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Making stability dependable: stable cellphone access leads to better health outcomes for those experiencing poverty

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ABSTRACT

The technology maintenance framework argues that digital access is unreliable and thus consequential for individual/social welfare. However, no one has demonstrated a causal effect of cell phone access on health and well-being. Using a 7-month longitudinal field experiment we investigated how stable cellphone access impacts health and quality of life of people experiencing poverty (N = 45, median annual income = $7,216). Participants received phone cards providing unlimited talk, text, and data (n = 23) or were given grocery store gift cards of the equivalent amount (n = 22). Over the course of the experiment, participants in the treatment group reported better health and quality of life compared to those in the control group. Emotional social support moderated this relationship in such a way that those with the least social support benefited the most from stable cellphone access (supporting a 'poor-get-richer' hypothesis). We present practical and theoretical implications in the discussion.

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Technology maintenance; ICTs; computer-mediated-communication; digital divide; mobile technology

Mobile devices are part of the essential 'kit' for contemporary life (Campbell, 2020; Farman, 2014; Ito et al., 2008), and have become a primary tool for everyday routine activities (Katz, 2006; Mihailidis, 2014; Szyjewski & Fabisiak, 2018). Rapid global proliferation of, and dependence on, mobile technology over the last two decades has led to a 'taken-for-grantedness' of our relationship to these devices (Ling, 2012), which is often described as a new technological extension of the physical self (Clayton et al., 2015; Park & Kaye, 2018). However, cellphones are expensive, which is one of the key barriers to adoption (Smith, 2012), and contributes to why so many households in the US are 'mobile-only,' lacking any landline access (Blumberg & Luke, 2018). As a result, a large percentage of the population exclusively relies on telephone service that is more expensive than local landline service and prone to temporarily being broken, lost, disconnected, or otherwise out of service (Gonzales, 2014a; 2016b). Despite this fact, there is little research in the US on the consequences of disrupted cellphone service. And although many have studied the inconsistency of cell phone access in low- and lower-

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middle income countries (e.g., Ahmed et al., 2015; Donner, 2008; Horst & Miller, 2006; Wyche & Murphy, 2012), there is evidence that these same problems exist in wealthy contexts, where periods of disconnection compromise access to healthcare, employment, education, and other resources (Gershon & Gonzales, 2021; Gonzales et al., 2020; Gonzales et al., 2016) especially for those living at the socio-economic margins (Kim, 2015).

Although qualitative and cross-sectional studies strongly suggest negative causal effects of cellphone disruption (Gonzales, 2014b; Gonzales et al., 2016; Gonzales et al., in press), to our knowledge this has not been tested. This study fills that gap by providing evidence that consistent cellphone access is associated with health and well-being. We apply a *technology maintenance* framework (Gonzales, 2014a; 2016b) to examine the effects of stable, reliable cellphone access on health-related outcomes and to elucidate social conditions under which these effects manifest. Using a method relatively novel in communication research (Read et al., 2019), a longitudinal field experiment, we examined the impact of cellphone access on health and well-being outcomes for people living in poverty. This is the first study to demonstrate these effects causally and to also look at the moderating role of social support – a concept shown to play an important role in health outcomes (House et al., 1988; Reblin & Uchino, 2008; Uchino et al., 1996) – as a factor contributing to the relationship between stable cellphone access and health. We begin our discussion with an overview of poverty and ICT access, broadly, to position our research in a wider digital divide context and to acknowledge the long line of literature from which our hypotheses derived. We then follow this section with a discussion of the concept of social support and the essential role it plays in the benefits derived from ICT access.

The digital divide and dependable instability

Scholars in a wide variety of disciplines have demonstrated the essential role of Information and Communication Technology (ICT) access for participating in twenty-first century life. For example, ICT access, like many other social determinants of health, is essential for acquiring and maintaining basic needs, such as education, employment, and housing (Baum et al., 2012; Gonzales et al., 2016) and is associated with health-related outcomes such as patients' relationships with doctors, treatment compliance, and health self-efficacy (Bass et al., 2006). It should be noted, however, that such dependence on ICT access embeds users, especially marginalized users who may depend on this technology to a great extent, into cycles of unwanted state/corporate surveillance and data collection (Ekbia, 2016). Despite this and because of its critical role in accessing basic needs, ICT access is often a necessity, and lost digital access compromises access to resources more broadly, which only further complicates the ability to access digital technology. Such cycles can have real detrimental effects on health and well-being (Baum et al., 2012; Gonzales et al., 2016).

