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Research

The effectiveness of virtual reality aggression and violence de-escalation training for nursing and midwifery students: A quasi-experimental study

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ABSTRACT

Background: Nursing students experience substantial exposure to aggression and violence while attending clinical placement. De-escalation training can effectively prepare students for aggressive encounters, yet is resource-intensive to deliver. Immersive virtual reality (VR) may improve training accessibility for nursing students.
Aim: To evaluate the effectiveness of a VR de-escalation training program to improve nursing students' confidence in managing patient aggression and its perceived usability.
Methods: This study utilized a single-group quasi-experimental pre-/post-test design. Undergraduate Australian nursing students (n = 221) completed a VR de-escalation training program, providing pre-/postintervention self-reported confidence in coping with patient aggression, system usability, and motion sickness data.
Results: Significant improvements in confidence scores were observed from pre- to postintervention ($p < 0.001$, d = 0.70). Participants found the program easy-to-use and reported minimal motion sickness. The majority agreed VR is a suitable medium for de-escalation training (93%) and desired further VR de-escalation training (89%).
Conclusions: Results show a single 20-minute VR training exposure significantly improved participant confidence in managing aggressive patients. VR may provide an opportunity to increase the accessibility of aggression management training for nursing students.

Introduction

Aggression and violence are issue impacting healthcare systems globally, with reported workplace incidents rising annually (Mento et al., 2020). In the United States of America, healthcare workers account for 73% of all nonfatal workplace injuries and illnesses caused by violence, with a notable 86% increase in incident rates between 2011 and 2018 (U.S. Bureau of Labor Statistics, 2020). Similarly, Australian hospital assaults rose by 48% in Queensland, 44% in New South Wales, and 60% in Victoria between 2015 and 2018 (Crimes Statistics Agency Victoria, 2024; NSW Bureau of Crime Statistics and Research, 2024; Queensland Health, 2024). A survey conducted with over 3,000 Australian nursing and midwifery staff reported that 79% of participants had experienced workplace violence in the 6 months prior to completing the survey (Pich & Roche, 2020), with student clinicians reported to face similar risks during clinical placements (Johnston et al., 2024). Further, the Australasian College of Emergency Medicine suggests the perceived normalization of aggression in healthcare environments and time-consuming reporting procedures contribute to staff choosing not to report incidents of workplace aggression and violence, indicating current prevalence data may be under-representative (Australasian College of Emergency Medicine, 2024). A systematic review examining the impact of aggression and violence on healthcare staff reports exposure to these incidents can result in severe consequences, highlighting outcomes such as burnout, diminished job performance, and workplace absenteeism due to injury (Mento et al., 2020). Nursing students affected by aggression and violence similarly report feelings of panic and despair, lessened self-assurance, reduced ability to positively impact patient care, and reconsideration of nursing as a chosen career (Hallett et al., 2023).

Training in aggression and violence de-escalation and management can effectively assist in preparing both students and clinicians

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to manage hostile patients (Somani et al., 2021), though there is limited evidence of widespread implementation of such training in Australian nursing tertiary programs. Many clinicians feel inadequately prepared to navigate aggressive and violent situations upon entering the workforce (Johnson et al., 2024). A 2025 systematic review of workplace violence training programs for healthcare professionals identified confidence as a crucial component contributing to clinician perceived preparedness to manage aggression and violence (Chung et al., 2025). Key challenges to integrating aggression and violence management training in nursing education include the duration and quality of training and the availability of qualified instructors (Searby et al., 2019).

Immersive virtual reality (VR) could provide a novel educational modality to help overcome these barriers in aggression and violence management training for nursing students. Immersive VR technology employs a headset and controllers to create interactive 3D virtual worlds. This form of training can be standardized in terms of exposure and duration, requires fewer instructors with less specified expertise, and may be facilitated with lower costs compared to live (particularly higher fidelity) simulations (Mills et al., 2020). Research demonstrates VR in nursing education can achieve similar learning outcomes to desktop or in-person training while enhancing user engagement (Checa & Bustillo, 2020).

