

Reducing the stigma on posttraumatic stress disorder in militaries through virtual reality

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Over the last years, the occurrence and consequences of posttraumatic stress disorder (PTSD) in militaries has received increasing attention in the media. Young members of the British royal family raise awareness by speaking out and funding training and education programs for active duty militaries, veterans and their families. Actions such as these aims to help reduce the persevering stigma of PTSD. In clinical research, the stigma and underreporting of PTSD in militaries has been an area of investigation for decades.

PTSD has an estimated prevalence of 2–17% in US militaries and veterans (1). Both the suffering and the perception of threat of a traumatic event during a military mission are strong predictors of the occurrence of PTSD symptoms (2,3). PTSD is a disabling disorder with severe consequences if left untreated, such as an increased risk of aggressive behavior, comorbid depression, homelessness, unemployment, suicide and alcohol misuse (4). Although effective treatments for PTSD exist, research has shown that many veterans returning from missions in Afghanistan in need of treatment did not seek professional help (5). A study conducted by Harik *et al.* found veterans with PTSD symptoms did not recognize these symptoms and lacked knowledge about effective treatments of PTSD. This could be a barrier to visit a clinician and seek help (6). A qualitative study by Mellotte *et al.*, using semi-structured interviews amongst UK veterans who sought mental help, reported they initially refrained from seeking help because of self-stigma and possible public stigma. They commonly waited until a point of crisis was reached before reaching

out for help (7). A survey conducted amongst military clinicians by Wilk *et al.* showed that in 41% of cases where PTSD was diagnosed clinically, clinicians did not report the formal diagnosis including a code in the military health record. This was mostly motivated by perceived stigma and possible consequences for the career prospects of the militaries (8). Social support, internal motivation, and media attention were identified as factors to support the decision in seeking help in US militaries (7). Access to mental health care in a proximate facility is another contributing factor (9).

The delaying factors for militaries in help seeking underscore the vital importance of adequate screening and detection of PTSD to facilitate timely treatment and prevent symptoms from worsening. In the Departments of Defense and Veteran Affairs of the USA, the Primary Care PTSD screen (PC-PTSD) is the most widely used screening tool for PTSD. This is a four item questionnaire with four closed-end questions (10). The PC-PTSD is usually incorporated into more extensive surveys, such as the Post-Deployment Health Assessment (PDHA) symptom checklist. After screening positive for PTSD, a clinical assessment by a trained professional will establish a diagnosis and treatment plan.

New technologies such as virtual reality and mobile applications may further stimulate help-seeking and reduction of stigma. These technologies can be used for education, initial screening of PTSD symptoms and assignation to treatment. An example is the Smart Assessment on your Mobile (SAM) application, which

contains a PTSD checklist. A large agreement was found between SAM and a clinical structured interview for PTSD amongst police officers (11). Apart from symptom assessments, other applications such as the *PTSD coach* mobile application include information on PTSD, symptom managing tools such as relaxation skills and recommendations for professional help (12).

In the study of Lucas *et al.*, US active service militaries are interviewed by virtual human interviewers about PTSD symptoms (13). The virtual human interviewers were created by the research group of Rizzo *et al.* using the MultiSense system. This system is able to detect and analyze behavioral signals of the militaries such as head position, facial expression, body posture and speech dynamics. The virtual interviewer can then provide an appropriate response such as a follow-up question, an acknowledging gesture or feedback (14). Therefore, the virtual human interviewers are able to conduct a semi-structured interview with open-ended questions and emotional reflections. The amount of disclosed PTSD symptoms by the militaries in response to three open ended questions on PTSD symptoms was compared with both an anonymized and a regular version of the golden standard PDHA symptom checklist containing the PC-PTSD. The authors hypothesized that both the possibility of anonymous reporting and the building of rapport through the virtual interviewers would contribute to an increased disclosure of PTSD symptoms compared to the regular and anonymized version of the PDHA questionnaire. Indeed, they found active duty militaries were more likely to disclose PTSD symptoms to the virtual interviewer in comparison to both the regular and the anonymized version of the PDHA. This underscores the potential of virtual reality in the initial screening for PTSD symptoms in militaries. However, multiple factors could have contributed to this finding. As stated by the authors, the questions on PTSD symptoms by the virtual interviewer were asked in an open manner, as opposed to the yes/no questions of the PDHA. Additionally, in the virtual interview the questions on PTSD were intertwined in a clinical interview, in which the prior phase consisted of making contact and introductory questions and the final phase of questions about positive experiences. These additional phases were not part of the PDHA screening.

In a second study conducted in both active service militaries and veterans, the wording of the questions in the anonymous PDHA matched the wording of the open-ended questions on PTSD of the virtual interviewer. In this second study, no significant differences in symptom disclosure were

found in both the veterans and the active duty militaries. The number of active service militaries in this sample was not clear however, which is a limitation because perceived stigma could be more pronounced in this group as they reported less PTSD symptoms compared to veterans.

More research into other possible factors contributing to disclosure of symptoms with the virtual interviewer is necessary, such as the verbal and non-verbal rapport building by the virtual interviewer. Also, the clinical relevance of the increased disclosure with virtual interviewers should be considered. It was found that with the virtual interviewer, a mean of 1 PTSD symptom was disclosed in active duty militaries, while on the PDHA this was 0.5 PTSD symptom. A single symptom does not equal a diagnosis of PTSD nor a need for treatment. Therefore, the virtual interview can be considered a screening instrument and not yet a replacement for an actual clinical interview. It is still essential to follow-up with a comprehensive clinical assessment to ensure a diagnosis and allocation to treatment. It would also be interesting to explore the possibilities to provide psycho educational information by the virtual interviewer to stimulate the military to seek help. If the use of the virtual interviewers instead of the PDHA will lead to more diagnosis and treatment of PTSD in the end, this technology would be of great value for the military.

Based on this study, the use of virtual interviewers to stimulate disclosure of PTSD symptoms in militaries seems promising. Especially in populations with a high risk but relatively limited knowledge of PTSD symptoms and treatment this is an interesting alternative to closed-end traditional questionnaires. Other professions with a great risk of confrontation with traumatic events, such as police and fire officers, would also be relevant target groups. However, the implications depend on the subsequent actions by the military department. As long as the stigma and the consequences for the military career are large, militaries will continue to be reluctant to have a diagnosis of PTSD recorded in their military health records and accept help for treating this disorder. Against this background, apart from arrangements to reduce stigma and improve career prospects, it would also be interesting to look into possibilities for treatment of PTSD using virtual reality. This could also be of benefit to militaries who have limited access to mental health care facilities. The use of intelligent virtual therapists in combination with exposure treatment using multimedia including virtual environments could potentially facilitate an anonymous form of therapy. Such an application was developed by Tielman *et al.* and is currently

investigated in patients with sexual assault or combat related PTSD (15). More research on applications like these for PTSD treatment is necessary before conclusions on efficacy and usability can be drawn.

In conclusion, the innovative technique of virtual reality has great potential to contribute to a better screening process for PTSD in high-risk professions such as the military. PTSD has a tremendous impact but can also be treated effectively, especially in the case of an early diagnosis after single traumatic events. A good mental condition of militaries benefits all parties including patients, their families, their employers and the people of the countries they are protecting.

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Footnote

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