

ORIGINAL RESEARCH

Evaluating the feasibility and impact of using virtual simulation games as presimulation preparation for verbal de-escalation education of undergraduate nursing students: A quasi-randomized controlled study

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ABSTRACT

Background: Nurses and nursing students frequently report feeling underprepared to manage aggressive patients and often lack confidence in verbal de-escalation skills. Although high-fidelity and standardized patient simulations are effective for teaching these competencies, learners may enter emotionally charged scenarios without adequate preparation. Virtual simulation games (VSGs) offer a potentially engaging, psychologically safe method of presimulation preparation, yet their impact in this context has not been examined.

Methods: A quasi-randomized controlled study compared VSG-based presimulation preparation with traditional case-study preparation among fourth-year nursing students (N = 108) at a Canadian university. Students were assigned by simulation group to the experimental (VSG) or control (case study) condition. Knowledge, self-confidence, and anxiety were measured before and after preparation, and perceived competence was assessed before and after a standardized patient de-escalation simulation. Usability, engagement, and perceived impact on learning were evaluated using the Classroom Instructional Support Perception (CRISP) scale.

Results: Knowledge improved significantly following preparation for both groups, with the VSG group showing significantly greater gains ($p = .008$). Self-confidence did not change significantly in either group, while anxiety increased over time in both groups ($p = .003$). Perceived competence improved significantly following the live simulation for all students, regardless of preparation method. VSGs were rated significantly higher than case studies for usability, engagement, and impact on learning (all $p < .01$).

Conclusions: VSG-based presimulation preparation is feasible, highly acceptable, and associated with greater knowledge gains compared with traditional case-study preparation. While VSGs alone did not significantly influence self-confidence or anxiety, they appear to enhance cognitive readiness and learner engagement for emotionally demanding de-escalation simulations. Integrating VSGs into routine presimulation preparation may optimize in-person simulation efficiency and learning outcomes.

Key Words: Anxiety, Competence, De-escalation skills, Knowledge, Presimulation preparation, Self-confidence, Virtual simulation games

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1. INTRODUCTION

1.1 Introduction of issue and potential solution

Healthcare professionals, including nurses and nursing students, are increasingly confronted by aggressive patients in clinical settings globally but are often not confident or adequately trained in verbal de-escalation skills.^[1] De-escalation education is essential for the safety of patients and healthcare professionals.^[2] The communication skills required to de-escalate aggressive patient behaviours are not easily learned and require practice. Simulation-based education provides the opportunity for repetitive practice with feedback in an authentic but safe learning environment.^[1,3] However, learners are not always sufficiently prepared to participate in in-person clinical simulations, which hampers their learning.^[4] Virtual simulation is proposed as a presimulation preparation strategy to support engagement and enhance learning in undergraduate nursing students.^[5]

1.2 Challenges in nursing education

Nursing students face multiple challenges as they transition into professional practice, including low confidence, difficulty with communication and prioritization, challenges recognizing patient deterioration, and limited clinical judgment.^[6-9] Variability in clinical placements further contributes to inconsistent exposure to complex or high-risk clinical situations prior to graduation.^[10,11] Consequently, even when students possess adequate theoretical knowledge, they may perform poorly in stressful or unfamiliar situations because they are rarely exposed to real-life emergencies.^[12,13]

1.3 Clinical simulation

High-fidelity simulation and standardized patient (SP) simulations are well-established strategies to address these gaps, particularly for communication-intensive and emotionally charged encounters.^[14,15] These modalities allow students to practise real-time therapeutic communication, situational awareness, clinical judgment and evidence-based practice in a controlled, safe environment.^[16,17] Simulation exposes learners to clinical scenarios that may not occur during placement and enables them to observe the consequences of their actions without risk of patient harm.^[18] Well-designed simulation experiences are associated with improvements in knowledge, skills, confidence, communication, critical thinking, patient safety competencies and caring behaviours.^[19-22]

