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An exploratory study of mobile messaging preferences by age: Middle-aged and older adults compared to younger adults

Alexis Kuerbis¹, Katherine van Stolk-Cooke² and Frederick Muench³

Abstract

Introduction: Mobile technologies, such as short message service or text messaging, can be an important way to reach individuals with medical and behavioral health problems who are homebound or geographically isolated. Optimally tailoring messages in short message service interventions according to preferences can enhance engagement and positive health outcomes; however, little is known about the messaging preferences of middle-aged and older adults.

Methods: Utilizing secondary data, global messaging preferences were examined to inform the development of short message service interventions for adults of all ages. Two hundred and seventy-seven adults were recruited through an online labor market. They completed an online survey by evaluating message dyads in 22 content groupings. Dyads were identical in subject matter but structurally or linguistically varied. Participants selected the message in each dyad they would prefer to receive when attempting to meet a self-selected personal goal. Preferences were tested for two age groups ≤ 50 and 51 and older.

Results: Findings reveal adults 51 and older have clear messaging preferences that differ significantly from the younger group for only two content groupings; specifically, they prefer no emoticon to a smiley face emoticon and “you” statements rather than “we” statements.

Conclusion: Recommendations for optimizing messaging for older adults are reviewed.

Keywords

Older adults, mHealth, short message service intervention, text message, health

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Introduction

Harnessing contemporary mobile technologies, such as cell phones, smartphones, and tablets, for the purposes of developing effective frontline interventions for medical and behavioral health problems has been the focus of much research over the last decade.^{1,2} Mobile health interventions (mHealth) provide an affordable, flexible, convenient, and accessible format for assessment and intervention, particularly among individuals who may be isolated due to being homebound or in rural communities. In addition, mobile interventions have demonstrated efficacy and effectiveness across numerous health domains.^{2,3}

While much of research and development of mHealth focuses on smartphone applications,

smartphone ownership, though growing, remains limited in the US.⁴ In 2015 in the US, only 54% of adults 50–64 years old and 27% of adults 65 years old and older reported owning a smartphone. Internationally, particularly among countries with emerging economies, smartphone ownership is still relatively rare among

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those 35 and older.⁵ Smartphone applications are not yet reaching middle-aged and older adults at the same rates as younger adults (79+%),⁴ nor are they reaching those in the lowest socioeconomic classes in the US or abroad.^{4,5}

A primary medium for implementing mHealth interventions to middle-aged and older adults, with a range of economic resources, is short message service (SMS), otherwise referred to as text messaging. Although smartphone ownership remains limited, data reveal high levels of mobile phone access and text messaging usage by this group. In 2014, 74% of individuals 65 and older and 88% of those aged 50–64 in the US owned a cell phone.⁶ Among cell and smartphone owners over the age of 50 in 2015, 92% used the text messaging feature on their phones,⁶ often daily. In addition to widespread access, a majority of older adults (including those 75 and older) report positive attitudes toward mobile technology, including text messaging and smartphones.^{7–13} Thus, SMS-based interventions could be a highly accessible, feasible, and desirable approach to helping middle-aged and older adults with medical and behavioral health problems, especially those who may be relatively isolated.

Existing SMS interventions demonstrate efficacy in improving both physical and mental health outcomes across a variety of demographics and conditions^{2,14–16}; however, older adults have generally been excluded from studies on SMS interventions. A review of the literature reveals that very few studies examining text messaging interventions focus on adults over 50 as a target population, report findings by age group, or include this population in study samples at all.¹⁷ Among the few studies that have assessed age differences related to willingness to use text messaging interventions, results show no differences in feasibility or willingness of adults aged 50 and older to receive text message appointment or medication adherence reminders compared to younger adults.¹⁸

