(Mis)information and Anxiety: Evidence from a Randomized Covid-19 Information Campaign

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Abstract

Dispelling misinformation during crises is critical to public health. But information can also induce distress. We ask whether factual information hurts or improves mental health during the Covid-19 pandemic. We randomized the provision of Covid-19-related information through text messages, a pre-recorded audio message, or live phone calls to Indian migrant workers. Phone calls increased knowledge and reduced depression and anxiety substantially. The amount of information delivered explains gains in knowledge, but not improvements in mental health. These results suggest that governments should reconsider the dependence on automated broadcasts during crises given the beneficial mental health effects of live phone calls.

JEL: D83, D90, I12

Keywords: Misinformation, Mental Health, Covid-19, Risk Communication

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I Introduction

Information during crises can be a double-edged sword. On one hand, it is absolutely essential to dispel misinformation. Bursztyn et al. (2020) document that misinformation about the Covid-19 pandemic from television programs in the US correlated with high rates of Covid-19 infections and deaths. On the other hand, information can induce anxiety. Holman, Thompson, et al. (2020) report that acute stress and depressive symptoms increased during the Covid-19 pandemic, particularly among those more exposed to ambiguous information. In fact, individuals can go out of their way to avoid bad news. In one study, Ganguly and Tasoff (2016) found that their participants were willing to pay to avoid testing for a treatable sexually transmitted disease. If information— whether factual or false— leads to a perception of excessive risk, it can lead to fatalistic attitudes. When Akesson et al. (2020) experimentally changed individuals' beliefs about the infectiousness of Covid-19, those who believed the disease to be more infectious became less willing to adopt precautionary measures.

Anxiety is also tied to cognitive functions. Moran's (2016) meta-analysis shows that anxiety is consistently associated with poor working memory. To the extent anxiety impedes cognitive functions, it can lead to poor decisions. Xie et al. (2020) learned that individuals with lower working memory were less likely to comply with physical-distancing measures during the Covid-19 pandemic. Mental illness can entrap the poor in a vicious cycle. Ridley et al. (2020) show that depression and anxiety caused poverty, which in turn exacerbates mental health.

Against this backdrop, we ask whether certain modes of broadcast are better at delivering information without negative consequences to mental health. We randomly assigned garment industry workers in India to receive information through text messages, a pre-recorded audio message, or phone calls. We then measured their knowledge of Covid-19 and screened them for depression and anxiety.

Phone calls led to the most engagement. Compared to participants receiving pre-recorded audio messages, those who received phone calls stayed on the phone longer, were more likely listen to the full message, and opted to have the message repeated at a higher rate. Phone calls were only minimally better at improving knowledge, though the effect was prominent for individuals without smartphones. Surprisingly, phone calls reduced depression and anxiety by 16 percent.

These results prompt us to inquire to what extent information alone explains the effects of phone calls. Controlling for the amount of information delivered almost entirely eliminates the effect of phone calls on knowledge, but hardly changes the effect on mental health. This result is noteworthy because, by protocol, we restricted the caller's interaction with participants to reading from a script. In other words, phone calls improved mental health not because they relayed more information, but because a real person did so.

II Data

Between June and August of 2020, we recruited internal migrants employed in the Indian garment industry to participate in the study. Internal migrants are an im-

portant population because they could be at a higher risk of contracting Covid-19 during return migration, and could infect their families. Mobarak (2020) has found that households in Bangladesh that had migrants return during the Covid-19 pandemic were more likely to report symptoms of the disease. This population is also at risk of severe economic and mental health consequences (Ridley et al. 2020). Furthermore, it is crucial for manufacturing sector workers to be informed about the disease in order for production to safely continue in the midst of a pandemic. Manufacturing environments are of particular concern given the potential of fast and large-scale spread. One factory in Sri Lanka, for instance, found 1,000 employees to be Covid-19 positive within three days of detecting the first case (Agence-France Presse 2020).

