HOW TO PROMOTE PATIENTS' ADHERENCE TO VR TREATMENTS?

A preliminary exploration of virtual environments preferences according to sociodemographic factors

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SHORT BIOGRAPHY

Solène LE BARS, PhD

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SHORT BIOGRAPHY

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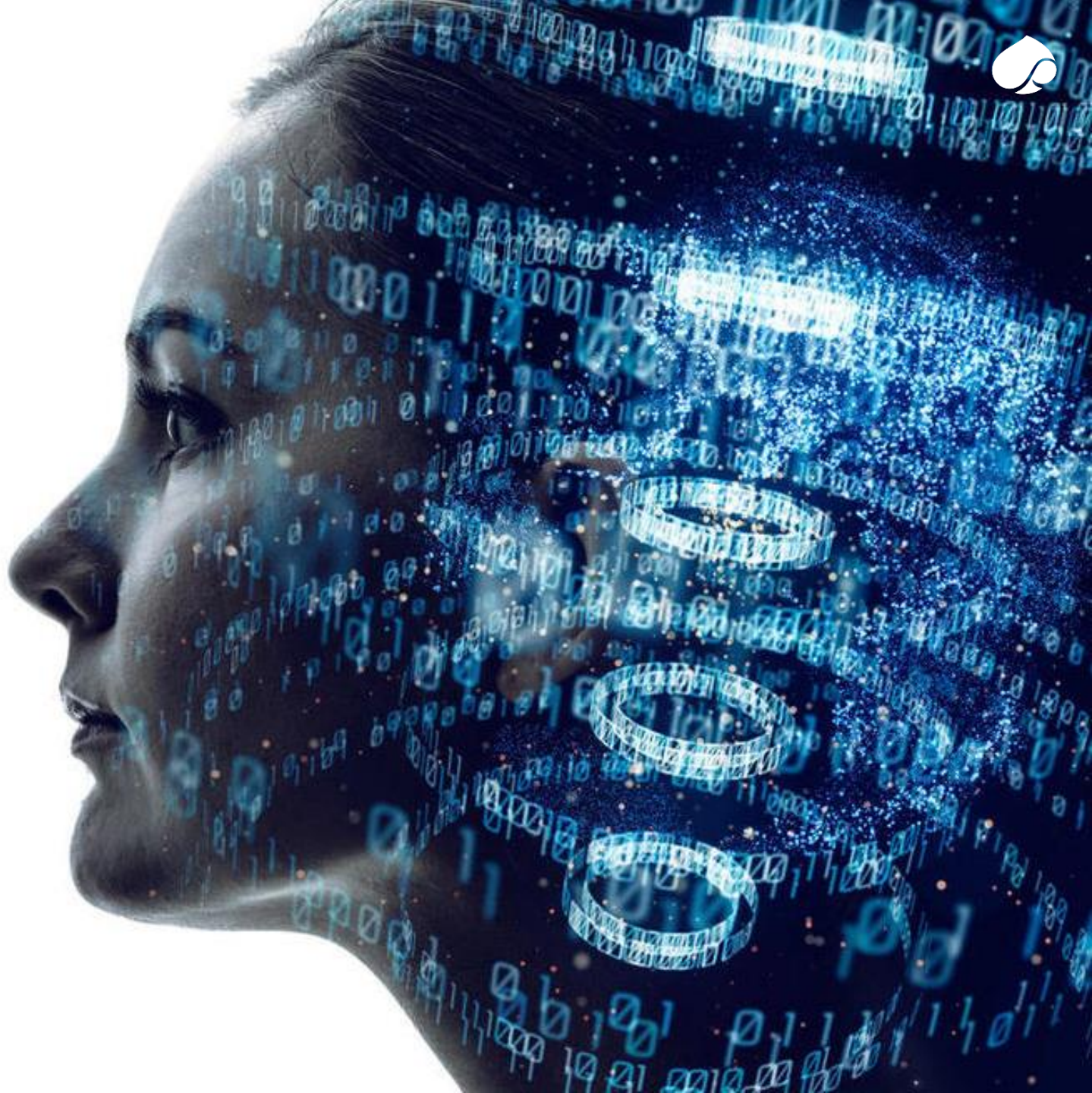
Postdoctoral position at the ENS – PSL from 2018 to 2020 ;

Neuroscientist at the Altran Lab – Capgemini Engineering from 2020 to present ;

Scientific leader of the Mind&Act Team – Capgemini Engineering – which aims to develop relevant and non-invasive Brain-Computer Interfaces to support future of Healthcare.