Data on adoption of mobile technology obscure the fact that many struggle with stable ICT access. There are innumerable ways by which people repeatedly lose and regain access (e.g., unpaid bills, broken devices), especially for those who have limited resources. The *technology maintenance* construct maintains that, as the globe becomes saturated with internet use and device ownership, the form of inequality between those who have access to ICTs and those who do not will increasingly manifest as the inability to

maintain *reliable* digital connectivity (Gonzales, 2014a). Individuals living in poverty are more likely to use relatively inexpensive prepaid cellphones than are wealthier users (Gideon, 2012; Kalba, 2008). Relying on inexpensive hardware and the inability to consistently replenish minutes as needed contributes to cycles of regular disconnection or *dependable instability* (Gonzales, 2014a). Dependable instability can interfere with the use of cellphones for health and security (Crawford et al., 2014; Donner et al., 2011; Gonzales, 2014a; John et al., 2016; Ling, 2004), and can disrupt access to critical social services that support health, including caseworkers and doctors (Baum et al., 2012; Gonzales et al., 2014). Reliable cellphone access is critical for undisrupted communication with healthcare providers, employers, and social support networks (Raven et al., 2018), factors essential for maintaining physical and psychological health – though researchers have yet to test the causal effects of stable digital access on global assessments of health and well-being. We address this gap by employing a longitudinal field experiment in which we provided consistent cellphone access to a cellphone insecure population. The hypotheses of our experimental research are informed by the findings of qualitative and cross-sectional research conducted with a technology maintenance framework. We propose the following:

> H1: Participants receiving monthly cellphone service (treatment) will show more improvement in health and quality of life over time than participants receiving a monthly grocery card of equal value (control).

The moderating role of social support

Social support has long been recognized as essential for promotion of positive health outcomes (Berkman, 1995; House et al., 1988; Reblin & Uchino, 2008). Social support includes the 'structures of an individual's social life … and the more explicit functions they may serve' (Uchino, 2004, p. 10). Researchers categorize social support into three categories: instrumental (e.g., provision of material aid), informational (e.g., provision of information), and emotional (e.g., provision of empathy and caring; Cohen, 2004). Emotional support, which is associated with expression of caring and concern, is most consistently associated with health and well-being (e.g., Reblin & Uchino, 2008; Robinson et al., 2019; Turner et al., 2013; Uchino, 2004; Uchino et al., 1996). At the individual level, people with better access to social support have better immune health, cardiovascular health, and neuroendocrine health, (Uchino et al., 1996). At the population level, scholars have found a link between social support and psychiatric disorders, risk of accident, and even mortality (House et al., 1988). Given this, it is not surprising that the ICT revolution of the past few decades has prompted a renewed interest in the psychological consequences of social connection, albeit in a new medium.

Social internet-based communication has been linked to the exchange of social support for many decades (Braithwaite et al., 1999; Hampton, Goulet, et al., 2011; Liu & LaRose, 2008; Rains & Wright, 2016). Moreover, the relationship between socially supportive online communication and well-being is well-established (Houston et al., 2002; Lieberman & Goldstein, 2006; Rains & Keating, 2011; Rains & Young, 2009; Turner et al., 2013). Online support groups have been shown to improve psychological health,

especially in the context of clinical patient care (Braithwaite et al., 1999; Campbell & Kelley, 2008; Rains & Young, 2009; Yeshua-Katz & Martins, 2013). And even outside of the clinical context there are well demonstrated benefits of using digital technologies for maintaining social connections with existing friends and loved ones (Bessiere et al., 2008; Valkenburg & Peter, 2009). This is not surprising given that the internet provides new, sometimes improved, ways of creating social connection, enabling intensified opportunities for connection (Valkenburg & Peter, 2009; Walther, 1996). Of course, not all online communication is created equal. Scholars have pointed out that *who* we talk to plays a big role in determining whether mediated communication is beneficial and helps to explain the mixed findings that internet communication- especially with strangers- can be detrimental for psychological health (Bessiere et al., 2008; Burke & Kraut, 2016; Clark et al., 2018; Valkenburg & Peter, 2007).