Given the documented frequency of aggressive and violent incidents, with data clearly suggesting prevalence continues to intensify, and the clear acute and chronic impacts such incidents can have on healthcare workers and students, exploring alternative training approaches is crucial. VR has the capability to circumvent many of the challenges in implementing aggression and violence management training in nursing programs, offers learning outcomes comparable to traditional simulation-based learning environments, ensures consistent learning experiences, and potentially reduces resource needs. The present study aimed to assess the usability and impact on self-reported confidence of a VR-based aggression and violence management training program for nursing students.

Methods

Study design

This research assessed a VR-based aggression and violence de-escalation training tool leveraging a single-group pre-/post-test quasi-experimental design. Participants completed online questionnaires on their personal mobile devices, accessed via a QR code, before and after the VR intervention to gather self-reported data related to changes in confidence in managing aggressive patients, perceived resource usability, and motion sickness.

The VR program

The Simulation and Immersive Digital Technology Group at Edith Cowan University in Western Australia created the VR scenario, collaborating with a clinical advisory group (n = 12) of content specialists. These included hospital-based work health and safety managers, workplace violence training coordinators, and experienced frontline healthcare workers. Further, a series of focus groups were conducted with both clinical and hospital management staff, with access being granted to a series of security reports and video footage of violent incidents. The collation of these data worked to enhance the authenticity of the VR scenario and ensure alignment with hospital standards for de-escalation practices. The scenario script undertook multiple reviews with the advisory group and was tested with a group of five clinicians prior to finalization. The program features a branching narrative structure, allowing users at designated points to make dialogue choices that affect the scenario outcome. Each dialogue choice offers two to four alternatives, and users can call security or trigger a duress alarm at any time.

Before beginning the actual training scenario, participants completed a virtual tutorial to get acquainted with use of the controllers and how to engage with the interactive nature of the virtual experience. The tutorial also provides information on de-escalation strategy, advice on keeping appropriate/safe distances from patients, and demonstrates positioning to ensure clear exit routes. The primary scenario involves participants engaging with a simulated patient exhibiting aggressive behavior, which they must work to de-escalate. Depending on the dialogue choices made, the patient may become more aggressive, disclose relevant contextual information, or show signs of de-escalation. The scenario offers 38 different dialogue choices with six possible endings, ranging from successfully de-escalating the patient and providing a handover to the nurse manager to the patient becoming increasingly agitated and turning physically violent. After the scenario is completed, a summary screen depicts a review of decisions made.

Participants

Participants were recruited from a single public Australian university in Victoria. To be eligible to take part in the study, participants were required to be Bachelor of Nursing or Bachelor of Midwifery/Bachelor of Nursing dual degree students and aged over 18 years. Completion of the VR program was mandated into curricula, although participation in the research component (i.e., completion of pre-/postsurveys) was voluntary. A participant information sheet was provided, and informed consent was obtained from all participants prior to their involvement in the study.

Study measures

Changes in confidence were measured using the confidence in coping with patient aggression (CCPA) scale (Thackrey, 1987). The CCPA questionnaire was completed immediately before and after the intervention and consisted of 10 questions answered via an 11-point Likert scale with scores ranging from 1 to 11. The scale has been validated as being a reliable pre-/post-test instrument in group assessments (Nau et al., 2011).

To gauge the perceived ease of use or usability of the VR program, we used the System Usability Scale (SUS) (Brooke, 1996). The SUS is a 10-item, 5-point scale that has been extensively used in research evaluating usability of novel systems (Bangor et al., 2008).

The Fast Motion Sickness Scale (FMS) determined the extent to which any participants experienced motion sickness attributable to the VR intervention. It is a single-item 20-point scale that has been utilized in prior research to detect visually induced motion sickness potentially caused by VR (Keshavarz & Hecht, 2011). The scale was divided by quartile into *nil to negligible, mild, moderate*, and *severe* motion sickness.

Participant demographics were gathered using a survey that collected information on gender, age, degree, study year, and previous experience with immersive VR. Participants were also asked the extent to which they agreed with the following three statements via a 5-point Likert scale (1 = Strongly Disagree, 5 = Strongly Agree):

1. "I believe all healthcare staff and students should undergo more aggression and violence management training."

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2. "I believe immersive virtual reality is a suitable medium through which to provide aggression and violence management training."
3. "I would like to undertake more aggression and violence management training in immersive virtual reality."