Very few studies have tested text messaging interventions specifically designed for adults ranging in age from 55 to 83 for conditions such as diabetes and coronary heart disease or to increase mobility,^{12,13,19,20} and only two of those studies had sample sizes of at least 30 participants. Findings demonstrate these interventions are well received and are initially efficacious in improving overall medication adherence or increased mobility compared to controls who did not receive text messages. Despite the fact that each of these studies focused on SMS as a behavioral intervention, none of these studies reported on factors related to message tone and content that might be critical for impacting behavior. One of the studies did not disclose the message content at all,¹³ and

another reported that messages only contained questions about the participants' daily behaviors (e.g. assessment focused).¹⁹ The other two studies looked at the impact of either motivating messages to enhance mobility²⁰ or personalized messages and education to improve medication adherence for heart disease.¹² In neither of these studies was there a comparison of the tone and structure of the messages themselves to determine how that might facilitate or inhibit engagement with the intervention and ultimately impact behavior. Indeed, across populations, one systematic review of Hall et al.¹⁶ found that very few studies included in reviews could delineate characteristics of text messaging interventions that might help or hinder intervention engagement or efficacy. Personalization and tailoring to needs have been associated with larger effects among some studies (e.g. Head et al.²¹ and Finitis et al.²²), but it is unknown how adults over 50 might differentially engage with different types of messaging.

Much remains unknown about how best to foster older adult engagement with SMS interventions. To take an initial step in facilitating the development of SMS interventions that target middle-aged and older adults and optimize their engagement, more research is needed about how messaging content may be differentially received and perceived by adults in these age groups. For example, what specific features of a text message make it more or less acceptable to a middle-aged or older adult?

Across age groups, message content features, such as tone and structure, can impact user receptivity and engagement.¹ Message framing and its impact on users' overall experiences and outcomes is a growing research area with important implications for intervention tailoring.^{23–28} While middle-aged and older adults appear to be open to the idea of text message-based health resources, age may have an important impact on messaging preferences. For example, starting at age 50, age-related changes in cognitive processing cause individuals to process visual information, including fonts and punctuation, differently,²⁹ and in some cases, formatting of visual information can inhibit effective information retrieval. It is therefore important to better understand how messaging preferences may differ across age groups in order to promote user engagement. Importantly, these authors found no research on the SMS preferences of adults 50 and older. In a previous study, we looked at age as a moderator of message preferences, but did not explore the specific preferences of those over the age of 50.¹ Given the gaps in the literature, the aim of the current study was to explore age-specific preferences for short messages to promote goal-directed behaviors among adults 51 and older.

Method

This study implemented a secondary data analysis on data collected in 2012 for a study on messaging preferences among the general population.¹

Recruitment

Participants were recruited online through Mechanical Turk (MTurk), Amazon's online labor market. MTurk is a platform through which "workers" are contracted to complete tasks, called "human intelligence tasks" (HITs), such as beta testing software or providing consumer opinions. For completing a HIT, workers are compensated by the "requester" who published the task and approves their work. Compensation is generally low—often times below \$1—and commensurate with the task intensity. Increasingly, MTurk is being used for social sciences research with comparable results to more traditional sampling methods when validity checks are included in the design.^{1,30} For the purpose of the parent study, investigators set worker qualifications to the study to be a HIT approval rate of 95% or greater out of at least 500 completed. This ensured response quality, as these qualifications denoted consistent and reliable performance on previous HITs, as well as a certain level of computer and internet literacy. Workers were also limited to those in the US.

Participants

Individuals (N=277) met basic worker criteria and passed consistency and validity checks described in the parent study.¹ Respondents ranged in age from 18 to 70. The typical participant was between the ages of 18 and 30, more likely to be female (56.5%) than male, Caucasian (81.1%), and had a college degree or higher (59.8%). There were a total of 37 individuals aged 51 or older.

Procedures

Qualified workers could view the study HIT, titled *Answer a survey about your text message preferences*. Within the HIT, there was a link to an external, web-based survey hosted by Survey Monkey.com. Prior to completing the survey, participants completed a brief consent form for anonymous survey-based research, which also provided investigator and IRB contact information. In the consent form, participants were informed that the study's aim was to understand the types of text messages individuals would prefer to receive when trying to achieve a personal goal. Once participants completed the survey, they were provided with a survey code to enter into their MTurk account to await requester review and compensation.

The survey was published via MTurk four times, and workers were barred from participating in the survey more than once. Each survey included a total of about 90 items required about 10 min to complete. After the first two published surveys were completed, preliminary data analysis was performed. In cases of clear consensus about messaging, a number of message dyads and groupings (described further below) were removed from subsequent iterations of the survey, and a number of new dyads and groupings were added. These revisions account for differences in sample sizes across groupings.

