

# The Perceived Usefulness of Virtual Reality for Disaster Preparedness Among Older Adults

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## ABSTRACT

This paper explores the perceptions and potential behavioral intention of older adults in using a virtual reality (VR) game (*All Hazards*) for disaster preparedness. A user-centered experiment was conducted at sites in Brooklyn, New York, and Atlanta, Georgia. Twenty older adults participated in the experiment across both locations. Results indicate that the game effectively enhanced their overall perception on ease of use, especially in areas related to learning and skill development. It also suggests a clear trend toward increased comfort and confidence in using *All Hazards*, with the greatest improvements seen in participants' confidence and sense of learning. Participants showed greater confidence in their technological abilities after the experiment. Overall, participants perceived the game as easy to use and felt that their learning and gaming skills had improved through the experiment. Future work is discussed at the end of the paper.

## Keywords

Disaster preparedness, virtual reality, older adults, game design, user experiment

## INTRODUCTION

Despite increased public awareness of disasters, our communities are underprepared. In a recent FEMA study, less than half (45%) of adults self-reported being prepared for a disaster (FEMA, 2023). This can undermine the resilience of socially vulnerable populations, who are often disproportionately impacted during disasters. For example, less than 30% of older adults ( $\geq 60$ ) indicated they were prepared for a disaster (Davis, 2022). The older adult population in the US is projected to reach 20% by 2040, and the preparedness gaps and the resultant negative impacts are expected to remain substantial (Gamble et al., 2013).

While unpreparedness is widely known and measured, the data has been collected in limited ways. The primary methods to collect data on disaster preparedness have relied on self-report surveys, often after a particular disaster has occurred. These methods have common limitations, including reliance on the memories of respondents (retrospective memory bias) and testing preparedness for only one hazard (and not multiple). However, emergency management professionals have increasingly employed games and simulations to increase awareness of multiple

hazards and provide preparedness information (Clay et al. 2020).

The games used for preparedness range from low-tech board games to high-tech computer games. Traditional board games present notable limitations for older adults, including small font sizes, difficulty hearing other players, and the cognitive load of remembering complex rules can hinder accessibility and reduce the effectiveness of the intervention (Nakanishi et al., 2023). With the rapid growth of the internet and advanced technology, computer games have extended beyond entertainment to become valuable tools for learning, research, education, health, and cultural understanding (Babu et al., 2018; Mendes et al., 2022; Sukirman et al., 2019).

Digital and virtual reality (VR) disaster simulations have emerged as powerful tools for immersive preparedness training across many domains, including health maintenance, rehabilitation, education, workplace training, diversity and inclusion, and emergency management (Ghali, 2012). The evolution of games from traditional board games to immersive VR simulations has played an instrumental role in advancing hazard preparedness (Mossoux et al., 2016; Sukirman et al., 2019; Tarek, 2018). VR can help people better understand disaster risks and respond appropriately (Tarek, 2018). In Thailand and Japan, virtual and augmented reality have been used to improve disaster risk reduction in schools (Kemavuthanon & Uchida, 2025; Itamiya 2024). Moreover, VR games have been applied to a range of disaster scenarios, including floods, earthquakes, and fires, demonstrating their versatility in fostering strategic thinking, operational coordination, and psychological readiness (Ducatti et al., 2025; Fu & Li, 2024).

In this project, we designed a VR game called *All Hazards* to improve preparedness for multiple disasters and tested the effectiveness of this game with older adults. The project has multiple research questions exploring variations in disaster decision-making, the influence of emotional compared to factual framing in decision-making, the feasibility of VR for improving disaster preparedness, and the acceptability of the same. Since the study is ongoing, in this paper, we address the following research question (RQ) as it is answerable at this stage of the study:

RQ: How do older adults perceive the *All Hazards* VR game in terms of its perceived usefulness and ease of use?

The paper makes the following contributions to the field, it: (1) contributes to research on emerging technology for individual preparedness employing VR in an experiment; (2) presents the design and development of a VR game for disaster preparedness; and (3) evaluates the effectiveness of the *All Hazards* game through user experiments, and reports findings from these users.

## BACKGROUND

### Games Designed for Disasters

Gaming has increasingly been used for disaster training. Traditional board games have demonstrated significant potential in disaster education, especially among older adults; a demographic often overlooked in preparedness initiatives (Nakanishi et al., 2023). In Japan, Ki-chan's Disaster Evacuation Game was designed to improve disaster readiness among elderly individuals, including those with cognitive or mobility disabilities (Nakanishi et al., 2023). The game facilitated learning through social interaction and scenario-based play, helping participants internalize evacuation procedures and hazard awareness (Nakanishi et al., 2023). Meanwhile, computer games are increasingly recognized as powerful instruments for raising awareness and preparing individuals and communities for real-world crises, including disasters (Mossoux et al., 2016; Nowak et al., 2018).