We selected individuals from an administrative dataset of 23 factories in Karnataka. The dataset contained information on gender, age, education, and whether individuals had left the job. All contact with participants occurred over the phone. While factory workers were predominantly women, we approached roughly the same number of men and women for participation. Since some individuals declined to participate, we were left with 914 individuals at baseline, 57 percent of whom were female. The sample is young with an average age of 24 years. Half of the participants had left their jobs at the time of baseline— also a feature of the recruitment strategy. A third of our sample had an education above 10^{th} grade, and three fourths had smartphones. Just over a quarter lived in hostels with other workers. The average individual was able to recall 5-digit numbers in a test of short-term memory. The sample could solve roughly two out of three arithmetic problem, culminating into an average numeracy score of 2.19.

We have two outcomes— knowledge and mental health. We measured knowledge using an index that sums scores each participant received on a set of questions measuring their knowledge about various aspects of Covid-19— the symptoms, potential remedies, and spread— standardized with mean zero and standard deviation one. We measured mental health with the four-item Patient Health Questionnaire (PHQ-4) (Kroenke et al. 2009). The PHQ-4 is a combination of two-item Patient Health Questionnaire (PHQ-2), which screens for depression, and the two-item General Anxiety Disorder (GAD-2) questionnaire, which screens for anxiety. (See Appendix for precise definitions.)

Baseline data confirm that there was substantial misinformation among participants. About a third did not mention cough to be a symptom of Covid-19, and about half did not mention fever. Fewer than half were certain that non-symptomatic individuals can spread the disease. Participants also seemed to hold inconsistent beliefs. While only eight percent were certain that Covid-19 had remedies, 26 percent said they would recommend symptomatic individuals to take antibiotics, and 13 percent said they would recommend drinking cow's urine. A third felt that consuming turmeric regularly protects from Covid-19 infections, and 21 percent said that people of certain religions are more likely to spread the disease. About 18 percent of the sample attrited between baseline and endline. (Attrition is further discussed in Section III.)

III Research Design and Execution

We randomly assigned study participants to receive information on Covid-19 via one of three modes: text messages, a pre-recorded audio message, or live phone calls. We stratified the sample for randomization. Each strata was defined as a unique combination of the following four variables: 1. whether the individual was female, 2. whether the individual had education above 10^{th} grade, 3. whether the individual had left their job as of February 2020 when the pandemic reached India, and 4. the factory where the individual was employed. About 20 percent of participants were assigned to receive text messages, and the rest were split between pre-recorded audio and phone calls. Surveyors too were assigned to participants at random at both baseline and endline. Table V in the Appendix shows that baseline characteristics and outcome measures were balanced across all three intervention groups.

The content of the message remained unchanged for all three modes. Moreover, we ensured that the pre-recorded audio message was in the voice of the same person who made the phone calls, and that the speed at which the caller read the message script matched the speed of speech in the pre-recorded audio. We also trained the caller to decline requests for additional information and to refrain from consoling participants.

As a protocol, participants from about five strata were surveyed each day, then randomized and administered interventions the following day. Text messages were predominantly delivered in one attempt. On the contrary, we made up to eight attempts to deliver the treatment through pre-recorded audio or phone calls. Roughly

93 percent of text messages were delivered. Likewise, 94 percent of those sent pre-recorded audio answered their phones, but only 86 percent answered the phone when called (see Table II).

We do not observe whether the text messages were read. However, conditional on answering the phone, we observe how long participants in the pre-recorded audio and phone call interventions stayed on the phone. Since we ensured that the phone calls and the pre-recorded audio delivered information at the same speed, we are able to determine how much of the message content these interventions delivered before the participant disconnected. Figure I shows that participants who received phone calls stayed on the phone longer compared to those sent pre-recorded audio. Table II shows that two thirds of the participants assigned to phone calls were delivered the entire message in contrast to 40 percent of those assigned to pre-recorded audio. Participants had the option to repeat the message at the end of the pre-recorded audio message as well as phone calls. Those assigned to phone calls were 12 percentage points more likely to make this choice. Essentially, phone calls engaged participants more than pre-recorded audio.