It is worth noting that the benefits of internet communication extend beyond social support. Decades of research suggest that engaging with others online, particularly those we are close to, can enhance self-esteem, social involvement, and other forms of well-being (Bass et al., 2006; Kraut et al., 2002; Lee et al., 2018). Online interaction also plays an important role in reinforcing and broadening social networks (Hampton, Lee, et al., 2011; Wellman et al., 2001). Indeed, mobile communication has become an essential tool for facilitating maintenance of both core and weak tie network connections (Campbell, 2020). For our purposes, however, we narrow in on social support (versus the related constructs of social capital or social self-esteem) as the key variable of interest. Although there is a wealth of work on the exploitation caused by embedding technology in all our social, corporate, and political institutions (Eubanks, 2011, 2018; Noble, 2018; Toyama, 2011), as well as possible ways to circumvent those (Srinivasan, 2019), this piece is focused on the fact that, despite the drawbacks of ICT dependence, there is still an emotional benefit to access to digital communication.

However, this benefit of emotional social support via digital technology may vary depending on the amount and quality of social support available. On one hand, it is possible that stable cellphone access allows those with more emotional social support to leverage existing networks to promote positive health outcomes ('rich-get richer' hypothesis). Supporting this hypothesis is research demonstrating that those with the greatest social resources derive the most benefit from using ICT (Abbas & Mesch, 2018; Kim, 2018; Kraut et al., 2002; Lee, 2009; Lin, 2019). On the other hand, for those with limited or non-existent emotional social support networks, the increased ability to communicate could buffer negative health effects of limited social support ('poor-get-richer' hypothesis). This expectation is consistent with research indicating positive effects of ICT use on well-being for those with the least social resources (Ellison et al., 2007; Frison & Eggermont, 2020; Rains & Keating, 2011; Utz & Breuer, 2017). For example, those lacking in strong tie relationships benefited the most from blogging about health (Rains & Keating, 2011). In short, given mixed evidence from the literature, we pose a non-directional hypothesis about the moderating effect of social support:

H2: The amount of emotional social support will moderate the relationship between stable cellphone access and a) health and b) quality of life.

Method

Participants

Participants in a mid-western town in the United States were recruited through three organizations that exclusively or primarily serve very low-income residents. The last author contacted representatives at each organization and asked caseworkers to distribute an invitation to participate in a study on '*how people stay connected to resources.*' Participants were told that they would receive monthly financial support ($45) for the completion of surveys. Participants were contacted by the last author.

A total of 45 participants agreed to participate in the study (23 treatment, 22 control). Participants were randomly assigned to a condition. Of these, three fifths ($n = 27$) were self-identified men and the rest (n = 18) were self-identified women. Most had a high school education or less (51.11%). The median annual individual income was $7,216 for those who disclosed this information (71.11%). Most participants did not have full-time jobs at baseline data collection (86.67%) and 42.22% were temporarily living with someone else or were homeless. Most participants (86.67%) owned or were regularly using cellphones and the rest reported some access in the past year.

Procedure

Data were collected during a longitudinal experiment in which participants were randomly assigned to receive $45 monthly phone cards with unlimited talk, text, and web (treatment) or the financial equivalent in the form of a grocery store gift card (control). If participants did not have a cellphone they also received one at the start of the study; if participants in the treatment condition lost their cell phone during the study, we replaced it for them at no charge. Participants reported two months of baseline data followed by five months of data after implementation of the manipulation. The researchers knew what condition participants were in because they had to facilitate replacement of broken technology, etc. Although participants were not told the true nature of the study it is possible that, due to the tight knit community, they may have found out that some people received gift cards while others received cellphones. Data were collected in 2016-2017.