Measures

Demographics. Participants were asked questions about demographics, cell phone usage, and text messaging plans.

Personal goal. Participants were asked to supply a personal goal they would like to achieve. Goals did not have to be health related and could vary from flossing to getting promoted to being more assertive.

Messages preferences. Participants were asked to rate their message preferences based on the personal goal they selected. The survey contained approximately 70 message dyads in 22 groupings, with three dyads per grouping. Message structure and content were developed based on principles of motivational and behavior change literature (e.g. Gollwitzer³¹ and Bandura³²), as well as public health campaigns. Mirrored messages were created to delineate preference, such that messages had the same semantic content but differed in structure or wording. For example, in testing manipulation of voice, if one message included the word *you*, we created an identical or mirrored message with the word *we* in place of "you," with other appropriate changes to grammar included. Message type, grouping, description, and examples are presented in detail elsewhere.¹ Message descriptions and examples are reexamined here in Table 1.

Analytic plan

Analyses occurred in three basic steps. First, descriptive statistics were used to characterize two age groups (<51; ≥51). Chi square and t-tests were implemented to test whether group differences were statistically significant where appropriate. Next, frequencies of message preferences among both age groups were calculated. Binomial tests were implemented to see if message preferences among either age group were significantly different from chance at the $p < .05$ level. Message preferences among the younger cohort were

Table 1. Message grouping with examples.

Dyad grouping	Dyad description	Dyad example
Gain framing versus loss framing		
Smiley versus sad emoticon		
	Smiley emoticon messages contain a smiley face to make the content gain framed.	Don't give up:-)
	Sad emoticon messages contain a sad face to make the content loss framed.	Don't give up:-(
Benefit- versus consequence-oriented		
	Benefit-oriented messages consist of language that is gain framed.	Close your eyes—imagine the benefits of changing.
	Consequence-oriented messages consist of language that is loss framed.	Close your eyes—imagine the consequences if you don't change.
Personal/emotional emphasis		
Coaching versus uncoached direction		
	Coaching messages contain a direction or recommendation with positively framed emotional emphasis.	You've been doing great, don't quit now.
	Uncoached direction messages contain a direction or recommendation with no additional emphasis.	The most important thing you can do to reach your goal is not give up.
Goal setting and task performance		
Implementation intention versus general goal		
	Implementation intention messages consist of an if-then plan to trigger a specific action	If I start to get down on myself, I will think of all my previous successes.
	General goal messages consist of an open-ended, nonspecific if-then plan.	If I start to get down on myself, I will do something to make me feel better.
Locus of control theory		
Intrinsic versus extrinsic locus of control		
	Intrinsic locus of control messages emphasize an internal locus of control over goal attainment.	You are responsible when you don't meet your goal.
	Extrinsic locus of control messages emphasize the degree to which external factors influence goal attainment	Many different aspects of your environment play a role when you don't meet your goal.
Spelling and grammatical manipulations		
Correct grammar versus grammatical errors		
	Correct grammar messages contain no grammatical errors.	If you accept where you are now, you're way ahead of the pack.
	Grammatical error messages contain grammatical errors.	If you accept where you are now you're way ahead of the pack.
Textese versus nontextese		
	Textese messages utilize the spelling abbreviations common to text messaging.	u have changed b4, u can meet ur goals today. b who u r.
	Nontextese messages	You have changed before, you can meet your goals today. Be who you are.
Manipulations of visible emphasis		
Single punctuation versus multiple punctuation		
	Single punctuation messages utilize only a single punctuation mark between phrases or clauses.	Reinvent yourself!
	Multiple punctuation messages utilize multiple punctuation marks between phrases or clauses for emphasis.	Reinvent yourself!!!
Smiley emoticon versus no emoticon		
	Smiley emoticon messages contain a smiley face to enhance a friendly or positive tone.	You are on the right track:-) just keep going!

