	0.0691	0.242	0.104	0.104	0.039	0.039	0.026	0.026

Source: Gallup World Poll Data, 2010-2012

Notes: Robust standard errors in parentheses. All regressions use region and year dummies. BPL = Best Possible Life. The dependent variable is BPL in (1) and (2), smiled yesterday in (3) and (4), experienced stress yesterday in (5) and (6), and experienced anger yesterday in (7) and (8). Best Possible Life measures the respondent's assessment of her current life relative to her best possible life on a scale of 0 to 10, where 0 is the worst possible life, and 10 is the best possible life. Smiled Yesterday, Experienced Stress Yesterday, and Experienced Anger Yesterday are binary variables coded as 1 if the respondent experienced this type of affect and 0 otherwise. All regressions are for 2009-2011. Model (1) is estimated using an ordered logistic regression, and models (3)-(8) are estimated using a logistic regression. The estimators for Model (2) did not converge using an ordered logistic regression and OLS was used instead. The goodness of fit statistic reported is the R-squared and not the Pseudo R-squared for this model.

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

Table 7: Determinants of Learning, 2009-2011		
Variables	(1) Learn	(2) Learn
Smiled Yesterday (1=Yes)	1.203***	1.182***
	(0.010)	(0.010)
Landline in Home (1=Yes)	0.117***	0.120***
	(0.011)	(0.012)
Cell Phone in Home (1=Yes)	0.182***	0.183***
	(0.012)	(0.013)
TV in Home (1=Yes)	0.084***	0.112***
	(0.015)	(0.016)
Internet in Home (1=Yes)	0.316***	0.292***
	(0.012)	(0.013)
Age	-0.018***	-0.020***
	(0.001)	(0.001)
Age squared/100	0.009***	0.010***
	(0.002)	(0.002)
Female (1=Yes)	-0.076***	-0.072***
	(0.014)	(0.014)
Married (1=Yes)	-0.015	-0.005
	(0.014)	(0.015)
Married and Female (1=Yes)	-0.078***	-0.086***
	(0.018)	(0.018)
High School Education or Higher (1=Yes)	0.363***	0.387***
	(0.013)	(0.014)
Household Income (in 10,000s of ID)	0.044***	0.030***
	(0.003)	(0.003)
Employed Full Time (1=Yes)	0.098***	0.117***
	(0.009)	(0.010)
Urban Area (1=Yes)	-0.018*	0.024**
	(0.009)	(0.010)
Child in Household (1=Yes)	-0.040***	-0.071***
	(0.010)	(0.010)
Household Size	0.005*	-0.006**
	(0.002)	(0.003)
Region Dummies	Yes	No
Country Dummies	No	Yes
Year Dummies	Yes	Yes
Observations	266,851	266,851
Pseudo R-squared	0.106	0.126

Source: Gallup World Poll Data, 2010-2012
Notes: Robust standard errors in parentheses. All regressions use year dummies. Model (1) uses regional dummies and Model (2) uses country dummies. The dependent variable is whether or not the respondent learned or did something interesting yesterday. Both models are estimated using a logistic regression as the dependent variable is binary.
**** p<0.01, ** p<0.05, * p<0.1*

