

Is Technology–Based Fall Risk Assessment Associated with Technology Acceptance Among Community–Dwelling Older Adults? A Cross–Sectional Study

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Abstract: Compared to the general population, older adults experience more falls, negatively impacting their health and independence in the activities of daily living. They have many risks for falls, and there is a need to assess their risks using technology to determine appropriate interventions for them. The use of technology may lead to better outcomes in risk assessment and fall prevention. This study aimed to describe technology acceptance in community-dwelling older adults and examine the relationship between technology-based fall risk appraisal and senior technology acceptance. The study was conducted among community-dwelling older individuals in low-income settings in Central Florida. The Senior Technology Acceptance survey (n = 79) was used to obtain information about older adults' technology acceptance. The Short Fall Efficacy Scale International which measures fear of falling, and the BTrackS Balance System, which assesses balance, were used for the fall risk appraisal. Participants were categorized into four fall risk appraisal groups based on their fear of falling and balance scores, including rational, irrational, congruent, and incongruent fall risk appraisal groups. A multiple linear regression adjusted for covariates was performed.

Results found that the average senior technology acceptance score was at moderate acceptance; 41.8% of participants had excellent, 49.4% moderate, and 8.9% low senior technology acceptance. A total of 44.3% had rational, and 17.7% had congruent fall risk appraisal. We found no significant association between technology-based fall risk appraisal and senior technology acceptance. This study shows that many community-dwelling older adults accept the use of technology, and senior technology acceptance was not significantly associated with fall risk appraisal, which indicates the need to support their use of technology, including making it accessible and using it in fall risk assessment. Additionally, senior technology acceptance was not significantly associated with fall risk appraisal. This necessitates using technology to improve fall risk awareness and considering other factors affecting senior technology acceptance besides fall risk appraisal.

Keywords: Community-dwelling older adults, Fall risk, Fall risk assessment, Senior technology acceptance, Technology

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Introduction

Falls are a preventable event that negatively impacts the quality of life, especially for older adults. Between 28% and 35% of adults aged 65 years and older experience falls every year globally.¹ The highest prevalence of falls in Oceania and the United States was 34.4% and 27.9%, respectively.² More than 14 million adults 65+ years experience falls yearly in the United States.³ Meanwhile, falls have negative financial implications for the healthcare system; fall-related medical costs for older adults are about \$50 billion yearly in the United States.⁴ Likewise, the Republic of Finland spends \$3611 per fall injury, and Australia pays \$1049 for a fall-related injury.⁵

Older adults have many fall risks, including advanced age, muscle weakness, impaired gait, balance impairment, and fear of falling.⁶ Fear of falling is common among community-dwelling older adults and is a major risk for falls.⁷ Community-dwelling older adults experience fear of falling when they persistently develop concerns about falling, which limits their engagement in the activities of daily living.⁸ While community-dwelling older adults develop a fear of falling from a previous fall, it also puts them at a higher risk for subsequent falls.⁹ Balance impairment is another common risk of falls among older adults. Older adults with balance impairment may experience vertigo, staggering, fainting, and confusion.¹⁰ Unfortunately, balance impairment may have profound effects on the quality of life due to potential disability and loss of independence related to injurious falls.¹¹ Therefore, assessing the fear of falling and balancing performance in older adults is necessary.

Review of Literature

The fear of falling was measured in this study with the Short Fall Efficacy Scale International (FES-I),¹² and balance performance with the BTrackS Balance System (BBS).¹³ This novel technology objectively assesses balance. The importance and use of technology