Participants met with the last author for a baseline data collection in which participants read and signed a consent form and received an explanation of the study format. At that time, all demographic measures were collected, as well as baseline measures of health, quality of life, and social support. Participants returned in one month to complete the same measures and received either a grocery store or cell phone gift card. Over the next 5 months, participants met with various authors monthly to complete survey items and receive the intervention. Qualitative data were collected but are not reported here. Most meetings took place in public spaces, such as the library or grocery store. The final meeting consisted of an in-depth interview for which participants received $20. The average rate of return for participants during the study was 84.81% and every participant returned at least three times.

Measures

Self-reported health

Overall health was measured using the SF-12, a scale with established reliability and validity (Ware et al., 1996; e.g., 'During the past 4 weeks, how much of the time has your physical health or emotional problems interfered with your social activities (visiting friends, relatives, etc.).' The survey was scored using publicly available syntax (https://labs.dgsom.ucla.edu/hays/pages/programs_utilities; $\alpha = .92$; $M = 54.92$, $SD = 22.88$).

Quality of life

Quality of life (QoL) was measured using the World Health Organization WHOQOL-BREF (Harper & Power, 1998). The scale includes 25 items that assess QoL in four domains: *physical health* (activities, discomfort, e.g., 'To what extent do you feel that physical pain prevents you from doing what you need to do?' $\alpha = .88$; $M = 3.24$, $SD = .87$), *psychological quality of life* (self-esteem, positive feelings, e.g., 'In the last month, how often have you been upset because of something that happened unexpectedly?', $\alpha = .86$; $M = 3.28$, $SD = .89$), *social relationships* (social support, sexual activity, e.g., 'Someone to confide in or talk to about yourself or your problems?', $\alpha = .78$; $M = 3.33$, $SD = 1.07$), and *environmental quality of life* (safety, financial resources, transport, e.g., 'Do you have enough energy for everyday life?', $\alpha = .80$; $M = 3.25$, $SD = .73$).

Emotional social support

Emotional social support was measured using two items adapted from previous research demonstrating positive health implications of emotional support (Berkman et al., 1992): 'How often have you been in contact with someone that provides you with emotional support during the last month? (1 = *At least once a day*; 2 = *About 3-4 times a week*; 3 = *About 1 a week*; 4 = *About 1-2 during the month*; 5 = *Not at all*), and 'Have you been able to get emotional support whenever you needed it during the last month?' (1 = *I was always able to get emotional support when I needed it last month* to 5 = *I was never able to get emotional support when I needed it last month*). Items were reverse coded so that high scores represent high emotional support ($r = .63$, $p < .001$; $M = 3.65$, $SD = 1.11$).

Cellphone access

Cellphone access was measured using a single item at the baseline and the final month. Participants were asked 'Please indicate your current access to a cellphone' (1= *I own or regularly use a cellphone*; 2 = *I have NOT owned or regularly used a cellphone in the past*; 3 = *I do not own or regularly use a cellphone now, BUT I have IN THE PAST YEAR.*).

Analytical framework and model comparison

We used multilevel modeling (MLM) with random intercept for analysis because of strengths in handling missing data and accommodation of violation of the homoscedasticity assumption (Snijders & Bosker, 2011). The first-level units, repeated survey measures, are nested within the second-level units ($N = 45$) of analysis, the individual

participants (i.e., time-invariant units). The analysis was conducted using the *lme4* package in R.

We first tested an empty random-intercept model without any independent variables. We then fitted three models to test the hypotheses: model 1 includes only the demographic variables as predictors (see SI: Table 1); model 2 includes time (i.e., month), treatment, and a term to represent the interaction between the two, controlling for emotional social support and cellphone access, and, finally, testing moderation effects of emotional social support; model 3 includes a two-way interaction between treatment and emotional social support and controls for the three-way interaction. The model comparison showed a general trend of decrease of ICC, AIC, and BIC along with the increase of complexity for all five DVs of interest, with a few exceptions (see SI: Table 1).