Procedure

Data was collected across three distinct blocks, with each individual block consisting of a 4-week period. In each block, exposure to the VR simulation was scheduled as a set task for a whole day in a lab space consisting of 20 VR simulation stations. The experience was completed using the Meta Quest 2 headset. Groups of approximately 20 students completed a presession briefing and discussion to understand the voluntary nature of the research component of the exercise. Upon informed consent being gathered, participants completed the preintervention survey (approximately 5 minutes including CCPA and participant demographics), the VR intervention (approximately 20 minutes), and the postintervention survey (approximately 7 minutes including the CCPA, SUS, and FMS). Access to the online survey was facilitated through provision of a QR code that participants could scan using their personal mobile device. Upon completion of the postsurvey, participants were provided a debrief in groups of 10 with a trained facilitator.

Prebriefing and debriefing were guided by simulation standards of best practice (Decker et al., 2021; McDermott et al., 2021). Prebriefing covered simulation objectives, expectations for student involvement, the voluntary nature of the research component, session logistics, available support, and an orientation to the VR technology. Students were explicitly informed of the aggressive and violent content and its potential emotional impact, encouraged to ask questions, and offered opportunities for confidential discussion. Debriefing addressed scenario content, de-escalation strategies, and considerations for real-world practice. Students were invited to share perceptions of their performance, challenges encountered, and views on using VR for this form of education, and the facilitator provided clarification of de-escalation concepts as needed. Students could share reflections during the group debrief or privately postdebrief. Debriefing closed with reminders about available support services and the importance of seeking assistance if experiencing distress resulting from the scenario. A member of the academic team was present during the exercise and available to provide support related to research participation, the VR technology, or emotional reactions before, during, and after the session.

Participants completed the virtual tutorial once and training scenario twice. Prior to the beginning of the second scenario, participants were encouraged to select alternate options to explore a different scenario outcome. Session duration was approximately 40–60 minutes per group. Participants completed the VR program individually.

Data analysis

A paired samples t-test compared differences in total CCPA scores (out of 110) between pre- and post-VR intervention. For SUS data, scores were derived by (1) subtracting the sum of scores from odd-numbered questions by five, and (2) by subtracting 25 by the sum of scores from even-numbered questions. This was then followed by multiplying the sum of these by 2.5 to provide a total score ranging from 0 to 100 (Brooke, 1996). Data were analyzed using SPSS v29.

Ethics approval

Reciprocal ethics approval was granted by the site of study's institutional Human Research Ethics Committee based on primary approval from the Edith Cowan University Human Research Ethics Committee (#2023-04944). As study facilitators included university faculty, there was potential for participants to have working relationships with the researchers. To minimize potential influence on the decision to participate, written and verbal communication delivered prior to the VR session made explicitly clear that participating or withdrawing (at any time) would not impact relationships or standing with members of the research team or university. The online survey did not collect identifiable information, and while completion of the VR program was mandated into curricula, faculty had no means to identify those who chose to complete the research component. Data were managed and analyzed by research team members not involved in data collection or teaching potential participants. Incentives to participate were not utilized.

Results

A total of 223 participants completed the VR simulation. There were errors in two students' responses to the online survey, leaving a total of 221 participants who completed both pre- and postintervention surveys with no missing data (54 participants attended the block session in May 2024, 88 at the block session in April 2024, and 79 at the block session in March 2024).

Participant demographics

Participants predominantly identified as female (85.5%, n = 189), were aged under 25 years (57.3%, n = 126), and in their second year of study (54.3%, n = 120). The majority (81.4%, n = 180) had no previous experience with immersive VR. Table 1 presents participant demographic data in full.

In total, 96% of participants agreed or strongly agreed healthcare staff and students should undergo more aggression and violence management training, 93% agreed or strongly agreed immersive VR is suitable to deliver this training, and 89% agreed or strongly agreed they desired further aggression and violence management training in immersive VR. Table 2 presents Likert scale response data in full.

Table 1
Participant demographic characteristics.