Virtual Reality (VR) has been used as a means to immerse the 'gamers' in board game or computer game approach for training. VR disaster simulations have proven to be effective tools for immersive preparedness education and training by offering dynamic environments where users can engage with realistic scenarios, receive instant feedback, and adapt their strategies in real time. For example, Tsai et al. (2015) emphasizes that such games enhance motivation and learning outcomes by providing enjoyable, interactive experiences that mirror real-world crises. In Bangladesh, a VR simulation of the 2015 Nepal earthquake allowed participants with limited formal education to intuitively understand the severity of the disaster and adopt appropriate response behaviors (Tarek, 2018). Increasingly, VR simulations are being adopted across diverse contexts to improve disaster preparedness among elderly populations, offering more accessible and adaptable formats (Nakanishi et al., 2023). In Japan, VR has been used to improve disaster awareness, evacuation, and training for cascading disasters such as earthquakes that cause tsunamis (Ooi et al., 2019; Takeichi et al., 2020). While VR has been used as a research and training tool, its application in disaster training has often focused on emergency response professionals, not the public, and has focused on preparedness for one type of hazard (or cascading hazards). Increasingly, VR simulations are being adopted across diverse contexts to improve disaster preparedness among elderly populations, offering more

accessible and adaptable formats (Nakanishi et al., 2023).

### Current Usage of VR as a Training Method for Older Adults

Older adults in the U.S. are expected to reside in places that may be more affected by the climate, including coastal zones and large metropolitan areas (Gamble et al, 2013; Beltran et al., 2022). They are also more vulnerable during heatwaves and winter weather events (Loughnan et al., 2015; Gascoigne et al. 2010; Rudge & Gilchrist, 2005). During flooding scenarios, older adults may be reluctant to leave due to social connections in the area (Brockie & Miller, 2017). Similarly, there is evidence that few older adults develop plans for evacuation from a hurricane because of their social connections (Coronese et al., 2019). Those living alone or with low income often need more assistance during evacuation, though awareness and preparedness can reduce this vulnerability (Arimura et al., 2018; Koloushani et al., 2022). Therefore, various preparedness approaches have been developed to better train and support older adults by considering their needs at every stage of disaster planning to help prevent disparities in outcomes.

Virtual reality has been increasingly used with older adults. Training in VR increased the retention of information and task performance in both novices and more experienced workers (Manca et al., 2013) and in memory encoding and recall of newly learned routes in both older adults and young adults (Lokka et al., 2018). VR has been found to improve the interview skills of people with schizophrenia and increase the length of their employment (Smith et al. 2015). In the health domain, VR use with older adults was shown to be efficacious in the treatment of people who are at risk of falling (Rendon et al., 2012), to increase cognitive functioning while also boosting motivation and mood (Rose et al., 2015; Zelinski & Reyes, 2009; Belchior et al., 2019; Chan et al., 2009), and to improve muscle strength and control (Kim et al., 2013). VR strengthens internal validity and replicability, creates realistic environments that enhance ecological validity, and supports the transfer of skills to real world practice (Kinaterder et al., 2015). Further, VR supports participant safety, flexible/adaptive environments that are highly controllable, immediate and real-time feedback, and objective and precise measurements of behavior and psychophysiological states (Kinaterder et al., 2015). Notably, participatory design approaches empower older adults to co-create meaningful VR environments supporting social participation and technology adoption (Baker et al., 2019).

### THEORETICAL MODEL

We adopted the Technology Acceptance Model (TAM) (Davis, 1989) (see Figure 1) to examine the perceived ease of use and perceived usefulness of VR for disaster preparedness and ascertain behavioral intentions. The TAM model is a widely used theoretical framework for understanding how users adopt and use new technologies. TAM suggests that perceived usefulness and perceived ease of use are the primary factors influencing users' attitudes and intentions toward adopting technology. Research has indicated that perceived usefulness, ease of use, perceived enjoyment, and comfort are key determinants of acceptance of VR among older adults (Roberts et al., 2019; Syed-Abdul, 2019). In the present study, TAM guides us in identifying older adults' perceived ease of use and perceived usefulness of *All Hazards*.

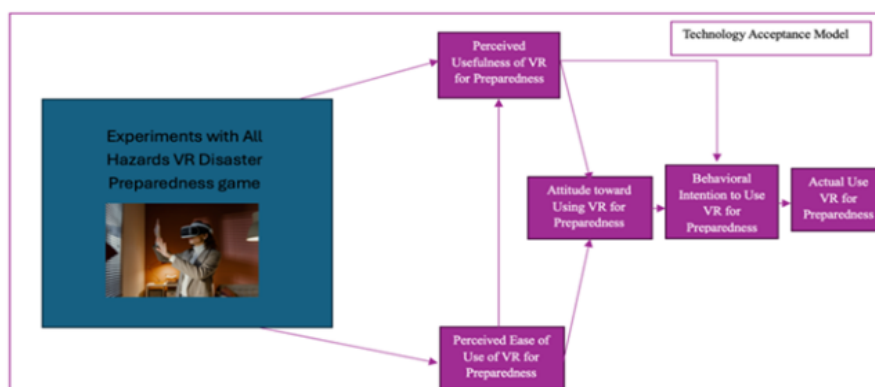


Figure 1. Technology Acceptance Model (Adapted from Davis, 1989)

