

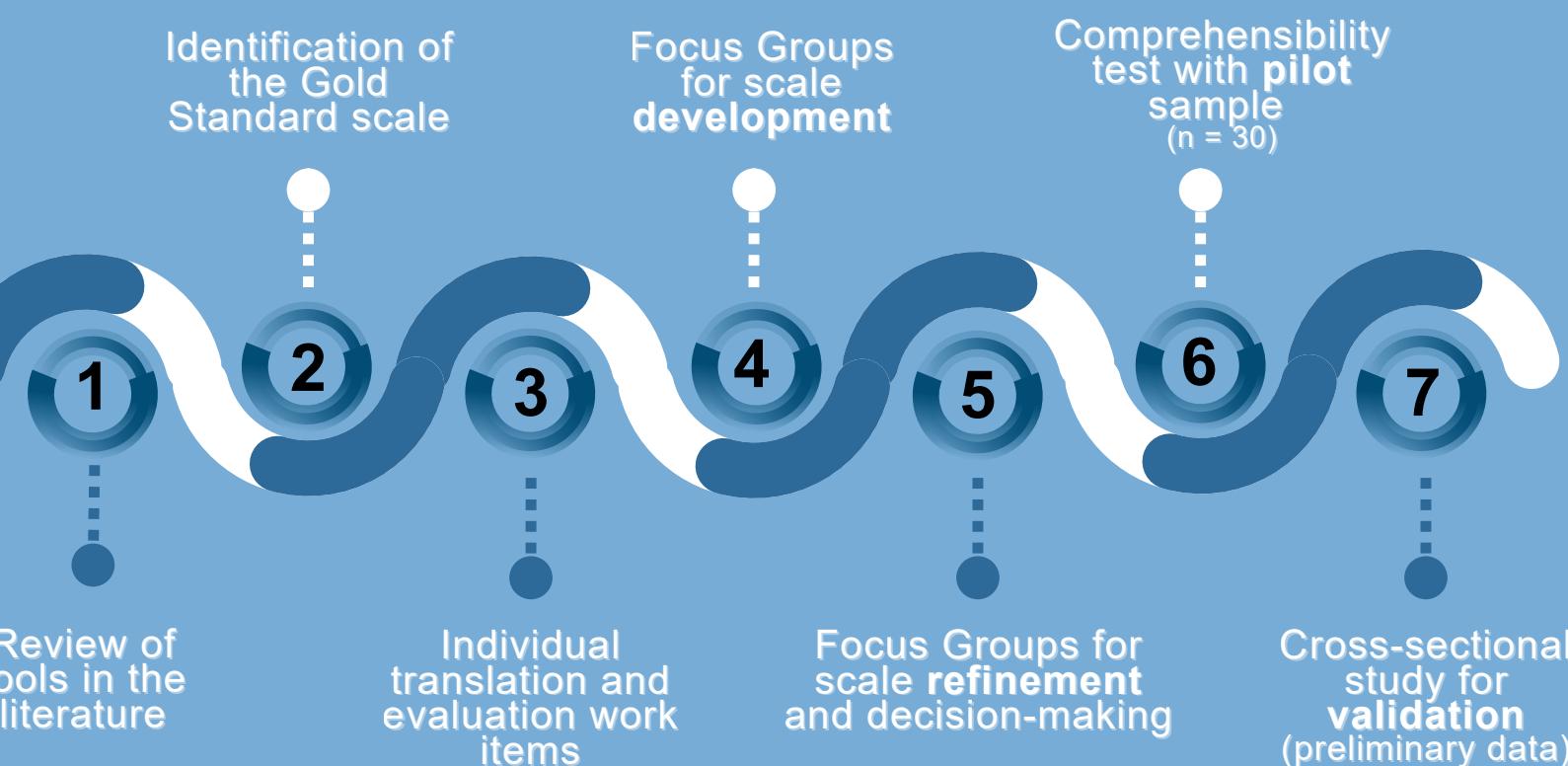
INTRODUCTION

As **psychological processes** increasingly unfold in virtual and hybrid environments (Hadi & Park, 2024; Soh et al., 2024), understanding **telepresence** is essential because it can shape people's digital experiences (Barranco Merino et al., 2023).

However, current **assessments** often struggle to capture the complexity of telepresence, either focusing on **narrow aspects** or using long user experience measures that can be **challenging** to implement in practice.



▷ Mixed methods approach



▷ Pearson's correlations among the scale's factors and internal reliability

Factors	Engagement	Ergonomics	Presence	Cyberpresence	Flow	
Engagement	1					a=.884
Ergonomics	0.366***	1				a=.887
Presence	0.727***	0.379***	1			a=.830
Cyberpresence	0.494***	n.s.	0.407***	1		a=.772
Flow	0.490***	0.453***	0.488***	0.281***	1	a=.785

Notes: * = p < 0.05; ** = p < 0.01; *** = p < 0.001

▷ Pearson's correlations with UX scale (Tcha-Tokey et al., 2016)

Factors	VTS Engagement	VTS Ergonomics	VTS Presence	VTS Cyberpresence	VTS Flow	Scale under validation
UX - Engagement	.818***	.411***	.656**	.557***	.425***	
UX - Presence	.699***	.487***	.727***	.389***	.488***	
UX - Immersion	.739***	.305***	.691***	.594***	.441***	
UX - Flow	.383***	.377***	.368***	.398***	.242*	

Notes: VTS = VirtHuLab Telepresence Scale; UX = User Experience in Immersive Virtual Environments Scale (Tcha-Tokey et al., 2016); * = p < 0.05; ** = p < 0.01; *** = p < 0.001

▷ No differences related to sociodemographics were found (i.e. gender, age or education).

