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How Proficiency and Feelings impact the Preference and Perception of Mobile Technology Support in Older Adults

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Abstract

The kind of technology (tech) support that older adults prefer during continued mobile use varies widely. So does the perceived quality of that support. However, we know little about what influences these preferences and perceptions. We conducted an online survey with 138 U.S. older adults to understand how mobile device proficiency and feelings of anxiety and confidence during mobile use impact the preference for and perception of mobile tech support in older adults. Proficiency predicted a positive preference for self-reliant support but a negative preference for social support during continued mobile tech use. The effects of proficiency and confidence on the perceived quality of self-reliant mobile tech support in older adults were partially mediated by a preference for it.

CCS Concepts

• **Human-centered computing** → **Empirical studies in HCI**; **Empirical studies in accessibility**; **Mobile devices**.

Keywords

Older adults, Technology support, Mobile use, User preferences, Survey, Support quality, Tech Support

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1 Background

An increase in mobile tech ownership among older adults has not yet translated into an increase in mobile tech use [21, 22, 29, 32, 34]. An oft-cited reason behind such limited tech use in older adults is a lack of tech support during ongoing or *continued* use, which follows the initial learning or onboarding period [29, 33, 34]. During onboarding, e.g., when learning about cloud storage systems or rideshare apps, older adults largely seek out structured, instructional (or formal) support, like computer classes, workshops, or online tutorials [12, 19, 28]. However, during continued use, e.g.,

when revisiting a feature with an updated user interface or recovering from errors in new, complex, or less-used apps, formal support is rarely sought out [29, 34]. Instead, older adults may use trial-and-error methods, consult YouTube videos, or look for social support from friends and family [29, 33, 34]. In a recent study, 16 out of 23 older adults (who were neither absolute beginners nor experts in mobile tech use) reported *never* using help menus on their mobile devices [34]. This trend reflects a paradigm shift from using instruction manuals [2, 11, 25, 29, 40]. Instead, older adults are broadly using two types of tech support during continued mobile use, *self-reliant* (e.g., self-exploration [34], trial-and-error [23, 29], or “playing around” [41]) and *social* support [33, 34].

To meet older adults’ changing tech support preferences, new support tools are emerging [8, 17, 38, 45]. Equally important but less explored is how the heterogeneity of older adults’ personalities, life experiences, and general learning preferences [43] impact their tech support choices. Some may prefer self-exploration, while some seek out social support during continued mobile use [29, 34, 35]. Even when one prefers a type of tech support, they may not *perceive* it as effective or of high quality [34].

Tech support can play an important role in ensuring that older adults experience technology positively [1]. Post-adoption, during continued use, positive and negative emotional responses can be triggered by not only a technology’s usefulness and ease of use but also by the ease of learning to use it and the quality of tech support [26, 33, 34]. Positive experiences can boost *confidence* during tech use in older adults [1, 3]. With increased confidence, older adults become more open to exploring and using new apps, features, and services. For instance, structured computer courses have been shown to increase self-reported confidence as well as reduce *anxiety* during computer use, such as when looking up health information online [6]. Computer *anxiety* is known to predict the breadth of computer use in older adults [9, 10]—which may be caused by the age stereotype that older adults have less technological ability than their younger counterparts [24]. Owing to this stereotype threat, older adults can feel *older* after using mobile apps, especially when those are unfamiliar [5]. Anxiety and confidence make up the ends of a spectrum of feelings that are relevant to general learning [20]. We also know that these feelings impact older adults’ technology uptake and use [9, 24, 34, 42]. However, their role in older adults’ tech support choices remains unknown. Based on past work, we hypothesize that:

Feelings of confidence and anxiety during mobile use and proficiency in mobile use will influence the type of mobile tech support older adults prefer to use (**H1**), as well as how they perceive their quality, i.e., the effectiveness or efficacy of the obtained support (**H2**).

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We measured the constructs in this hypothesis using three self-report questionnaires and contribute empirical evidence about how mobile device *proficiency* and feelings of *confidence* and *anxiety* during mobile use impact older adults' mobile tech support preferences and perceptions.

