

Fear of Falls Following an Online Exercise Program for Aging Adults

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Abstract

Individuals who participate in regular exercise tend to report a lower fear of falling; however, it is unknown if this fear can be reduced following an online fall prevention exercise program. The main purpose of this study was to test if offering a peer-led fall prevention exercise program online reduced the fear of falling and if this potential improvement was greater than when the program was offered in person. The secondary objectives were to describe participants' characteristics when participating online, the rate of falls and the context in which falls occur. A total of 85 adults aged 69.0 ± 7.8 years participated in the program offered online ($n=44$) and in-person ($n=41$). No significant differences in fear of falling before and after participation in the program were reported for either group: online (20.7 ± 5.1 – 21.8 ± 5.5) and in-person (20.6 ± 5.1 – 21.2 ± 5.3). Online participants reported a greater proportion of falls ($n=9$; 20.5% vs. $n=4$; 9.8%; $p=.14$), mostly occurring outdoors ($n=7$) (77.8). A properly designed study is needed to test if the rate of falls is greater when an exercise program is offered online.

Keywords

falls, aging, physical fitness, active life/physical activity

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Introduction

The second leading source of deaths caused by unintentional injury worldwide is falls, with older adults suffering the greatest number of fatal falls compared with younger populations (World Health Organization, 2021). In addition, falls cause significant injury, including fractures and traumatic brain injury (Alexander et al., 1992; Jager et al., 2000; Sterling et al., 2001). In the United States, the cost associated with nonfatal falls in older adults was estimated at \$53.9 billion in direct medical expenses in 2020 (Florence et al., 2018). It is clear from the literature that exercise programs prevent falls in older adults if appropriately designed (Sherrington et al., 2017; Tricco et al., 2017). Although some report that fear of falls can increase after becoming more physically active (Headley et al., 2013), most report that exercise reduces the fear of falls, especially immediately following a program, as reported by a Cochrane review (Kumar et al., 2016). This Cochrane review focused on participation in Tai Chi/yoga, balance training, and strength/resistance training for 12 to 26 weeks at a frequency of 1 to 4 times a week (Kumar

et al., 2016). Fear of falling is an important psychological factor associated with falls in older adults, as falls and fear of falling are strongly correlated (Friedman et al., 2002). Although some of the literature reports that exercise reduces the fear of falling in older adults (Kumar et al., 2016), it is unknown whether exercise programs delivered online may present a reduction in fear of falling (Donath et al., 2016).

According to a survey completed in the United States (US), adoption of technological innovation rates among older adults is rising, with many using the technology daily (Anderson & Perrin, 2017). For example, 42% of adults aged 65+ reported owning smartphones, and 67% of seniors reported internet use (Anderson & Perrin, 2017). With the COVID-19 pandemic, the pace at which older adults adhere to technology is increasing

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(Haase et al., 2021). As older adults become more digitally connected, there is an opportunity for the delivery of online fall prevention exercise programs to reap many benefits, including a reduction in fear of falls and falls themselves.

The main purpose of this study was to test if offering a peer-led fall prevention exercise program online reduced the fear of falling and if this potential improvement was greater than when the program was offered in person. Secondary objectives were to describe participants' characteristics when participating online, the rate of falls, and the context in which falls occur.

Methods

Participants

To participate in the program, individuals had to be over 50 years of age and living independently. Participants were required to complete pre-screening for physical activity via the Canadian Society of Exercise Physiology Get Active Questionnaire (Canadian Society for Exercise Physiology, 2021) or by a physician if necessary. For this study, participants were excluded from the study if they had previously participated in the program. Participation in the study was voluntary, and written informed consent was obtained from participants before the sessions began. Staff were involved in coordinating the program and were available by phone and email to assist participants in the registration process, especially for the online sessions.