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INTRODUCTION : CONTEXT & OBJECTIVES

CONTEXT

During the last decades, the emergence of Virtual Reality (VR) technology has provided new opportunities for developing innovative and relevant clinical applications, adapted to numerous medical contexts and pathologies :

- Exposure tool for Anxiety and PTSD
- Serious games for ADHD
- Rehab tool for post-stroke patients
- Etc.

How to properly adapt VR contents to such a myriad of pathologies and sociodemographic differences ?

OBJECTIVES

General Hypothesis :

Given the myriad of pathologies and clinical applications, one might expect that the Virtual Environment (VE) characteristics (e.g., kind of landscape and atmosphere, virtual 3D or real 3D, etc.) could influence patients' adherence to the VR clinical tools.

Specific Hypothesis :

we believe that socio-demographic factors such as the individual's age, gender and socio-professional category - which can be related to the pathology [6] - could have an impact on patients' preferences regarding the used VE, and consequently, on patients' adherence to VR treatments

Objective: Determining which Virtual Environments (VE) are the most suited to individuals' socio-demographic characteristics such as age and gender.

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METHODOLOGY & RESULTS

METHODS

Sample

N=105 healthy participants (63 females) with a wide range of ages ∈ [20, 85], (M=45.85, SD=17.12) and various Socio-Professional Levels (SPL), going from no higher education (Level 1) to doctorate level (Level 6).

Material

- Google form to spread the online survey;
- 24 2D pictures of Virtual Environments matched by pairs (real vs. 3D virtual) representing different landscapes
- 4 questions on 7-point scale regarding EV:

- Estheticism
- Time to spend in it
- Exploration will
- Relaxation aspect

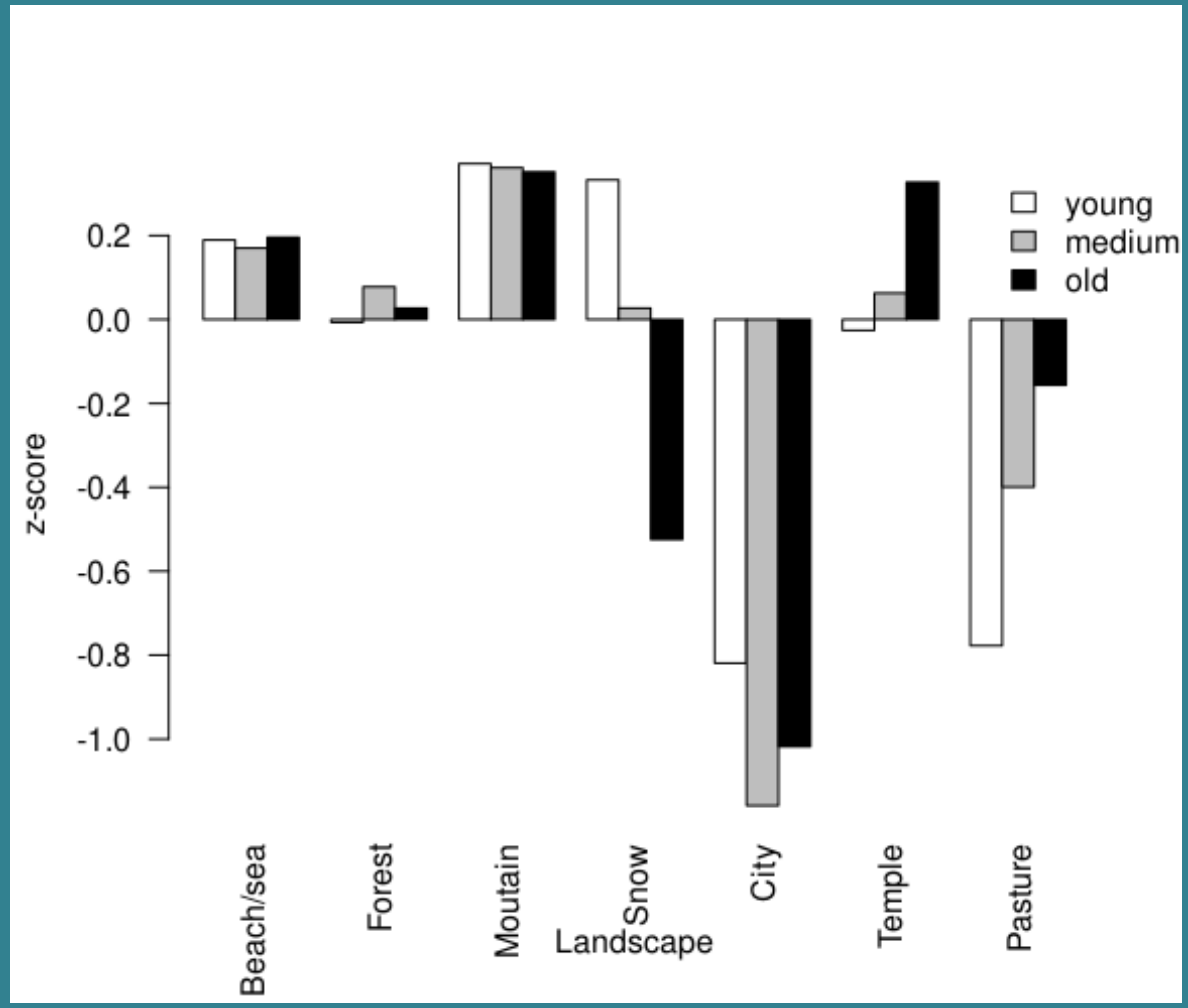
RESULTS: ESTHETICISM RATINGS

We found a main effect of the landscape type ($F(6, 10.04) = 3.36$, $p = 0.044$), regardless of the participants' socio-demographic factors.

More specifically, participants preferred the estheticism of mountainous lands samples relative to the town images ($t(10) = 1.35$, $p = 0.0302$), whatever their age, gender and SPL.

More interestingly, we found a significant interaction between the group of ages and the landscape kind ($F(12, 2468) = 9.75$, $p < 0.0001$), meaning that estheticism preferences for landscapes were influenced by participants' age.

For instance, as presented in Figure 2, young participants were more inclined ($t(2309.4) = 5.914$, $p < 0.0001$) to find snowy lands esthetic than older participants, who preferred Buddhist temple images