for fall risk assessment cannot be over-emphasized due to its capability to provide accurate, reliable, and objective measurements of fall risks.¹⁴ This is necessary “to identify discrepancies in perceived and physiological fall risks”^{15(p.42)} that could increase the accuracy of fall risk assessment, including fall risk appraisal (FRA) and the effectiveness of fall prevention interventions.¹⁵ FRA was assessed using a combination of perceived fall risk (fear of falling) measured with the FES-I and physiological fall risk (balance performance) measured with the BBS for community-dwelling older adults,¹⁶ but lacked information about technology acceptance. Participants were categorized based on their FRA into four categories, including irrational FRA (high perceived despite low physiological fall risk), incongruent FRA (low perceived despite high physiological fall risk), congruent FRA (high perceived aligned with high physiological fall risk), rational FRA (low perceived aligned with low physiological fall risk).¹⁶ People might have a high fear of falling despite a low physiological fall risk or a low fear of falling despite a high physiological fall risk, which can make individuals less active.¹⁵ A study on FRA showed that about 40% of participants had maladaptive appraisal (irrational and incongruent groups), and about 60% had adaptive FRA (rational and congruent groups).¹⁵ Therefore, the combination of physiological fall risk and perceived fall risk is essential for identifying discrepancies in fall risk assessments, which is needed to plan effective interventions for at-risk older adults. However, since BBS is used in categorizing the FRA group, it is crucial to understand older adults’ acceptance of technology.

Technology acceptance is the individuals’ attitude and intention to adopt technology.¹⁷ Chen and Lou¹⁷ suggested four components of senior technology acceptance (STA): attitudinal beliefs, control beliefs, gerontological anxiety, and health conditions. Attitudinal beliefs refer to the older adults’ positive or negative attitudes toward technology and beliefs about the impact of technology on them.¹⁸ Control belief is described as individuals’ beliefs regarding the use of technology,

including their access to technology and task completion.¹⁸ Gerontechnology involves using technology to address issues and challenges with aging. Gerontological anxiety is described as a determinant of using technology that manifests in the form of fear due to older adults' perception of technology usage.¹⁸ Self-reported health conditions include general health status, vision, auditory, and mobility of older adults.¹⁸ Although there are many studies on older adults and technology, only a few studies have explicitly investigated senior technology acceptance among older adults. The STA of an accelerometer for automatic fall detection conducted in Germany found a high level of acceptance among older adults at risk for falls.¹⁹ Likewise, information communication technology was found acceptable to Korean community-dwelling older adults, including a strong association between STA and the education level and age of the study participants.²⁰ Findings from another study²¹ showed an association between smartphone use and demographic factors: age, education, gender, and ethnicity in low-income older adults. Understanding that demographic and health status could influence older adults' intention to use technology is crucial.²² This is necessary because older adults experience more falls than the general population, and there could be differences among older adults in terms of using technology²³ and their fall risk appraisal.¹⁵

Although using technology such as smartphone apps and telehealth in health care is becoming more popular among older adults,²⁴ "community-dwelling older adults reported satisfaction with technology."^{25(p.28)} It is essential to understand older adults' acceptance of the technology used in fall risk assessment, including the BBS for measuring balance performance.²⁶ This study focuses on community-dwelling older adults because there is evidence that they have been less included in previous technology studies than young adults. In addition, their thinking and decision-making differ from younger generations.¹⁸ It is also crucial to understand the relationship between technology-based FRA and STA to provide information about the need for using

technology-based fall risk assessment instead of non-technology fall risk assessment methods. Additionally, the outcomes of this study could provide insight into future research on fall risk and assessment among community-dwelling older adults.

Aims

Aim 1: Describe the technology acceptance among community-dwelling older adults.

Aim 2: Examine the relationship between technology-based fall risk appraisal and senior technology acceptance (STA).

Methods

Design: This study used a cross-sectional method. This report followed the Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) Statement: Guidelines for reporting observational studies.

Sample and Setting: This study used the primary data of 79 community-dwelling older adults participating in a fall prevention program in Central Florida. The sample included older adults aged 60 years and above who lived in the community and were cognitively healthy (Memory Impairment Screen score of between 5 and 8). Participants were excluded if they had medical conditions that hindered physical activities, such as breathing problems and the inability to stand on the balance plate for measurement and receiving treatment at a rehabilitation center. More recruitment information can be found in the study protocol by Thiamwong et al.²⁷ However, the current study is the first to focus on senior technology acceptance. A minimum of 120 participants was needed based on the power of 0.80 and a significant level of 5%. This generated a sample size of 120, and 124 community-dwelling older adults were screened based on the inclusion criteria. However, participants were excluded from the data analysis due to the missing data. Therefore, the data of 79 older adults were analyzed in this study.