Intervention

The exercise program was a free fall prevention program offered to and by people aged 50 and above. Peer trainers received 30 h of training and subsequent liability via a local certification body and delivered the program as a volunteer. Participants could register for three classes/week in-person or online and receive a Thera-Band resistance band and a sponge ball. Each session was composed of 60 min, consisting of a 10-min warm-up, 15 min of balance exercises, 15 min of muscle strengthening exercises using an elastic band, 10 min of flexibility activities, and a 10-min cool-down. This program had shown benefits for physical functions when offered in person (Bouchard et al., 2021). The in-person program was delivered in nearby communities. The online sessions were live-streamed via Microsoft Teams. The in-person group participated in the 12-week program between September and November 2021, while the online group participated in the program between January and March 2022. Leaders were asked to infuse some fall prevention topics during their classes using information from the partner's website—Finding Balance (Trauma NB, 2016). At week 8, participants and leaders also received an educational session to reduce the risk of falls

online by a health professional (e.g., an Occupational Therapist); this educational component was included for both online and in-person participants.

Primary Outcomes

The primary outcome of this study was the fear of falling assessed with the Fall Efficacy Scale (FES) (Kempen et al., 2008; Yardley et al., 2005). The FES is often used for its validity and reliability in capturing the fear of falls (Delbaere et al., 2010; Kempen et al., 2008). The FES requires a selection of one option out of four possible (1—not at all concerned, 2—somewhat concerned, 3—fairly concerned, 4—very concerned) for 16 activities. The score is then totalled using a scale of 1 to 4 for each activity with a total score from 16 to 64; 16 being the least concerned and a score of 64 being the most concerned.

Secondary Outcomes

In addition to the FES, demographics, confidence with technology use, and previous falls were collected. Attendance for in-person sessions was collected on-site by the leaders and submitted. Online session attendance was recorded through Microsoft Teams software and downloaded. Demographic data, including age, sex, marital status, occupation, and household income, were assessed via a self-reported questionnaire. The ability to handle the technology was measured via the Functional Assessment of Currently Employed Technology Scale (FACETS). The FACETS was used to determine an individual's use of various information technologies (Lepkowsky, 2020). The FACETS questionnaire was completed by participants, and the score was compared with an interpretation scale. A score of 0 to 14 relating to very infrequent information technology (IT) use; 15 to 24, infrequent IT use; 25 to 34, moderate IT use; 35 to 44, frequent IT use; and 45 to 50, very frequent IT use. Finally, a questionnaire was used to determine whether the participant fell during the previous 12 weeks and the previous year. The Falls Questionnaire consisted of 12 questions to determine the frequency, resulting injury, location, and cause of falling. The first section of the questionnaire determines if the participant has fallen in the previous 12 weeks. If yes, they are required to report how many falls, if fall(s) impacted activities of daily living, if fall(s) resulted in an injury and hospitalization, where the fall(s) occurred (outdoor or indoor), and the main cause of the fall(s) including locomotion, slippery conditions, transfer, or others. The second section of the questionnaire includes the same questions as the first section, however, related to falls in the previous 12 months. The main interest for this study was the post-questionnaire regarding the last 12 weeks to assess falls during the program.

Table 1. Descriptive Characteristics of Participants.

Characteristic	Online (n=44)	In-person (n=41)
Age—years)	67.5 ± 9.1	70.5 ± 6.4
Sex—women	40 (90.9)	37 (90.2)
Occupation—retired	32 (72.7)	37 (90.2)
Marital status—married	27 (61.4)	28 (68.3)
Household income—\$30K–100K/year	24 (54.5)	24 (58.5)
# of participants who fell at least once in the last 12 months	17 (38.6)	14 (34.1)
Frequency of technology use—0–50; 50 being most frequent	34.3 ± 10.9	26.8 ± 13.4

Note. Data presented as average ± SD or N (%).

*Significant difference based on independent T-tests or Chi-square tests.

Data Analysis

Descriptive data are presented as average ± SD or *N* (%). Differences between pre and post in each group were tested via paired *T*-tests or Chi-square within groups. In contrast, differences between groups were tested using linear regression on post-FES scores adjusting for baseline FES, groups (online vs. in-person) or Chi-square. Similarly, falls during the program were tested between the two groups via a linear regression adjusting for reported falls 12 weeks before the program. Statistical analyses were done using SPSS statistical software (version 27).