(continued)

Table 1. Continued

Dyad grouping	Dyad description	Dyad example
	No emoticon messages contain the same language as their smiley emoticon counterparts but do not include an emoticon.	You are on the right track – just keep going!
CAPS (capitalization) emphasis versus no visible emphasis	CAPS emphasis messages contain at least one word that is spelled in all capital letters for emphasis. No visible emphasis messages do not include any all-caps words	When it comes to the negative consequences of a bad habit, you are NOT the exception. When it comes to the negative consequences of a bad habit, you are not the exception.
Manipulations of voice, person, or origin		
“I” statement versus “We” statement	“I” statement messages employ a singular first person point of view “We” statement messages employ a plural first person (or collectivist) point of view	Changing can be hard: I promise it will get better. Changing can be hard: we promise it will get better.
“You” statement versus “We” statement	“You” statement messages employ a singular second person point of view. “We” statement messages employ a plural first person (or collectivist) point of view.	Your past should motivate you to change—not paralyze you! Our pasts should motivate us to change—not paralyze us!
Cited versus uncited	Cited messages refer to a source/sources of the information presented. Uncited messages provide no point of reference for the information presented.	Studies show that simply visualizing your future actions makes them more likely to come true! Simply visualizing your future actions makes them more likely to come true!
Manipulations of tone		
Direction versus passive	Direction messages express a command. Passive messages express a suggestion in a passive or nonurgent tone.	Think about what you will lose if you give up on your goals. It could be helpful to think about what you will lose if you give up on your goals.
Statement versus question	Statement messages utilize declarative language. Question messages utilize interrogative language.	Committing to your goals today will help you in the long-run. How will committing to your goals today help you in the long-run?
Aggression versus nonaggression	Aggression messages utilize a confrontational or shaming tone. Nonaggression messages utilize a nonconfrontational tone.	Do you seriously think that blaming others will help you change for the better? Blaming others probably won't help you change for the better.
Polite versus nonpolite	Polite messages include words such as please and thank you. Nonpolite messages do not include words such as please and thank you.	Please text us to let us know if you received this message. Text us to let us know if you received this message.
Directive versus nondirective statement	Directive messages contain an imperative statement within the context of a time frame	Call a friend to help you feel better as soon as you have a free moment.

(continued)

Table 1. Continued

Dyad grouping	Dyad description	Dyad example
	Nondirective statement messages offer suggestions with no direction or time-sensitive context.	Going out with friends is a good idea to help you feel better.
Humor versus gravity	Humor messages include a joke or playful tone to suggest levity. Gravity messages are serious in tone and do not contain playful or jocular language.	Why did the chicken cross the road? Because it knew that action creates change. Action creates change.
Symbolic language		
Metaphor versus literal	Metaphor messages contain symbolic imagery. Literal messages present content in plain terms	When you reach the end of your rope, tie a knot and hang on. When you feel like giving up, keep going until it passes.
Brevity versus added meaning		
Short versus long	Short messages contain as little content as possible to convey meaning. Long messages are designed to convey additional meaning.	Your actions define you. Your actions define you: the world looks at you differently when you act differently.

Note: This table was adapted from Muench et al.¹ and reproduced here for reference.

identical to findings from our previous analysis¹ and are therefore excluded from our “Results” section. Only binomial tests related to the older group are reported here. Finally, Chi square was used to test for significant differences in the proportions of preferences by age group.

Results

Sample description

Table 2 shows the basic demographics and cell phone characteristics of this sample. Adults 51 and older were significantly more likely to be female and more educated than adults in the younger cohort. Both groups were predominantly non-Hispanic, Caucasian. As expected, a significantly larger proportion of the younger cohort was employed full or part time than the older group. While the older group contained 22% retirees, there were no retirees in the younger group. Almost all participants (99.6%) owned a cell phone. Participants in the younger group were significantly more likely than those in the older group to have phone plans that included unlimited texting. Conversely, the older group was more likely to have a limited or pay per message text messaging plan. There were significant differences by age in how many text messages were sent and received in the past week ($t(231.7) = 5.4, p < .001$), such that the younger cohort reported a mean of 220 text messages sent or received

($SD = 506$), while the older group reported a mean of 27 ($SD = 53$).

Across age cohorts, almost half of the sample (49.5%) reported personal goals relating to their physical health and well-being, such as diet and exercise. There were no significant differences in the types of personal goals generated by older or younger adults.