1.4 De-escalation simulations

The management and de-escalation of angry or aggressive patients is one of the most challenging competencies for nursing students to develop.^[23] High-fidelity and SP simulations are particularly well suited for teaching mental health

skills, as they allow learners to practise therapeutic communication, boundary setting, emotional regulation, and safety behaviours in realistic interpersonal encounters.^[24] Simulations specific to de-escalation provide opportunities for students to respond to escalating behaviours, recognize early warning signs, and apply verbal and non-verbal de-escalation strategies in real time,^[3] and have been shown to improve health professional student confidence and performance of de-escalation.^[25-27]

However, emotionally charged scenarios are often stressful for learners.^[3] Nursing students report anxiety related to simulation is due to the fear of the unknown, fear of making mistakes, and critique by peers and faculty.^[28] Thus, without adequate preparation, students may enter these simulations feeling anxious and unprepared, which can impair performance and limit learning.^[29,30] However, the presimulation preparation phase remains under-examined despite its critical role in learner readiness.^[4]

1.5 Presimulation preparation

Traditionally, presimulation preparation relies on passive learning activities such as textbook readings and written case studies, yet students frequently demonstrate inconsistent engagement with these approaches.^[4,31] Presimulation orientation has been shown to decrease anxiety and improve confidence and performance in medical trainees.^[32] Video-driven active learning strategies have been shown to promote engagement and learning and reduce anxiety surrounding presimulation preparation.^[33] Virtual simulation games (VSGs) are one form of video-driven activity that have shown promise for presimulation preparation.^[5]

1.6 Virtual simulation games

VSGs are serious games that immerse students in authentic clinical scenarios such as de-escalation, enabling them to rehearse communication strategies, practise clinical reasoning, and receive immediate feedback within a psychologically safe environment.^[34,35] By supporting repeated, deliberate practice and exposing learners to situations not consistently available in clinical placements, VGS have been associated with high levels of learner satisfaction, engagement, and learning outcomes such as clinical reasoning.^[36] VSGs also offer the advantages of cost-utility, accessibility and repeatability.^[37,38]

Despite the increasing use of high-fidelity and SP simulations to teach de-escalation, no studies were identified that explored options for presimulation preparation of these emotionally demanding, communication-intensive scenarios. Presimulation preparation strategies primarily focus on technical or procedural skills and commonly rely on pas-

sive learning activities, such as readings or case studies. No studies were identified that directly compared immersive, interactive presimulation preparation strategies with traditional approaches for de-escalation simulations involving aggressive or escalating patient behaviors. Accordingly, this study addressed a critical gap in the nursing education literature by directly comparing traditional case study–based presimulation preparation with VSG–based preparation for SP simulations focused on de-escalation of angry patients.

1.7 Study purpose and research questions

The purpose of this study was to examine the feasibility and impact of these approaches on undergraduate nursing students' knowledge, self-confidence, anxiety, and perceived competence. The following research questions guided the evaluation:

- 1) What is the feasibility and impact on nursing student knowledge, self-confidence and anxiety of VSG presimulation preparation versus traditional case-study preparation prior to participation in a de-escalation clinical simulation?
- 2) What is the impact of VSG presimulation preparation versus traditional case-study preparation on nursing student perceived competence following participation in a de-escalation clinical simulation?
- 3) What are nursing students perceptions of the usability, engagement and impact on learning of VSG presimulation preparation versus traditional case-study preparation?

2. METHODS

2.1 Study design

A quasi-randomized controlled design was used in this evaluation.

2.2 Setting and sample

Study participants were fourth-year nursing students enrolled in a community health nursing course of a BScN program at a Canadian University. Students were randomized by pre-assigned simulation group to the experimental (VSG) or control group (traditional case study) presimulation preparation. To minimize the threat of cross-over between groups, all simulations for the traditional approach groups were conducted prior to the introduction of the VSG to the remaining groups.