Baseline characteristics	Full sample	
	n	%
Gender		
Female	189	85.5
Male	31	14.0
Other	1	0.5
Age		
Under 25	126	57.0
25–35	70	31.7
36–45	19	8.5
46–55	3	1.4
56 and above	3	1.4
Degree title		
Bachelor of nursing	173	78.3
Bachelor of nursing and midwifery	48	21.7
Years of study completed		
0–1	1	0.5
1–2	40	18.1
2–3	120	54.3
3–4	46	20.8
More than 4	14	6.3
Hours of immersive VR experience		
Never used immersive VR before	180	81.4
Less than 1	23	10.4
1–5	10	4.5
6–10	5	2.3
More than 10	3	1.4

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Table 2
Likert scale responses.

	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
I believe all healthcare staff and students should undergo more aggression and violence training.	1 (0.5%)	-	7 (3.1%)	50 (22.6%)	163 (73.8%)
I believe immersive virtual reality is a suitable medium through which to provide aggression and violence management training.	-	1 (0.5%)	15 (6.7%)	63 (28.5%)	142 (64.3%)
I would like to undertake more aggression and violence management training in immersive virtual reality.	-	7 (3.2%)	18 (8.1%)	65 (29.4%)	131 (59.3%)

Confidence

A paired samples t-test assessed changes in confidence scores (out of 110) pre- vs. postimmersive VR intervention. A statistically significant difference was detected, with postintervention scores (65.77) being significantly higher than preintervention scores (51.17; $p < 0.001$, $d = 0.70$). Independent samples t-tests and/or One-Way ANOVA analyses indicated no significant differences in change in pre-/postintervention confidence scores across all demographic factors, with the exception of a greater confidence improvement amongst those with no prior immersive VR experience compared to those with prior immersive VR experience (16.49 vs. 6.54, respectively; $p = 0.02$, $d = 0.59$).

Interestingly, between males and females, differences in both baseline (61.94 vs. 49.35, respectively; $p = 0.02$, $d = 0.59$) and postintervention confidence scores (72.90 vs. 64.53, respectively; $p = 0.038$, $d = 0.41$) were noted.

User-friendliness

The mean SUS score was 71.40 (SD = 17.13) out of 100. An independent samples t-test suggested no significant differences existed between those who had vs. those who had not used immersive VR before (72.57 vs. 71.32, respectively; $p = 0.688$, $d = 0.07$). Similarly, no statistically significant differences were noted across any other demographic characteristics. There were small but statistically significant correlations found between SUS scores and motion sickness ($r = -0.241$, $p < 0.001$) and change in confidence pre-/postintervention ($r = 0.206$, $p = 0.02$).

Motion sickness

The average FMS score was 2.62 out of a possible 20 (SD = 3.87), with 84.2% ($n = 186$) of participants reporting nil to negligible sickness, 10.8% ($n = 24$) reporting mild sickness, 3.6% ($n = 8$) reporting moderate sickness, and 1.4% ($n = 3$) reporting severe motion sickness. No participants withdrew from the training due to motion sickness. There was a very small, yet statistically significant negative correlation found between change in confidence pre-/postintervention and motion sickness ($r = -0.136$, $p = 0.044$).

Discussion

Study findings suggested statistically significant improvements in self-reported confidence in managing aggressive patients, measured via the well-validated CCPA (Thackrey, 1987), between pre- and postintervention, with an average confidence increase of 28.53% from one approximately 20-minute immersive VR training interaction. Further, confidence gains seem independent of captured demographic characteristics, except for prior experience with immersive VR. Participants with no previous experience with VR improving in confidence by a greater margin than those with previous VR experience may indicate some small novelty effect interaction (i.e., initial positive outcomes when introduced and, as its novelty lessens over time, so does the positive effect) (Clark, 1983).

Digital gamification in education is often associated with novelty that can inflate initial outcomes (Nacke & Deterding, 2017), yet research tracking gamification impacts over longer periods also suggests novelty effects are mitigated with repeated exposures, leading to benefits from familiarization (Rodrigues et al., 2022). While the present study is unable to determine sustainment of improvements in confidence in managing aggressive patients over time attributable to a VR intervention, immediate improvements were noted following one short, low-burden engagement. Future research could investigate more long-term exposures and impacts on confidence over time, which would also provide insight into any potential mediating effects of novelty and/or familiarization. In this study, statistically significant improvements in confidence were observed following a single short exposure. These findings, when considered alongside the lower resource requirements consistent with VR-related deliveries, particularly in comparison to traditional in situ high fidelity simulation (Mills et al., 2020), support consideration for the use of VR to enhance flexibility and accessibility of aggression and violence education for nursing students.