Results

H1 predicted that, compared to the control group, the interaction of monthly cellphone service (treatment) and time would have a positive effect on overall health and quality of life (QoL) for participants in the treatment group. The Pearson's r correlation test showed significant positive relationships between a dummy interaction variable (Treatment * Months) and overall health ($r = .13$, $p < .05$, $CI[.01,.24]$), as well as on environmental ($r = .22$, $p < .001$, $CI[.10,.33]$), physical ($r = .12$, $p = .05$, $CI[.00,.23]$), psychological ($r = .13$, $p < .05$, $CI[.01,.24]$), and social ($r = .17$, $p < .01$, $CI[.07,.28]$) QoL. The results confirm this hypothesis even after controlling for demographics, phone access, and baseline contact problems. The effects are significant for the outcome measures of overall health, and environmental, physical, psychological ($\beta = .09$, $SE = .04$, $p < .05$), and social QoL (see Table 1). The significant marginal effects of the interaction between treatment and time on overall health are shown in Figure 1(a). To help dissect this interaction we note that the predicted average score of overall health (out of 100) at the final month follow-up for treatment group is 72.61 ($SE = 5.37$) whereas the predicted average score for the control group is 50.61 ($SE = 4.35$). The pattern is similar across the other four QoL measures (see SI: Figure 1(a)). Hypothesis 1 was supported.

H2 predicted that availability of emotional social support and treatment would interact to moderate the effect of consistent cellphone access over time on health and well-being. The results mostly confirmed this hypothesis in the following manner: there are significant and negative interactions between time, treatment, and emotional social support after controlling for variables mentioned above as well as the possible two-way interaction effects for overall health, environmental, physical, and social QoL. The only exception is the effect on psychological QoL ($\beta = -.06$, $SE = .15$, $p = .15$), which shows the same direction but is not significant. As a test of H2, the moderation model indicates amplification of the positive effects of treatment over time on overall health, environmental, physical, and social QoL for those with the least social support. The effects are not significant for psychological QoL ($\beta = .31$, $SE = .16$, $p = .09$; see other details in Table 1). Hypothesis 2 was also supported. Social support moderates the relationship between stable cellphone access and health (see Figure 1(b)). The pattern is consistent for QoL measures (see SI: Figure 1). The negative three-way interactions demonstrate

Table 1. Random-intercept models with two-way (Model 2) and three-way interactions (Model 3)

Dependent Variables:	Overall Health		QoL^{+}: Environmental		QoL: Physical		QoL: Social	
Fixed Effects:	2-way	3-way	2-way	3-way	2-way	3-way	2-way	3-way
Intercept	15.76	91.14***	2.91***	3.73***	3.77***	4.70***	2.49***	3.89***
Monthly Income (unit: $1,000)	13.05	11.11	.35	.23	.44	.34	.23	.08
Age	−.33	−.33	.02	.01	−.01	.−.02	.00	.00
Minority[a]	−3.17	−1.80	.12	.21	−.03	.04	.01	.74*
Education	−4.63	−4.35	−.21**	−.19	−.14	−.12	−.30	−.28*
Gender[b]	.23	.55	.04	−.01	−.11	−.09	.37	.39
Cellphone Access[c]	1.52	−4.65	.03	−.23	.20	−.37	.43	−.63
Treatment	−14.28	−55.67**	−.63***	−2.93***	−.45	−2.37***	−.95***	−3.28***
Months	−.52	−.4.67	−.01	−.13	−.01	−.14	−.01	−.18
Emotional Social Support	.45	−3.87	.13***	−.04	.09	−.08	.27***	.04
Treatment X Months	4.13***	12.97***	.14***	.58***	.09*	.52***	.15***	.54***
Treatment X Emotional Social Support		11.17*		.62***		.52**		.63**
Months X Amount of social support		1.13		.03		.04		.05
Treatment X Months X Emotional Social Support		−2.37***		−.12***		−.10**		−.11*
Random Effects:								
Within-individual	177.97	176.58	.18	.16	.18	.18	.31	.30
Between-individual	363.62	350.00	.21	.22	.58	.54	.39	.35
Marginal R^2 / Conditional R^2	.16 / .72	.18/.72	.27 / .67	.31/.71	.20 /.81	.22/.81	.37/.72	.40 /.73

Notes: Reference group a): White/Caucasian, b) Male, c) Owning a phone + QoL stands for *Quality of Life*. QoL: Psy was omitted because of non-significant three-way interaction.
*$p < .05$, ** $p < .01$, *** $p < .001$.