Message preferences among the older group only

Table 3 shows message preferences among the older age group for each content grouping. For this study, we define “clear preference” as a preference among 75% or more of the sample and with a significant binomial test. Similar to analyses that included all age groups, the older adult group demonstrated a clear preference for messages that were grammatically correct, did not use *textese* (e.g. u r gr8), referenced an internal locus of control, were benefit oriented, were directive, included positive as opposed to negative images (i.e. a smiley versus frown-faced emoticon), did not attempt humor, employed statements rather than questions, were non-aggressive and polite. In addition, the older adult group also clearly preferred messages with single punctuation and “you” statements (as opposed to “we” statements).

Differences between age groups

For three message dyads, older adults preferred the opposite form of the message from the form preferred

Table 2. Characteristics of study sample.

Variable	Age group	
	<51 (N = 240) %	≥51 (N = 37) %
Demographics		
Age		
18–30 years old	47.1	
31–40 years old	37.5	
41–50 years old	15.4	
51–60 years old		81.1
61–70 years old		18.9
Female ^a	53.1	78.4
Race/ethnicity		
Hispanic/Latino, any race	8.8	2.7
White/Caucasian, non-Hispanic	74.6	94.6
Other	16.6	2.7
Education ^b		
High school or equivalent	13.1	5.7
Some college	36.1	28.5
Bachelor's degree or higher	37.4	42.9
Graduate education	13.5	22.9
Employment ^c		
Employed full time	50.0	27.8
Employed part time	16.3	30.6
Retired	0.0	22.2
Unemployed	14.6	13.9
Other (not disabled)	19.2	8.1
Cell phone characteristics		
Own a cell phone in past year	99.6	100
Type of text messaging plan ^b		
Unlimited	74.6	48.6
Limit of 200 per month or similar	15.4	27.0
Pay per message	8.8	21.6
Can't receive messages even if wanted to	1.3	2.7

^a $p < .01$.^b $p < .05$.^c $p < .001$.

by the younger cohort. While not significantly greater than chance, based solely on proportions, older adults appeared to prefer implementation intentions to general statements, no emoticon to smiley emoticons, and messages with added meaning (long) to short messages. Younger adults had greater proportions who preferred general statements, smiley emoticons, and short messages.

When testing each message preference dyad separately for difference by age, only two message categories

emerged as significant. A significantly ($\chi^2(1) = 4.14$, $p < .05$) greater proportion of older adults (83.3%; $n = 24$) preferred single punctuation over multiple punctuation compared to younger adults (62.0%, $n = 150$). In addition, consistent with the findings of those 40 and older in our previous analysis, a significantly ($\chi^2(1) = 6.09$, $p < .05$) greater proportion of older adults (81.1%; $n = 37$) preferred “you” statements to “we” statements compared to younger adults (60.0%, $n = 235$). Finally, age groups differed at the trend level for smiley emoticon versus no emoticon ($\chi^2(1) = 3.63$, $p = .057$). A greater proportion of older adults preferred no emoticon (61.1%, $n = 36$) over a smiley emoticon compared to younger adults (44.1%, $n = 238$).

Discussion

To our knowledge, this is the first study to explicitly examine message preferences of adults over 50 compared to a younger cohort. Findings contribute to the limited knowledge about text messages received by middle-aged and older adults to promote personal goal attainment and demonstrate that middle-aged and older adults have clear preferences related to message structure, voice, and tone. Interestingly, almost all of the preferences for messaging were in the same direction as younger adults, suggesting that general guidelines for messaging may be used for most age groups. When constructing messages for adults 50 and older, interventionists should consider the preferences they share with younger adults, such as avoidance of *textese* and attempts at humor in messages. Nonaggressive, polite messages with good grammar emphasizing the benefits of change are likely to be the most well-received messages across age groups.

Older adults in this sample differed from the younger cohort in some expected ways. They were more likely to be retired than the younger cohort and less likely to be employed full or part time. Interestingly, there were no differences between age groups on cell phone ownership. This difference contrasts with earlier studies; however, this sample is biased toward individuals with a working knowledge of computers. Adults over 50 were more likely to have limited text messaging plans, which is an important limitation for providers to consider when developing mobile interventions for older adults. Individuals in this population may be unable or unwilling to participate in a text messaging intervention due to cost and plan limitations. This is consistent with previous literature on barriers to engagement with mobile technology among older adults,³³ in which cost is cited as the largest barrier.

Because age also moderated preferences in several categories, additional consideration must be given

Table 3. Message preferences among adults 51 and older (N = 37).