2 Methods

2.1 Measures

To measure mobile tech support preferences and how older adults perceive the quality (i.e., effectiveness) of different types of mobile tech support, we used the recently developed and validated Mobile Tech Support Questionnaire for older adults (MTSQ) [35]. In the 10-item preference part of MTSQ, older adults were asked to rate, on a scale of 1 (low) to 5 (high), how much they like to use ten different types of tech support (e.g., asking a friend or searching YouTube) when encountering a problem with a mobile app (e.g., Skype or Facebook). In the 7-item quality part of MTSQ, older adults were asked to rate, on a scale of 1 (strongly disagree) to 5 (strongly agree), the perceived quality of two types of tech support when facing a problem with a mobile app: self-reliant (e.g., 'The help section of the mobile app usually solves the problem I am facing.') and social tech support (e.g., 'When someone helps me out, the problem usually gets solved.').

To measure mobile device proficiency, we used the 14-item Mobile Device Proficiency Questionnaire (MDPQ-14) that has been validated with older adults [30]. In MDPQ-14, older adults were asked to rate their perceived ease of accomplishing fourteen different tasks with a mobile device, like adjusting screen brightness, entering events into a calendar, or upgrading device software. MDPQ-14 scores range from 14 (beginner) to 70 (proficient).

Unlike the recently developed MDPQ-14 [30] or MTSQ [35], the validated scales that measure feelings about computer use were created circa 1990 and 2000 [4, 7, 13, 15, 27]. Those questionnaires were not developed for older adults. Nor do they account for the recently evolving tech learning preferences of older adults during different stages of use [11, 25, 29, 34, 37]. For instance, the computer attitude scale [27] measures computer anxiety (example item: 'It wouldn't bother me at all to take computer courses.' and computer confidence (example item: 'I am sure I could learn a computer language'), but does not include feelings related to older adults' continued mobile tech use, such as feeling old [5], motivated [16], or cautious [22]. So, we created a new questionnaire (9 items) drawing on the latest research about older adults' feelings during computer use [29, 33, 34]. Older adults responded to the question, 'When you are using mobile devices, such as smartphones or tablets, how often do you:' on a 5-point Likert scale, never, rarely, sometimes, often, and always. The items for confidence during mobile use were *feel confident*, *feel motivated*, and *explore how to do something new* and for anxiety were *feel cautious*, *feel impatient*, *feel confused*, *feel old*, *give up on what you wanted to do*, and *forget things that you had previously learned how to do*.

2.2 Procedure

We conducted an online survey with English-speaking older adults in the U.S. to measure mobile device proficiency, feelings during mobile use, mobile tech support preferences, perceived quality of

mobile tech support, and demographics. This survey was conducted as part of a larger online study between March and August 2023, with approval from a university-wide institutional review board. The survey took an average of 15 minutes to complete. Recruitment was managed by an independent research services company, which used diverse methods such as website intercepts, member referrals, targeted emails, customer loyalty programs, and social media to find participants. Demographic details like date of birth and address were verified through third-party checks before participation. Depending on their recruitment source agreements, participants were compensated by the research services company with points, cash, or coupons. To be eligible, participants needed to be 65 years or older, reside in the U.S., own at least one mobile device, and use a mobile device at least once a week, ensuring that they were ongoing mobile tech users, not beginners.

3 Results

3.1 Participants

A sample of 138 responses from older adults between the ages of 65 and 83 (71 women, $Mdn_{age} = 70$, $Mdn_{MDPQ} = 54$) was collected. The majority of participants identified as White (124), five identified as African American, four as Asian, one as Native American Indian or Alaska Native, and the rest chose not to respond. Twenty-one older adults had a graduate degree, 32 were college-educated, 29 had a 2-year degree, 40 had a high school diploma, and two had less than a high school diploma. Some chose not to respond. 103 older adults lived independently, 27 lived with family, and two lived in a senior living community. Participants were not at the stage of initial mobile tech adoption, as estimated by their mobile device proficiency (MDPQ [30]) score ($Mdn = 54$) and number of years of mobile device use (87%, 10%, and 5% reported using mobile devices over 5 years, 2 – 5 years, and 1 – 2 years, respectively).

3.2 Data analysis preliminaries

Each of the seven constructs in our research, confidence and anxiety during mobile use, mobile device proficiency, preference for self-reliant and social mobile tech support, and perceived quality of self-reliant and social mobile tech support were measured using Likert scales. For example, anxiety during mobile use consisted of five Likert items. So, first, we computed the aggregate score for each construct, a mean rating of all items except for proficiency, which was computed as a sum—as prescribed by the authors of the scale [30, 31]. We chose an intervalist approach to analyze Likert scale data [14, 36]. So, all data were tested using parametric statistics.