### ALL HAZARDS GAME DESIGN

Within *All Hazards*, users find themselves in a home setting where they can move around and explore an animated environment. The setting was designed to be an easily traversed environment for experiments, so as not to confound the experimental data. The 1-bedroom, 1-bathroom apartment includes an open concept kitchen, living,

and dining space. Users can look outside through the windows, where worsening conditions can be observed. The game objects include furniture, lights, a TV, a cell phone, general kitchen appliances, and preparedness items such as canned foods, flashlights, and bottled water. The components (for the game objects) determine the position, rotation, and scale of the objects; only reasonable objects can be rotated at 360°. The VR space is primarily animated. However, real video clips are used for television in the environment.

## EXPERIMENTAL METHODOLOGY

This study employed a quasi-experimental research design where data is collected using pre and posttest measures while the participant is in the game (e.g., eye-tracking, actions taken, duration). The team screened participants for eligibility using the following inclusion criteria: self-identified as an adult aged 60 years or older; holding their consent; self-identified reading at an 8th-grade level; having a minimum of 20/70 corrected vision, an unrestricted visual field, no diagnosed nystagmus, and no known motion sickness.

The procedures for this user-centered experiment included: informed consent, pre-test survey, VR tutorial, two disaster scenarios in VR, a post-test (immediate), and a 6-month posttest (see Figure 2). Each participant was informed of the procedures and purpose of this study and signed a consent form. The study was approved by the University's Institutional Review Boards (IRB) # 24X153 and #H24362. The pre-test survey collected individual background information, assessed their perception of VR for disaster preparedness, and their baseline perceived preparedness and risk perception levels. The posttest-immediate assessed their perception of VR for disaster preparedness. Each participant completed the within-groups experiment to test perception of use, where all participants were provided with an immersive VR tutorial and two disaster scenarios (the order of which was randomized to mitigate testing effects). For the tutorial and the disaster scenarios, participants used a VR headset and two hand controllers. Breaks were strategically set after the tutorial and between the two scenarios. Each participant received a gift card incentive worth \$50.

Three experimenters were used during the experiment. One experimenter was responsible for intake to assist the participants through the consent form and the pre-test survey. A second experimenter was responsible solely for the VR game. The second experimenter also guided the participant in using the game. The third experimenter was responsible for making observations, taking notes, keeping time, and attending to the participant.

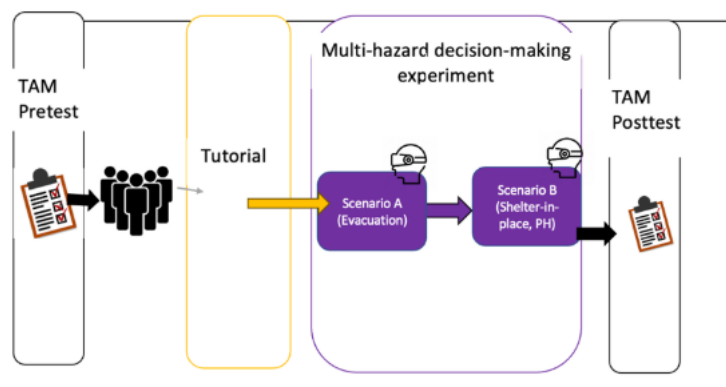


Figure 2. Experimental Design for Testing the TAM Model

## RESULTS

### Demographics

In total, twenty participants completed the experiments in Brooklyn, NY, or Atlanta, GA in July 2025. For a within-groups experiment, 20 participants are valid when one condition is tested, such as in this case where we are testing the perception of use for VR to increase disaster preparedness (Creswell & Creswell, 2018). In Table 1, the participants were predominantly female (85%), with the majority aged between 70 and 79 (80%). The percentage of women in the study was expected to be higher than men given there are more women than men older adults in the US (ACL, 2023). In terms of ethnicity, one participant identified as having Hispanic, Latino, or Spanish origin, while half the sample identified as Black, 40% as White, and the remaining participants chose not to disclose their race. Regarding educational attainment, 65% of participants reported holding a bachelor's or

master's degree. Household income varied across participants, with 25% choosing not to disclose their income; however, responses represented a range of income brackets. Concerning disability status, 35% of participants identified as having a disability, with chronic (20%) and hearing (20%) conditions reported most frequently.

