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Role of smart phones in improving psychological well-being and successful ageing of Iranian old women living with Technophobia: a randomized controlled trial

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Abstract

Background Covid-19 pandemic and its following lock-down lead to loneliness of older adults especially females. Smart phones can reduce the crises-caused complications. Technophobia is an overwhelming fear of technology or the powers of artificial intelligence.

Aims The study focused on determining the impact of regular smartphone use in decreasing Technophobia and improving mental health and successful ageing (SA) for older adults residing alone during the Covid-19 pandemic.

Materials & Methods In this randomized controlled trial, 80 old females living alone as the member of a daily caring center were randomly categorized into intervention (40 people) and control (40 people) groups. The intervention group received 9 skill training online sessions of using smart phone through WhatsApp. The data were collected before and two months after intervention by demographic, Technophobia, Ryff's Psychological Wellbeing (PW), and Successful Ageing Index. The data were analyzed by SPSS (V.28) through independent and paired t-tests and effect size measures.

Results The results showed negative ($r = 0.303$) and significant ($P < 0.05$) correlation between Technophobia and PW of old women living alone. Also, there were negative ($r = 0.644$) and significant ($P < 0.001$) correlation between Technophobia and SA. The findings revealed no significant differences between the two studied groups based on Technophobia ($r = 0.553$), PW ($P > 0.05$) and SA ($P > 0.05$). However, there were significant differences between the two groups regarding the mean scores of Technophobia, PW, and SA in the two groups ($P < 0.001$).

Discussion & Conclusion Online training of smart phone use is proposed to effectively reduce Technophobia and improve PW and successful ageing.

Clinical Trials Registration IRCT20180514039648N2, Registration Date: 25 July 2023.

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Keywords Technophobia, Older women, Psychological wellbeing, Successful ageing, Aged, Ageing, Healthy ageing, Phobia social, Phobic disorders, Psychological well-being, Women

Introduction

According to the 2022 Iranian Nationwide Census, individuals aged 60 and older constitute 11.8% of Iran's population, with this demographic growing significantly [1]. Women, who tend to outlive men by 6 to 8 years, represent a larger proportion of older adults globally and in Iran [2, 3]. Technological advancements have introduced services like Telecare and online social security, tailored for older adults [4]. However, many individuals, particularly older adults, experience Technophobia—a fear or anxiety toward technology. This phenomenon affects about one-third of the global population and includes emotional and cognitive dimensions [5–11]. Technophobia is characterized by discomfort with devices like smartphones and concerns about artificial intelligence. It is prevalent among older adults and those with anxiety about the future, often exacerbated by media portrayals of technological failures. While not formally classified in the DSM-5, some experts consider it a specific phobia [10, 11].

Technophobia is influenced by factors such as education, health, and financial status, with older adults exhibiting more negative attitudes toward technology than younger individuals [2, 12]. A study by Salifu Yusif et al. [11] found that 16% of older adults avoided digital devices due to fears of dependency and perceived lack of resources [12]. In Iran, digital device usage among older adults has increased by 10%, potentially reducing Technophobia and improving quality of life [13, 14].

Psychological well-being (PW), which includes independence, strong relationships, self-acceptance, and personal growth, is crucial for successful aging [15–19]. The COVID-19 pandemic exacerbated mental health challenges, particularly for older adults living alone. Studies in Greece highlighted increased fear of COVID-19, depression, sleep disturbances, and loneliness among older women during the pandemic [20, 21]. Health-monitoring software became vital during quarantine, especially for women lacking access to healthcare [22–25].

This study focuses on the impact of smartphone usage on reducing Technophobia, enhancing PW, and alleviating social anxiety (SA) among isolated older women in Shiraz, Iran, during the pandemic. Notably, most participants used Samsung smartphones with button keyboards, as touchscreen devices were less common and often outdated. Other phone models were excluded from the study.