Simulation resources and infrastructure, trained educators/facilitators, and prolonged durations with long periods of learner downtime are recognized barriers to the introduction and/or persistence of incorporating education programs targeting aggression and violence management in undergraduate nursing (Searby et al., 2019). While didactic lecture-based information delivery is typical in tertiary settings, given the need to deliver education to large cohorts, numerous studies have established improved outcomes (including knowledge retention, skill development, and confidence improvements) through incorporating digital learning modalities (Joseph & Melder, 2018; Min et al., 2022; Pan et al., 2021). Immersive VR provides an avenue to deliver aggression and violence management training that is more interactive and engaging, reduces human resource burden, and can be delivered anywhere without the need for trained facilitators, in a sustained and standardized fashion, ensuring evidence-based delivery. Further, data capture capabilities can also be leveraged for compliance tracking as well as from an objective basis for feedback and debriefing.

Usability is an important consideration for successful realization of any contemporary innovation, but particularly digital innovations. For educational digital innovations, weak usability can inhibit learning acquisition, motivation to learn, and user buy-in (Fink et al., 2023). The VR resource leveraged in this study received a mean usability score of 71.40 out of a possible 100, with no differences being noted between those with or without prior VR experience. An empirical evaluation of the SUS would suggest this score demonstrates good usability, with scores above 68 indicating systems have "above average" usability (and "truly superior products" scoring above 90) (Bangor et al., 2008). A small association was observed between perceived usability and improvements in confidence in managing aggressive patients pre vs. post VR intervention; however, likely only predicted around 4% of this variance ($R^2 = 0.042$).

Cybersickness, a form of motion sickness caused by engaging with VR, can restrict VR efficacy (Chang et al., 2020). While the cause of cybersickness is not yet fully understood, it has been linked to smooth movement within immersive virtual worlds due to the

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perceived illusion of movement contradicting the lack of true self-motion, leading to sensory discrepancies (Chang et al., 2020; Laessoe et al., 2023). Purposeful virtual movement limitations were imposed in the development of the VR application environment leveraged for this research, which may have contributed to the low rates of motion sickness reported. However, educators should be cognizant of motion sickness when considering VR application implementations, particularly if experiences are to be embedded into curricula and/or participation/completion made mandatory. While VR software developers can implement steps to limit motion sickness likelihood, 5% of participants in the present study reported moderate to severe motion sickness. Fortunately, no motion sickness was severe enough to cause any participant to cease participation (even with participants being expressly informed to remove VR headsets at the first sign of motion sickness), though those reporting severe motion sickness required monitoring for a short period of time (i.e., 5–10 minutes) prior to them re-engaging in day-to-day activities. Motion sickness did have a statistically significant impact on perceived application usability, but like the relationship between usability and change in confidence, this relationship was very small, with motion sickness accounting for just under 6% of usability variance ($R^2 = 0.058$).

There was near-unanimous (96%) agreement that aggression and violence training should make up part of education for undergraduate nursing students. Higher learning institutions have a responsibility to train and prepare nursing students to recognize, manage, and report aggressive and violent behavior (Hallett et al., 2023), yet such training is rarely mandatorily implemented into curricula. A 2021 literature review synthesizing evidence about training programs focusing on management and prevention of aggression and violence toward undergraduate nursing students encouraged students enrolled in programs not providing such training to strongly advocate for its inclusion, suggesting experiential learning experiences enabling nursing students to practice aggression and violence management skills are paramount (Solorzano Martinez & De Oliveira, 2021). A total of 9 in 10 (93%) of present study participants suggested they felt VR was a suitable medium to deliver aggression and violence management training, with 9 in 10 (89%) also suggesting they would like to undertake more aggression and violence training in VR.