We administered the median endline survey 18 days after intervention. Despite various survey protocols set up to minimize attrition, we were unable to contact 18 percent of our baseline sample for endline. As Table VI shows, attrition is imbalanced along baseline characteristics and treatment assignment, but not along outcome measures. To correct for this imbalance, we estimate treatment effects by weighing observations with the inverse of the probability of remaining in the study

at endline. We also estimate Lee (2009) bounds to check if zero effects can be ruled out.

IV Methods

While we present analysis in keeping with our pre-registered design in the appendix, certain features of our data deviate from assumptions under which we pre-registered our study. Knowledge and PHQ-4 were not as strongly correlated between baseline and endline as our power calculations anticipated. In order to draw meaningful insights, we present results where we pool two of the three interventions. Our views on the similarity of interventions have also evolved since pre-registration. Pre-recorded audio messages and phone calls are similar in that they convey information through audio rather than text. From a different viewpoint, text messages and pre-recorded audio messages are both impersonal compared to phone calls. The latter demarcation was predominantly favored by the group of India-based researchers that we consulted. Our interpretation of Figure I and Table II also suggest that the latter view is the most pertinent to the analysis.

We estimate variants of the following econometric model using Least Squares regression:

$$Outcome_i^1 = \beta \cdot \mathbb{1}[Call_i] + \gamma \cdot Outcome_i^0 + s_i + r_i + \epsilon_i \quad (1)$$

where i denotes each individual, $Outcome_i^1$ is the outcome variable after treatment, $\mathbb{1}[Call_i]$ indicates assignment to phone calls, $Outcome_i^0$ is the outcome variable before treatment, s_i indicates surveyor fixed effects, r_i indicates trial round fixed effects,

and ϵ_i is the unobserved error. The parameter β represents the effect of assignment to phone calls relative to assignment to either pre-recorded audio messages or text messages.

We also test whether short-term memory, numeracy, and smartphone ownership moderate the effects of phone calls. We estimate variants of the following model using Least Squares regression:

$$\begin{aligned} Outcome_i^1 = \phi \cdot \mathbb{1}[Call_i] + \delta \cdot M_i \cdot \mathbb{1}[Call_i] \\ + \lambda \cdot M_i + \gamma \cdot Outcome_i^0 + s_i + r_i + \epsilon_i \end{aligned} \tag{2}$$

where M_i is an indicator for either high (at or above median) short-term memory, high (at or above median) numeracy, or smartphone ownership.

V Results

Table III presents estimates of Model (1). It shows that phone calls were only minimally better at improving knowledge. Individuals assigned to phone calls were more knowledgeable by about 10 percent of standard deviation when compared to those assigned to either text messages or pre-recorded audio messages. The estimate is smaller and less precise when we use inverse probability weights and controlling for participant characteristics. Lee (2009) bounds do not rule out a null effect. Contrarily, phone calls seem to reduce depression and anxiety. PHQ-4 scores were 16 percent lower for those assigned to receive phone calls. The effect on anxiety and depression is stable when we use inverse probability weights. Lee (2009) bounds

rule out a null effect. Table VII in the Appendix shows that the effect is larger on anxiety (GAD-2) than on depression (PHQ-2). Phone calls reduced moderate to severe anxiety (GAD-2 $\geqslant 3$) by 28 percent. The magnitude of the effects would likely be larger if our phone calls had reached participants at the same rate as pre-recorded audio messages.

We observe the information content delivered through phone calls and pre-recorded audio. We also know if individuals receiving these interventions opted to have the information repeated. Controlling for these variables explains almost all of the effect of phone calls on knowledge relative to the pre-recorded audio, but not the effect on PHQ-4. In other words, information delivery does not on its own account for the effect on depression and anxiety.