2.3 Sample size

An a priori power analysis was conducted in IBM SPSS Statistics for a one-way analysis of variance (ANOVA) comparing NASC-CDM scores between two groups. The significance level was set at $\alpha = .05$ and power at $1 - \beta = .80$. The analysis indicated a required total sample size of $N = 94$,

with 47 participants per group (equal allocation), to detect the expected between-group difference.

2.4 Interventions

Delivery of the de-escalation simulation experience aligned with Healthcare Simulation Standards of Best Practice[®] (HSSOBP) and included presimulation preparation, prebriefing, simulation delivery and facilitated debriefing.^[39]

2.4.1 Control group

The traditional presimulation preparation materials consisted of assigned readings and a case-study based on the content and decision points used to create the “De-Escalation of the Angry Patient” VSG.

2.4.2 Experimental group

The VSG presimulation materials required students to view a nursing situation, filmed from the perspective of the nurse, and select from three potential nursing actions at regular intervals. If learners selected the correct response the video continued to the next decision point; however, when learners selected an incorrect response, a short video illustrating the consequences was followed by a statement that the decision was incorrect along with the rationale. The VSG was previously designed using the Canadian Alliance of Nurse Educators using Simulation (CAN-Sim) VSG design process.^[40]

2.5 Data collection

Although participation in the “De-Escalation of the Angry Patient” clinical simulation and assigned preparation was mandatory, participation in the research study was voluntary and anonymous. Students were invited to complete 3 surveys linked by a uniquely generated code. Surveys were administered by trained research assistants at three time points: T1 (prior to completion of the presimulation preparation activities; T2 (following completion of the presimulation preparation activities and prior to the clinical simulation); and T3 (following completion of the clinical simulation and debriefing). An outline of the data collection timepoints, simulation activities and outcome measures is presented in Table 1.

2.6 Outcome measures

Knowledge was measured using two balanced 10-item multiple choice question quizzes before and after completion of the presimulation preparation activities. The quizzes were created by the research team based on Canadian guidelines for therapeutic communication and crisis intervention and reviewed by other faculty with mental health nursing expertise.

Table 1. Outline of data collection and simulation activities

Activity	Experimental Group	Control Group
T1 Data Collection	Pre-Knowledge Test	Pre-Knowledge Test
	Pre-NASC-CDM	Pre-NASC-CDM
Presimulation Preparation	Lecture and Readings	Lecture and Readings
	Virtual Simulation Game	Case Study
T2 Data Collection	Post-Knowledge Test	Post-Knowledge Test
	Post-NASC-CDM	Post-NASC-CDM
	Pre-Assessment Rubric	Pre-Assessment Rubric
Clinical Simulation	Prebriefing	Prebriefing
	De-Escalation of Angry Patient: Simulated Patient	De-Escalation of Angry Patient: Simulated Patient
	Debriefing	Debriefing
T3 Data Collection	Post-Assessment Rubric	Post-Assessment Rubric
	CRISP-VSG	CRISP-CS

*NASC-CDM = Nursing Anxiety and Self-Confidence with Clinical Decision Making Scale; CRISP = Class Room Instructional Support Perception Scale

Self-confidence and anxiety before and after completing the assigned presimulation preparation were measured using the Nursing Anxiety and Self-Confidence with Clinical Decision Making Scale (NASC-CDM), a 6-point, Likert scale questionnaire with 32 items.^[41] The two subscales demonstrated high reliability (self-confidence, $\alpha = .97$; anxiety, $\alpha = .96$).