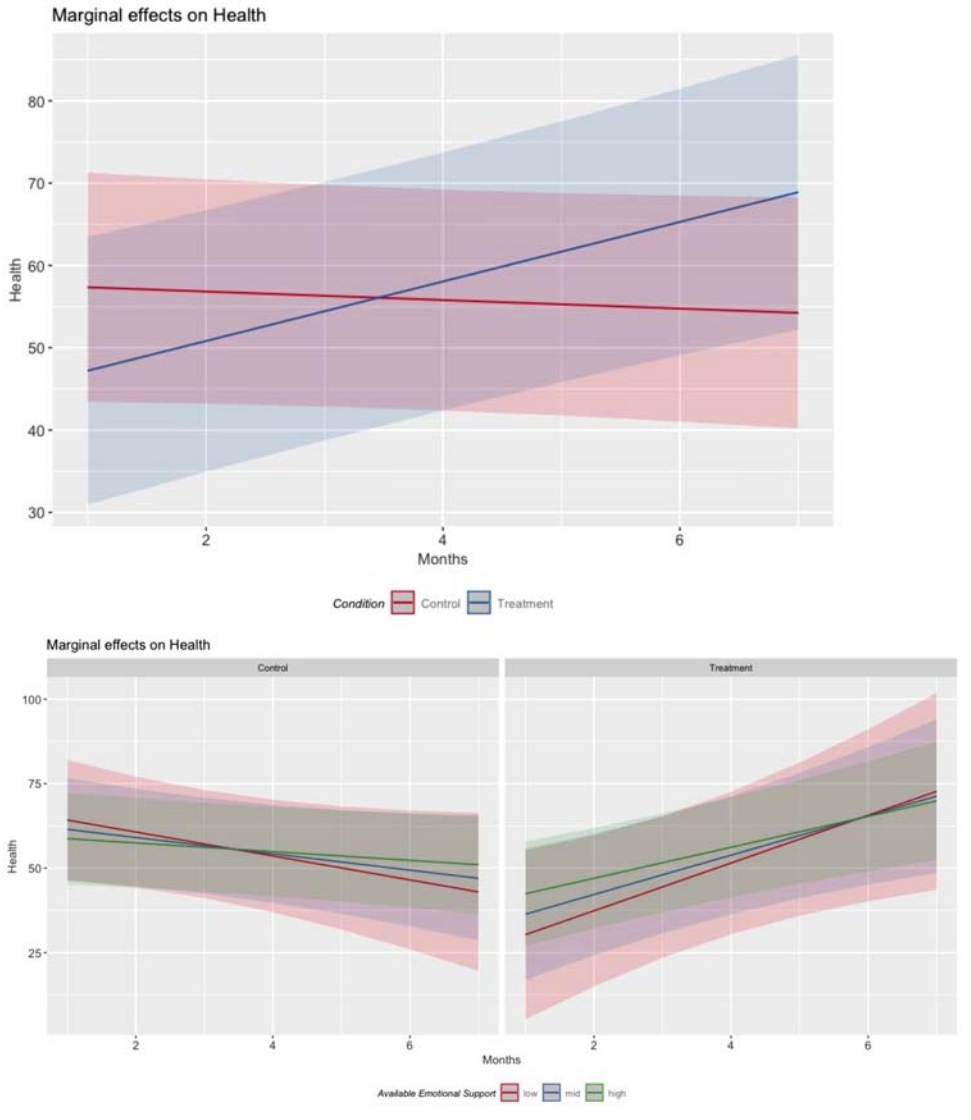

Figure 1. (a) Effects of Month*Treatment; (b) Moderation effects of available emotional support on health.

a 'poor-get-richer' effect such that those with the least social support benefited the most from stable cellphone access.

For the four models where the results show significant interaction effects of treatment and months, the average marginal effect size (i.e., the proportion of residual variance reduction by fixed-effects variables) is 25.00% and the average conditional effect size (i.e., the proportion of residual variance reduction by both fixed- and random-effects variables) is 73.00%. After including the moderation effects of emotional support, the marginal effect size increased to 27.25%, and the conditional effect size to 74.25%.