Ethical Considerations and Recruitment: The University of Central Florida Institutional Review Board (STUDY00003206) approved this study on September 10, 2020. Community-dwelling older adults were recruited from their homes or senior centers through local newspapers, flyers posted in public places, word of mouth, and face-to-face recruitment during community activities.²⁸ The participants completed an informed consent form before data collection. They were also informed about the study's benefits and risks and their right to participate, not participate, or withdraw from the study at any time without penalty.

Measurements: The current study involves four instruments, described below:

Dependent Variable: Senior Technology Acceptance (STA): Technology acceptance was measured using the short form of the *Senior Technology Acceptance Model* developed by Chen and Lou¹⁷ to obtain information on community-dwelling older adults' acceptance of technology. This scale consists of four components and 14 items that seek older adults' perceptions about their attitude and intention to accept technology usage.¹⁷ The components are attitudinal beliefs, control beliefs, gerontechnology anxiety, and health conditions. **Appendix Table A1** shows the STA model content rated on a 10-point Likert scale: 1 (strongly disagree) to 10 (strongly agree) for attitudinal beliefs, control beliefs, and gerontechnology anxiety. Health condition was measured with a 10-point Likert scale: 1 (very poor, very uneasy, or very unsatisfied) to 10 (very good, very easy, or very satisfied). The total score ranges from 14 to 140. We re-arranged the Likert scale for gerontological anxiety items (Q3.1 and Q3.2) of the STA model since the items were written as negative statements. For example, in Q3.1, "You feel apprehensive about using technology," and Q3.2, "You hesitate to use the technology for fear of making mistakes you cannot correct." We represented strongly disagree as "10" and strongly agree as "1."

The internal consistency of the four components of the STA calculated in this study was Cronbach's

alpha 0.83. We categorized the acceptance of technology by older adults into four categories: poor acceptance, low acceptance, moderate acceptance, and excellent acceptance, with the following scores for each category (poor acceptance: 14–45; low acceptance: 46–77; moderate acceptance: 78–109; excellent acceptance: 110–140).

Independent Variable – Fear of falling: *The Short Fall Efficacy Scale International FES-I*¹² was used to measure concern as a proxy measure of fear of falling. This scale consists of seven items: 1) getting dressed or undressed, 2) taking a bath or shower, 3) getting in or out of a chair, 4) going up or down stairs, 5) reaching for something above your head or on the ground, 6) walking up or down a slope, and 7) going out to a social event (e.g., religious service, family gathering or club meeting).¹² The items are rated on a 4-point Likert scale from 1 (not at all concerned) to 4 (very concerned). A score of 7–10 indicates a low fear of falling, and a score of 11–28 indicates a high fear of falling. This instrument has been validated and has a Cronbach's alpha = 0.97 and ICC = 0.98 among older adults.²⁹ The reliability of FES-I in this study was 0.89.

Balance Performance: This was measured by the *Portable BTrack Balance System (BBS)*,³⁰ a technology that provides objective and reliable measurement of balance performance.³¹ It comprises a balance plate, balance software, and a computer.³⁰ BBS includes the BTrackS Balance Test (BBT), which measures the balance performance of community-dwelling older adults. It compares the score to normative data in the normative database according to age and sex to calculate their percentile ranking.³⁰ BBT uses percentile ranking from 0 to 100, where a score of 0–30 indicates a low fall risk for normal balance, and a score ≥ 31 indicates a moderate or high fall risk for poor balance.³² The BBT has been validated for older adults (Pearson correlation; $r = 0.90$), and the test-retest reliability was found to be excellent (0.83).³¹

The Fall Risk Appraisal Matrix: Based on participants' scores of fear of falling and balance performance from

the current study, the participants were grouped into four categories according to the matrix created by Thiamwong et al.,¹⁶ including 1) irrational FRA group with high perceived fall risk (i.e., FES-I) despite low physiological fall risk (i.e., BBS); 2) Incongruent FRA group with low FES-I despite high BBS; 3) Rational FRA group with low FES-I aligned with low BBS; and 4) Congruent FRA group with high FES-I aligned with high BBS. Although there are many factors and instruments to assess fear of falling and balance, the researchers used the Short FES-I and the BBS to measure fear of falling and balance, respectively, because they are reliable instruments. FES-I has been validated and found reliable among older adults,²⁹ likewise BBS.³¹

