

# A mixed-methods examination of the acceptability of, CareMOBI, a dementia-focused mhealth app, among primary care providers

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Zuha Ali<sup>1</sup>, Jie Zhong<sup>2</sup>  and Tina R Sadarangani<sup>3</sup>

## Abstract

**Background:** CareMOBI (mhealth for Organization to Bolster Interconnectedness) is a user-centered mobile application that supports secure communication between adult day health centers, primary care providers, and family caregivers. The aim of this study was to examine the acceptability of CareMOBI in the primary care setting and identify factors contributing to the likelihood of adoption among primary care providers.

**Methods:** We used a mixed-methods concurrent triangulation design. We, first, collected quantitative data using the Technology Acceptance Model questionnaire. Follow-up interview questions allowed participants to elaborate on their experience interacting with CareMOBI. We developed an informational matrix based on major themes within the Technology Acceptance Model (ease of use, value in clinical care, fit within existing workflows, and likelihood of adoption) in which qualitative data were embedded and compared.

**Results:** Our sample included 10 primary care providers. Participants rated CareMOBI high in ease of use ( $M = 6.71$  out of 7), value in clinical care ( $M = 6.79$ ), and likelihood of adoption ( $M = 6.71$ ). They found specific functions of CareMOBI helpful, including the summary of health progress and the patient profile. In contrast, participants reported the lowest score for the fit of CareMOBI within existing workflows ( $M = 5.52$ ). Qualitative feedback attributed this score to concerns over the lack of interoperability between CareMOBI in its current form and electronic health record systems used in the primary care setting.

**Conclusion:** Providers found CareMOBI valuable and easy to use, and there was a high likelihood of eventual adoption. However, apprehensions regarding workflow and electronic health records integration arose, which the team will have to consider as they move forward to the next phase of the application's development.

## Keywords

Dementia disease, eHealth, health communications, elderly medicine, application-based personalized medicine

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One in nine Americans over the age of 65 is living with Alzheimer's disease and related dementias (ADRD).<sup>1</sup> In the absence of a cure for ADRD, clinical management is a complex and multifaceted process that requires comprehensive interdisciplinary health and social support for persons living with dementia (PLWD) and their families. In the United States, visits with primary care providers (PCPs) last, on average, just 18 minutes.<sup>2</sup> The majority of care for PLWD is actually provided outside the physician's office, in home and community-based care settings.<sup>3</sup> Settings like adult day health centers (ADHCs)—which provide supervised health social care for older adults with cognitive

and/or functional impairments up to 8 hours a day—play a crucial role in providing comprehensive care and services for PLWD by addressing their day-to-day needs and supporting overall quality of life.<sup>4–6</sup> PCPs are better equipped to

<sup>1</sup>School of Medicine, Indiana University, Indianapolis, IN, USA

<sup>2</sup>School of Nursing, University of Hong Kong, Hong Kong, China

<sup>3</sup>College of Nursing, New York University Rory Meyers, New York, NY, USA

### Corresponding author:

Tina R Sadarangani, College of Nursing, New York University Rory Meyers, 433 First Avenue, New York, NY 10010, USA.

Email: trs233@nyu.edu



provide effective patient-centered ADRD care and promote better health outcomes when they have access to information from these community settings.<sup>4,5</sup> Serial observations from trained staff in community settings give PCPs important insights into patients' symptoms, functional status, and unmet health and social needs.

Collaboration between PCPs and community care providers is especially important in identifying early warning signs of an acute problem or complication in PLWD who may not be able to effectively communicate their symptoms.<sup>4</sup> However, our prior research suggests communication across settings is largely fragmented and hinges on the reports of family caregivers, who are brokers of communication.<sup>7</sup> One reason for this is the lack of modern technological infrastructure within community-based settings to support secure and efficient information exchange. For example, 92% of ADHCs lack interoperable electronic health records systems (EHRs) and do not have the financial and technical infrastructure to implement them.<sup>8,9</sup> Many centers, in fact, continue to chart participant progress using paper and pencil. In our previous studies, PCPs characterized the communications they receive from ADHCs and other home and community-based settings via facsimile and voicemail as being infrequent, delayed, incomplete, unreliable, irrelevant, and generic. PCPs expressed a need for more interdisciplinary, relevant, and succinct information at the point of service to help inform diagnosis and care planning.<sup>7,10</sup>