Perceived competence before and after completing the de-escalation clinical simulation was measured using the scenario specific learning outcomes assessment rubric that accompanies both the VSG and the clinical simulation. Similar learning outcomes assessment rubrics have demonstrated reliability and validity.^[42]

Usability, engagement and impact on learning of the two presimulation preparation activities as perceived by nursing students was measured using the Classroom Instructional Support Perception (CRISP) Scale which is an adaptation of the CRiSP survey used previously to evaluate classroom response systems.^[43] The three subscales of the CRISP survey demonstrated good reliability as demonstrated by Cronbach's alphas of .795 (usability), .888 (engagement), and .824 (learning) when used to evaluate VSGs and case studies as presimulation preparation activities.^[5] CRISP subscale scores can be interpreted as high for usability (16.1-20), engagement (44.1-55) and impact on learning (48.1-60).^[44]

2.7 Data analysis

Two broad sets of repeated measures analysis were performed within and between the experimental and the control groups. First, to assess the extent to which the assigned presimulation preparation impacted nursing student knowledge, self-confidence and anxiety prior to participating in

the de-escalation clinical simulation, and secondly, to assess the extent to which the assigned presimulation preparation impacted learners' perceived competence to perform verbal de-escalation of an angry patient. Additionally, independent *t*-tests were conducted to assess learners' perceptions of the usability, engagement and impact on learning of the two presimulation preparation activities.

2.8 Ethical considerations

Ethical approval was obtained from the Queen's University Health Sciences and Affiliated Teaching Hospitals Research Ethics Board. Informed consent was obtained from all study participants prior to data collection and only anonymous data were collected.

3. RESULTS

A total of 108 fourth year nursing students enrolled in the study and completed at least one of the three surveys. The participants ranged in age from 20 to 26 years (average 22 years). The majority identified as female/women (79%) and white (67%). Fifty-seven participants were randomized to the experimental group and 51 to the control group.

A breakdown of study participant characteristics is displayed in Table 2.

3.1 Knowledge

The control group (case-study preparation) scored significantly higher on the pre-preparation knowledge test than the experimental group [$F(1, 107) = 3.674, p < .001, n_p^2 = .033$]; however, both groups' scores increased significantly from pre-test to post-test [$F(1, 107) = 18.524, p < .001, n_p^2 = .148$] with the experimental group (VSG preparation) scores increasing significantly more over time, with a large effect

size [$F(1,107) = 7.285, p = .008, \eta_p^2 = .064$].

Table 2. Participant characteristics

Characteristics (N = 108)	Frequency	Percentage (%)
Self-Identified Gender		
Female/Woman	85	78.7.0
Male/Man	12	11.1
Non-binary	0	0
Other	0	0
Not disclosed	11	10.2
Racial Identity		
White	72	66.7
Asian	11	10.2
Black/African	3	2.8
Middle Eastern	3	2.8
Indigenous	1	1.0
Mixed	1	1.0
Other	3	2.9
Not Disclosed	14	13.0
Characteristic	Mean (SD)	Range
Age (years)	22.1 (1.42)	20-26

Scores for the knowledge test and the NASC-CDM self-

confidence and anxiety subscales are reported in Table 3.

Results of the repeated measures ANOVA for these outcomes are reported in Table 4.

Table 3. Pre and post-preparation scores: Knowledge, self-confidence and anxiety

Outcomes and Groups	Pre-Preparation Scores (T1) Mean (SD)	Post-Preparation Scores (T2) Mean (SD)
Knowledge Test		
Experimental Group:	5.21 (.55)	6.30 (1.19)
VSG Prep (n = 57)		
Control Group:	5.95 (1.10)	6.20 (1.20)
Case Study Prep (n = 51)		
NASC-CDM Self-Confidence Subscale		
Experimental Group:	118.48 (17.39)	114.56 (19.11)
VSG Prep (n = 48)		
Control Group:	103.50 (22.72)	104.94 (15.76)
Case Study Prep (n = 32)		
NASC-CDM Anxiety Subscale		
Experimental Group:	57.91 (17.27)	64.83 (17.29)
VSG Prep (n = 47)		
Control Group:	63.72 (16.69)	67.94 (17.23)
Case Study Prep (n = 32)		

*NASC-CDM = Nursing Anxiety and Self-Confidence with Clinical Decision Making Scale