Covariates: Sociodemographic variables such as age, sex (male, female), race/ethnicity (White, African American, Hispanic, and Asian), financial status (less than adequate, just enough, and more than adequate), and education (less than high school, high school, and college or above) were included in the study. The covariate variables were selected through the literature review. According to a mapping review conducted by Schroeder et al.,²² these factors may contribute to older adults' acceptance of technology, and their fall risk, demographics, and health status could influence their intention to use technology. Also, we referred to previous research documenting the association between STA and those sociodemographic variables.²²

Data Collection: The primary data for the STA and FRA were collected concurrently from the same participant in this study as part of the data collection for the National Institute of Health project (R03AG06799) during the COVID-19 pandemic. The pandemic was marked by social and physical distancing, which impacted community-dwelling older adults' social activities, and many of them feared going out to avoid contracting the coronavirus.³³ The research team contacted the participants in their homes to complete the questionnaires. The authors prevented bias by making the study open to older adults living in low-income settings in Central Florida. The data were collected at

the senior independent apartments' meeting rooms and the University of Central Florida College of Nursing in 2020–2022.

Statistical Analysis: Descriptive statistics were performed; mean (M) and standard deviation (SD) were presented for continuous variables, and the number of study participants (n) and percentage (%) of the total sample size were presented for categorical variables. Statistical analyses were conducted at a significant level of 0.05 and a power of 0.80. This generated a sample size of 120, and 124 community-dwelling older adults were screened based on the inclusion criteria. The final sample was 79. Since the outcome variable (STA) is a continuous variable and the independent variable and covariates were categorical, with some having two categories and others more than two categories, independent samples t-test and one-way analysis of variance (ANOVA) were conducted, respectively. A multiple linear regression model was conducted using the Enter method to investigate the association between technologically based fall risk assessment and STA, adjusted for sociodemographics among study participants. Statistical analyses were performed at a significant level of 0.05 using SPSS version 28.0. Moreover, it is noted that, in the regression model, most predictors are dummy variables, which are coded as 0 and 1. When we tested the assumptions of normality, homoscedasticity, and multicollinearity using each dummy variable and age variable (continuous), those assumptions were met in this study. Moreover, there were no outliers in the dummy variable and age variable.

Results

Participants' characteristics

Table 1 shows the descriptive statistics of the participants. A total of 79 older adults in the current study had a mean age of 74.47 (SD = 6.99), ranging from 60 to 96. In terms of finances, of 79 participants, slightly less than half (48.1%, n = 38) identified their

finances as more than adequate, followed by participants who identified their finances as just enough (41.7%, $n = 33$), and 10.1% ($n = 8$) of participants identified as less than enough. There were more female participants (77.2%, $n = 61$) than males (22.8%, $n = 18$). Most participants identified as White (69.6%, $n = 55$), 7.6% ($n = 6$) identified as African American, 3.8% ($n = 3$) identified as Asian, and 19.0% identified as Hispanic ($n = 15$). Most participants had a college-level education (72.2%, $n = 57$), one-fourth had a high school

education (25.3%, $n = 20$), and 2.5% ($n = 2$) had an education lower than high school. The total mean STA score was 104.63 (SD = 18.69); this indicates moderate acceptance based on our categorization of the STA (moderate acceptance: 78–109). Regarding the FRA matrix (BBT–FES–I scores categories), slightly less than half of the participants were categorized as rational FRA (44.3%, $n = 35$), followed by participants with irrational (20.3%, $n = 16$), incongruent (17.7%, $n = 14$) and congruent (17.7%, $n = 14$).