To support collaboration and information exchange among community care settings, family caregivers, and PCPs, we developed a user-centered mobile application prototype called CareMOBI (**m**health for **O**rganizations to **B**olster **I**nterconnectedness). We developed CareMOBI with the hope of creating a low-cost and easily accessible way to exchange information between home and community settings that do not have EHRs but have a wealth of clinical information and healthcare providers. Moreover, we designed the app to support family caregivers and community-based providers in identifying and reporting clinical changes, thereby enabling team-based communication and early intervention in geriatric care.<sup>9</sup>

Within CareMOBI, care team members (e.g. family caregivers, PCPs, and ADHC staff) are invited to join a PLWD's care team. They can securely log and report on key aspects of day-to-day management relevant to the care of PLWD and/or other chronic conditions. This includes tracking upcoming medical appointments, whether prescribed daily medications was administered, tracking vital signs, nutrition, sleep, mood and behavior, and daily health progress (either routine updates or new challenges) all in the form of a timeline (Figure 1). The purpose of this study was to test the acceptability of a new version of the CareMOBI prototype and identify factors contributing to the likelihood of adoption among PCPs.

## Conceptual framework

The conceptual underpinnings for CareMOBI are rooted in the eHealth Enhanced Chronic Care Model (eCCM).<sup>11</sup> The eCCM expands on Wagner's original chronic care model in 1998,<sup>12</sup> which focuses on a well-informed patient collaborating with a prepared, proactive, and professional interdisciplinary team to align treatment goals across settings. The eCCM strengthens Wagner's model by incorporating electronic health components to facilitate improved exchange of clinical information between communities and health systems. The eCCM promotes a feedback loop between patients and interdisciplinary providers. Through productive interactions that are supported by information technology, continuity of care is improved, supporting better health outcomes. Effective communication between members of the care team is a central condition of the model.