Table IV shows estimates of Model (2). Numeracy and short-term memory do not moderate the effect of phone calls on knowledge. However, phone calls were more effective on those without smartphones. Among participants assigned to phone calls, those without smartphones became more knowledgeable by 18 percent of standard deviation compared to those with smartphones. The effect on depression and anxiety did not change with numeracy, short-term memory, or smartphone possession.

VI Conclusions

Previous research shows that exposure to discussions of mass violence (Holman, Garfin, et al. 2013; Thompson, Jones, et al. 2019), natural disasters (Thompson, Holman, et al. 2019), as well as outbreak of infectious diseases such as Ebola (Thomp-

son, Garfin, et al. 2017) and Covid-19 (Gao et al. 2020; Holman, Thompson, et al. 2020) are associated with anxiety and distress. Given the rise in stress, anxiety and depression during the Covid-19 pandemic (Salari et al. 2020), the mental health consequences of risk communication demand attention. Holmes et al. (2020) have called for urgent research on health messaging that reins in distress. Our study responds to this call. Whereas text messages and pre-recorded audio dominate Covid-19 information campaigns targeting individuals without access to the internet (International Telecommunication Union 2020; World Health Organization 2020), we demonstrate that, for under $0.25 per message, phone calls can broadcast information at least as effectively as conventional methods, yet with better consequences for mental health.

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Ethics This study was approved by Good Business Lab's Ethics Committee in India (Identifier: GBL0520) and University of Michigan Human Subjects Research Committee in the United States (Office of Human Research Protections Registration Number: IRB00000246). All study participants provided informed consent.

Pre-registration The trial was pre-registered with the American Economic Association's Trial Registry (doi: 10.1257/rct.5947).

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Competing Interests Adhvaryu and Nyshadham disclose that they are members of the Board of Directors and serve as Chief Development Officer and Chief Strategy Officer, respectively, at Good Business Lab (GBL). None of the authors has any financial interest in GBL.

Data and Code Availability Anonymized data, a data dictionary defining each field, and software code used in the analysis are made freely available with the published article.

Tables and Figures

Table I: Descriptive Statistics

Variable	Mean	Standard Deviation
Female	0.57	0.50
Age	24.06	5.74
Left job	0.51	0.50
Educated above grade 10	0.33	0.47
Smartphone	0.75	0.43
Lives in hostel	0.28	0.45
Short-Term Memory	5.24	1.90
Numeracy Score	2.19	1.01
PHQ-4	3.00	2.78
Attrited	0.18	0.39
Select knowledge:		
Cough is symptom of Covid-19	0.64	0.48
Fever is symptom of Covid-19.	0.53	0.50
Non-symptomatic can spread Covid-19.	0.43	0.49
Covid-19 has remedies.	0.08	0.27
Would recommend Covid-19 symptomatic to take antibiotics.	0.26	0.44
Would recommend Covid-19 symptomatic to drink cow's urine.	0.13	0.33
Eating turmeric protects from Covid-19 infection.	0.35	0.48
Believers of some religions spread Covid-19 more.	0.21	0.41

Statistics are from a sample of 914 individuals surveyed at baseline.

Table II: Information Delivery

Variable	Phone Call	Pre-Recorded Audio	Difference
Answered phone	0.86	0.94	-0.08
			(0.02)
Information Content	4.89	3.64	1.25
			(0.22)
All information delivered	0.66	0.40	0.26
			(0.04)
Opted to repeat information	0.14	0.01	0.12
			(0.02)

The table reports statistics from t-tests comparing differences in means between groups assigned to phone call and pre-recorded audio. Standard errors are in parentheses.