**Table 1. Demographic Statistics**

Variable	Unique Value	N	%
Age	75-79	9	45
	70-74	7	35
	60-64	2	10
	65-69	1	5
	80-85	1	5
Gender	Female	17	85
	Male	3	15
Latino/Hispanic	Yes, Puerto Rican	1	5
	Black, African American, or West Indian	10	50
	White or European	8	40
Race	Prefer not to say	2	10
	Bachelor's degree	7	35
	Master's degree	6	30
	High school diploma or GED	2	10
	Some technical school or college, but no degree	2	10
	Doctoral degree or professional degree (PhD, MD, JD)	2	10
	Associate's degree or technical school diploma	1	5
Education	Prefer not to say	5	25
	\$75,000-\$99,999	3	15
	\$15,000-\$24,999	3	15
	\$150,000-\$174,999	3	15
	\$50,000-\$74,999	2	10
	\$100,000-\$149,999	1	5
	\$200,000 and up	1	5
	Under \$10,000	1	5
	\$35,000 - \$49,999	1	5
Income	1	10	50
	2	10	50
Household (Adults)	0	19	95
	1	1	5
Household (Children)	0	13	65
	1	6	30
Pets	2	1	5
	No	18	90
Caregiver	Yes	2	10
	No	19	95
Require Caregiver	Yes	1	5
	Chronic	4	20
Disability	Hearing	4	20
	No Disability	13	65

Lower Body	3	15
Other	2	10
Communication	1	5
Upper Body	1	5

### Differences of TAM Variables Before and After the Experiment

After assessing the reliability of the responses for each TAM variable category, constructs (see Table 2) were retained with strong internal consistency; Cronbach's Alpha exceeded 0.9 for Perceived Usefulness (PU), Perceived Ease of Use (PEU), and Behavioral Intention (BI). For Attitude Toward Use (ATU), a construct was formed based on the following items, yielding an acceptable alpha of 0.8: (1) Learning about technology feels like a burden on myself; (2) Learning about technology feels like a burden on my family; (3) I have had bad experiences with technology; (4) I think that using a new technology is not necessary; (5) I do not feel comfortable asking my family for help in using a new technology; (6) I am tech-savvy; and (7) Learning how to use new technologies has made my daily life more convenient.

Given that the data were not normally distributed, two-sided Wilcoxon signed-rank tests were conducted to compare pre- and post-test scores for the TAM constructs (Table 2).

**Table 2. Comparison of TAM constructs Pre- and Post-test; \*p<.05, \*\*p<.01**

Variable	Construct	W-val	p-val	RBC	CLES
ATU	Attitude Toward Using	38.5	.0756	0.497	0.440
PU	Perceived Usefulness	31	.186	0.409	0.375
PEU	Perceived Ease of Use	26	.031*	0.618	0.369
BI	Behavioral Intention to Use	50.5	.609	0.158	0.490

### Perceived Ease of Use (PEU)

Table 3 presents the names of Perceived Ease of Use (PEU) variables that shape the construct, the statements describing those variables presented to the participants, and the results of two-sided Wilcoxon signed-rank tests for comparing the results before and after the experiment. Participants showed a significant change from pre- to post-test in their perception of learning ( $p = .021$ ). Figure 3 shows the percentage of responses for PEU, pre, and post experiment. The distribution of responses shifted from 60% "Somewhat agree" pre-test to a more varied spread post-test, with increases in "Agree" (25%) and "Strongly Agree" (10%) indicating a stronger endorsement of learning benefits after the intervention.

**Table 3. Comparison of PEU Variables Pre- and Post-test; \*p<.05, \*\*p<.01**

Variable	Variable Description	W-val	p-val	RBC	CLES
Learning	Learning to operate the VR game would be easy for me	11	.021*	- 0.718	0.372
Desire	I would find it easy to get the VR game to do what I want it to do	47	.264	- 0.309	0.421
Skill	It would become easy for me to become skillful in the use of the VR game	5.5	.009**	- 0.833	0.355
VR Game	I would find the VR game easy to use	19	.209	- 0.424	0.4

Perceptions of skill improved significantly ( $p = .009$ ). Before playing the VR game, 40% "Somewhat agreed" and 25% "Agreed." Afterward, responses shifted to 40% "Agree and 5% "Strongly agree," suggesting participants felt more skilled in the use of the VR game. Differences in perception of the VR game being easy were not statistically significant. However, descriptively, agreement responses were stronger and disagreement, weaker after playing the game.