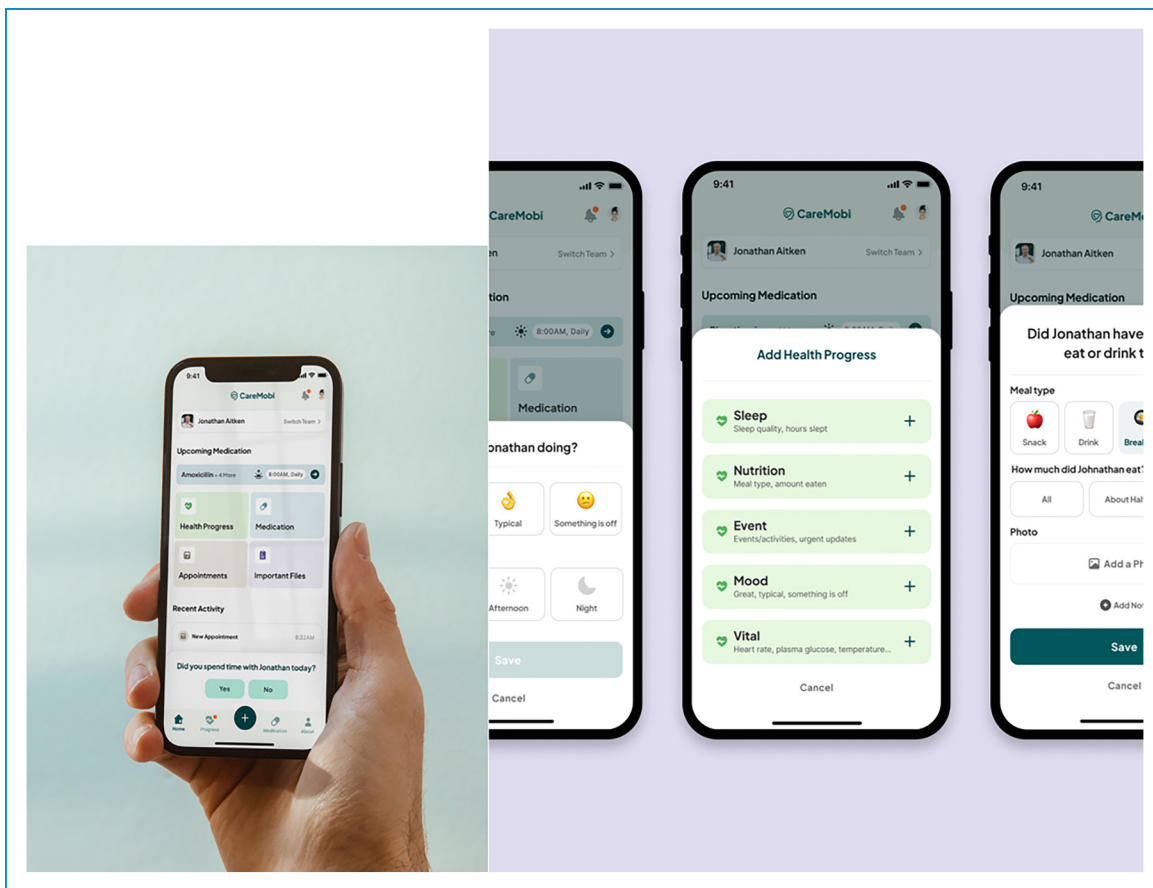
## Methods

To enhance usability and likelihood of adoption of the eventual app, we employed a design thinking approach to develop, test, and refine a user-centered prototype of CareMOBI. Design thinking represents an iterative approach to problem solving that emphasizes empathy for end users (PCPs, family caregivers, and ADHC staff) and rapid prototyping of solutions, which requires multiple rounds of ideation and testing done in collaboration with small groups of stakeholders.<sup>13</sup> As part of our need-finding approach, our team studied communication and workflows in ADHCs and asked stakeholders what information should be conveyed to PCPs and how.<sup>7</sup> The app's eventual domains evolved from this early research into a prototype or minimum viable product, which we tested in this study. Features such as a person-centered patient profile, an exportable summary of data, and a modern interface were constructed to meet the need for bidirectional, relevant, and succinct information.

After using design-thinking to develop the prototype, we subsequently employed a mixed-methods concurrent triangulation design to (a) assess the acceptability of the CareMOBI prototype among PCPs and (b) identify factors contributing to eventual adoption or non-adoption of the app using the Technology Acceptance Model.

## Sample and setting

Participants were eligible if they were licensed, actively practicing PCPs, either physicians, nurse practitioners, or physician associates. Participants were excluded if (a) their patient panels did not include PLWD or (b) they did not have access to a smartphone. Purposive sampling was used to ensure a sample reflective of disciplines within the primary care workforce. Recruitment was carried out purposively with the support of a network of community-based geriatricians across the state of California who championed the study to their professional networks.



**Figure 1.** Caremobi design.

### Procedures

PCPs contacted colleagues across California who met the inclusion/exclusion criteria via email and/or phone. Those who were interested were instructed to reach out to the research team via email or telephone. A research assistant coordinated virtual one-on-one interviews via Zoom based on the participants' availability. Approximately one week before the scheduled interview, participants received a confirmation email containing a link to an interactive prototype of the application, which they could access on their smartphone or tablet. They were asked to watch a 2-minute video to learn about the app and spend 10 minutes playing with the interactive prototype. They were specifically asked to complete certain tasks, including logging in, adding a new medication, logging patient progress, and filtering for relevant information. Upon receipt of Institutional Review Board approval, PCPs were recruited and enrolled using purposive sampling methods. All participants provided written informed consent and were paid \$50 for completing the interview and surveys. This study was approved by the Institutional Review Board of New York University with the number IRB-FY2023-7509.

### Data collection and analysis

We collected qualitative and quantitative data in a single-session virtual interview between the interviewer and participant lasting ~ 45 min. Quantitative data, collected using a deidentified survey, enabled us to evaluate the likelihood that care team members will adopt CareMOBI. Qualitative data were collected via a semi-structured interview guide. Questions were designed to elicit in-depth feedback on the overall impression of CareMOBI and aspects of the app that were confusing or disliked and to understand how it could or could not address challenges faced in organizing and communicating information about PLWD's health-related needs to evaluate the results.