A 2024 systematic review of 25 studies exploring the effectiveness of simulation-based education for teaching aggression management skills to acute healthcare professionals concluded there are clear positive impacts on knowledge, performance, and confidence, yet also noted provision of such training is a costly and resource-intensive intervention (Mitchell et al., 2024). Immersive VR provides an avenue worthy of consideration and further exploration to provide this imperative training in a more cost- and resource-efficient manner. Prior literature reports, following initial hardware and development expenditure, VR becomes less costly per participant than live simulation due to fewer ongoing expenses (Farra et al., 2019; Mills et al., 2020). This suggests VR may have potential to complement existing nursing curricula, as once established, VR resources could lower recurring education delivery costs across student cohorts.

Limitations

However, this study is not without limitations. Self-reported confidence, while commonly used to evaluate education programs, including those targeting aggression and violence management, has not been verified as predicating real-world performance (Tölli et al., 2017). Further, participation was limited to a single site with a single cohort of nursing students from one public university in Australia. While exposure to aggression and violence is well documented as a substantial problem that requires urgent addressing globally and within states across Australia, previous aggression and violence education and real-world exposure may vary across different populations, which could limit present study generalizability. However, given participants were undergraduate students unlikely to have exposure to patient-related aggression and violence outside of clinical placement, there is undoubtedly merit in consideration of study findings for other tertiary educators, if not also those involved in aggression and violence education and training in healthcare workplaces. Lastly, as no control and/or comparison group was used, it is unknown how this VR application might compare to other educational modalities, providing a natural and important avenue for future research.

Conclusion

A substantial opportunity exists to leverage VR to enhance aggression and violence management education for tertiary nursing students. Present study findings include considerable improvements in confidence in managing aggressive patients following a single short exposure to a VR education program. Data capture and export capability can provide educators with a foundation to provide feedback to students, which could lead to reductions in the number of staff required to facilitate training. Resource burden has the potential to be lessened further, given system usability data, indicating VR education may have the potential to be leveraged as a stand-alone resource that could allow users to access education separate to scheduled classroom activities. While potential impacts on hardware wear-and-tear and breakages would need to be considered, capability for self-directed exposure would provide additional opportunity for knowledge and skill consolidation.

The high prevalence and associated effects of aggression and violence toward nursing staff and students is well documented and of significant concern. Of equal concern is, due to current barriers in provision of effective aggression and violence education, students are attending clinical placements and entering the workforce ill-prepared and at heightened risk. VR has the capability to deliver consistent experiential practice with lowered resource burden through providing exposure to authentic and interactive volatile situations within low-risk virtual environments.

Declaration of competing interest

The authors declare that they have no known competing personal relationships or financial interests that may have influenced the study reported in this article.

CRediT authorship contribution statement

Joshua Johnson: Writing – review & editing, Writing – original draft, Visualization, Methodology, Formal analysis, Data curation, Conceptualization. **Brennen Mills:** Writing – review & editing, Supervision, Resources, Project administration, Methodology, Funding acquisition, Conceptualization. **Luke Hopper:** Writing – review & editing, Supervision, Methodology, Funding acquisition, Conceptualization. **Sara Hansen:** Writing – review & editing, Supervision, Methodology, Funding acquisition, Conceptualization. **Kelley Mumford:** Writing – review & editing, Resources, Investigation. **Renju Joseph:** Writing – review & editing, Resources, Investigation. **Susan Philip:** Writing – review & editing, Resources, Investigation. **Gina Kruger:** Writing – review & editing, Resources, Investigation. **Abdi D. Osman:** Writing – review & editing, Supervision, Resources, Project administration, Methodology, Investigation, Conceptualization.

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References

Australasian College of Emergency Medicine. (2024). Violence in emergency department. https://acem.org.au/getmedia/6496564f-8330-47a3-9ae5-16af7453808f/P32-Violence-in-the-ED.

Bangor, A., Kortum, P. T., & Miller, J. T. (2008). An empirical evaluation of the system usability scale. *International Journal of Human—Computer Interaction, 24*(6), 574–594. doi:10.1080/10447310802205776.

Brooke, J. (1996). SUS—A quick and dirty usability scale. In P. W. Jordan, B. Thomas, A. Weerdmeester, I. L. McClelland (Eds.), *Usability evaluation in industry* (pp. 189—194). London: Taylor and Francis.

Chang, E., Kim, H. T., & Yoo, B. (2020). Virtual reality sickness: A review of causes and measurements. *International Journal of Human—Computer Interaction, 36*(17), 1658–1682. doi:10.1080/10447318.2020.1778351.