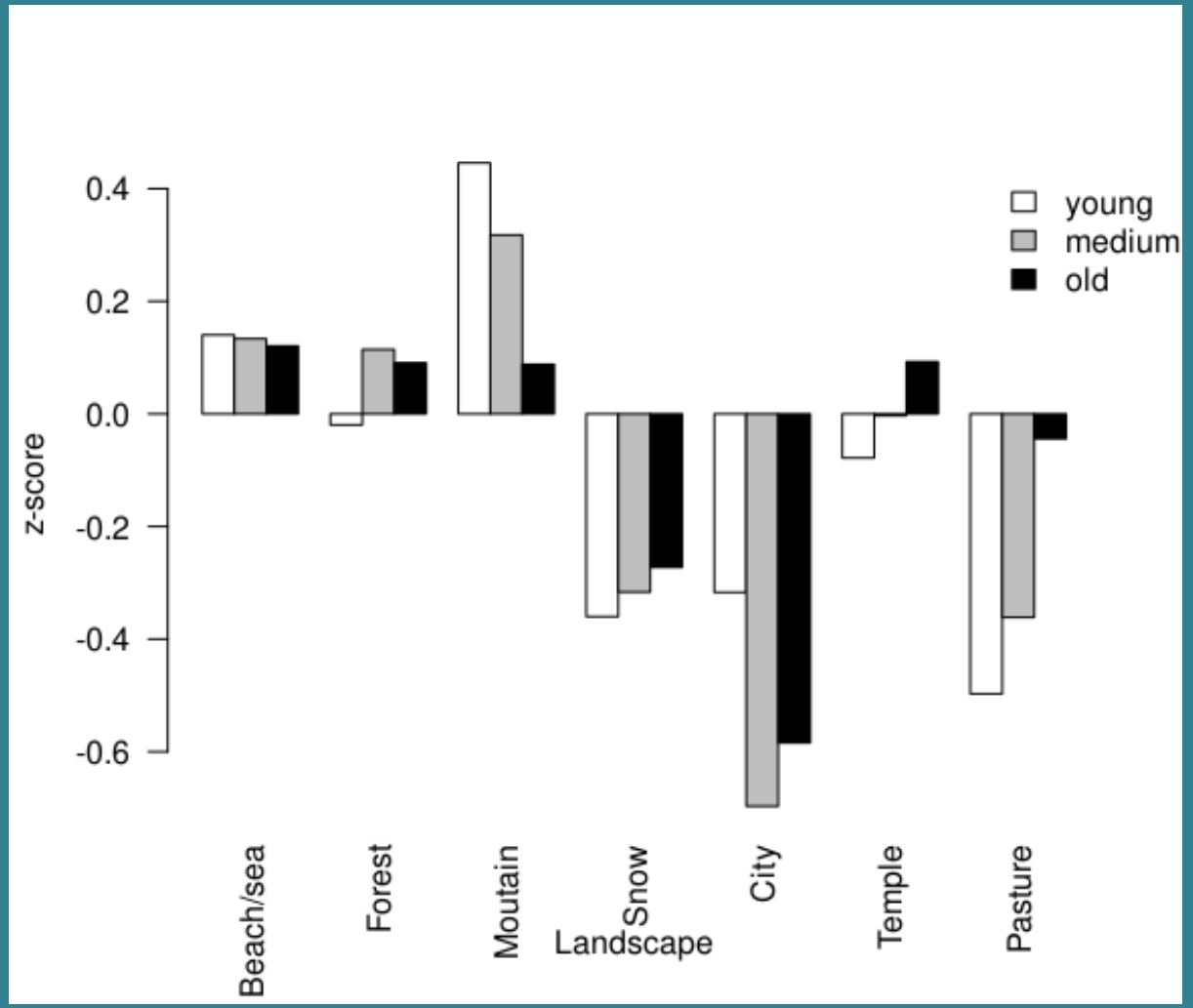


RESULTS: EXPLORATION WILL

We found a main effect of the content type ($F(1, 10.04) = 8.448$, $p = 0.014$), regardless of the participants' socio-demographic factors.

More specifically, participants' ratings concerning their exploration will, were significantly higher for real 3D VE than for virtual 3D VE ($t(10) = -2.91$, $p = 0.016$), whatever their age, gender and SPL.