The qualitative and quantitative data were then merged into a matrix defined by four major themes within the Technology Acceptance Model. The original Technology Acceptance Model is a 33-item survey developed by Davis in 1989<sup>14</sup> to understand acceptance of new technology, and subsequently adapted by Gagnon for healthcare providers<sup>15</sup> (see Appendix 1). The Technology Acceptance Model is grounded in the idea that perceived usefulness and ease-of-use influence acceptability and eventual adoption. In this mixed-methods study, we organize our findings

within four major domains of the Technology Model relevant to CareMOBI: *perceived value in care, ease of use, fit within workflow, and likelihood of adoption.*

**Qualitative data collection and analytic procedures.** The qualitative interview guide was developed with support from experts in user-centered design and user testing. Interviews were conducted by either the principal investigator (TS, PhD) or trained research assistant (Jonelle Boafu, MS), both of whom are female and have extensive experience conducting qualitative research. Participants were informed that the study was being led by a principal investigator who was a primary care nurse practitioner. Before each interview, the interviewer introduced the study team's motivation for developing CareMOBI—to reduce fragmentation of health-care communication—and the goal of this research project—to improve information between caregivers, ADHCs, and PCPs via a low-cost portable app. Participants were also informed about prior research done by the authors identifying barriers and facilitators of communication between PCPs, ADHC staff, and family caregivers. Participants participated in a single one-on-one semi-structured virtual interview via Zoom. Interview questions allowed participants to elaborate on their reaction to the CareMOBI prototype and allowed researchers to elicit information on factors influencing their perceptions of the app, its usability, and barriers to and facilitators of eventual adoption. Interview questions included

- Was there anything you've seen here that's at all confusing?
- Was there anything that you weren't clear about in looking at it that you felt could've been more obvious, perhaps something that was hard to find?

All interviews were recorded, professionally transcribed, and reviewed for accuracy. The interviewer's field notes supplemented the tape-recorded interviews. To ensure methodological rigor, a detailed audit trail was developed to document the rationale for methodological changes using notes during the interview and analysis process, such as when a unique follow-up question was posed to a specific participant based on their previous response. Participant feedback clarifying responses was elicited to ensure interviewers interpreted responses to major questions correctly.

Field notes by the interviewers supplemented recorded interviews. Given the possibility of response bias, the interviewers maintained an audit trail/reflexive journal to document observations and reflections throughout the data-gathering process. This included decisions about follow-up questions and reactions to responses. The interviewers met regularly to review transcripts and discussed whether they may have influenced participant responses which supported an honest and reflexive process.

Qualitative data were analyzed using content analysis.<sup>16</sup> The principal investigator and research assistant generated a

preliminary codebook a priori based on the interview guide as a coding scheme for all transcripts. Any texts that could not be categorized in the codebook were discussed with the research team to determine whether a new category or code needed to be defined or aligned with an existing category or code. Three coders coded independently in Dedoose, a web-based platform for qualitative and mixed-method coding, and met regularly to review coding and resolve any disagreements. To ensure the reliability and consistency of coding, a third independent coder analyzed a subset (20%) of transcripts. Any unresolved disagreements as well as potential new categories or codes were addressed in team meetings with the principal investigator. Themes were identified by consistently comparing codes across categories. Saturation occurred when no new themes emerged. The research team members regularly debriefed to discuss and validate the results of the analysis.

**Quantitative data and analytic procedure.** At the end of the interview session, quantitative data were collected through the Technology Acceptance Survey, which was adapted for use among healthcare providers. Based on feedback from our study's champions, we made minor adaptations to the survey for PCPs to ensure clarity and limit redundancy. Our 30-item questionnaire which was administered using Qualtrics, an online survey tool. This version of the Technology Acceptance Survey had a Cronbach's alpha of 0.7, suggesting high internal consistency. Respondents rated each item on a 7-point Likert scale ranging from "totally disagree"<sup>1</sup> to "totally agree."<sup>7</sup> Preceding the survey questions were additional questions eliciting socio-demographic information (age, gender, race, educational attainment, etc.). Standard descriptive statistics including frequencies, means, medians, and ranges were calculated for all of the quantitative variables in Qualtrics.

**Integration of qualitative and quantitative data.** Qualitative and quantitative data were integrated in the third and final analysis phase. Using triangulation methods, we sought to understand the overall likelihood of adoption of the app by end users (quantitatively) and factors underpinning this across cases in each stakeholder group (qualitatively). Four themes within the Technology Acceptance Model created an anchor for data integration<sup>1</sup>: (1) ease of use, (2) value in clinical practice, (3) fit within existing workflows, and (4) likelihood of adoption. An informational matrix was developed using the four themes, in which qualitative data were embedded and compared to quantitative data.

