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Haptic Suits in Emergency Professional Training: Enhancing User Experience and Stress Assessment

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INTRODUCTION

In emergency situations, particularly during CPR, there are special circumstances where different guidelines must be followed¹. One such situation is accidental hypothermia, which occurs when core temperature drops below 35°C². Since these cases can be rare depending on the region, emergency teams require training to manage both the situation and the stress experienced by personnel³. Virtual reality (VR) and new technologies, such as haptic vests, can replicate challenging scenarios⁴, bringing immersive and realistic experiences to training environments.

AIM

This study aims to evaluate the user experience, usability, and stress levels of emergency professionals during CPR training sessions using haptic suit technology. By integrating physiological stress measurements and usability assessments, the research seeks to determine the impact of haptic feedback on training effectiveness and participant well-being.



METHOD

The pilot phase of this study involved 80 emergency responders randomly assigned into two groups participating in the **same Virtual Experience** (see **demo in QR code**). One of them trained **with a haptic suit** and the other without the haptic suit. The usability of the training with haptic suits was evaluated using the **System Usability Scale**. To measure stress levels, saliva samples were collected from participants before and after training sessions to analyze changes in **Alpha Amilase** levels, a **biomarker for acute stress response**⁵. User-reported **stress perception** was also **measured using the Polo Stress Perception Questionnaire**⁶. The training sessions were conducted over a three-month period, with immediate feedback collected post-training to gauge participants' perceptions and stress.



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CONCLUSIONS

- The integration of haptic suits into CPR training for emergency responders **not only improves the usability and user experience but also significantly reduces participant stress**, as evidenced by biochemical markers.
- This **enhanced training methodology fosters a more effective learning environment** by simulating realistic emergency scenarios while minimizing the psychological burden on trainees.

These findings support the broader **adoption of haptic technology** in emergency training programs to **improve both the effectiveness and well-being of professionals**.

REFERENCE

1. **Lott C et al.** European Resuscitation Council Guidelines 2021: Cardiac arrest in special circumstances. Resuscitation.2021;161:152-219.
2. **Paal P et al.** Accidental Hypothermia: 2021 Update. Int J Environ Res Public Health. 2022;19(1):501.
3. **Pons Claramonte M et al.** The stress experienced in an emergency medical service (EMS): A descriptive study. Int Emerg Nurs. 2024;74:101450.
4. **DeMaria Jr S et al.** Adding emotional stressors to training in simulated cardiopulmonary arrest enhances participant performance: Emotional stressors in advanced cardiac life support training. Med Educ. 2010;44(10):1006-15.
5. **Valentin B et al.** Cortisol and alpha-amylase as stress response indicators during pre-hospital emergency medicine training with repetitive high-fidelity simulation and scenarios with standardized patients. Scand J Trauma Resusc Emerg Med. 2015;23(1):31.
6. **Polo A et al.** Assessment of academic stress in university student. Ansiedad Estrés. 1996;2(2-3):159-72.



RESULTS

The group using haptic suits reported significantly higher usability scores, indicating a more positive user experience compared to the traditional training group. SUS scores averaged 78 out of 100 for the haptic group, suggesting good usability. Analysis of salivary Alpha Amilase indicated a marked reduction in stress levels after training sessions with haptic suits, contrary to the increase observed in the control group. Additionally, participants in the haptic suit group reported enhanced perception of realistic training scenarios, which correlated with lower post-training stress levels.



Preliminary results for a future comparative project on the use of VR and VR with a haptic suit. The use of the haptic suit leads to more extensive and complex neural activation. This suggests a much more immersive and multimodal experience, where the brain is integrating visual, tactile, and proprioceptive information more comprehensively. Bilateral activation indicates a more holistic processing of the experience, possibly leading to a stronger sense of presence and a deeper emotional and cognitive response to the simulated situation.

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