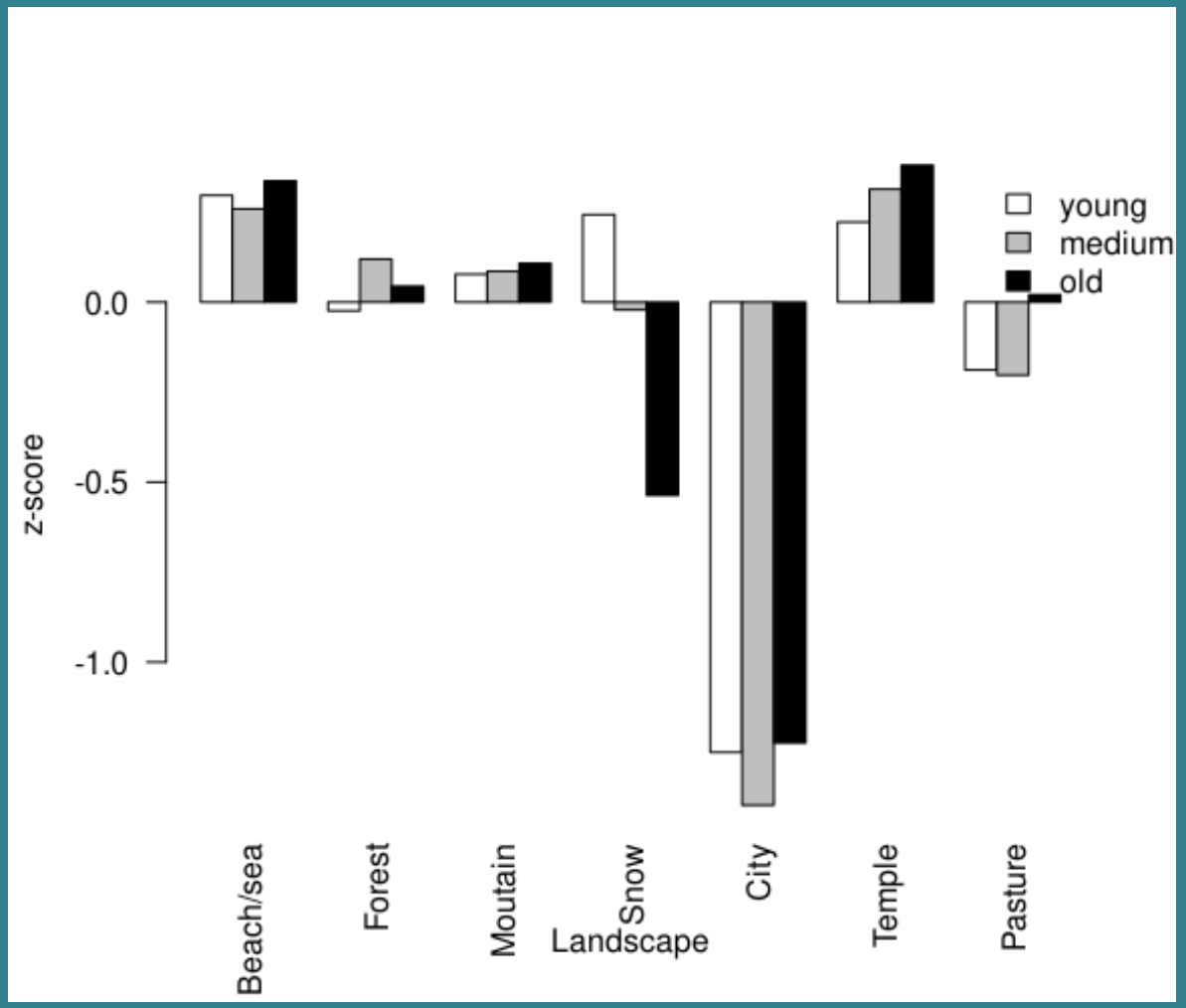
We also found a significant interaction between the group of ages and the landscape kind ($F(12, 2449) = 2.95$, $p = 0.0004$), meaning that landscapes' exploration preferences were influenced by participants' age, as presented in the Figure.



RESULTS: RELAXING ASPECT

Interestingly, we observed a significant interaction between the group of ages and the landscape kind ($F(12, 2449) = 2.95$, $p = 0.0004$), meaning that the relaxing aspect of landscapes depended on participants' age, as presented in the Figure.