Table III: Effects of Phone Calls on Knowledge and PHQ-4

	Knowledge				PHQ-4			
Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Phone Call	0.12	0.11	0.10	0.06	-0.46	-0.49	-0.49	-0.48
	(0.06)	(0.07)	(0.07)	(0.07)	(0.16)	(0.17)	(0.16)	(0.20)
Knowledge (*Bl*)	0.50	0.50	0.47	0.49				
	(0.03)	(0.04)	(0.04)	(0.04)				
PHQ-4 (*Bl*)					0.53	0.53	0.51	0.49
					(0.04)	(0.04)	(0.04)	(0.04)
Surveyor (*Bl*) *FE*	✓	✓	✓	✓	✓	✓	✓	✓
Surveyor (*El*) *FE*	✓	✓	✓	✓	✓	✓	✓	✓
Trial Round *FE*	✓	✓	✓	✓	✓	✓	✓	✓
IPW		✓	✓	✓		✓	✓	✓
Control Variables			✓	✓			✓	✓
Information Delivery				✓				✓
Observations	739	735	735	573	737	733	733	573
Adjusted R^2	0.33	0.34	0.36	0.37	0.37	0.36	0.38	0.37
Mean of Outcome (*Bl*)		-0.00				3.00		

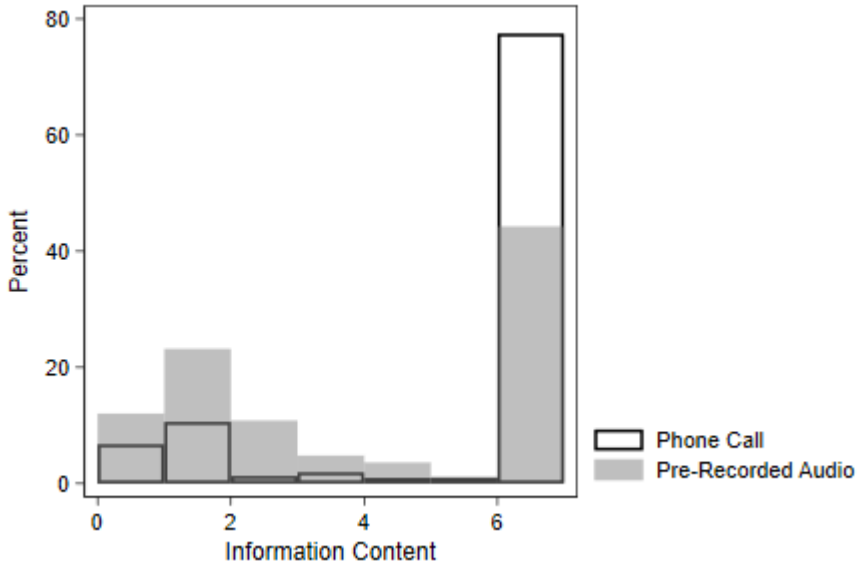
The table reports results of Least Squares regressions estimating variants of Model (1). *Bl* means baseline, *El* means endline, *FE* means fixed effects, and *IPW* means inverse probability weights. Control variables include gender, age, employment status, indicator for hostel residence, numeracy, short-term memory, smartphone ownership, and indicator for having education above grade 10. Information delivery refers to two variables defined only for phone calls and pre-recorded audio: one that counts the paragraphs of information delivered before the participant disconnected and another that indicates whether the participant opted to have the information repeated. Regressions controlling for information delivery exclude individuals assigned to text messages. Standard errors are robust to heteroskedasticity.

Table IV: Moderators of the Effects of Phone Calls

Variables	Knowledge (1)	PHQ-4 (2)
Phone Call	0.33	-0.98
	(0.16)	(0.45)
Phone Call X High Numeracy	-0.05	0.03
	(0.13)	(0.33)
Phone Call X High Memory	0.07	0.38
	(0.14)	(0.34)
Phone Call X Smartphone	-0.33	0.35
	(0.16)	(0.43)
High Numeracy	0.18	-0.06
	(0.09)	(0.24)
High Memory	0.08	-0.46
	(0.09)	(0.24)
Smartphone	0.15	-0.33
	(0.11)	(0.31)
Knowledge (*Bl*)	0.48	
	(0.04)	
PHQ-4 (*Bl*)		0.51
		(0.04)
Surveyor (*Bl*) *FE*	✓	✓
Surveyor (*Bl*) *FE*	✓	✓
Trial Round *FE*	✓	✓
IPW	✓	✓
Control Variables	✓	✓
Observations	735	733
Adjusted R^2	0.36	0.38
Mean of Outcome (*Bl*)	-0.00	3.00

