Acute Pain Control in Virtual Environments: The Effect of the Narrative

Abstract

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Immersive Virtual Reality (VR) has become increasingly available in healthcare scenarios and is starting to be consolidated as a powerful non-pharmacological tool to reduce acute pain during medical procedures. Despite there is evidence showing the efficacy of VR in improving pain related outcomes, **there has been no systematic exploration about the utility of including therapeutic narratives within virtual scenarios specifically designed to manage pain**, stress, and anxiety. Given this context, the main objective of this study was to evaluate if the inclusion of a therapeutic narrative in a virtual environment can increase the analgesic effects of VR during a cold-pressor experiment.

With this aim, a between-group design was used with 62 volunteers (mean age = 24.63, SD = 4.61). The participants were randomly assigned to one of the following conditions during the cold test procedure:

- **Condition 1- Relax VR with a therapeutic narrative**. The participants were exposed to a 360º video of a tropical virtual beach though a Gear VR HMD. The virtual scenario included a narrative that guided the users in using a breathing awareness technique.

- **Condition 2 - Relax VR without a narrative**. The participants were exposed to the same tropical beach than in the Condition 1 while listening a soothing music and the sound effects of the relaxing virtual scenario.

It is important to note that this experiment is a pioneer in isolating and studying the analgesic effects derived from the inclusion of a therapeutic narrative in a virtual environment.

A series of t-tests were conducted to assess the effects of the two conditions on a variety of pain-related measures (intensity, tolerance, threshold, and heart rate), subjective anxiety, and levels of satisfaction. Results showed that in comparison to the condition 2, the virtual scenario that includes a therapeutic narrative significantly increased both pain tolerance (F=15.362, p=0.003), pain threshold (F=1.731; p=0.060), and levels of satisfaction (F=1.742; p=0.004), No statistically significant differences were found in relation to heart rate (F=.891, p=0.349) or subjective anxiety (F=8.223, p=0.006). Finally, the group that experienced the VR scenario without the narrative experienced lower pain intensity (F=.473, p=0.014). The last result can be explained by the fact that the participants from the first condition tolerate the levels of pain 85.35% more time (105.65 seconds in Condition 1 and 57 seconds in the Condition 2)

These results of the present study **illustrates the importance of using appropriately designed virtual scenarios that include a relaxation technique to achieve effective VR analgesia**. This study also indicates the need of incorporating qualified mental health professionals within the existing multidisciplinary teams focused on the design, development and/or validation of digital interventions. In future studies it would be needed to study the effects of the narratives using clinical populations.

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