Table 1. Descriptives and frequencies of participants' characteristics (N = 79)

Characteristics	Frequency	Percentage
Age (years), Mean = 74.47, SD = 6.99, Min–Max = 60–96		
Gender		
Male	18	22.8
Female	61	77.2
Race		
White	55	69.6
African American	6	7.6
Asian	3	3.8
Hispanic	15	19.0
Financial status		
Less than adequate	8	10.1
Just enough	33	41.7
More than adequate	38	48.1
Education attainment		
Lower than high school	2	2.5
High school	20	25.3
College or above	57	72.2
BBT, Mean = 29.83, SD = 14.33, Min–Max = 0–100		
Fear of falling, Mean = 10.38, SD = 4.16, Min–Max = 7–28		
STA, Mean = 104.63, SD = 18.69, Min–Max = 14–140		
Poor acceptance, Min–Max = 14–45	0	0.0
Low acceptance, Min–Max = 46–77	7	8.9
Moderate acceptance, Min–Max = 78–109	39	49.4
Excellent acceptance, Min–Max = 110–140	33	41.8
Fall risk appraisal matrix		
Rational ^a	35	44.3
Incongruent ^b	14	17.7
Irrational ^c	16	20.3
Congruent ^d	14	17.7

Note. BBT = BTrackS Balance Test, STA = Senior technology acceptance

^aCategory 1: Low FES–I scores_Low BBT scores; ^bCategory 2: Low FES–I scores_High BBT scores;

^cCategory 3: High FES–I score_Low BBT scores; ^dCategory 4: High FES–I scores_High BBT scores

Table 2 shows the results of the t-test and analysis of variance (ANOVA) tests of the STA scores by sociodemographic variables and the FRA matrix. Regarding sex, male participants obtained a non-statistically higher mean STA score of 105.67 (SD = 17.08) than females with mean STA scores of 104.33 (SD = 19.26), $p = 0.791$. There was a marginally significant difference in the mean STA scores based on education level ($p = 0.077$). The community-dwelling older adults with a college education or higher obtained the highest mean STA score

of 106.89 (SD = 17.48), and those with an education level lower than high school received the lowest mean STA score of 80.50 (SD = 37.48). There was a statistically significant difference in the mean STA scores based on finances ($p < 0.05$); participants with more than adequate finances obtained the highest mean STA score of 110.08 (SD = 18.79), and the participants with lower than adequate finances obtained the lowest mean STA score of 91.75 (SD = 13.00). There was no statistically significant difference in the STA scores of the FRA groups ($p = 0.530$).

Table 2. Bivariate analysis between participants' characteristics and senior technology acceptance: categories differences in STA (N = 79)

Characteristics	Mean	SD	p-value
Gender			0.791
Male	105.67	17.08	
Female	104.33	19.26	
Race			0.403
White	106.47	18.74	
African American	101.50	18.33	
Asian	89.33	22.37	
Hispanic	102.20	18.06	
Financial status			0.017
Less than adequate	91.75	13.00	
Just enough	101.48	17.87	
More than adequate	110.08	18.79	
Education attainment			0.077
Lower than high school	80.50	37.48	
High school	100.60	19.11	
College or above	106.89	17.48	
Fall risk appraisal matrix			0.530
Rational ^a	107.51	19.86	
Incongruent ^b	98.79	26.41	
Irrational ^c	103.63	11.83	
Congruent ^d	104.43	12.01	

Note. p-values were from independent samples t-test and one way ANOVA.

^aCategory 1: Low FES-I scores_Low BBT scores; ^bCategory 2: Low FES-I scores_High BBT scores;

^cCategory 3: High FES-I score_Low BBT scores; ^dCategory 4: High FES-I scores_High BBT scores

Table 3 shows the regression results of the STA with demographic characteristics and the FRA matrix. There was no statistically significant difference between the STA score and having irrational FRA, having congruent FRA, or having incongruent FRA compared to having rational FRA. Regarding financial status, there was a

significant difference between STA scores and having less than adequate finance ($B = -22.52$) and a non-significant difference in having just enough finance ($B = -6.68$) compared to those who reported more than adequate finance. There was no statistically significant difference between STA and age, education level, and race.

Table 3. Factors associated with STA based on a multiple linear regression model (N = 79)

Characteristics	B	SE	t	p-value
Constant	138.97	23.71	5.86	
Age	-0.39	0.32	-1.24	0.220
Gender				
Female	0.70	5.11	0.14	0.892
Race/ Ethnicity				
African American	1.77	8.82	0.20	0.841
Asian	-14.57	11.52	-1.27	0.210
Hispanic	0.75	5.99	0.12	0.901
Education attainment				
Lower than high school	-22.84	14.45	-1.58	0.119
High school	-2.49	5.58	-0.45	0.657
Perceived financial situation				
Less than adequate	-22.52	8.88	-2.54	0.014
Just enough	-6.68	5.49	-1.22	0.228
Fall risk reappraisal matrix				
Incongruent ^a	-3.32	6.14	-0.54	0.590
Irrational ^b	3.80	6.24	0.61	0.544
Congruent ^c	4.67	6.33	0.74	0.463

Note. In each categorical variable, other values are recoded as 0. ^aCategory 2: Low FES-I scores_High BBT scores;

^bCategory 3: High FES-I score_Low BBT scores; ^cCategory 4: High FES-I scores_High BBT scores.