3.3 Confidence positively correlates with the perceived quality of tech support

More older adults reported higher confidence during mobile use ($M = 3.3$, $SD = .8$) than anxiety during mobile use ($M = 2.51$, $SD = .8$), $t = 6.91$, $p < .001$, $r = .59$. But no significant differences were found between a preference for self-reliant ($M = 3.05$, $SD = .93$) vs. social support ($M = 2.87$, $SD = 1.01$). Neither between the perceived quality of self-reliant ($M = 3.43$, $SD = .79$) vs. social support ($M = 3.49$, $SD = 1.03$).

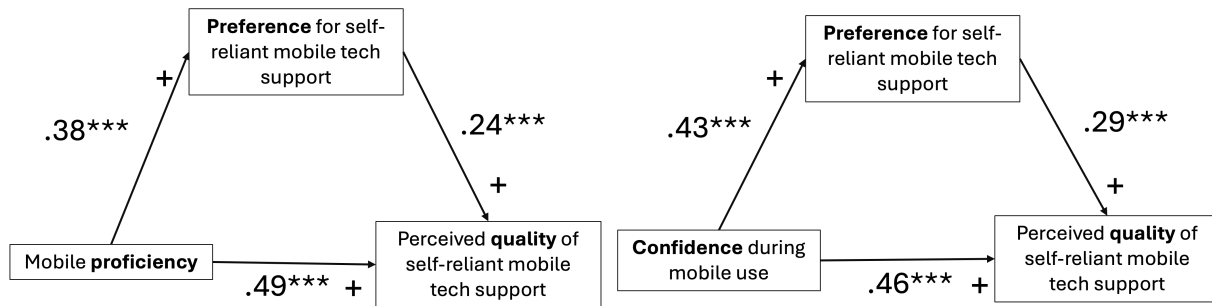


Figure 1: The effects of mobile device proficiency (left) and confidence during mobile use (right) on the perceived quality of self-reliant mobile tech support were partially mediated by a preference for it. All measures were self-reported by older adults. All visualized effects were significant, $p < .001$.

When controlling for the effect of anxiety and confidence on proficiency, we found a semi-partial correlation [18] between preference for self-reliant mobile tech support and proficiency, $r = .26$, $p = .003$. Likewise, when controlling the effect of proficiency and anxiety on confidence, we found a semi-partial correlation between preference for self-reliant mobile tech support and confidence, $r = .21$, $p = .02$. No significant semi-partial correlations were found between proficiency, feelings, and a preference for social support.

When controlling for the effect of anxiety and confidence on proficiency, we found a semi-partial correlation between the perceived quality of self-reliant mobile tech support and proficiency, $r = .44$, $p < .001$. When controlling the effect of proficiency and anxiety on confidence, we found a semi-partial correlation between the perceived quality of self-reliant tech support and confidence, $r = .21$, $p = .02$, as well as between the perceived quality of social tech support and confidence, $r = .20$, $p = .022$.

3.4 Hypotheses testing

A multiple regression using a hierarchical approach was used to test the hypotheses. Predictor variables were entered into the regression in the order of proficiency, confidence, and anxiety for both the outcome variables, preference and perception of mobile tech support. Mobile device proficiency ($t = 3.57$, $p < .001$, $\beta = .30$, 95% CI [.13, .47]) and confidence during mobile use ($t = 2.95$, $p = .004$, $\beta = .25$, 95% CI [.08, .41]) predicted a preference for self-reliant tech support in older adults, $F(2, 130) = 16.82$, $p < .001$, $R^2 = .21$, $R^2_{Adjusted} = .19$. However, only proficiency was a significant predictor ($t = -2.63$, $p = .01$, $\beta = -.23$, 95% CI [-.40, -.06]) for a preference for social tech support in older adults, $F(1, 124) = 6.03$, $p = .01$, $R^2 = .05$, $R^2_{Adjusted} = .05$. H1 was partially supported.

Proficiency ($t = 7.3$, $p < .001$, $\beta = .51$, 95% CI [.37, .65]) and confidence during mobile use ($t = 3.73$, $p < .001$, $\beta = .26$, 95% CI [.12, .40]) also predicted the perceived quality of self-reliant tech support in older adults, $F(2, 135) = 52.21$, $p < .001$, $R^2 = .44$, $R^2_{Adjusted} = .43$. But neither proficiency nor feelings predicted the perceived quality of social tech support in older adults. H2 was partially supported.