Table 8: Regression Analysis of Well-Being and Affect with Access to Mobile Transactions, 2011				
Variables	(1) BPL	(2) Smile	(3) Stress	(4) Anger
Landline in Home (1=Yes)	0.427***	0.008	-0.258**	0.113
	(0.089)	(0.065)	(0.125)	(0.142)
Cell Phone in Home (1=Yes)	0.227***	0.237***	0.019	-0.001
	(0.053)	(0.057)	(0.074)	(0.062)
TV in Home (1=Yes)	0.636***	0.164***	-0.090	-0.202***
	(0.100)	(0.041)	(0.076)	(0.071)
Internet in Home (1=Yes)	0.336***	0.202***	0.060	-0.048
	(0.108)	(0.058)	(0.088)	(0.087)
Mobile	0.219***	0.093***	0.325***	0.109***
	(0.024)	(0.010)	(0.016)	(0.016)
Age	-0.018***	-0.038***	0.033***	0.029***
	(0.005)	(0.004)	(0.007)	(0.007)
Age squared/100	0.016***	0.030***	-0.032***	-0.035***
	(0.006)	(0.005)	(0.008)	(0.008)
Female (1=Yes)	0.051	0.158***	-0.065	0.012
	(0.053)	(0.041)	(0.064)	(0.063)
Married (1=Yes)	0.160***	0.051	-0.202***	-0.011
	(0.042)	(0.061)	(0.070)	(0.070)
Married and Female (1=Yes)	-0.050	0.065	0.068	-0.090
	(0.055)	(0.052)	(0.079)	(0.085)
High School Education or Higher (1=Yes)	0.367***	0.028	-0.043	-0.073
	(0.092)	(0.117)	(0.105)	(0.107)
Household Income (in 10,000s of ID)	0.207***	0.065**	0.012	-0.096**
	(0.033)	(0.030)	(0.029)	(0.041)
Employed Full Time (1=Yes)	0.083	0.034	0.172**	-0.034
	(0.060)	(0.061)	(0.073)	(0.052)
Urban Area (1=Yes)	0.152	-0.062	0.200***	0.244***
	(0.108)	(0.069)	(0.058)	(0.062)
Child in Household (1=Yes)	-0.144***	0.076	0.040	0.038
	(0.044)	(0.060)	(0.056)	(0.083)
Household Size	0.013	-0.009	-0.002	0.009
	(0.012)	(0.012)	(0.009)	(0.013)
Learned or Did Something Interesting Yesterday (1=Yes)	0.350***	1.188***	-0.415***	-0.337***
	(0.051)	(0.101)	(0.083)	(0.083)
Country Dummies	Yes	Yes	Yes	Yes
Observations	23,674	23,580	23,622	23,661
Pseudo R-squared	0.0483	0.0932	0.042	0.0239

Sources: Gallup World Poll Data, 2012; World Bank Findex, 2012
Notes: Standard errors in parentheses, clustered at the country level. All regressions are for Sub-Saharan Africa only and use country dummies. BPL = Best Possible Life. The dependent variable is BPL in (1), smiled yesterday in (2), experienced stress yesterday in (3), and experienced anger yesterday in (4). Best Possible Life measures the respondent's assessment of her current life relative to her best possible life on a scale of 0 to 10, where 0 is the worst possible life, and 10 is the best possible life. Smiled Yesterday, Experienced Stress Yesterday, and Experienced Anger Yesterday are binary variables coded as 1 if the respondent experienced this type of affect and 0 otherwise. All regressions are for 2011 as data on mobile are only available for 2011. Model (1) is estimated using an ordered logistic regression, and models (2)-(4) are estimated using a logistic regression. Mobile is the average percentage of adults using mobile phones to either send money, receive money, or to pay bills.
**** p<0.01, ** p<0.05, * p<0.1*

Appendix Table 1: Determinants of Information and Communication Technology Access, 2009-2011			
Variables	(1) Cell Phone	(2) Internet	(3) TV
Landline in Home (1=Yes)	-0.103*** (0.013)		
Internet in Home (1=Yes)	1.279*** (0.022)		
Age	0.035*** (0.002)	0.004*** (0.000)	0.001*** (0.000)
Age squared/100	-0.065*** (0.002)	-0.009*** (0.000)	-0.002*** (0.000)
Female (1=Yes)	-0.030* (0.016)	-0.002 (0.002)	-0.004** (0.002)
Married (1=Yes)	0.051*** (0.017)	-0.008*** (0.002)	-0.020*** (0.002)
Married and Female (1=Yes)	-0.036* (0.021)	0.004 (0.003)	0.018*** (0.002)
High School Education or Higher (1=Yes)	0.609*** (0.024)	0.144*** (0.003)	0.031*** (0.001)
Household Income (in 10,000s of ID)	0.495*** (0.015)	0.058*** (0.002)	0.007*** (0.000)
Employed Full Time (1=Yes)	0.239*** (0.012)	0.030*** (0.002)	0.005*** (0.001)
Urban Area (1=Yes)	0.656*** (0.012)	0.136*** (0.002)	0.114*** (0.001)
Child in Household (1=Yes)	0.029** (0.012)	-0.031*** (0.002)	-0.023*** (0.001)
Household Size	0.080*** (0.003)	0.006*** (0.000)	0.007*** (0.000)
Region Dummies	Yes	Yes	Yes
Year Dummies	Yes	Yes	Yes
Observations	310,000	316,669	318,606
Pseudo R-squared	0.214	0.399	0.332