Table 4. Knowledge, self-confidence and anxiety repeated measures ANOVA for time (pre/post) by group (control/experimental)

Source	SS	df	Mean Square	F	Sig	Partial Eta Squared
Knowledge						
Between Subjects						
Group	4.560	1	4.560	3.674	.058	.033
Error (Group)	132.825	107	1.117			
Within Subjects						
Time	20.686	1	20.686	18.524	< .001	.148
Error (Time)	119.489	107	1.117			
Within Subjects						
Time X Group	8.135	1	8.135	7.285	.008	.064
Self-Confidence Subscale						
Between Subjects						
Group	5,811.504	1	5,811.504	10.918	.001	.123
Error (Group)	41,519.896	78	532.306			
Within Subjects						
Time	59.004	1	59.004	.340	.562	.004
Error (Time)	13,551.771	78	173.741			
Within Subjects						
Time X Group	275.204	1	275.204	1.584	.212	.020
Anxiety Subscale						
Between Subjects						
Group	755.961	1	755.961	1.644	.204	.021
Error (Group)	35,405.077	77	459.806			
Within Subjects						
Time	1,179.955	1	1,179.955	9.185	.003	.107
Error (Time)	9,891.564	77	128.462			
Within Subjects						
Time X Group	69.195	1	69.195	.539	.465	.007

3.2 Self-confidence

The experimental group (VSG preparation) rated their self-confidence significantly higher than the control group prior to completing the presimulation preparation [$F(1, 78) = 10.918$, $p = .001$, $n_p^2 = .123$]. The repeated measures ANOVA showed no significant main effect of time [$F(1, 78) = 0.34$, $p = .562$, $n_p^2 = .004$] indicating that participants' scores did not change significantly from pre-test to post-test overall. The Group $\times$ Time interaction was not significant, [$F(1, 78) = 1.58$, $p = .212$, $n_p^2 = .020$] indicating that changes in scores from pre-test to post-test did not differ significantly between groups.

3.3 Anxiety

The control and experimental groups did not differ significantly in terms of their reported anxiety prior to completing their assigned presimulation preparation [$F(1, 77) = 1.644$, $p = .204$, $n_p^2 = .021$]. The repeated measures ANOVA revealed a significant main effect of time [$F(1, 77) = 9.19$, $p = .003$, $n_p^2 = .107$] indicating that participants' anxiety scores increased significantly from pre-test to post-test overall with a moderate effect size. The Group $\times$ Time interaction was not significant [$F(1, 77) = 0.54$, $p = .465$, $n_p^2 = .007$] indicating that changes in scores from pre-test to post-test were similar across groups.

3.4 Perceived competence

The control and experimental groups did not differ significantly in terms of their perceived competence after completing their assigned presimulation preparation and prior to participating in the de-escalation clinical simulation [$F(1, 82) = .149$, $p = .700$, $n_p^2 = .002$]. Ratings of perceived competence as measured by the learning outcomes assessment

rubrics are reported in Table 5.

Table 5. Learning outcomes assessment rubric results: Perceived competence to de-escalate an angry patient

Group	Pre-Simulation Score (T2) Mean (SD)	Post-Simulation Score (T3) Mean (SD)
Experimental Group: VSG Prep (n = 45)	8.49 (1.10)	9.07 (2.33)
Control Group: Case Study Prep (n = 39)	8.46 (1.54)	8.87 (1.53)

Score Interpretation Guide: Novice Learner (Scores 4-7); Intermediate Learner (Scores 8-11); Competent Learner (Scores 12)

Repeated measures ANOVA results are reported in Table 6 and revealed a significant main effect of time [$F(1, 82) = 10.198$, $p = .037$, $n_p^2 = .052$] indicating that overall participants' perceived competence increased over time regardless of the presimulation preparation group. The Group $\times$ Time interaction was not significant, $F(1, 82) = 0.129$, $p = .720$, $n_p^2 = .007$, indicating that changes in scores from pre-test to post-test were similar across groups.