The table reports results of Least Squares regressions estimating variants of Model (2). Variables starting with *High* indicate individuals at or above median. *Bl* means baseline, *El* means endline, *FE* means fixed effects, and *IPW* means inverse probability weights. Control variables include gender, age, employment status, indicator for hostel residence, and indicator for having education above grade 10. Standard errors are robust to heteroskedasticity.

Figure I: Distribution of Information Content Delivered



The figure shows the distribution of information content (number of paragraphs) delivered by pre-recorded audio messages and phone calls. Sample excludes participants who did not answer their phones.

Appendix

Variable Definitions

1. **Knowledge Index**: A sum of nine binary variables that indicate whether or not an individual knows each of nine symptoms of Covid-19, and six ternary (3 categories) variables that measure individuals' knowledge related to Covid-19, standardized to have mean zero and standard deviation of one. This index was measured both before and after the intervention. Below is a description of how variables were encoded to create the Knowledge Index:

    Knows the symptom: Cough [No = 0, Yes = 1]

    Knows the symptom: Fever [No = 0, Yes = 1]

    Knows the symptom: Breathing Difficulty [No = 0, Yes = 1]

    Knows the symptom: Congestion in nose and throat [No = 0, Yes = 1]

    Knows the symptom: Runny nose [No = 0, Yes = 1]

    Knows the symptom: Feeling tired [No = 0, Yes = 1]

    Knows the symptom: Body aches [No = 0, Yes = 1]

    Knows the symptom: Diarrhoea [No = 0, Yes = 1]

    Knows the symptom: Loss of taste or smell [No = 0, Yes = 1]

    If someone does not show any symptom of the novel coronavirus, could they still have the disease? [No = -1, Don't Know = 0, Yes = 1]

    Do you think there is any medicine or herb that helps against the novel coronavirus? [Yes = -1, Don't Know = 0, No = 1]

    Suppose a person you know has symptoms of the novel coronavirus. Would you advise them to take antibiotics? [Yes = -1, Don't Know = 0, No = 1]

    Would you advise them to drink cow's urine? [Yes = -1, Don't Know = 0, No = 1]

    If a person takes turmeric every day, do you think they will be less likely to get the novel coronavirus? [Yes = -1, Don't Know = 0, No = 1]

    Do you think people of some religions are more likely to spread the novel coronavirus? [Yes = -1, Don't Know = 0, No = 1]

2. **Four-Item Patient Health Questionnaire (PHQ4)**: A sum of four questions about mental health on a four-point scale (0 to 3). This index was measured both before and after the intervention. Below is a description of how variables were encoded to create the PHQ-4 score:

    How often do you have little interest or pleasure in doing things? [Not at all = 0, Several Days = 1, More than half the days = 2, Nearly everyday = 3]

    How often do you feel down, depressed or hopeless? [Not at all = 0, Several Days = 1, More than half the days = 2, Nearly everyday = 3]

    How often do you feel nervous, anxious, or on edge? [Not at all = 0, Several Days = 1, More than half the days = 2, Nearly everyday = 3]

    How often do you feel like you are not able to stop or control worrying? [Not at all = 0, Several Days = 1, More than half the days = 2, Nearly everyday = 3]

The first two questions of PHQ-4, known as the two-item Patient Health Questionnaire (PHQ-2), measure depression. The last two questions, known as the two-item General Anxiety Disorder (GAD-2) questionnaire, measure anxiety.