Materials & methods

Study design

This randomized controlled trial (RCT) with a control group involved women aged 60 and older who were members of the Farzanegan Daily Caring Foundation (FDCF) in the second half of 2022. FDCF is a non-profit charitable organization providing daily care and rehabilitation services for older adults, with over 150 centers nationwide. The Shiraz branch, one of the largest, serves 5,000 older members.

The sample size was calculated using the two-group mean score formula in NCSS-PASS (V.15), based on similar studies [17, 26]. With a 95% confidence interval, 90% test power, 0.05 significance level, and standard deviation from prior research, 40 older women per group were included, accounting for a 5% attrition rate. Participants were randomly assigned to intervention and control groups.

Inclusion criteria:

Women aged 60 + who felt isolated during the COVID-19 pandemic.
Technophobia, indicated by a score > 30 on the Technophobia Questionnaire.
Ability to articulate reasons for not using smartphones or difficulties in doing so.
Willingness to participate and provide consent.
Basic accessibility and ability to use a phone.

Exclusion criteria:

Unwillingness to participate.
A score < 26 on the Montreal Cognitive Assessment (MoCA).
Motor disorders affecting hands or wrists.
Lack of basic literacy (reading/writing).
Recent stress-inducing events (e.g., family death, accidents, acute illness).
Non-consent to continue participation.

To minimize anxiety, participants were informed they could withdraw at any time. Those with Technophobia were assured they could manage stress levels and opt out if they felt uncomfortable.

Instrumentations

(1) Demographic Questionnaire It consists of a research-made instrument with 12 questions such as age, incidence of any chronic disease, and abuse of any opioid materials.

(2) Technophobia and Technophilia Questionnaire (TTQ) It was used by Mario Martínez-Córcoles for the first time and the TTQ had 12 questions with five Likert options including completely disagree (score 1) to completely agree (score 5). Cronbach's alpha of this instrument was achieved and affirmed as 0.95 [27].

(3) Successful Ageing Index (SAI) SAI was designed by Seif et al. [27] to assess successful ageing. It has 23 questions with five Likert-options and seven domains of PW, social support, environmental and financial security, mental and physical health, functional health and also the behaviors related to health and spirituality. Cronbach's Alpha of this questionnaire was achieved as 0.7 [28, 29].

(4) Ryff's PW Scale includes six domains: self-acceptance, positive relations with others, autonomy, environmental mastery, purpose in life, and personal growth. Responses are based on a six-point Likert scale (from "completely disagree" to "completely agree"). Items 3, 4, 5, 9, 10, 13, 16, and 17 are reverse-scored. The scale's reliability was confirmed by Asgari et al., with a Cronbach's alpha of 0.74 and a Split-Half correlation of 0.72, indicating acceptable internal consistency. Additionally, the scale demonstrated strong convergent validity, confirming its effectiveness in measuring psychological well-being.

Sampling method

After approval from Shiraz University of Medical Sciences and coordination with the Farzanegan Daily Caring Foundation (FDCF), participants were selected using simple randomization based on predefined inclusion criteria. Phone numbers of eligible individuals were extracted from the foundation's database, and an independent person randomly assigned them to either the intervention or control group. To account for potential exclusions, ten additional participants were selected for each group. The study's objectives and benefits were explained to participants, and written informed consent was obtained. Pretest questionnaires were administered on July 15, 2022, to establish baseline measurements.

Intervention process

The intervention group joined a dedicated WhatsApp group, where they introduced themselves and discussed their educational needs. Participants actively engaged in the sessions and provided positive feedback. Questions raised during or after sessions were addressed within the group. Educational materials were shared bi-weekly, and participants were encouraged to raise issues every Thursday for discussion (see Supplementary Table 1).

The primary outcomes were reducing technophobia and promoting successful aging, while secondary outcomes included improvements in mental health and self-esteem. Intervention fidelity was maintained at 100%, with full adherence during the second session and follow-up. There were no dropouts throughout the study.