Discussion

Previous research using qualitative and cross-sectional methods suggest that dependable instability of mobile technology – regular and recurring disruption in access for a wide range of reasons (e.g., lost or broken devices, unpaid monthly bills) – is a widespread issue for those living in poverty (Gonzales, 2014a; 2016b; Raven et al., 2018) and may have deleterious implications for health and well-being (Gonzales, 2014b; Gonzales et al., 2016; Gonzales et al., in press). The present research is the first to examine the *causal* role of dependable instability in health outcomes and to probe the impact of emotional social support using a field experiment with a non-student sample. In this way it further validates the technology maintenance framework and highlights the critical role of social support in this process. Through a longitudinal field experiment conducted over the course of seven months with participants living in poverty and experiencing phone insecurity, we found that an intervention designed to provide consistent cellphone access contributed to better overall health and quality of life compared to a control (**H1**). Furthermore, those with low emotional social support showed more improvement in health and well-being over time compared to those with moderate or high emotional social support (**H2**).

From a technology maintenance perspective, this research is the first to quantitatively test whether dependable instability has a causal effect on poor health and well-being outcomes. This elaborates multiple qualitative and correlational studies that have previously demonstrated an association between digital access and health and well-being (Gonzales et al., in press; Gonzales, 2014a; Gonzales et al., 2016). Additionally, this research extends the technology maintenance construct by pointing to social support as a moderator of the relationship between dependable instability and health. This finding helps better integrate technology maintenance and social support literatures, and points to future theoretical elaboration as well as opportunities for intervention.

Causal benefits of access

These data validate previous qualitative and cross-sectional findings that digital cell phone access is important for health and safety for those living in poverty. Cellphones are an essential tool for regular communication with doctors and healthcare providers (Gonzales, 2014a; Gonzales, 2016a; Oyeyemi & Wynn, 2014), and are critical for receiving a quick emergency medical response (Chib, 2010; Oyeyemi & Wynn, 2015). Moreover, cell phones, like landline telephones before them (Dimmick et al., 1994), provide an immense psychological benefit by providing users with an enhanced sense of security (Gonzales, 2014a). It is interesting to note that this particular benefit was echoed by several participants in this research during the exit interview who mentioned that having access to call emergency services increased their sense of safety. Finally, cellphones are all but necessary for social, professional, and civic participation, which form the backbone of everyday quality of life and maintenance of physical health (Gonzales et al., 2014). In short, given previous findings that cellphones are an essential tool for maintaining access to socio-cultural resources (e.g., food stamps, doctors, employers), it is not surprising that our study found a causal effect of reliable digital access on overall health and quality of life. It is also worth noting our intervention revealed a medium (marginal)

effect size, though we recognize that it may be amplified due to the marginalized status of the sample. This was not a randomly drawn sample from the population and is thus, as with most experiments, not generalizable. For this reason, replications with both low- and middle-high income samples are needed to validate these findings and elaborate the mechanisms behind them.

The importance of support

In addition, the findings reinforce the importance of considering emotional social support when examining the relationship between ICT use and health. The findings are consistent with decades of research indicating that access to emotional social support is associated with better health (House et al., 1988; Uchino et al., 1996), and more recent work that has found that ICT use overall can be a psychologically valuable way for staying connected to supportive relationships (Bass et al., 2006; Kraut et al., 2002; Valkenburg & Peter, 2009). This finding is echoed by a quote from a participant in the phone condition during the exit interview:

> I may have tended to reach out a little bit more to friends and family having the resource of the phone than I would if I wouldn't have had it … being able to reach my friends and family during difficult times … that helped my emotional health'.