Discussion

We examined the acceptance of technology by community-dwelling older adults and the association between the dependent variable (STA) and FRA (FES-I and BBT scores). This research found that most participants had moderate or excellent STA. This may be related to using technology, including telemedicine, that was encouraged during the COVID-19 pandemic due to social distancing and other factors.³⁴ Therefore, the participants may have found BBS easier to use and acceptable for measuring balance performance. Additionally, there is a need to support participants in each FRA group. All four groups (rational, irrational, congruent, and incongruent) would benefit from physio-feedback and cognitive reframing to assist community-dwelling older adults in improving their FRA and fall risk.³⁵ For example, support for irrational FRAs needs to focus on balance confidence, while rational FRAs need to continue with regular physical

exercise. Incongruent FRAs need to focus on fall risk awareness and understand individual fall risk using the CDC checklist. In contrast, congruent FRAs must focus on fall risk awareness and exercise engagement.³⁵

Moreover, no statistically significant association existed between the FRA groups and the STA scores. However, previous studies showed that FRA groups like accelerometer-based physical activity³⁶ and some indicators of body composition using the Bioelectrical Impedance Analysis.³⁷ Therefore, it is vital to use technology in fall risk assessment and prevention among community-dwelling older adults to increase their awareness of fall risk. In addition, our findings also show that some demographic factors (age, education level, race, and sex) were not associated with STA, which implies these factors did not significantly contribute to STA. Although previous studies have found telehealth/digital disparities in demographic factors among older adults,³⁸ of the higher STAs in our study population may have contributed to our observed results. Other

factors may have contributed to the findings, including a small sample size of 79 participants and the distribution of the demographic characteristics, as most participants were female, white, and had more than a high school education. More research is needed to investigate the findings further.

Furthermore, this study shows that older adults with poorer perceived financial status were significantly associated with lower STA. This aligns with the findings from Chan et al.,³⁹ which showed that the perceived cost of technology negatively impacted its use among low-income older adults, partly due to their concern about paying for technology. Older adults aware of their financial difficulties may feel burdened by the affordability of paying for and maintaining technological devices.⁴⁰ In addition to the perceived economic status, it has been documented that older adults' actual financial hardship may be associated with adopting technology.⁴¹ Moreover, given that many need-based applications are available only online, the lack of resources and opportunities to use technology may cause a lower STA of low-income older adults. Therefore, to enhance low-income older adults' affordability and accessibility to technology, community-based financial support for technology devices would be facilitated, and interventions to train how to use technology devices and applications would be provided.

Strengths and Limitations

To our knowledge, this is the first study that examined the association between STA and FRA of community-dwelling older adults. However, the study was conducted during the COVID-19 pandemic, which could have limited the enrollment of some older adults due to social distancing. Meanwhile, the study was conducted among community-dwelling older adults in the U.S.; therefore, it is cautionary to generalize the findings to other parts of the world of older adults. This was a cross-sectional study; thus, the findings

did not go beyond the associations between the STA and FRA groups and covariates investigated in this study. With a small study sample, the generalizability is limited. A larger sample size with a more racially diverse population may yield findings that could better answer the research questions addressed in this study. Additionally, more studies are needed to address the study's limitations and determine effective strategies to encourage older adults to use technology in fall prevention interventions and improve their well-being.

Conclusion

Even though each FRA group was represented in this study, the lack of a significant association between STA and FRA necessitates considering other factors that may influence the association, including sociodemographic factors not included in the current study besides financial status. Providers should maximize their use of fall risk assessment regardless of their FRA group to assist community-dwelling older adults with fall risk assessment and as part of fall prevention efforts to ensure they are aware of their fall risk.