Statistical analysis

Two months after the final session (September 8, 2022), post-tests were administered to both groups. Data were analyzed using IBM SPSS Statistics version 28. Normality was confirmed using the Kolmogorov–Smirnov test ($P > 0.05$). Independent and Paired Samples t-tests, Chi-Square tests, and descriptive statistics (mean, standard deviation, frequencies, and effect size) were applied, with significance set at $P < 0.05$.

Ethics approval

Participants received comprehensive information about the study through a Participant Information Sheet and completed a Consent Form. Participation was voluntary, and participants could withdraw at any time. Data were stored securely, ensuring confidentiality and anonymity. The study was registered with the Iranian Clinical Trials Center (IRCT20180514039648N2, July 25, 2023) and approved by the Ethical Committee of Shiraz University of Medical Sciences (IR.SUMS.SCHEANUT.REC.1400.061, July 15, 2023). The study adhered to the 2013 Helsinki Declaration and 2009 CONSORT guidelines. At the study's conclusion, the control group received the same training and interventions at no cost.

Results

Participants of the study

The mean score and standard deviation of age were 66.38 (SD = 3.45) and 66.38 (SD = 2.63) in intervention and control groups, respectively ($P > 0.05$). The average score for sleeping hours over a 24-h period was 6.9 (SD = 0.9). The majority of the participants had an elementary level of education (51.4%), with 42.5% working as housekeepers and 77.5% being married. In terms of health status among older women, over 75% reported having at least one chronic disease, while 32.5% indicated that they feel "healthy to some extent." Additionally, 52.5% expressed feelings of loneliness. Based on Chi-square test, there were no significant differences between the two groups in respect of education level ($P > 0.05$), occupation

($P > 0.05$), marriage status ($P > 0.05$), chronic disease ($P > 0.05$), and loneliness feeling ($P > 0.05$). Pearson correlation test showed negative correlation (r = 0.303) and significant difference between Technophobia and PW of women living alone. It means that Technophobia reduces PW. Effect Size for this correlation measured by Cohen's d = 0.54. This score demonstrates appropriate effect of the two mentioned variables. Pearson correlation test showed negative correlation (r = 0.644) and significant differences between Technophobia and SA of female old women (P < 0.001). It was declared that Technophobia can decrease successful ageing. Effect coefficient of this correlation was achieved as 0.45, which demonstrates appropriate effect of the two mentioned variables.

Main results of the study

According to the results of the T-Independent test, there was no significant difference between the two study groups regarding Technophobia levels ($P > 0.05$) prior to the intervention. However, a significant difference was observed in the mean Technophobia scores after the intervention ($P < 0.001$). Additionally, the T-Paired test revealed a significant difference in the mean Technophobia scores within the intervention group before and after the intervention ($P < 0.001$). This significant difference indicates a reduction in Technophobia in the intervention group after the intervention (mean = 41.4 ± 4.47) compared to before the intervention (mean = 31.38 ± 5.59), highlighting the positive impact of the educational intervention. In contrast, no significant difference was observed in the control group's mean Technophobia scores before and after the intervention ($P > 0.05$).

The effect size of the difference before and after the intervention was measured using Cohen's d test for both the intervention and control groups. The effect size for the intervention group was calculated as 1.928, indicating a substantial effect level (193%) of the educational intervention on reducing Technophobia. Furthermore, the effect size coefficient for the two groups combined after the intervention was 2.01, suggesting an even greater impact. These findings confirm that the technical educational intervention not only caused a significant difference between the two groups but also had a strong effect (201%) on reducing Technophobia among older adults in the intervention group. For more details, refer to Table 1.

The Independent T-test revealed no significant difference between the two groups regarding perceived well-being (PW) before the intervention ($P > 0.05$). However, a significant difference was observed in the mean PW scores between the two groups after the intervention ($P < 0.001$). Additionally, the Paired Sample t-test demonstrated a significant difference in PW mean scores within both the intervention and control groups before and after the intervention ($P < 0.001$).