Source: Gallup World Poll Data, 2010-2012
Notes: Robust standard errors in parentheses. All regressions use region and year dummies. All dependent variables are binary and measure access to different information technologies. The dependent variable in Model (1) is the access to cell phones, in Model (2), it is access to internet, and in Model (3), it is access to TV. Model (1) is estimated using a logistic regression. The estimators for Models (2) and (3) did not converge using an ordered logistic regression and OLS was used instead. The goodness of fit statistic reported is the R-squared and not the Pseudo R-squared for these models.
**** p<0.01, ** p<0.05, * p<0.1*

Appendix Table 2: Regression Analysis of Best Possible Life by Income Quintile, 2009-2011					
Variables	(1) Poorest Quintile	(2) Quintile 2	(3) Quintile 3	(4) Quintile 4	(5) Richest Quintile
Landline in Home (1=Yes)	0.354***	0.272***	0.167***	0.131***	0.123***
	(0.026)	(0.019)	(0.017)	(0.017)	(0.022)
Cell Phone in Home (1=Yes)	0.248***	0.240***	0.282***	0.316***	0.243***
	(0.017)	(0.019)	(0.023)	(0.029)	(0.046)
TV in Home (1=Yes)	0.516***	0.463***	0.426***	0.267***	0.014
	(0.020)	(0.022)	(0.030)	(0.043)	(0.061)
Internet in Home (1=Yes)	0.699***	0.508***	0.338***	0.387***	0.584***
	(0.045)	(0.028)	(0.020)	(0.017)	(0.023)
Age	-0.022***	-0.032***	-0.039***	-0.054***	-0.050***
	(0.002)	(0.003)	(0.003)	(0.003)	(0.003)
Age squared/100	0.017***	0.028***	0.037***	0.054***	0.056***
	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)
Female (1=Yes)	0.021	0.131***	0.136***	0.134***	0.119***
	(0.023)	(0.024)	(0.023)	(0.023)	(0.024)
Married (1=Yes)	0.054**	0.142***	0.085***	0.042*	0.176***
	(0.025)	(0.025)	(0.025)	(0.024)	(0.024)
Married and Female (1=Yes)	0.070**	-0.041	-0.018	0.011	0.071**
	(0.031)	(0.031)	(0.030)	(0.030)	(0.030)
High School Education or Higher (1=Yes)	0.206***	0.163***	0.199***	0.153***	0.167***
	(0.048)	(0.030)	(0.024)	(0.019)	(0.015)
Household Income (in 10,000s of ID)	1.468***	1.214***	0.717***	0.501***	0.078***
	(0.119)	(0.093)	(0.056)	(0.023)	(0.003)
Employed Full Time (1=Yes)	0.127***	0.105***	0.039**	0.031*	0.007
	(0.016)	(0.017)	(0.017)	(0.016)	(0.017)
Urban Area (1=Yes)	0.007	-0.009	-0.024	-0.011	-0.017
	(0.020)	(0.017)	(0.016)	(0.016)	(0.016)
Child in Household (1=Yes)	-0.144***	-0.119***	-0.115***	-0.080***	-0.029*
	(0.018)	(0.017)	(0.017)	(0.017)	(0.017)
Household Size	-0.004	-0.019***	-0.039***	-0.073***	-0.065***
	(0.004)	(0.004)	(0.004)	(0.005)	(0.007)
Learned or Did Something Interesting Yesterday (1=Yes)	0.439***	0.386***	0.405***	0.430***	0.456***
	(0.015)	(0.015)	(0.015)	(0.015)	(0.015)
Region Dummies	Yes	Yes	Yes	Yes	Yes
Year Dummies	Yes	Yes	Yes	Yes	Yes
Observations	59,186	59,657	60,076	60,244	62,353
Pseudo R-squared	0.0250	0.0250	0.0289	0.0298	0.0361