Implications for Nursing

Community-dwelling older adults demonstrated moderate to excellent acceptance of technology, indicating the importance of supporting their use by making it available and accessible to them. This should include financial support, which is crucial to their acceptance of technology, and education about their fall risk appraisal with opportunities for improvement. Healthcare providers, including community health nurses, should consider using technology in the fall risk assessment of older adults to improve patients' fall risk awareness, as community-dwelling older adults seem to accept technology. Future studies should include a larger sample size and more racially diverse community-dwelling older adults.

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Appendix

Appendix A. Senior technology acceptance model

Item no.	Variable name	Item	Response options	Response code
Attitudinal beliefs				
Q1.1	STA_1	Using technology would enhance your effectiveness in daily activities.	Strongly disagree	1
				2
				3
				4
				5
				6
				7
				8
				9
				Strongly agree
Q1.2	STA_2	You would find technology is useful in your daily activities.	Strongly disagree	1
				2
				3
				4
				5
				6
				7
				8
				9
				Strongly agree
Q1.3	STA_3	You like the idea of using technology.	Strongly disagree	1
				2
				3
				4
				5
				6
				7
				8
				9
				Strongly agree
Control beliefs				
Q2.1	STA_4	You could be skillful at using technology.	Strongly disagree	1
				2
				3
				4
				5
				6
				7
				8
				9
				Strongly agree

Appendix A. Senior technology acceptance model (Cont.)

Item no.	Variable name	Item	Response options	Response code
Q2.2	STA_5	You could complete a task using technology if there is someone to demonstrate how.	Strongly disagree	1
				2
				3
				4
				5
				6
				7
				8
				9
				Strongly agree
Q2.3	STA_6	Your financial status does not limit your activities in using technology.	Strongly disagree	1
				2
				3
				4
				5
				6
				7
				8
				9
				Strongly agree
Q2.4	STA_7	When you want or need to use technology, it is accessible to you.	Strongly disagree	1
				2
				3
				4
				5
				6
				7
				8
				9
				Strongly agree
Gerontechnology anxiety				
Q3.1	STA_8	You feel apprehensive about using technology.	Strongly disagree	10
				9
				8
				7
				6
				5
				4
				3
				2
				Strongly agree

Appendix A. Senior technology acceptance model (Cont.)

Item no.	Variable name	Item	Response options	Response code
Q3.2	STA_9	You hesitate to use the technology for fear of making mistakes you cannot correct.	Strongly disagree	10
				9
				8
				7
				6
				5
				4
				3
				2
				Strongly agree
Health conditions				
Q4.1	STA_10	How are your general health conditions?	Very poor	1
				2
				3
				4
				5
				6
				7
				8
				9
				Very Good
Q4.2	STA_11	How well are you able to concentrate?	Very uneasy	1
				2
				3
				4
				5
				6
				7
				8
				9
				Very easy
Q4.3	STA_12	How satisfied are you with your personal relationships?	Very Unsatisfied	1
				2
				3
				4
				5
				6
				7
				8
				9
				Very satisfied

Appendix A. Senior technology acceptance model (Cont.)

Item no.	Variable name	Item	Response options	Response code
Q4.4	STA_13	How satisfied are you with the support received from friends and family?	Very Unsatisfied	1
				2
				3
				4
				5
				6
				7
				8
				9
			Very satisfied	10
Q4.5	STA_14	How satisfied are you with your quality of life?	Very Unsatisfied	1
				2
				3
				4
				5
				6
				7
				8
				9
			Very satisfied	10

การใช้เทคโนโลยีประเมินความเสี่ยงต่อการล้ม มีความสัมพันธ์การยอมรับเทคโนโลยีในผู้สูงอายุที่อาศัยในชุมชนหรือไม่ : การศึกษาแบบภาคตัดขวาง