DISCUSSION AND CONCLUSIONS

- ▷ Preliminary results support the **initial validation** of the scale, which needs to be confirmed by expanding the sample and conducting Confirmatory Factor Analysis (CFA).
- ▷ The correlations among the various factors of the scale reflect the **multidimensionality** and complexity of telepresence, and are consistent with findings from previous literature (e.g., Chen et al., 2024; Felton & Jackson, 2022).
- ▷ Preliminary correlation analyses indicate **convergence** between the factors of the scale and the corresponding constructs in the reference questionnaire.
- ▷ Preliminary analyses indicate a **discriminative capacity** among differently immersive conditions, in line with the reference scale, and previous literature (e.g., Fusco & Tieri, 2022).

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VirtHuLab Telepresence Scale (VTS): preliminary data for a multidimensional tool

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AIM AND HYPOTHESIS

This study aims to develop and **validate a multidimensional self-report instrument** that can provide an up-to-date assessment of telepresence and the associated core psychological dynamics.

Hypotheses for preliminary analyses:

- ▷ **H1** = Significant positive correlations between VTS scale scores and the UX reference scale (convergent validity).
- ▷ **H2** = Significant differences between the experimental conditions, as detected by the VTS scale (discriminant validity).

METHODS

- ▷ **Convenience sample:**
 - n=135 (71.1% females);
 - Mean Age=22.90 (s.d.=3.86)
- ▷ **Selection criteria:**
 - ≥18 years old
 - Fluency in Italian
- ▷ **Task:** Exploration of a digital forest environment (Wakamarina Valley New Zealand, (2025):
 - with a personal computer (PC, Step 2A);
 - with virtual reality (VR, Step 2B);
 - in a third condition (Darkness, Step 3A), a relaxation task (Norelli et al., 2018) was performed in dim lighting.
- ▷ Randomised order of conditions



RESULTS

▷ Explorative Factorial Analysis (EFA)

Items	Factors		Items	Factors		
	Engagement	Ergonomics		Presence	Cyberpresence	Flow
n.10	0.921		n. 36	0.916		
n. 7	0.786		n. 30	0.738		
n. 28	0.775		n. 37	0.650		
n. 3	0.708		n. 12	0.589		
n. 27	0.694		n. 8	0.503		
n. 26	0.672		n. 42		0.918	
n. 44	0.610		n. 45		0.890	
n. 4		0.866	n. 16		0.512	
n. 5		0.850	n. 20			0.874
n. 1		0.814	n. 17			0.777
n. 15		0.794	n. 19			0.744
n. 13		0.737		• Kaiser criterion (Kaiser, 1960) • Promax rotation		
n. 14		0.703		• 24 items on a 1-5 Likert scale (from "not at all" to "extremely") • 66.67% of the variance is explained by the five factors		

• Kaiser criterion (Kaiser, 1960)
• Promax rotation

• 24 items on a 1-5 Likert scale (from "not at all" to "extremely")

• 66.67% of the variance is explained by the five factors

▷ Discriminant analyses among the conditions

Paired differences	Means	Means Delta	Student's t	p value	Cohen's d
VTS - Engagement (PC) - VTS - Engagement (VR)	19.75	-7.304	-14.976	.001	5.666
VTS - Engagement (Dark) - VTS - Engagement (VR)	17.24	-9.815	-16.454	.001	6.931
VTS - Ergonomics (PC) - VTS - Ergonomics (VR)	22.88	5.844	11.471	.001	5.920
VTS - Ergonomics (Dark) - VTS - Ergonomics (VR)	23.50	6.467	12.518	.001	6.002
VTS - Presence (PC) - VTS - Presence (VR)	12.26	-3.519	-9.005	.001	4.540
VTS - Presence (Dark) - VTS - Presence (VR)	13.45	-2.326	-4.936	.001	5.476
VTS - Cyberpresence (PC) - VTS - Cyberpresence (VR)	7.54	-2.874	-11.045	.001	3.023
VTS - Cyberpresence (Dark) - VTS - Cyberpresence (VR)	8.47	-1.948	-7.500	.001	3.018
VTS - Flow (PC) - VTS - Flow (VR)	10.16	-0.896	-3.898	.001	2.672
VTS - Flow (Dark) - VTS - Flow (VR)	10.79	-0.274	-0.860	.196	3.704

Notes: VTS = VirtHuLab Telepresence Scale

▷ The scale could be used in **different areas** to measure the impact of telepresence on various processes.



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