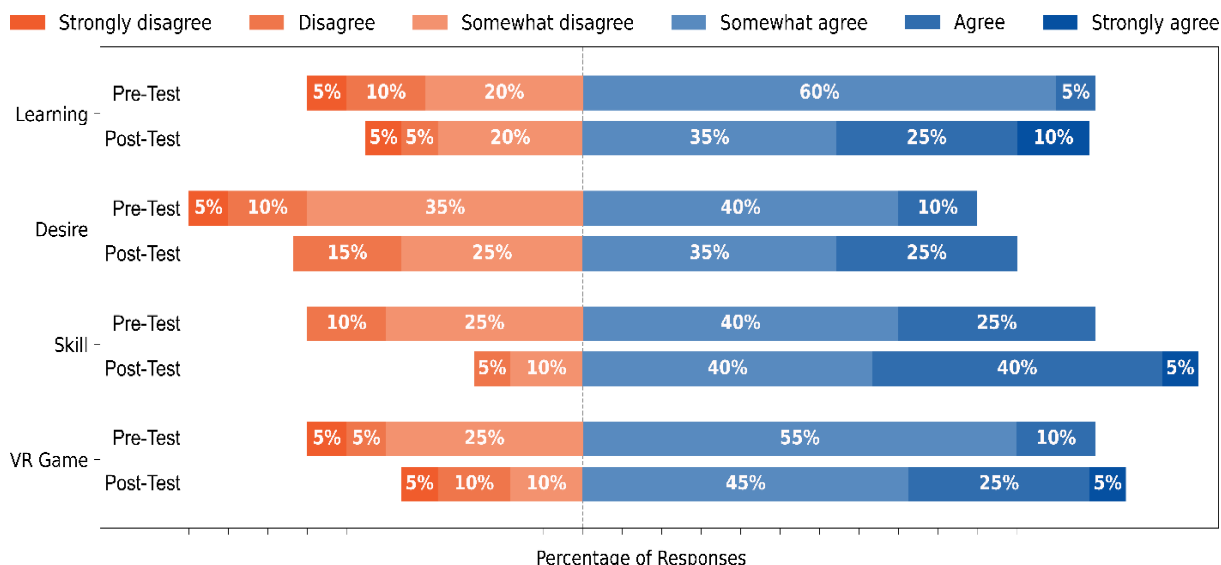


Figure 3. Percentage of Responses for PEU, Pre, and Post Experiment

Perceived Usefulness (PU)

Table 4 presents the results of the Wilcoxon test for Perceived Usefulness of the VR Game for disaster preparedness, while Figure 4 presents the percentages of responses for the items comprising the PU construct. The results showed no significant difference between pre- and post-experiment ( $p > .05$ ). However, the Likert distributions show a shift toward higher agreement and clear descriptive improvements in positive perceptions, particularly in Planning Effectiveness for disasters and Disaster Planning, where agreement levels increased substantially.

Table 4. Comparison of PU Variables Pre- and Post-test

Variable	Variable Description	W-val	p-val	RBC	CLES
Performance	Using this VR game would improve my performance during a disaster	17	.161	-0.485	0.399
Productivity	Using this VR game would improve my productivity concerning taking the steps to become prepared for a disaster	33.5	.685	-0.141	0.426
Planning Effectiveness	Using this VR game would enhance my effectiveness in planning for a disaster	22	.336	-0.333	0.396
Disaster Planning	I would find this VR game useful to disaster planning	26	.303	-0.333	0.371

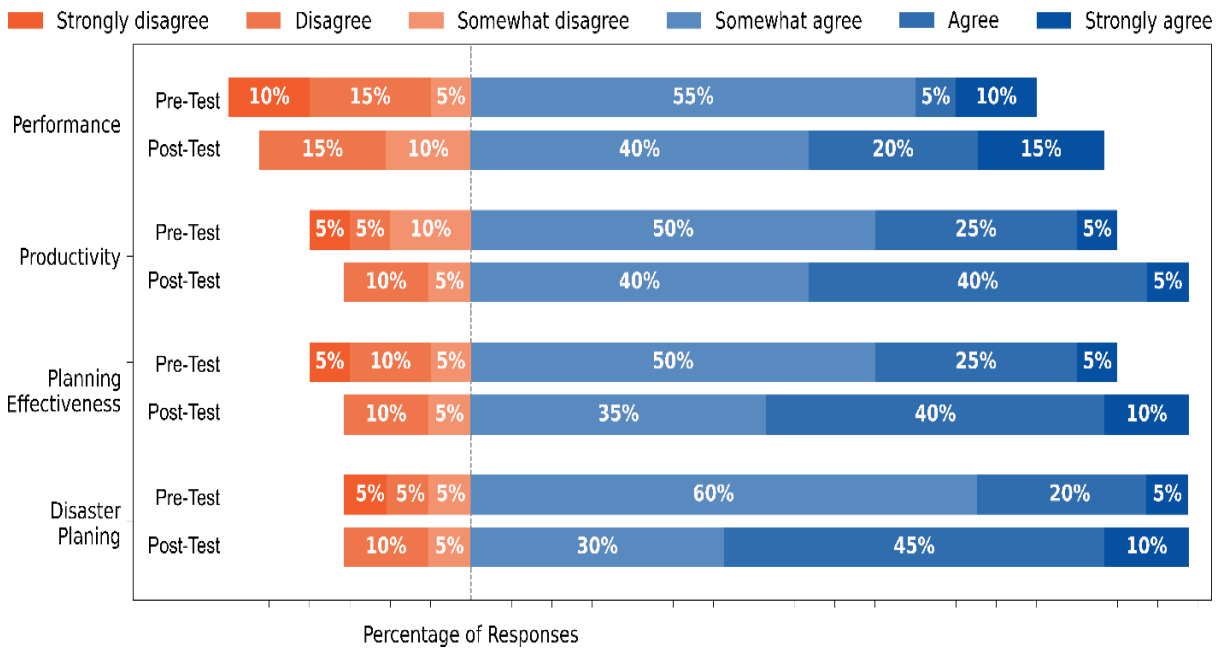


Figure 4. Percentage of Responses for PU, Pre and Post Experiment

Attitude Toward Use (ATU)

Table 5 showcases the results of the Wilcoxon tests for comparing Attitude Toward Using the VR game before and after playing it, while Figure 5 illustrates the percentages of participants’ responses for all the attitude items regardless of comprising the construct.