Message type greater preference	%	Message type lesser preference	%	n ^a
Correct grammar	100	Grammatical errors	0.0	28 ^b
Nontextese	100	Textese	0.0	30 ^b
Locus of control: intrinsic	100	Locus of control: extrinsic	0.0	6 ^b
Benefit oriented	100	Consequence oriented	0.0	17 ^b
Direction	96.7	Passive	3.3	30 ^b
Smiley emoticon	93.1	Sad emoticon	6.9	29 ^b
No humor	86.2	Humor	13.8	29 ^b
Statement	84.8	Question	15.2	33 ^b
Single punctuation ^c	83.3	Multiple punctuation	16.7	24 ^b
Polite	83.3	Impolite	16.7	30 ^b
“You” statement ^c	81.1	“We” statement	18.9	37 ^b
Nonaggression	80.6	Aggression	19.4	36 ^b
Implementation intention ^d	80.0	General goal	20.0	5
Nondirective	74.3	Command	25.7	35 ^b
Coaching	71.4	Uncoached direction	28.6	7
“I” statement	63.9	“We” statement	36.1	36
No emoticon ^d	61.1	Smiley emoticon	38.9	36
Literal	58.3	Metaphorical	41.7	36
Uncited	51.4	Cited	48.6	37
Long ^d	51.4	Short	48.6	37
CAPS (capitalization) emphasis	50	No visible emphasis	50	36

^aThe n applies to both message types.

^bNot the result of chance using a nonparametric binomial test to ensure that the difference between groups was greater than a 50% chance ($p < .05$).

^cProportion of preference is significantly greater than the younger cohort.

^dPreference direction differs from younger cohort.

to preferences of adults 50 and older. For adults over 50, phrasing messages using “you” (as opposed to “we”) and avoiding multiple punctuation (e.g. ! instead of !!!) may optimize message tailoring to this age group. In addition, while older adults prefer a happy emoticon to a sad emoticon, messages tailored to adults over 50 probably should not have an emoticon at all to increase engagement as a general rule. By making such accommodations in tailoring messaging to older adults, health promotion interventions that utilize SMS will have a more optimal opportunity to engage the adult in the intervention.

Study limitations

As mentioned above, caution should be used in generalizing findings to a broad range of adults over 50 who may vary in their working knowledge of digital technology. Due to the fact that the sample was recruited from an online labor market, it is safe to assume that individuals less familiar with computers are less likely to have been recruited for the present study. While this

prevents generalizability to all middle-aged and older adults with a spectrum of knowledge of digital technology, there is evidence that large group middle-aged and older adults are already pursuing online³⁴ and text messaging health interventions.³⁵ Understanding how best to intervene with this group of relatively technology savvy individuals is only an initial step in serving individuals in middle and older age.

Sample size for some of the message dyads is a clear limitation, given that in some cases the dyads were evaluated by fewer than 10 people. Another key limitation is that these message preferences were assessed in the context of personal goals defined by the respondents. It is not known how these preferences might change within person when considering different personal goals. Messaging preferences also may be context specific, such that preferences delineated during an online survey may or may not reflect preferences if an individual were actually receiving messages on his or her phone. Messaging preferences have yet to be linked to outcomes, and it remains unknown whether preferred messages are the most effective in promoting

behavior change among this age group. Finally, age may be just one of many factors that determine messaging preferences.

Conclusions

Despite these limitations, this study provides important preliminary information about message preferences among adults over 50. Mobile messaging intervention development can be informed by these message preferences in order to increase user engagement in SMS and mobile app push alert interventions to improve health outcomes. While older adults had similar messaging preferences to younger adults in most categories, differences in specific categories—specifically, preferring no emoticon and “you” based messages—suggest the need to further test preferences with a larger sample and in the context of an actual intervention in order to link messaging preferences to outcomes among middle-aged and older adults. In addition, research on text messaging interventions with this age group must report on the structure, tone, and voice used in the messages so that more information can be gained about how the format of messaging encourages or discourages engagement. These will be important initial steps in expanding and honing mHealth for older adults, both within and outside the home.

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AK.

Contributorship

FM designed and implemented the parent study with KVS as the research assistant and AK as a co-collaborator. AK performed this secondary data analysis and wrote the manuscript with edits from KVS and FM.

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