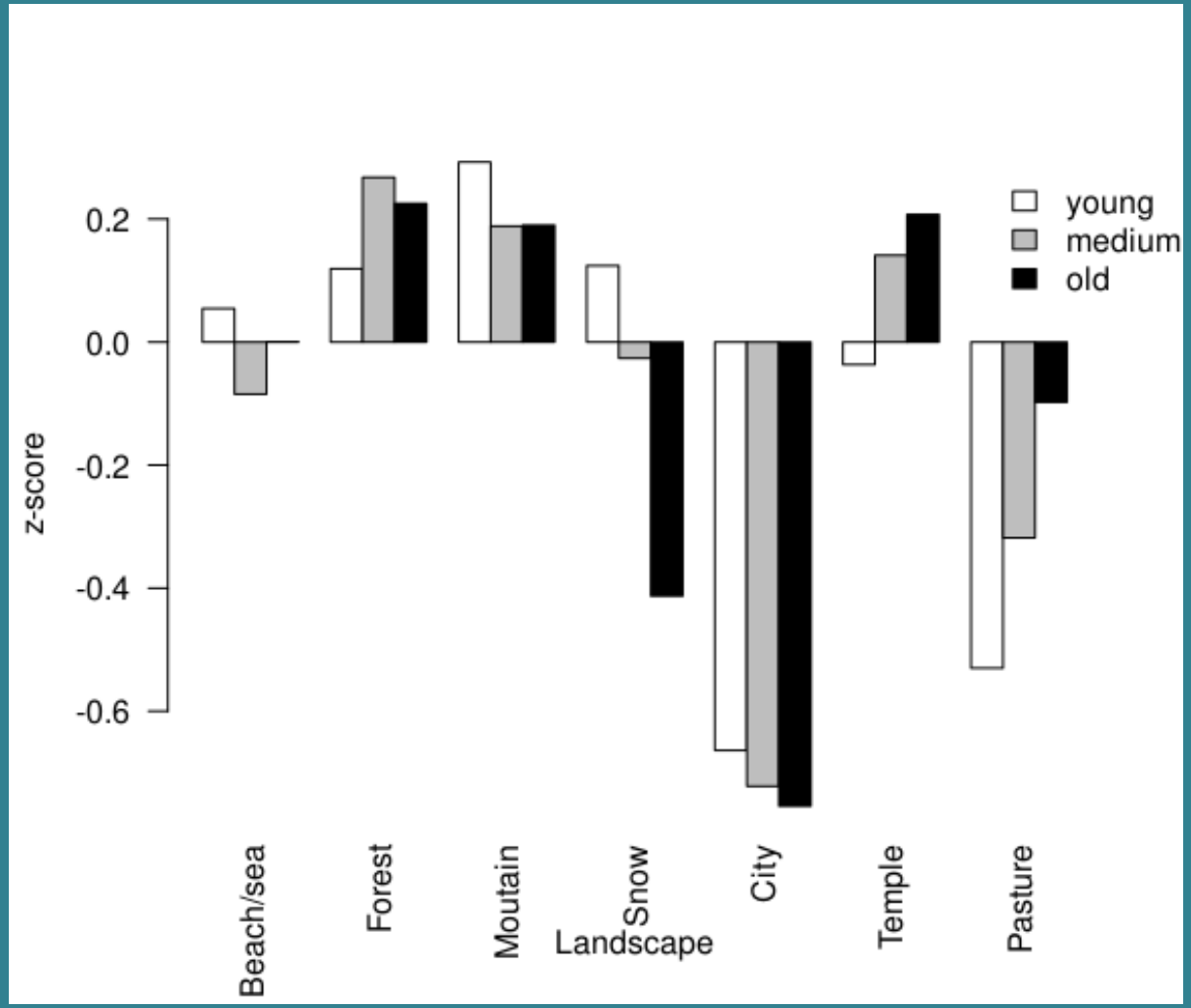
Notably, older participants found the snowy landscapes less relaxing than young participants ($t(2449)=-5.85$, $p < 0.0001$).



RESULTS: TIME TO SPEND

Regarding the time participants were ready to spend within the different landscapes, we observed a significant interaction between the type of landscape and the group of ages ($F(12, 2449) = 4.08$, $p < 0.0001$), as presented in the Figure.

For instance, older participants preferred to spend less time in snowy landscapes than young participants ($t(2449) = -3.1$, $p = 0.002$), while young participants were even less incline to spend some time in VE representing pastures than medium age ($t(2449) = 2.31$, $p = 0.021$) and older participants ($t(2449) = 3.14$, $p = 0.0017$).



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GOING FURTHER ?
DISCUSSION

DISCUSSION

We found that participants' age had a significant impact on all the rated dimensions, relative to VE estheticism, exploration will, relaxing aspects and time to spend in the presented VE.

Thus, these preliminary results could guide clinicians and developers to select the right VE while creating serious games or VR therapeutic contents, in order to design a task and a gameplay that would fit the patients' characteristics.

For instance, a rehabilitation program designed for post-stroke patients could take into account the preferences that were expressed by the group of elderly participants.

Further studies are now required to specifically evaluate patients' adherence to treatments using VR headsets.

Such adaptation of gameplays and programs should necessarily increase the patients' adherence to the VR tools and consequently the efficiency of the clinical application.

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