Source: Gallup World Poll Data, 2010-2012
Notes: Robust standard errors in parentheses. All regressions use region and year dummies. BPL = Best Possible Life. The dependent variable is BPL, which measures the respondent's assessment of her current life relative to her best possible life on a scale of 0 to 10, where 0 is the worst possible life, and 10 is the best possible life. All regressions are for 2009-2011. All models are estimated using an ordered logistic regression.
**** p<0.01, ** p<0.05, * p<0.1*

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ENDNOTES

1. For a study of how the usage of cell phones for internet access and social network cites varies across countries, education, age, and gender, among other things, see Pew Research Center Global Attitudes Project (2011). In general, the usage of cell phones to access the internet increases with education levels and decreases with age; there are few gender differences with the exception of some countries such as Germany, Spain, and Turkey. Social networking usage across countries is correlated with GDP per capita, meanwhile.
2. See Chandy and Kharas (2012) and Vaughan, Fengler, and Joseph (forthcoming).
3. See, for example, Aker and Mbiti (2010); Choi and Hoon (2009); Labonne and Chase (2009); Litan and Rivlin (2001); Klonner and Nolen (2008); Mbiti and Weil (2011); Muto and Yamano (2009); Roller and Waverman (2001); and Waverman, Meschi, and Fuss (2005).
4. We adopt Sen's definition of capability, namely, "the substantive freedom to achieve alternative functioning combinations" or "the freedom to achieve various lifestyles" (Sen, 1999, p. 75). In addition, an agent is "someone who acts and brings about change, and whose achievements can be judged in terms of her own values and objectives, whether or not we assess them in terms of some external criteria or not" (Sen, 1999, p. 19). The reverse of being an agent is being oppressed, forced, or passive (Alkire & Deneulin, 2009, p. 37).
5. For a discussion of the two dimensions of well-being, see Chapter 2 in Graham (2011). For a more detailed review of subjective well-being metrics, see Kahneman and Krueger (2006).
6. Aker and Mbiti (2010).
7. See Graham and Pettinato (2002); Graham (2005); Graham (2009); Hirschman (1973); and Knight and Gunatilaka (2007).
8. Graham and Markowitz (2011).
9. The question asks respondents to compare their life to the best possible life they can imagine, based on a 10 point scale or ladder.
10. Demirguc-Kunt and Klapper (2012).
11. Chandy and Kharas (2012, p.5); Demirguc-Kunt and Klapper (2012).
12. Demirguc-Kunt and Klapper (2012).
13. We thank Charles Kenny for raising the important point about technology access and wealth.
14. Regression results are in Appendix Table 1. While the standard specification for a binary ownership variable would typically be a logit, the estimators for the determinants of internet and TV did not converge and we used Ordinary Least Squares (OLS) estimation instead.
15. Kahneman and Deaton (2010).
16. Aker and Mbiti (2010).
17. It is possible that our results underestimate the impact of information and communication technologies on well-being as there are important externalities of ICTs which increase with penetration and use (Waverman et al., 2005). Such spillovers are likely to manifest themselves on the aggregate and not the individual level.
18. For a summary of the standard determinants of well-being across respondents worldwide, see Graham (2009).
19. Wheeler (2006).
20. On tweets, see Smith (2012).
21. Aker and Mbiti (2010).
22. See Aker and Mbiti (2010).
23. See Chesley, 2005; Kraut, Patterson, Lundmark, Kiesler, and Mukophadhyay, 1998; Cohen and Wills, 1985.

24. See, for example, Stutzer, Benesch and Frey (2010).
25. Regression results available from the authors.
26. Regression results split by quintiles are in Appendix Table 2.
27. Results available from the authors.
28. See Graham and Pettinato (2002); Graham (2005); and Graham (2009).
29. For a brief synopsis of the risks to the poor to carrying out financial transactions in cash and not having bank accounts, see Voorhies (2012).
30. The situation was similar with respect to receiving funds: about half did so through friends, while about 30 percent used post office and an equal percentage used bus. Banks, Western Union, and checks were less than 10 percent each (Mbiti and Weil, 2011).
31. Aker and Mbiti (2010); Mbiti and Weil (2011).

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