Checa, D., & Bustillo, A. (2020). A review of immersive virtual reality serious games to enhance learning and training. *Multimedia Tools and Applications, 79*(9), 5501–5527. doi:10.1007/s11042-019-08348-9.

Chung, Y.-F., Chang, Y.-C., Fetzer, S. J., Tessmer, L., Tsai, M.-H., & Feng, J.-Y. (2025). The effectiveness of workplace violence prevention education training programs on healthcare professionals' confidence: A systematic review and meta-analysis. *International Nursing Review, 72*,(4) e70107. doi:10.1111/inr.70107.

Clark, R. E. (1983). Reconsidering research on learning from media. *Review of Educational Research, 53*(4), 445–459. doi:10.3102/00346543053004445.

Crime Statistics Agency Victoria. (2024). Recorded offences. https://www.crimestatistics.vic.gov.au/crime-statistics/latest-victorian-crime-data/recorded-offences-2.

Decker, S., Alinier, G., Crawford, S. B., Gordon, R. M., Jenkins, D., & Wilson, C. (2021). Healthcare simulation standards of best practice: The debriefing process. *Clinical Simulation in Nursing, 58*, 27–32. doi:10.1016/j.ecns.2021.08.011.

Farra, S. L., Gneuhs, M., Hodgson, E., Kawosa, B., Miller, E. T., Simon, A., Timm, N., & Hausfeld, J. (2019). Comparative cost of virtual reality training and live exercises for training hospital workers for evacuation. *Computers, Informatics, Nursing, 37*(9), 446–454. doi:10.1097/cin.0000000000000540.

Fink, M. C., Eisenlauer, V., & Ertl, B. (2023). What variables are connected with system usability and satisfaction? Results from an educational virtual reality field trip. *Computers & Education: X Reality, 3*, 100043. doi:10.1016/j.cexr.2023.100043.

Hallett, N., Gayton, A., Dickenson, R., Franckel, M., & Dickens, G. L. (2023). Student nurses' experiences of workplace violence: A mixed methods systematic review and meta-analysis. *Nurse Education Today, 128*, 105845. doi:10.1016/j.nedt.2023.105845.

Johnson, J., Hansen, S., Hopper, L., Brook, L., Watson, J., & Mills, B. (2024). Aggression and violence in the emergency department: A qualitative study exploring the perspectives of frontline healthcare professionals. *Collegian, 31*(4), 195–201. doi:10.1016/j.colegn.2024.04.003.

Johnston, S., Fox, A., Patterson, S., Jones, R., Dafny, H., Pich, J., & Duff, J. (2024). Australian nursing students' experiences of workplace violence during clinical placement: A cross-sectional study. *Journal of Advanced Nursing, 80*(12), 1–13. doi:10.1111/jan.16189.

Joseph, C., & Melder, A. (2018). *Clinical aggression training: A rapid review*. Centre for Clinical Effectiveness, Monash Health. https://monashhealth.org//wp-content/uploads/2019/01/Clinical-Aggression-Rapid-Review-07082018.pdf.

Keshavarz, B., & Hecht, H. (2011). Validating an efficient method to quantify motion sickness. *Human Factors, 53*(4), 415–426. doi:10.1177/0018720811403736.

Laessoe, U., Abrahamsen, S., Zepernick, S., Raunsbaek, A., & Stensen, C. (2023). Motion sickness and cybersickness—Sensory mismatch. *Physiology & Behavior, 258*, 114015. doi:10.1016/j.physbeh.2022.114015.

McDermott, D. S., Ludlow, J., Horsley, E., & Meakim, C. (2021). Healthcare simulation standards of best practice prebriefing: Preparation and briefing. *Clinical Simulation in Nursing, 58*, 9–13. doi:10.1016/j.ecns.2021.08.008.

Mento, C., Silvestri, M. C., Bruno, A., Muscatello, M. R. A., Cedro, C., Pandolfo, G., & Zoccali, R. A. (2020). Workplace violence against healthcare professionals: A systematic review. *Aggression and Violent Behavior, 51*, 101381. doi:10.1016/j.avb.2020.101381.