3. **Short-Term Memory**: The longest sequence of one-digit numbers an individual can recall within 5 seconds of hearing it. This variable was measured before the intervention, but not after.

4. **Numeracy**: A sum of three binary variables that indicate whether an individual can solve simple addition, subtraction, and multiplication problems mentally. This variable was measured before the intervention, but not after.

Supplementary Tables and Figures

Table V: Randomization Balance

Variable	TM	VR	PC	TM - VR	VR - PC	TM - PC
Female	0.58	0.56	0.56	0.02	0.00	0.02
				(0.04)	(0.04)	(0.04)
Age	23.86	24.23	24.00	-0.37	0.23	-0.14
				(0.49)	(0.45)	(0.50)
Educated above grade 10	0.36	0.33	0.32	0.03	0.01	0.04
				(0.04)	(0.04)	(0.04)
Left job	0.54	0.50	0.50	0.04	0.00	0.04
				(0.04)	(0.04)	(0.04)
Smartphone	0.75	0.75	0.75	-0.00	0.01	0.01
				(0.04)	(0.03)	(0.04)
Lives in hostel	0.23	0.30	0.30	-0.06	0.00	-0.06
				(0.04)	(0.03)	(0.04)
Numeracy Score	2.21	2.18	2.20	0.03	-0.02	0.01
				(0.09)	(0.08)	(0.09)
Short-Term Memory	5.24	5.34	5.15	-0.10	0.19	0.09
				(0.17)	(0.14)	(0.16)
Knowledge	-0.02	-0.00	0.02	-0.02	-0.02	-0.04
				(0.09)	(0.07)	(0.09)
PHQ-4	3.07	2.92	3.04	0.14	-0.11	0.03
				(0.24)	(0.21)	(0.24)

The table reports statistics from t-tests comparing differences in means between the three intervention groups: Text Message (TM), Voice Recordings (VM), and Phone Calls (PC). Standard errors are in parentheses.

Table VI: Attrition Balance

Variable	Non-Attrited	Attrited	Difference
Female	0.53	0.75	-0.23
			(0.04)
Age	24.25	23.21	1.04
			(0.49)
Educated above grade 10	0.34	0.30	0.04
			(0.04)
Left job	0.53	0.42	0.11
			(0.04)
Smartphone	0.76	0.70	0.06
			(0.04)
Lives in hostel	0.27	0.32	-0.05
			(0.04)
Numeracy Score	2.24	2.00	0.24
			(0.09)
Short-Term Memory	5.31	4.96	0.35
			(0.16)
Knowledge	-0.00	0.00	-0.00
			(0.09)
PHQ-4	2.99	3.02	-0.03
			(0.24)
Text Message	0.22	0.21	0.00
			(0.04)
Pre-Recorded Audio	0.40	0.31	0.09
			(0.04)
Phone Call	0.38	0.47	-0.09
			(0.04)

The table reports statistics from t-tests comparing differences in means between the Non-Attrited and Attrited groups. Standard errors are in parentheses.

Table VII: Effects of Phone Calls on Depression and Anxiety

Variables	PHQ-2 (1)	PHQ-2 $\geqslant 3$ (2)	GAD-2 (3)	GAD-2 $\geqslant 3$ (4)
Phone Call	-0.21	-0.03	-0.27	-0.07
	(0.10)	(0.03)	(0.10)	(0.03)
PHQ-2 (*Bl*)	0.33			
	(0.04)			
PHQ-2 $\geqslant 3$ (*Bl*)		0.27		
		(0.04)		
GAD-2 (*Bl*)			0.43	
			(0.04)	
GAD-2 $\geqslant 3$ (*Bl*)				0.32
				(0.04)
Surveyor (*Bl*) *FE*	✓	✓	✓	✓
Surveyor (*El*) *FE*	✓	✓	✓	✓
Trial Round *FE*	✓	✓	✓	✓
IPW	✓	✓	✓	✓
Control Variables	✓	✓	✓	✓
Observations	733	733	734	734
Adjusted R^2	0.27	0.17	0.29	0.20
Mean of Outcome (*Bl*)	1.59	0.29	1.41	0.25

The table reports results of Least Squares regressions estimating variants of Model (1). *Bl* means baseline, *El* means endline, *FE* means fixed effects, and *IPW* means inverse probability weights. Control variables include gender, age, employment status, indicator for hostel residence, and indicator for having education above grade 10. Standard errors are robust to heteroskedasticity.