3.5 Usability, engagement and impact on learning

The experimental group participants rated the VSG presimulation preparation higher than the control group rated the case-study preparation in terms of usability ($p = .006$), engagement ($p = .002$), and perceived impact on learning ($p = .010$). The three CRISP subscales demonstrated good reliability: usability ($\alpha = .795$), engagement ($\alpha = .912$), and impact on learning ($\alpha = .824$).

Scores for the usability, engagement and impact on learning subscales of the CRISP scale are reported in Table 7.

Table 6. Perceived competence repeated measures ANOVA for time (pre/post) by group (control/experimental)

Source	SS	df	Mean Square	F	Sig	Partial Eta Squared
Between Subjects						
Group	.516	1	.516	.149	.700	.002
Error (Group)	283.889	82	3.462			
Within Subjects						
Time	10.198	1	10.198	4.491	.037	.052
Error (Time)	186.207	82	2.271			
Within Subjects						
Time X Group	.293	1	.293	.129	.720	.002

Table 7. Usability, engagement and impact on learning

CRISP Subscales	Mean (SD)		t-test	Sig	Effect size (Cohen's d)
	Control Group Case Study (N = 51)	Experimental Group VSG (N = 46)			
Usability (Score/20)	15.54 (2.44)	17.05 (3.06)	-2.592	.006	-.546
Engagement (Score/45)	41.12 (5.61)	44.80 (6.30)	-3.033	.002	-.620
Learning Score (Score/60)	43.64 (5.99)	46.61 (5.68)	-2.357	.010	-.509

CRISP = Classroom Instructional Support Scale

4. DISCUSSION

A novel VSG presimulation preparation activity was successfully implemented in an undergraduate nursing course as preparation for an in-person de-escalation simulation demonstrating its feasibility in the educational setting. Although the control group that completed the traditional case-based preparation demonstrated higher baseline knowledge, students who completed VSG preparation showed significantly greater improvement in knowledge scores over time. This finding supports the premise that that immersive, decision-based learning environments enhance knowledge construction more effectively than passive case-study approaches. These results are consistent with Power et al.^[3] and Mitchell et al.,^[1] who emphasized that experiential rehearsal of de-escalation strategies is critical for consolidating therapeutic communication principles. The large effect size observed suggests that VSGs may be particularly valuable for addressing gaps in procedural and applied knowledge related to managing aggressive patient behaviours.

Unexpectedly, self-confidence did not significantly change following presimulation preparation in either group. This finding aligns with Lattas et al.,^[45] who noted that confidence in managing aggression is influenced by cumulative exposure rather than isolated learning activities. Students in the experimental group began with higher self-confidence, potentially reflecting self-selection bias or prior informal experience with emotionally challenging encounters. The absence of significant change highlights the complexity of confidence development in emotionally demanding contexts and suggests confidence may be more strongly influenced by repeated high-fidelity simulation exposure rather than presimulation preparation alone.

Anxiety increased significantly in both groups following completion of presimulation preparation. Rather than indicating harm, this increase in anxiety may reflect heightened situational awareness of the cognitive and emotional complexity involved when managing patient aggression following exposure to authentic scenarios. Mitchell et al.^[1] and Poore et al.^[2] emphasize that recognizing the realities of aggression management can initially increase learner apprehension. This phenomenon may represent productive stress (eustress) that prepares students for engagement in high-fidelity SP simulations, consistent with Power et al.,^[3] who reported similar trends in emotionally charged simulation contexts.

Both groups demonstrated significant improvements in perceived competence following participation in the SP simulation, regardless of preparation method. This reinforces the pivotal role of high-fidelity and SP simulations in building practical de-escalation skills.^[25] The lack of a group ×

time interaction suggests that while VSGs enhance knowledge and engagement, mastery of interpersonal de-escalation skills may require embodied, relational learning achievable only through live simulation encounters.