Mills, B., Dykstra, P., Hansen, S., Miles, A., Rankin, T., Hopper, L., Brook, L., & Bartlett, D. (2020). Virtual reality triage training can provide comparable simulation efficacy for paramedicine students compared to live simulation-based scenarios. *Prehospital Emergency Care, 24*(4), 525–536. doi:10.1080/10903127.2019.1676345.

Min, A., Min, H., & Kim, S. (2022). Effectiveness of serious games in nurse education: A systematic review. *Nurse Education Today, 108*, 105178. doi:10.1016/j.nedt.2021.105178.

Mitchell, M., Newall, F., Bernie, C., Brignell, A., & Williams, K. (2024). Simulation-based education for teaching aggression management skills to healthcare providers in acute healthcare settings: A systematic review. *International Journal of Nursing Studies, 158*, 104842. doi:10.1016/j.ijnurstu.2024.104842.

Nacke, L. E., & Deterding, S. (2017). The maturing of gamification research. *Computers in Human Behavior, 71*, 450–454. doi:10.1016/j.chb.2016.11.062.

Nau, J., Dassen, T., Needham, I., & Halfens, R. (2011). Sensitivity, specificity and predictive value of Confidence in Managing Patient Aggression Scale on de-escalating behaviour. *Journal of Clinical Nursing, 20*(17—18), 2584–2586. doi:10.1111/j.1365-2702.2010.03597.x.

NSW Bureau of Crime Statistics and Research. (2024). Incidents of assault (non-domestic assault) on hospital premises from October 2023 to September 2024. https://crimetool.bocsar.nsw.gov.au/bocsar/.

Pan, L., Tlili, A., Li, J., Jiang, F., Shi, G., Yu, H., & Yang, J. (2021). How to implement game-based learning in a smart classroom? A model based on a systematic literature review and Delphi method. *Frontiers in Psychology, 12*, 749837. doi:10.3389/fpsyg.2021.749837.

Pich, J., & Roche, M. (2020). Violence on the job: The experiences of nurses and midwives with violence from patients and their friends and relatives. *Healthcare, 8*,(4) 522. doi:10.3390/healthcare8040522.

Queensland Health. (2024). Disclosure logs. https://www.health.qld.gov.au/system-governance/contact-us/access-info/disclosure-logs.

Rodrigues, L., Pereira, F. D., Toda, A. M., Palomino, P. T., Pessoa, M., Carvalho, L. S. G., Fernandes, D., Oliveira, E. H. T., Cristea, A. I., & Isotani, S. (2022). Gamification suffers from the novelty effect but benefits from the familiarization effect: Findings from a longitudinal study. *International Journal of Educational Technology in Higher Education, 19*(1), 13. doi:10.1186/s41239-021-00314-6.

Searby, P. A., Snipe, J., & Maude, P. P. (2019). Aggression management training in undergraduate nursing students: A scoping review. *Issues in Mental Health Nursing, 40*(6), 503–510. doi:10.1080/01612840.2019.1565874.

Solorzano Martinez, A. J., & De Oliveira, G. C. (2021). Workplace violence training programs for nursing students: A literature review. *Journal of the American Psychiatric Nurses Association, 27*(5), 361–372. doi:10.1177/1078390321994665.

Somani, R., Muntaner, C., Hillan, E., Velonis, A. J., & Smith, P. (2021). A systematic review: Effectiveness of interventions to de-escalate workplace violence against nurses in healthcare settings. *Safety and Health at Work, 12*(3), 289–295. doi:10.1016/j.shaw.2021.04.004.

Thackrey, M. (1987). Clinician confidence in coping with patient aggression: Assessment and enhancement. *Professional Psychology: Research and Practice, 18*(1), 57. doi:10.1037/0735-7028.18.1.57.

Tölli, S., Partanen, P., Kontio, R., & Häggman-Laitila, A. (2017). A quantitative systematic review of the effects of training interventions on enhancing the competence of nursing staff in managing challenging patient behaviour. *Journal of Advanced Nursing, 73*(12), 2817–2831. doi:10.1111/jan.13351.

U.S. Bureau of Labor Statistics. (2020). Workplace violence in healthcare, 2018. https://www.bls.gov/iif/factsheets/workplace-violence-healthcare-2018.htm#_edn1.

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