The acceptance and experience of virtual-reality-enhanced exercise in older people

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ABSTRACT

This study investigated how older people perceive and experience virtual-reality-enhanced exercise. Data comprised variables of technology acceptance, flow experience, and perceived rate of physical exertion and subjective mental effort. Participants recruited from community-based exercise groups took part in six 40-minute VR exercise sessions over three weeks. Behavioral intention and other acceptance measures demonstrated a sustainable increase over time. A substantial improvement was also found in flow variables and in both perceived mental and physical effort after the program. Results show that positive responses in the VR exercise experience were retained throughout all six sessions. These findings support an expectation that after using VR technology for exercise, older people from this population are very likely to use it in the future.

INTRODUCTION

VR assimilated into exercise has potential to improve exercise experience. Older people are aware of the numerous health benefits arising from exercise but most do not exercise regularly. Given the previous evidence of advantages from VR supported physical activity programmes in different groups, the question if older people accept exercising in a virtual environment is of particular relevance. Degree of acceptance may have important implications for future use and concordance to VR-enhanced exercise programmes.

METHODS

28 healthy men and women (mean age 65.2, SD 8, range 50-85) participated in six 40-minute VR exercise sessions over three weeks. Each session comprised five interactive IREX™ games repeated three times per session (Fig.1). Outcome measures comprise: 1) acceptance variables using the Modified Technology Acceptance Questionnaire[1]; (2) flow state of exercising using the Flow State Scale[2]; (3) perceived physical exertion via the Borg RPE[3]; (4) subjective mental effort via the SMEQ[4]; and (5) an overall evaluation using an open ended question at the end of every session. Batterham and Hopkins' approach of using magnitude-based-inferences was applied to estimate the likelihood of any clinical effects of the outcome measures.

RESULTS

Table 1 presents the means and standard deviations of the primary measure, behavioral intention (BI).

Outcome measure	T0 (initial)	T1 (Session 1)	T6 (Session 6)
BI	4.70 (1.26)	5.42 (1.55)	5.69 (1.68)

Table 2 presents the summary of *t* test, confidence intervals and clinical inference[5] for behavioral intention (BI).

Outcome measure	Mean change (T0 to T6)	Minimum magnitude of change (0.5SD)	Expressed outcome with 95% CI		t(27)	p	d	Chance (as a percentage) that the true value of the effect statistic is		
			LL	UL				Beneficial or substantially positive	Negligible or trivial	Harmful or substantially negative
Behavioral intention (BI)	0.99	0.63	0.40	1.60	3.47	0.002	0.65	88.8	11.2	0.0

Fig. 1: A model performing a lunge during a session

Outcome measure	T0 (initial)	T1 (Session 1)	T6 (Session 6)	Outcome measure	T0 (initial)	T1 (Session 1)	T6 (Session 6)
PE	4.31 (1.22)	5.52 (1.31)	5.61 (1.59)	CONT		3.63 (0.90)	3.85 (0.78)
EE	4.22 (1.05)	5.54 (0.97)	5.92 (0.99)	FDBK		3.79 (0.69)	4.14 (0.58)
SI	4.16 (1.67)	4.93 (1.46)	5.18 (1.75)	ACT		3.60 (0.80)	3.86 (0.67)
FC	4.73 (1.25)	6.14 (1.10)	6.25 (0.75)	TRAN		3.68 (0.68)	3.86 (0.88)
SE	4.29 (1.16)	5.07 (1.16)	5.63 (0.89)	LOSS		3.74 (0.63)	4.49 (0.44)
ENJY		4.12 (0.48)	4.41 (0.71)	BORG		11.48 (1.49)	12.61 (1.26)
GOAL		3.82 (0.50)	4.34 (0.65)	SMEQ		57.89 (11.67)	59.27 (14.75)
CHAL		3.98 (0.70)	4.14 (0.65)				
CONC		3.93 (0.69)	4.21 (0.48)				

Not applicable.

Table 3 presents the means and standard deviations of the other outcome measures.

[a]T0 to T6. [b]T1 to T6.

Table 4 presents the summary of *t* tests, confidence intervals and clinical inference[5] for the other outcome measures.

SUMMARY AND CONCLUSION

All measured dimensions of acceptance increased over the course of the intervention, demonstrating a significant positive influence on older people's behavioral intention to use VR-enhanced exercise. The same was found for flow measures.

The initial significant increase in behavioural intention was maintained over time. There was no evidence of any decrease in the quality of the exercise experience.

Overall, participants reported their experience of VR exercise to be positive, engaging and enjoyable.

These results suggest that VR-enhanced exercise is likely to be well received by older people.

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