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บทคัดย่อ: ผู้สูงอายุมีปัญหาการล้มมากกว่าประชากรกลุ่มอื่น การหกล้มในผู้สูงอายุส่งผลกระทบต่อสุขภาพและความสามารถในการทำกิจวัตรประจำวัน ผู้สูงอายุมีปัจจัยเสี่ยงต่อการล้มหลายปัจจัย จึงมีความจำเป็นที่จะต้องประเมินความเสี่ยงโดยเฉพาะการใช้เทคโนโลยี เพื่อนำไปสู่การออกแบบกิจกรรมที่เหมาะสมสำหรับผู้สูงอายุที่มีความเสี่ยงต่อการหกล้ม ทั้งนี้ การใช้เทคโนโลยีอาจนำไปสู่ผลลัพธ์ที่ดีขึ้นในการประเมินความเสี่ยงและการป้องกันการล้ม การศึกษานี้มีวัตถุประสงค์เพื่อศึกษาการยอมรับเทคโนโลยีและตรวจสอบความสัมพันธ์ระหว่างการประเมินความเสี่ยงต่อการหกล้มโดยใช้เทคโนโลยีและการยอมรับเทคโนโลยีในผู้สูงอายุที่อาศัยในชุมชน กลุ่มตัวอย่าง คือ ผู้สูงอายุ 79 รายที่อาศัยในชุมชนในพื้นที่รายได้ต่ำของเซนต์หลุยส์พาราไดส์ เก็บรวบรวมข้อมูลด้วยแบบประเมินการยอมรับเทคโนโลยีของผู้สูงอายุ ประเมินความเสี่ยงต่อการหกล้ม ได้แก่ แบบประเมินความกลัวการล้มสากลฉบับสั้น และเครื่องวัดระบบสมดุล BTrackS ในการประเมินความเสี่ยงต่อการล้ม ผู้เข้าร่วมวิจัยถูกจัดเป็นความเสี่ยงสี่กลุ่ม ตามคะแนนการประเมินความกลัวการล้มและความสมดุล ได้แก่ การประเมินความเสี่ยงต่อการหกล้มที่สมเหตุสมผล ไม่สมเหตุสมผล สอดคล้องกัน และไม่สอดคล้องกัน วิเคราะห์ข้อมูลด้วยการถดถอยเชิงเส้นพหุคูณที่ปรับตัวแปรร่วม

ผลการศึกษา พบว่า คะแนนเฉลี่ยการยอมรับเทคโนโลยีของผู้สูงอายุอยู่ในระดับการยอมรับปานกลาง โดยร้อยละ 41.8 ของผู้เข้าร่วมวิจัยมีการยอมรับเทคโนโลยีในระดับดีเยี่ยม ร้อยละ 49.4 ยอมรับในระดับปานกลาง และร้อยละ 8.9 ยอมรับในระดับต่ำ จากผู้เข้าร่วมวิจัยทั้งหมด พบว่า ร้อยละ 44.3 จัดอยู่ในกลุ่มประเมินความเสี่ยงต่อการล้มที่สมเหตุสมผล และ ร้อยละ 17.7 จัดอยู่ในกลุ่มการประเมินความเสี่ยงต่อการล้มที่สอดคล้องกัน โดยไม่พบความสัมพันธ์อย่างมีนัยสำคัญระหว่างการประเมินความเสี่ยงต่อการล้มโดยใช้เทคโนโลยีและการยอมรับเทคโนโลยีของผู้สูงอายุ ซึ่งสะท้อนให้เห็นถึงควมมีการสนับสนุนการใช้เทคโนโลยีทั้งการเข้าถึงและการประเมินความเสี่ยงในการหกล้ม นอกจากนี้ การยอมรับเทคโนโลยีของผู้สูงอายุที่ไม่มีความสัมพันธ์กับการประเมินความเสี่ยงต่อการล้มบ่งชี้ถึงความจำเป็นในการสนับสนุนการใช้เทคโนโลยีในผู้สูงอายุในการสร้างความตระหนักเกี่ยวกับความเสี่ยงต่อการล้ม ร่วมกับพิจารณาปัจจัยอื่น ๆ ที่ส่งผลต่อการยอมรับเทคโนโลยีของผู้สูงอายุนอกเหนือจากการประเมินความเสี่ยงต่อการล้ม

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คำสำคัญ: ผู้สูงอายุที่อาศัยในชุมชน ความเสี่ยงต่อการล้ม การประเมินความเสี่ยงต่อการล้ม การยอมรับเทคโนโลยีของผู้สูงอายุ เทคโนโลยี

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