## Results

### Study sample

The final sample included 10 PCPs, 70% of whom were physicians. Table 1 presents the sample's demographic information. Of the sample, 60% were aged between 30–

**Table 1.** Demographic characteristics of primary care providers ( $N = 10$ ).

Characteristics	No. (%)
Age (years)	
< 30	1 (10%)
30–39	6 (60%)
40–49	1 (10%)
50–60	1 (10%)
≥ 60	1 (10%)
Race	
White	7 (70%)
Asian	3 (30%)
Ethnicity	
Non-Hispanic	10 (100%)
Hispanic	0 (0)
Gender	
Female	9 (90%)
Male	1 (10%)
Highest level of education	
Doctorate	8 (80%)
Master's	1 (10%)
Professional	1 (10%)
Health profession	
Physicians	7 (70%)
Nurse practitioners	3 (30%)

39 years. The sample was White (70%) or Asian (30%), and predominantly female (90%).

### Value in clinical practice

Perceived value in clinical practice refers to the extent to which CareMOBI could enhance patient care and management for PLWD. This domain assesses the overall positive impact of CareMOBI, its potential effectiveness in

monitoring and managing PLWD, and its influence on the clinician's performance and practice. Table 2 presents the PCPs' level of agreement and disagreement on nine items related to perceived value in clinical practice. The mean score for this domain was 6.79 out of 7, indicating that PCPs rated CareMOBI highly in terms of its value for their clinical practice and patient management.

In the domain of "Value in Clinical Practice," the item with the highest average score ( $M = 7/7$ ) was "The use of the app may improve the monitoring and management of my patients/clients." Conversely, the item with the lowest domain score ( $M = 6.63/7$ ) was "The use of the app could help me manage my patients/clients more rapidly." These results suggest that PCPs perceived positive outcomes when using CareMOBI for enhancing patient care. However, it also indicates that CareMOBI may somewhat reduce the efficiency of care.

During the interview segment, participants consistently stated that CareMOBI's potential clinical value stems from its ability to provide context and information regarding what transpires outside of their providers' offices. One PCP referred to the lack of information about the care their patients receive in home and community settings as a "black box." They contended that the app addressed this issue and created value by providing real-time updates on patients' progress, often referred to as "live texture."

Furthermore, PCPs expressed their appreciation for the summary and patient profile pages, which they found useful in rapidly gaining insight into their patients' overall health over time as well as who their patients are as people, which can support the creation of patient-centered care plans. Additionally, some PCPs proposed additional features tailored to dementia patients' unique characteristics, such as setting alarms to provide medication reminders and facilitating transportation arrangements for long-term dementia care services.

### Ease of use

Perceived ease of use refers to the level of effort required to understand and utilize CareMOBI. The Technology Acceptance Model Questionnaire includes six items related to overall ease of use, the technological proficiency needed to use CareMOBI, and user comfort (Table 3). The mean score for this domain was 6.71 out of 7, indicating that PCPs generally found CareMOBI easy to use. The highest score ( $M = 6.88/7$ ) was in response to the statement "I will find it easy to acquire the necessary skills to use CareMOBI."

In qualitative interviews, we probed participants regarding their interactions with various CareMOBI features, emphasizing whether specific features either facilitated or hindered ease of use. Several PCPs expressed concerns about the complexity and confusion associated with CareMOBI. One PCP suggested that a less detailed interface might lower the barrier



**Table 2.** Quotes related to value in clinical practice.

Subtheme	Qualitative feedback
Helpful features	<p>“I could see this being very helpful to feel like you’ve got this really live texture on the ground for all the care staff and the family to dialog back with because that’s a real gap, huge gap for the family to feel disconnect from what’s happening on the ground with the ADHC or even in an assisted living. Black box, you don’t know what’s happening after you drop your loved one off”–PCP-CC</p> <p>“I love the summary page. If we can just go back to that of–yeah, exactly–of hobbies, interests, food. I feel like that –especially as people are getting to know patients, really can add a lot of value, especially for gaining rapport”–PCP-JB</p>
Suggested features	<p>“So, dementia, typically they’re very forgetful, [laughter] so if this app has reminders, can–I don’t know–like alarm is set into it to help give them those reminders, and maybe further along, some of–a lot of these patients may need transportation. If transportation can be set up through the app, be helpful to get the patients to the place they need to get to, their appointment”–PCP-NG</p>