Table 5. Comparison of ATU Variables Pre- and Post-test; \*p<.05, \*\*p<.01

Variable	Variable Description	W-val	p-val	RBC	CLES
Technology Mind	Technology works the way the mind works	7	.130	-0.611	0.408
Burden Myself	Learning about technology feels like a burden on myself	3.5	.071	0.750	0.574
Burden Family	Learning about technology feels like a burden on my family	10.5	.158	0.533	0.550
Bad Experience	I have had bad experiences with technology	12	.407	0.333	0.570
Tech-Savvy	I am tech-savvy	3.5	.04*	-0.806	0.421
Use Knowledge	I would use technology more in my daily life if I knew how	28.5	.223	-0.374	0.418
Not Necessary	I think that using a new technology is not necessary	26	.267	0.333	0.520
Help Shame	I do not feel comfortable asking my family for help in using a new technology	6.5	.003**	-0.857	0.353
Use Convenience	Learning how to use new technologies has made my daily life more convenient	12	.111	-0.564	0.460

Significant improvements (p = .040), with a trend toward higher tech-savviness, are evident from the comparison. The post-test responses shifted from 40% “Somewhat agree” and 15% “Agree” in the pre-test to 55% “Somewhat agree” and higher strong agreement overall, reflecting greater confidence in tech-savviness. In addition, a highly significant improvement (p = .003) was observed in comfort level in asking for help (Help Shame). Positive perceptions of shame decreased, with fewer “Strongly disagree” endorsements (30% pre vs. 5% post). Instead, responses shifted toward milder disagreement. However, agreement with feeling uncomfortable about asking for help increased after playing the game.