In the intervention group, this significant difference indicated an increase in PW mean scores, reflecting the positive impact of the intervention. The mean PW score in the intervention group was 61.18 (SD = 4.03) before the intervention, which increased to 62.60 (SD = 1.02) after the intervention. Conversely, in the control group, the significant difference showed a decrease in PW after the intervention. The mean PW score decreased from 59.88 (SD = 3.09) before the intervention to 61.53 (SD = 2.57) after the intervention.

The effect size of the difference before and after the intervention was measured using Cohen's d test to compare the intervention and control groups. The effect size for the intervention group was calculated as 0.484, indicating a moderate effect level (48.8%) of the educational intervention on perceived well-being. Furthermore, the effect size coefficient for the two groups combined after the intervention was 1.18, suggesting a large effect. These findings indicate that the technical educational intervention not only caused a significant difference between the two groups but also had a substantial impact (118%) on improving perceived well-being among older adults in the intervention group. For more details, refer to Table 2.

T-Independent test showed no significant difference between the two groups regarding SA mean scores ($P > 0.05$) before intervention. However,

Table 1 The changes of mean scores of technophobia before and after intervention between intervention and control groups

Variable	Time	Groups				P-value of independent samples T- test	Effect size*
		Intervention(n = 40)		Control(n = 40)			
		Mean	SD	Mean	SD		
Technophobia	Before	41.47	4.40	40.97	2.94	0.553	0.133
	After	31.38	5.95	43.23	5.82	< 0.001	2.013
P-value of Paired Samples T-Test		< 0.001		0.435		–	
Effect Size		1.928		–			

* Effect Size using Cohen's d

Table 2 The changes of mean scores of psychological wellbeing before and after intervention between intervention and control groups

Variable	Time	Groups				P-value of Independent Samples T- Test	Effect Size*
		Intervention(n = 40)		Control(n = 40)			
		Mean	SD	Mean	SD		
Psychological Wellbeing	Before	61.18	4.03	61.53	2.57	0.654	0.103
	After	62.60	1.02	59.88	2.09	< 0.001	1.183
P-value of Paired Samples T-Test		< 0.001		< 0.001		–	
Effect Size		0.484		–			

* Effect Size using Cohen's d

significant difference was reported between the two studied groups in terms of SA mean scores after intervention ($P < 0.001$). Also, T-Paired test showed significant difference of SA mean scores in intervention and control groups before and after the intervention ($P < 0.001$). It demonstrated the increase of PW mean scores and also positive impact of intervention in intervention group in a way that this score was 194.4 (SD = 10.51) before intervention and increased to 204.02 (SD = 14.4) after intervention. However, the significant difference in control group showed the decrease in SA after intervention as the mean score of this variable was decreased after intervention (mean = 191.97 ± 10.03) compared to before intervention (mean = 198.65 ± 9.65). Effect Size of this difference before and after the intervention was measures by d Cohen…test. Effect Size of intervention was 0.77 before and after the intervention. This score shows great effect level (48.8%) of educational intervention of this project on successful ageing. Also, this coefficient was 0.985 for the two groups after intervention. It was indicated that technical educational intervention could cause significant difference between the two groups in addition to great effect (98.5%) of older adults in intervention group in respect of increasing SA of the studied old people (See Table 3).

Discussion

The findings indicate that nine virtual training sessions on smartphone skills significantly reduced Technophobia, improved psychological well-being (PW), and promoted successful aging among older women. This suggests that smartphone training is an effective educational strategy to address Technophobia and enhance PW and successful aging in this population. The intervention and control groups were comparable in terms of age, education, occupation, marital status, chronic diseases, sleep duration, and feelings of loneliness, consistent with Liu et al.'s findings [17].

A significant negative relationship was observed between Technophobia and PW, indicating that higher Technophobia leads to greater discomfort [17]. Similarly, Nimroud et al. found that Technophobia negatively impacts well-being, while Selinger and Gröstenberger noted that technology use enhances well-being in later life [9]. Technophobia also showed a negative relationship with successful aging, as highlighted by Giacomo et al., who emphasized its hindrance to successful aging in online contexts [8].