**Table 3.** Quotes related to ease of use.

Subtheme	Qualitative feedback
Complexity	<p>“I almost wonder if it needs to–if it doesn’t need to be quite so detailed, if it can be just be like here’s a place where you–here’s a field where you communicate concerns or questions, and then there’s just a place where people can put inputs in because I think a little bit simpler. An interface that’s a little bit simpler might have a lower barrier to putting in information”–PCP-SRM</p>
Confusion	<p>“Do you think–so under cardiology appointment, you say remember to ask about increasing dose. Okay, so that is who wrote that, and do you answer, after the appointment, do you answer what happened at the cardiology appointment there? I wasn’t quite sure about that”–PCP-NMC</p>

to data entry. Participants raised concerns about the need for manual data entry and the potential complexity of the user interface, particularly for non-clinicians.

### *Fit within existing workflows*

A new technology should be compatible with providers’ and patients’ existing workflows to avoid disruptions and optimize adoption. A total of nine items assessed the extent to which CareMOBI could be incorporated into providers’ daily workflows and routine approaches to patient management (Table 4). The mean score for this domain was 5.52 out of 7, the lowest score across all domains. This suggests that although PCPs recognized CareMOBI’s value and ease of use, they had significant concerns about how the app would fit into their current workflows.

The PCPs’ score on the statement “The use of the app may interfere with the usual follow-up of my patients” ( $M = 3.25/7$ ) suggests ambivalence; they neither agreed nor disagreed. Furthermore, the strong agreement with the statement, “The use of CareMOBI may imply major changes in my clinical practice/care for my patients” ( $M = 6.5/7$ ) suggests that the use of the app might interrupt current approaches to care. Although the majority of our

participants (five out of eight) were already using smartphone apps to manage their patients, incorporating CareMOBI into the care staff’s patient follow-up processes may require an adjustment.

In qualitative interviews, PCPs emphasized that CareMOBI had the potential to facilitate and optimize communication across settings and disciplines. However, they expressed concerns about the additional workload that CareMOBI might introduce and the need for potential reimbursement. Care of PLWD is already complex and requires continued monitoring; PCPs were concerned that the time required for daily data entry by medical providers could be a deterrent to use.

### *Likelihood of adoption*

The likelihood of adoption measured how inclined providers were to incorporate CareMOBI into their practice and use it with clients and family caregivers. This domain was assessed by six items (Table 5), resulting in a mean score of 6.71 out of 7. The item with the highest score ( $M = 6.88/7$ ) was “I would use the app if I receive appropriate training,” and the item with the lowest score ( $M = 6.5/7$ ) was “I intend to use the app routinely for patient/client

**Table 4.** Quotes related to fit within the workflow.

Subtheme	Qualitative feedback
Care team information	“I think it’s a youthful idea, and I like the way it’s like a platform that multiple can provide inputs into. I think that’s actually, hugely helpful, especially in—that +accurately reflects people’s care in people’s situation and the support they have”—PCP-SRM
Potential concerns	<p>“The other thing is, is it free? Who pays the cost of this? How are you getting reimbursed for using this? Is it the patient? Is it the adult daycare center? I’m not quite sure. Then the other thing is, how will we get notified, say, if a message does go through on the CareMOBI. What if the daycare sends information, but I’m not accessing this? Then I would never get that information, so that is what, initially, struck me when I was looking at this”—PCP-NMC</p> <p>“The main question I had is—time is what everyone wonders about. What is the expected time that each person—so, the medical providers, the adult day staff, and then the patient, or mainly the patient’s caregiver would be spending on this each day?”—PCP-RM</p>