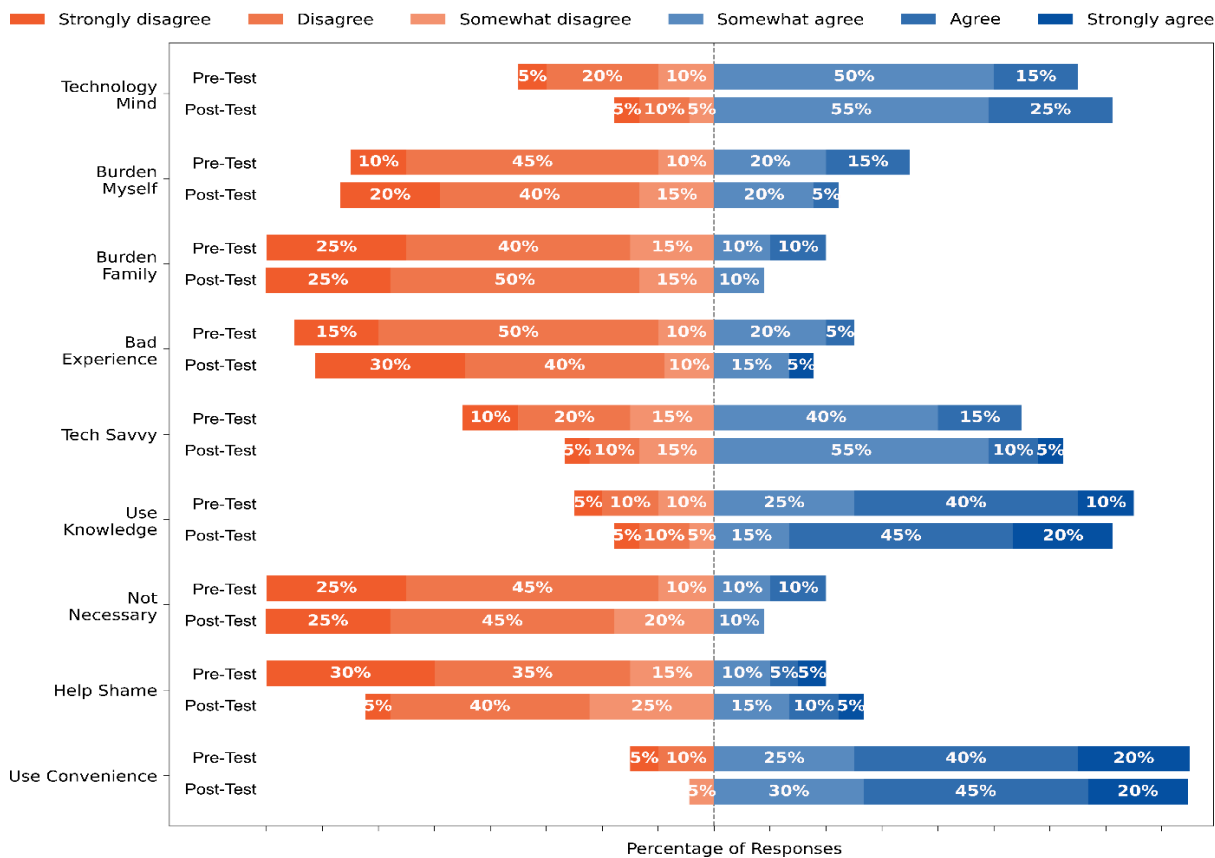


Figure 5. Percentages of Responses for ATU, Pre and Post Experiment

**Behavioural Intention to Use (BI)**

Table 6 shows the results of the Wilcoxon tests for comparison of behavioural intention to use the VR game, while Figure 6 visualizes the percentages and boxplot of participants’ responses.

**Table 6. Comparison of BI Variables Pre- and Post-test; \*p<.05, \*\*p<.01**

Variable	Variable Description	W-val	p-val	RBC	CLES
VR Game DP	I would play the VR game for disaster preparedness	35	.460	-0.231	0.432
VR Game Recommend	Once available, I would recommend the VR game to family and friends	48	.487	-0.200	0.452
VR Game Computer/Phone	Once available, I would play this game on my phone or computer	44	.942	-0.033	0.512
VR Game Purchase	I would be willing to pay for the VR game if it was between \$20-\$60	25	.154	0.450	0.615
VR Game Free	I would be willing to play the VR game if it were free	26.5	.958	0.036	0.509
VR Purchase	I would be willing to purchase a VR headset if it was between \$300 - \$600	7	.484	0.333	0.535
VR Free	I would be willing to use a VR headset if it were free	15.5	.7757	-0.139	0.506
VR	I plan to use VR in the future	24	.753	-0.127	0.485
VR DP	I would consider using VR for disaster preparedness	40.5	.744	0.110	0.539
VR DP Recommend	I will inform others about the use of VR for disaster preparedness	25	.836	0.091	0.469