Results

As presented in Table 1, a total of 85 participants completed the FES pre and post-questionnaire. The in-person group included 41 participants, 90.2% identified as women, and the mean age was 70.5 years. The online group included 44 participants, 90.9% identified as women, and the mean age was 67.5 years. One-third of all participants reported falling at least once in the previous year without any difference between groups. No significant difference was observed between groups for age, occupation, marital status, or household income. The FACETS domain scores were higher for the participants in the online group, but no significant difference was observed in the total score (Table 1) or any of the domains (Figure 1).

No significant difference was observed in fear of falling when comparing the FES score between groups before participation in the program, with an FES score of 20.7 ± 5.1 for the online group and 20.6 ± 5.1 for the in-person (Figure 2). In addition, no differences in FES scores were observed after participation in the program in either group; online (20.7 ± 5.1 – 21.8 ± 5.5) and in-person (20.6 ± 5.1 – 21.2 ± 5.3).

No significant differences were found in the number of falls reported for the year prior to participation in the program between the online and in-person groups. A total of 17 people (38.6%) reported at least a fall in the past year for the online group, compared with 14 people (34.1%) in the in-person group. Although not significant,

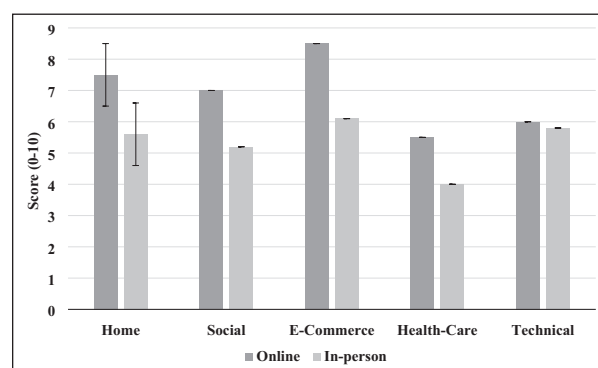


Figure 1. FACETS domain scores.

Note. Data presented as average ± SD.

a greater proportion of participants fell when participating online compared with participants performing the program in person (20.5% vs. 9.8%; $p = .14$) (Table 2). Descriptive information comparing the fallers during the program is also presented in Table 2.

Discussion

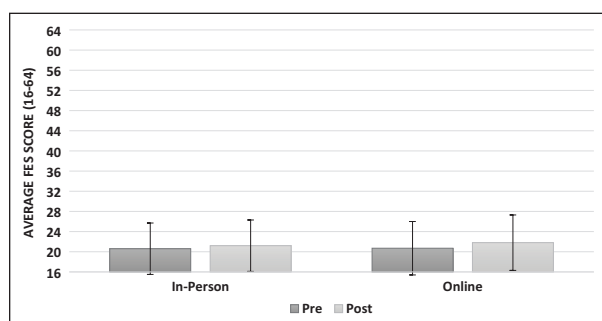
The results of the study show that after the 12-week program, no change in fear of falls was observed regardless of if participants were in the program in-person or online. Although not significant, the rate of falls during the intervention was greater for participants completing the program online.

Although other studies have reported that peer-led exercise programs can improve physical function in aging adults who participate in an exercise program (Waters et al., 2011; Wurzer et al., 2014), these changes might not translate into a reduction of the level of fear of falls. In this study, participants had a low fear of falling at baseline. As such, the null effect may be explained by a floor effect. The proposed intervention may have greater effects in those with high fear of falling at baseline. Palmgren et al., (2020) reported that fear of falls could be reduced following a structured exercise program, but their sample had a greater level of fear at baseline, with a median score of 31 on the Fall Efficacy Scale (Palmgren et al., 2020). The lowest level of fear of

Table 2. Descriptive Characteristics of Falls During the 12-Week Program.