**Table 5.** Quotes related to likelihood of adoption.

Subtheme	Qualitative feedback
Impression	“... there’s so much rich information that I feel like you’re capturing here, which is excellent. I think that it’s a really nice, easy-to-use dynamic interface. I feel like the clicking on it versus inputting—the ability to choose from more dropdown instead of having to type in a lot of text will make it, I think, a lot easier for any user to be able to do”—PCP-JB
Patient profile	“I love the kind of storyboard format, how it feels like a person. The person feels like he came alive. I don’t if everybody got the same person but my gentleman just really, I felt like I understood more texture about his life than I would have even in a typical electronic chart”—PCP-CC
Patient personal information	“Yeah this is a great social model of how we should be viewing our patients, and never forget where they came from. They’re just not a patient. They’re a human being, and they’re a person. That, probably, falls more into the ethics and how you learn some empathy in medical school, and how you learn how to treat patients. That’s why I don’t want you to—I would never say like, “Oh, that’s unnecessary,” because it reminds us of who we’re dealing with. We don’t wanna lose that personal connection to our patients, so it was nice”—PCP-NMC

care.” The survey results suggest that PCPs are more likely to embrace CareMOBI with proper training in spite of potential barriers.

Qualitative interviews revealed how PCPs perceived the facilitation of person-centered care with CareMOBI. The storyboard feature allowed PCPs to gain deeper knowledge of a patient’s life through the information in the app. One PCP noted that the app served as a reminder of who they were dealing with and helped them maintain a personal connection with their patients.

## Discussion

The purpose of this study was to assess the likelihood of PCPs adopting CareMOBI based on interactions with a prototype version. Our findings from survey data and qualitative interviews revealed that PCPs highly valued

CareMOBI (6.79 out of 7), found it easy to navigate (6.71 out of 7), and were inclined to use it when it was available (6.71 out of 7). Specifically, PCPs recognized that CareMOBI had a positive impact on monitoring and managing PLWD. It effectively addressed the issue of care fragmentation,<sup>17</sup> in which health information is scattered across various systems and providers, leading to negative health outcomes, decreased healthcare quality, and unnecessary hospitalizations. Underscored by the premise of the eCCM, CareMOBI has the potential to create a feedback loop between patients and PCPs, supporting productive provider–patient interactions that are supported by information technology.

The app’s features support the delivery of person-centered care, which respects and responds to patients’ individual preferences, needs, and values and is the cornerstone of effective clinical care for PLWD.<sup>18</sup> Providing person-

centered care for complex patients with multiple health issues and varying levels of awareness about their conditions poses a significant challenge for PCPs, who face time constraints.<sup>18</sup> CareMOBI addressed this by depicting a patient's life through a patient profile, providing insights into their likes, dislikes, and social history while summarizing relevant changes in their day-to-day health status. The positive response to CareMOBI can be attributed to the user-centered design process, which was informed by feedback from PCPs who expressed the need for more relevant and succinct information. Specifically, from the qualitative findings, CareMOBI has the potential to provide context and information outside of PCPs' offices through the "live texture" of family caregivers and long-term care providers. PCPs found the summary page and patient profile to be useful in helping them generate patient-centered care plans.

Regarding ease of use, most PCPs felt they had the skills to use the app and found it uncomplicated to learn. This could be supported by the result that PCPs scored the highest score ( $M = 6.88/7$ ) in response to the statement "I will find it easy to acquire the necessary skills to use CareMOBI." The interface was generally appealing and intuitive, drawing care staff to use the app. PCPs particularly appreciated live updates from ADHCs and family caregivers, who spent more time with patients, making their input valuable. At the same time, in the interviews, PCPs went further, suggesting it would be crucial to implement instructive strategies, such as on-site training or an online information guide, to lower the barriers to data entry and promote the app's adoption in clinical practice. In future research, the team will consider evaluating the daily time needed for data entry in both family caregivers and long-term care providers as well as designing a standard guiding video before implementing CareMOBI in real life.

Despite the positive reception, there were concerns about how CareMOBI would fit into a provider's workflow (5.52 out of 7). This may threaten adoption by PCPs because although bidirectional communication is possible in the app, it requires PCPs to go through an additional step. Therefore, integration into EHRs is crucial. CareMOBI could serve as a platform for multiple stakeholders to collaborate easily. Providers expressed extra concerns about reimbursement, time constraints, and interoperability across care teams. Addressing these financial and technical infrastructure issues is vital for smooth adoption. Interoperability, in particular, is crucial to prevent misunderstandings and ensure high-quality care. The next phase involves working with EHR vendors to integrate the application seamlessly. User-centered design and rapid prototyping will allow for further refinement based on these suggestions.