The intervention group demonstrated a significant reduction in Technophobia, aligning with studies showing that educational programs on basic ICT skills reduce Technophobia [4]. Increased technology use has been shown to lower Technophobia among older adults, and

Table 3 The changes of mean scores of successful ageing before and after intervention between intervention and control groups

Variable	Time	Group				P-value of Independent Samples T- Test	Effect Size*
		Intervention(n = 40)		Control(n = 40)			
		Mean	SD	Mean	SD		
Successful Ageing	Before	194.4	10.51	198.65	9.65	0.064	0.411
	After	204.02	14.4	194.97	10.03	< 0.001	0.985
P-value of Paired Samples T-Test		< 0.001		< 0.001		–	
Effect Size		0.778		–			

* Effect Size using Cohen's d

this study confirms that online education improves smartphone skills and reduces Technophobia in older women. Peer groups with similar backgrounds are recommended to facilitate education and interaction, as observed by Nimroud et al. [8].

Post-intervention, the intervention group showed significant improvements in PW and social anxiety (SA), while the control group remained unchanged. These results align with Rajabi et al. [26] and Demirchi et al. [17], who found that computer-based education reduced anxiety and improved self-esteem in older adults.

Many participants initially lacked smartphone skills, which diminished their self-esteem. However, education and video calls with family or friends boosted their confidence and sense of value. Maintaining an active lifestyle and strong adjustment capabilities are key to reducing SA, especially during crises like pandemics [26].

During lockdowns, online tools can significantly improve mental health by enhancing social connections, providing psychological consultations, and offering educational programs on healthy living and physical activity. Embracing technology is crucial for successful aging, and policies should support middle-aged and older adults in adopting technology effectively.

This study examined diverse literacy, income, and occupation levels to enhance generalizability. However, further research is needed for less socially engaged older adults. As the first study on Technophobia among older adults in Iran, it highlights the benefits of online education, including repeatable courses, personalized Q&A, flexible scheduling, and reduced social barriers.

Limitations and suggestions

While this study demonstrates the effectiveness of a trial intervention, it has limitations, including a short intervention duration and lack of long-term follow-up to assess sustainability. Future studies should explore longer interventions and additional follow-up assessments. The study primarily focused on older women, and findings may not generalize to older adults with low literacy or limited resources. Including older men or both genders in future research would enhance generalizability. Additionally, developing educational materials or software to teach smartphone skills and reduce Technophobia is recommended.

Conclusion

This study involved nine online sessions to assess how smartphone use reduces Technophobia, improves PW, and enhances SA among older women. The results suggest that such educational programs effectively reduce Technophobia, supporting better PW and SA. These training programs can be implemented in senior care facilities, retirement communities, health centers, and counseling services to empower older adults.

Supplementary Information

The online version contains supplementary material available at https://doi.org/10.1186/s13104-025-07181-8.

Additional file 1

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The Standard for Reporting

STROBE guidelines and methodology were followed.

Author contributions

AAv & MN planned the study and data collection. TF performed the statistical analyses. OKh took the lead in research section and writing the manuscript. AAs supervised the overall project. All authors discussed the results and contributed to the final manuscript. They have read and approved the final manuscript.

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Availability of data and materials

The datasets generated and/or analysed during the current study are available from the authors upon reasonable request and with the permission of SUMS.

Declarations

Ethics approval and consent to participate

Written informed consents were obtained from participants. Participants were advised that participation was voluntary and that the survey was anonymous. This study was registered in Iranian clinical trials center (IRCT20180514039648N2). Prior to commencing the study process, the certificate was received from Ethical committee of Shiraz University of Medical Sciences based on an ethical code (IR.SUMS.SCHEANUT.REC.1400.061).

Human and animal rights

No animals were used for studies that are the basis of this research. This research was conducted on humans are in accordance with the Helsinki Declaration of 1975, as revised in 2013 (http://ethics.iit.edu/ecodes/node/3931).

Consent for publication

Not Applicable.

Competing interests

The authors declare no competing interests.

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