Table VIII: Effects of Phone Calls and Voice Recordings on Knowledge and PHQ-4 (Pre-Registered)

	Knowledge		Knowledge (Strong)		PHQ-4	
Variables	(1)	(2)	(3)	(4)	(5)	(6)
Pre-Recorded Audio	-0.04	-0.03	-0.05	-0.05	0.11	0.13
	(0.09)	(0.09)	(0.09)	(0.09)	(0.23)	(0.23)
Phone Call	0.08	0.08	0.03	0.03	-0.42	-0.41
	(0.09)	(0.09)	(0.09)	(0.09)	(0.22)	(0.22)
Knowledge (*Bl*)	0.50	0.47				
	(0.04)	(0.04)				
Knowledge (Strong) (*Bl*)			0.52	0.49		
			(0.04)	(0.04)		
PHQ-4 (*Bl*)					0.53	0.51
					(0.04)	(0.04)
Surveyor (*Bl*) *FE*	✓	✓	✓	✓	✓	✓
Surveyor (*El*) *FE*	✓	✓	✓	✓	✓	✓
Trial Round *FE*	✓	✓	✓	✓	✓	✓
IPW	✓	✓	✓	✓	✓	✓
Control Variables		✓		✓		✓
Observations	735	735	735	735	733	733
Adjusted R^2	0.34	0.36	0.36	0.38	0.36	0.38
Mean of Outcome (*Bl*)	-0.00		0.00		3.00	

The table reports results of Least Squares regressions estimating variants of Model (1). *Bl* means baseline, *El* means endline, *FE* means fixed effects, and *IPW* means inverse probability weights. Control variables include gender, age, employment status, indicator for hostel residence, numeracy, short-term memory, smartphone ownership, and indicator for having education above grade 10. Standard errors are robust to heteroskedasticity.

Table IX: Moderators of the Effects of Audio Messages (Pre-Registered)

Variables	Knowledge (1)	PHQ-4 (2)
Audio Message	0.11	-0.12
	(0.21)	(0.66)
Audio Message X High Numeracy	-0.16	0.20
	(0.17)	(0.41)
Audio Message X High Memory	0.19	-0.09
	(0.17)	(0.44)
Audio Message X Smartphone	-0.15	-0.12
	(0.22)	(0.57)
High Numeracy	0.29	-0.23
	(0.16)	(0.37)
High Memory	-0.04	-0.23
	(0.15)	(0.40)
Smartphone	0.12	-0.07
	(0.19)	(0.50)
Knowledge (*Bl*)	0.48	
	(0.04)	
PHQ-4 (*Bl*)		0.51
		(0.04)
Surveyor (*Bl*) *FE*	✓	✓
Surveyor (*Bl*) *FE*	✓	✓
Trial Round *FE*	✓	✓
IPW	✓	✓
Control Variables	✓	✓
Observations	735	733
Adjusted R^2	0.36	0.37
Mean of Outcome (*Bl*)	-0.00	3.00

The table reports results of Least Squares regressions estimating variants of Model (2). Variables starting with *High* are indicate individuals at or above median. *Bl* means baseline, *El* means endline, *FE* means fixed effects, and *IPW* means inverse probability weights. Control variables include gender, age, employment status, indicator for hostel residence, and indicator for having education above grade 10. Standard errors are robust to heteroskedasticity.