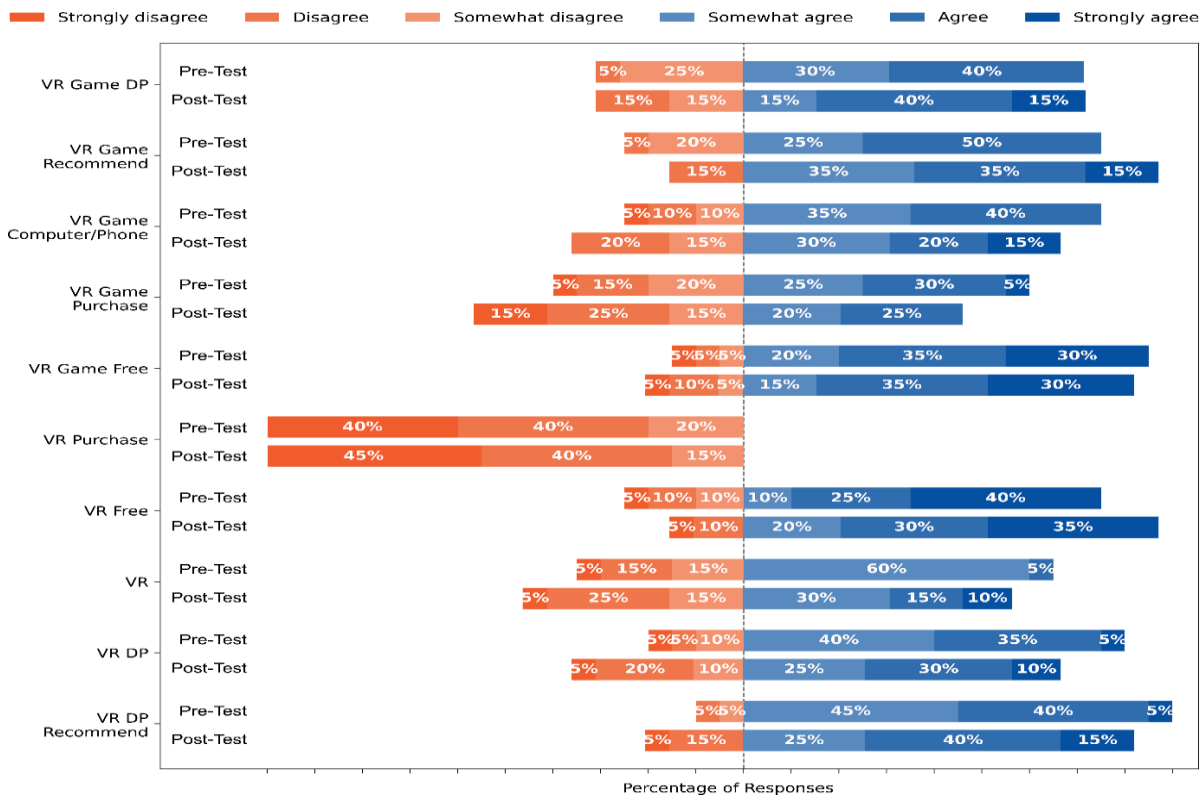


Figure 6. Percentages of Responses for BI, Pre and Post Experiment

The Wilcoxon two-sided test results consistently show p-values greater than the significance level of .05 for all measures. This indicates that there are no statistically significant differences between pre-test and post-test scores for any of the behavioural intention items. While not statistically significant, Figure 6 shows an increase in agreement regarding recommending the VR game to friends and family, as well as interest in using VR headsets if offered for free. Other behavioural variables either decreased slightly or remained stable in terms of positive or negative agreement. Interestingly, participants expressed more disagreement toward purchasing a VR headset, with an increase in the negativity level (a higher percentage of Strongly Disagree).

DISCUSSION

This paper examines the perceived usefulness and ease of use of older adults in using *All Hazards* for disaster preparedness. Results indicate that the participants perceived VR to be easier to use after playing it. The game effectively enhanced their overall sense of ease of use, especially in areas related to learning and skill development in using, as well as navigating the VR environment. Results also suggest a clear trend toward increased comfort and confidence in using the game, with the strongest gains seen in participants’ sense of competence and learning. This finding aligns with the results reported by Fu and Li (2024), where participants in VR fire safety simulations also reported feeling highly engaged, immersed, and present in the virtual environment. The findings also counter commonly held assumptions about older adults and the use of advanced technologies. Namely, that their level of technological skills is low and that they cannot learn how to use new and evolving technologies. The study, however, shows that VR training significantly improves learning outcomes, with many users describing the experience as both realistic and enjoyable. Together, these results highlight the potential of VR training as an effective and engaging tool for promoting disaster preparedness among older adults.

Participants affirmed greater confidence in their overall tech abilities after the experiment. Post-test responses reflected a noticeable shift toward higher agreement with statements related to tech-savviness, suggesting that the game experience boosted their self-assurance with technology. Additionally, participants reported feeling more comfortable asking for help, with fewer expressing strong negative feelings about doing so. While some still indicated mild discomfort, overall, the responses suggest a reduction in “help shame” and a more open attitude toward seeking assistance. It cannot be ruled out, however, that the increased comfort levels regarding help seeking were not influenced by the researchers’ character, patience with, and motivation for the individuals to

succeed. It would be interesting to study shame as a concept, randomizing the helper characteristics with different approaches to guidance (e.g., flat affect compared with good humour).

It is interesting to note that participants shared a lot of positive feedback during the experiment. Many described the game as fun, cool, and engaging, saying it made them happy, encouraged them to think, and helped them feel more prepared for disasters. Some participants particularly enjoyed the coin-collecting feature, so much that they kept collecting coins even when warning messages appeared. This result suggests that a well-designed VR game can motivate participants to stay engaged while helping them learn how to better prepare for disasters.

As mentioned above, there is a common assumption that older adults are not good candidates for new technologies. However, this study showed that when given the opportunity to explore new technologies, in this case, virtual reality, they find the experience enjoyable, useful, and easy, aligned with similar previous studies with older adults (Rose et al., 2015; Zeknski & Reyes, 2009; Belchior et al, 2019; Chan et al., 2009). This was evident in both their qualitative responses and quantitative results related to the perceived ease of use construct. While these are only preliminary findings, subsequent work will assess whether there are relationships between the constructs that may illuminate their interactivity, such as was seen with the BI to use VR contingent on it being free. However, the latter is not surprising given that the cost of technology has a negative relationship with behavioral intentions to purchase technology (Lee & Coughlin, 2015).

This research has several limitations, while data collection is ongoing, the small sample size is the bare minimum for a within experiment design focused on one question. The participants had a limited time to become familiar with the game, with experiments lasting on average one hour and 15 minutes. Additionally, this study was focused on the efficacy of VR for disaster preparedness games with an older adult sample, the post-test identified positive perceptions and ease of use with the game, however, this does not yet identify changed behaviour due to the game. A 6-month post-test will capture whether participants changed their in vivo preparedness efforts since experiencing the VR game.

## CONCLUSIONS

This paper conducted a user-centred experiment where older adults used a VR game called *All Hazards*. The paper explored how older adults perceive and use the game for disaster preparedness, and what challenges they encountered during the process. Results indicated that the use of *All Hazards* resulted in older adults feeling that VR was easier to use after the experiment, and they also felt that their ability to learn new technology and game skills was improved after the experiment.

Despite limitations, the study represents a meaningful and important effort to apply the Technology Acceptance Model (TAM) to the design of a VR-based game and to test its acceptance among older adults in disaster preparedness. This study also contributes to the broader goal of engaging socially vulnerable populations with emerging technologies. As we continue to recruit more participants, add additional experiment locations, and collect more data, we plan to expand the game's features and reach a wider range of users to ensure that it can benefit the larger public.

## ACKNOWLEDGMENTS

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