The present research builds upon these findings by indicating *who* benefits the most from consistent cellphone access – providing support for a poor-get-richer hypothesis. Those with the least social support reported the greatest improvement in health and quality of life over the course of the six-month intervention. While those with pre-existing social support networks also benefited from stable cellphone access, it was to a lesser extent than their low socially supported counterparts. These findings suggest that, because those with little emotional social support may have difficulty in leveraging pre-existing social support networks, the impact of consistent cellphone access has greater impact, perhaps by buffering the negative effects of this deficit. Although a conclusive explanation for why this occurs is beyond the scope of this research, an example from a specific participant – who mentioned that he does not socialize often and that the phone facilitated communication with doctors – may hint at the answer. This underscores the importance of the technology maintenance framework, which already acknowledges that low-income populations are more likely to face obstacles in maintaining digital access. It also suggests that additional research is needed to better understand how socio-economic status might moderate both maintenance capability and social resources. It should be noted that emotional social support did not moderate the relationship of consistent cellphone access and psychological quality of life although we observed main effects. This suggests that consistent cellphone access is an important contributor to psychological quality of life for those experiencing poverty, regardless of their amount of emotional social support. This finding further underscores the psychological benefits of consistent cellphone access (Gonzales, 2014a).

Strengths, limitations, and directions for future research

The main strength of this study is in the method of field experiment. However, longitudinal field experiments also present unique challenges. For example, we had limited control

over extraneous factors that may have affected outcomes. However, as participants were randomly assigned to a condition, it is not likely that these factors systematically affected participants in one condition more than the other. Additionally, because of instability in living situations, employment, etc., some participants missed their monthly meetings. We thus chose to use multilevel modeling for analysis - which is a statistical analysis technique well-suited for handling missing data. It is also important to note that this is a very low-income population. It is unclear how these relationships would unfold in a population with greater access to resources. Although we believe that participants in the phone condition were using their phones, we were unable to assess what participants were doing with their phones. Thus, we are unable to assess if health and well-being outcomes observed in this research are due to actual phone usage (e.g., calling the doctor) versus the perception of safety and well-being that comes from the knowledge that one has a phone (e.g., having a means of communication if the need arises). However, substantial social psychology research indicates that perceived social support is more consistently predictive of positive health than received support (Reinhardt, et al., 2006; Uchino, 2009). For the purposes of our study, this literature underscores the fact that cellphones may be tools for tapping that potential. Although beyond the scope of the present research, subsequent research should disentangle the effects of perceived versus received social support on the positive well-being effects of stable cell phone access.

Finally, while the findings of this research highlight the benefits of consistent cellphone access for those in low-income populations, it is important to note that access, and expectations for access, is not ubiquitously beneficial, especially for those in marginalized positions. ICT diffusion reinforces existing societal power structures by consolidating corporate and state power over access to ICT infrastructure (Wilkins & Chae, 2007; Wilkins & Enghel, 2013) and makes those who depend upon such infrastructure vulnerable to surveillance (Eubanks, 2018). Those in marginalized positions, such as the participants in this research, are especially vulnerable to these effects because they rely on their devices to a greater extent than those with multiple technological means of communication. Consequently, because devices are increasingly needed to fulfill even the most basic needs, for those in marginalized positions there can be no 'choice' to disconnect. This point is highlighted by a participant who noted that the consistent phone access during the study

> provided me extra assurance, but what does that assurance do? Does it tie me more to technology or does it maybe even make me more aware of the fact that I am too tied into the assurance, kind of artificial assurance? It got me thinking.

Conclusion

In sum, these findings have implications for scholars investigating the effects of cellphone access on health and wellbeing. These findings are the first to suggest causal effects of dependable instability in health and quality of life, and to suggest that scholars should consider nuanced measures of ICT access when investigating the health effects of cellphone access. These findings also underscore the need for policies that better ensure stable digital access to mobile technologies. Through the Universal Service Fund the FCC has started to include subsidies for broadband service as well, though current

policies require households to choose between internet and smartphone subsidies (FCC, 2020). If there is one thing the pandemic that began in 2020 taught us worldwide, it is that a robust at-home digital infrastructure is essential – one that includes stable cellphone access. We posit that one basic way to ensure such an infrastructure is to subsidize *both* cellphone and internet service. This article's findings make apparent the need for increased, simultaneous access to multiple ICT services and generally underscore the critical nature of a well-supported digital infrastructure across a given national and even global context.

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