3.5 Mediation analysis

Since we found that proficiency and confidence during mobile use predicts both a preference for and the perceived quality of self-reliant mobile tech support, it was worth examining if there were any mediation effects, that is, whether the casual effects of proficiency and confidence on quality is partially or fully mediated via preference [39]. The effect of mobile proficiency on the perceived quality of self-reliant mobile tech support was partially mediated via a preference for it (Figure 1, left). The indirect effect was $(.38) \times (.24) = .09$. We tested the significance of this indirect effect using bootstrapping procedures. Unstandardized indirect effects were computed for each of 1000 bootstrapped samples, and the 95% confidence interval was computed by determining the indirect effects at the 2.5th and 97.5th percentiles. The bootstrapped unstandardized indirect effect was .09, and the 95% confidence interval ranged from .04 to .14. Thus, the indirect effect was statistically significant, $p < .001$. A similar mediation analysis found that the effect of confidence during mobile use on the perceived quality of self-reliant mobile tech support was partially mediated via a preference for it (Figure 1, right). The indirect effect was $(.43) \times (.29) = .12$ (95% CI: .06, .20, $p = .002$).

4 Discussion

There is an ongoing push in research and community practices to help older adults use computers widely, effectively, and efficiently. This is probably because the last pandemic has demonstrated the need for digital literacy and inclusion of older adults more than anything before. Tech support programs and tools are being developed [32, 38, 44–46] and industry solutions are offered to make mainstream technology accessible to older adults—rather than designing applications separately for older adults¹. However, there is less emphasis on understanding how the *heterogeneity* of older adults’ personalities and lived experiences [43] influence how they perceive and use tech support. We argue that researchers and practitioners should not assume a one-size-fits-all approach when designing tech support tools and digital literacy programs for older adults.

Findings indicated that among U.S. older mobile users (predominantly identifying as White), confidence during continued use was

¹<https://developer.apple.com/videos/play/wwdc2023/10032/>

significantly higher than anxiety, with a large effect size. Whether continued mobile tech use reduces anxiety and increases confidence during use or vice versa remains to be known. We did not find any differences between their preference for self-reliant and social tech support nor between how they perceive their quality. However, mobile tech proficiency predicted a positive preference for self-reliant tech support with a medium effect size and a negative preference for social tech support with a small effect size. This finding implies a need to design self-reliant tech support tools for older adults who are not completely beginners, in line with findings from prior qualitative work [29, 34].

Confidence during mobile use only predicted a positive preference for self-reliant tech support with a small effect size. While prior work has suggested that tech support can help older adults feel positive about tech use and, in turn, boost confidence during tech use [1, 3], we found that that increase in confidence leads to a preference for self-reliant tech support. This finding implies that the type of tech support older adults prefer can evolve with time and continued use, and thus, new tech support tools need to adapt to these shifting preferences.

Interestingly, neither proficiency, confidence, or anxiety during mobile use predicted how older adults perceive the quality of social tech support. Confidence during mobile use negatively predicted a preference for social support, but only 5% variance was explained by that relationship. So, there might be other factors driving the perceived quality of social support, such as the helper's personality, temperament, or how help is provided.

On the other hand, proficiency predicted the perceived quality of self-reliant tech support with a large effect size and confidence with a small effect size, which implies that offering self-reliant tech support to older adults without considering their mobile proficiency might not be effective. There was a small indirect effect of proficiency and confidence during mobile use on the perceived quality of self-reliant tech support via a preference for it (Figure 1). However, the direct effects of confidence and proficiency on both preference and perceived quality were larger. Prior work has shown that preferences for a particular kind of mobile tech support during continued mobile use directly predict how older adults perceive the quality of that support [35]. In this work, we identified other factors, namely proficiency and confidence during mobile use, that predict both those preferences and perceptions.

Our work is not without limitations. The measures were self-reported, and the sample was predominantly White Americans. How these findings extend to different ethnicities, geographies, and cultures needs to be investigated. Deeper qualitative work is needed to answer some of the questions that we could not, such as what causes a preference for social tech support and impacts how its effectiveness is perceived. In conclusion, to successfully enable continual digital inclusion of older adults, tech support tools and techniques need to consider the individual differences among older adults and how their tech learning preferences change with time, technology, and life circumstances.

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