In summary, our evaluation of qualitative and quantitative data indicates a high likelihood of adoption, ease of use, and perceived value for geriatric care with CareMOBI. Achieving greater knowledge of patient care and integration in ADHCs and health systems is necessary

to enhance collaboration and interoperability. Testing in real-world settings and further refinement will help us understand the app's outcomes in geriatric care fully.

### Limitations

This study is not without limitations. First, the sample size is small relative to traditional qualitative and mixed-methods studies. However, it is appropriate given the user-centered approach to designing CareMOBI that involves rapid prototyping and continuous cycles of iteration based on feedback from small groups of stakeholders. Second, the small group of PCPs interviewed does not necessarily reflect the range of diversity within the primary care workforce nationally with respect to race or ethnicity. This limits the generalizability of our findings, but should not devalue the approach of incorporating perspectives of practicing clinicians focused on geriatric primary care to enhance the likelihood of successful implementation. Our approach sits in contrast to other tools that are developed for clinicians without soliciting feedback to ensure they actually address the needs of those who will eventually interact with the tool.<sup>19</sup>

### Conclusion

We assessed the acceptability of an app prototype, CareMOBI, among PCPs. Overall, PCPs were enthusiastic about incorporating the application into their service because of its potential to bridge communication barriers they experience with caregivers and ADHCs. They were also motivated by the ease of use and the app's unique ability to generate a concise yet impactful description of the patient. Our matrix of qualitative and quantitative data revealed a high likelihood of adoption, ease of use, and perceived value for geriatric care for CareMOBI. However, apprehensions regarding workflow and EHR integration arose that the team will have to consider as they move to the next phase of the application's development. The CareMOBI team will continue to leverage this important feedback in future iterations, as part of our user-centered approach, so that the application that is optimized to fit the needs of all end users. Further pilot and feasibility testing in primary care settings with larger and more diverse samples of end-users is needed to guide further refinement and eventual implementation.

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**ORCID iD:** Jie Zhong  <https://orcid.org/0000-0003-1025-7785>

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## Appendix 1

	Totally disagree	Disagree	Slightly disagree	Neither disagree or agree	Slightly agree	Agree	Slightly agree	Agree
<b>Ease of Use</b>								
I feel comfortable with information and communication technologies								
I think that I could easily learn how to use the proposed mhealth app								
I think that proposed mhealth app is a flexible technology to interact with								
I think I will find it easy to acquire the necessary skills to use this app								
I think that the proposed app will be easy to use								
<b>Perceived Value in Clinical Practice</b>								
The use of the proposed mhealth app could help me to manage my patients/clients/loved one more rapidly								
I think it is a good idea to use the proposed mhealth app to monitor/manage my patients/clients/loved one								
The use of the proposed mhealth app may improve the monitoring/management of my patients/clients/loved one								
The proposed mhealth app could help me get the most out of my time to monitor/manage my patients/clients/loved one								
I believe that the monitoring/management carried out by proposed mhealth app would be clear and easy to understand								
The proposed mhealth app can improve my performance in caring for patients/clients/loved one								
I think it would be easy to perform the tasks necessary for the monitoring/management of my patients/clients/loved one using the proposed mhealth app								

(continued)

Continued.

	Totally disagree	Disagree	Slightly disagree	Neither disagree or agree	Slightly agree	Agree	Slightly agree	Agree
I find it interesting to use proposed mhealth app for the monitoring and management of my patients								
The proposed mhealth app can facilitate the care of my patients/clients/loved ones								
The use of the proposed app may promote good clinical practice/care of my loved one								
The use of the proposed app will be beneficial for the care of my patients/clients/loved one								
In general, the proposed mhealth app may be useful to improve the care of my patients/clients/loved one								
In my opinion, the use of the proposed app will have a positive impact								
<b>Fit Within Existing Workflows</b>								
How it will fit in the existing workflow								
The use of the proposed mhealth app may imply major changes in my clinical practice or care for my loved one								
My patients/clients/loved one will welcome the fact that I use the proposed mhealth app								
I think that my center/practice has the necessary infrastructure to support my use of the proposed mhealth app								
The use of the proposed mhealth app is compatible with my work habits/lifestyle								
Most of my colleagues will welcome the fact that I use the proposed mhealth app								
I have already used a smartphone app to manage my patients/clients/loved ones								

(continued)