Characteristic	Online (<i>n</i> = 9; 20.5%)	In-Person (<i>n</i> = 4; 9.8%)
Number of falls		
1	7 (77.8)	3 (75.0)
2	2 (22.2)	1 (25.0)
Injury (yes)	1 (11.1)	2 (50.0)
Hospitalization (yes)	—	—
Impact on activity of daily living (yes)	1 (11.1)	—
Location of falls		
Inside	2 (22.2)	2 (50.0)
Outside	7 (77.8)	2 (50.0)
Main cause of falls		
Locomotion	1 (11.1)	3 (75.0)
Slippery condition	5 (55.6)	—
Transfer	—	1 (25.0)
Other	3 (33.3)	—

Note. Data presented as *N* (%).

**Figure 2.** Fall Efficacy Scale scores (16–64; 64 being more fear of falls).

Note. Data presented as average \pm SD.

falls using the FES is 16, and both groups in this study had a level below 20 out of a scale from 16 to 64 at baseline, meaning that most participants reported not being at all concerned about falling when performing activities of daily living.

The fact that peer leaders offer the program could lead to the recruitment of people who are less afraid to fall at baseline. It is possible that involving primary care workers in the direct process of referral could lead to participants who are more afraid of falling at baseline and could lead to an improvement following the program. This is currently being tested with the well established Otago program (Zou et al., 2022). There was no group difference in fear of falling level at baseline, suggesting that fear of falls was not making an individual choose to participate in the program in-person or online. It was expected that participants who have chosen to participate online might have less fear of falling as they were willing to participate in an exercise program that is unsupervised, but the results of this study did not show a lower fear of falls for people participating online. This could be attributed to the fact that older adults seeking out community exercise programs may not be doing so

for fall prevention. One study previously reported that fall prevention was not an important benefit of why older adults take part in fall prevention exercise programs (Franco et al., 2016).

The data suggest more online participants fell during the 12-week program. This may be attributed to the season in which the participants were involved in the program. It is well known that the season is a strong predictor of falls, especially in countries where there are important precipitations and icy conditions in winter (Gevitz et al., 2017; Qian et al., 2019). The participants who completed the fall season session of the program (in-person) reported fewer falls. Although not significant between groups, 78% (*n* = 7) of fallers reported their fall to be outside in the online group versus 50% (*n* = 2) in the in-person group, suggesting that falls were not a direct result of the program. A properly designed study is needed to test whether the rate of falls is greater when an exercise program is offered online.

It is important to note that participants who registered for the peer-led exercise program delivered online had a moderate level of technology use on the FACETS (34.3 ± 10.9); (Lepkowsky, 2020). This is encouraging, as it shows that older adults are open to opportunities using the internet, even if it may be new or challenging. Additionally, it is possible that recruitment with staff support was a facilitator in this program, allowing for participants to engage in the program through technology use, as has been shown in other studies (Wilson et al., 2021).

Limitations

As with many studies that have been conducted during the COVID-19 pandemic, some limitations can be attributed to pandemic restrictions. Restrictions may have led to two potential effects on participants' tendency to fall. One possibility may be fewer falls, as people were more likely to be outside or going for walks

during shutdowns. Although these effects would not have led to differences between groups, it is an important consideration as it may have had an effect on the number of falls for all participants. Also, it is known that falls are complex and multifactorial (Deandrea et al., 2010). Many variables, such as frailty, medications, and use of walking aids, were not collected.

Conclusion

Most participants who registered for the program reported low fear of falling, but about one third reported falling at least once in the previous year, which is the average for the age group in Canada. The program had no effect on the fear of falling scores. The absence of difference in fear of falling scores between groups suggests that in-person exercise programs may be equally effective in reducing fear of falling when compared with offering online. This conclusion may be valuable in supporting the online offering of exercise programs for older adults, which are often more accessible physically and financially.

Declaration of Conflicting Interests

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Ethical Approval

University of New Brunswick Research Ethics Board REB file number: 2018-053.

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