Findings from the CRISP survey demonstrate that VSG-based presimulation preparation is feasible and highly acceptable to senior undergraduate nursing students. Participants rated the VSG significantly higher than traditional case-study preparation across usability, engagement, and perceived impact on learning. These findings align with previous studies showing that senior nursing students prefer interactive and immersive preparation methods and perceive VSGs as more intuitive and learner-centred.^[5,46] The high CRISP usability scores suggest that VSGs can be easily integrated into existing curricula without excessive technical burden, supporting the scalability of this approach. Students' strong preference for VSG preparation highlights the unique advantages of virtual rehearsal for emotionally demanding scenarios. VSGs provide psychologically safe, repeatable, and feedback-rich environments that allow students to practise verbal de-escalation strategies without fear of judgement or real-world consequences.

4.1 Limitations

The quasi-randomized design and reliance on self-reported measures limit causal interpretation. Baseline differences in knowledge and self-confidence suggest potential pre-existing group differences. Future studies should explore longitudinal exposure to VSG-enhanced preparation and examine objective performance outcomes, transfer to clinical practice, and long-term retention of de-escalation skills.

Additionally, perceived competence was measured using self-reported assessment rubrics rather than objective behavioral performance measures, which may overestimate actual skill proficiency. Future research should incorporate direct observation and standardized performance scoring during live simulations.

4.2 Education and practice implications

From an educational perspective, integrating VSGs as routine presimulation preparation may allow faculty to optimize in-person simulation time by shifting foundational knowledge acquisition and decision rehearsal to an asynchronous, scalable format. This approach may be particularly valuable in large programs with limited access to standardized patients or faculty facilitators. VSGs may also support more equitable learner preparation by providing consistent exposure to high-risk communication scenarios that may not be encountered during clinical placements.

5. CONCLUSION

This study demonstrated that a VSG is a feasible, acceptable, and pedagogically valuable presimulation preparation strategy for undergraduate nursing students learning verbal de-escalation. Compared with traditional case-based preparation, VSGs produced significantly greater gains in knowledge, with a large effect size, underscoring the unique capacity of immersive, decision-based environments to foster applied learning in emotionally complex clinical situations. Although self-confidence did not significantly change and anxiety increased following preparation, these findings likely reflect the multifaceted nature of confidence development and a productive increase in situational awareness rather than adverse effects. Both groups improved in perceived competence after SP simulation, reinforcing that immersive learning in authentic high-fidelity environments remains essential for mastery of de-escalation skills. High usability and preference ratings further highlight the scalability and learner-centred appeal of VSGs as psychologically safe spaces for rehearsal. Collectively, these findings support integrating VSGs as a routine presimulation activity to enhance cognitive readiness, learner engagement, and the overall efficiency of in-person simulations, while future longitudinal research should examine performance outcomes, clinical transfer, and sustained skill retention.

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AUTHORS CONTRIBUTIONS

Dr. Luctkar-Flude and Dr. Tyerman were responsible for intervention and study design. Dr. Luctkar-Flude was responsible for study implementation and data collection. Dr. Luctkar-Flude drafted the manuscript and Dr. Tyerman revised it. Both authors read and approved the final manuscript.

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CONFLICTS OF INTEREST DISCLOSURE

The authors declare that they are both Co-Presidents of the Canadian Alliance of Nurse Educators using Simulation (CAN-Sim) and instructors for the Canadian Association of Schools of Nursing (CASN) Certified Canadian Simulation Nurse Educator (CCSNE) Program.

INFORMED CONSENT

Obtained.

ETHICS APPROVAL

The Publication Ethics Committee of the Association for Health Sciences and Education. The journal's policies adhere to the Core Practices established by the Committee on Publication Ethics (COPE).

PROVENANCE AND PEER REVIEW

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DATA AVAILABILITY STATEMENT

The data that support the findings of this study are available on request from the corresponding author. The data are not publicly available due to privacy or ethical restrictions.

DATA SHARING STATEMENT

No additional data are available.

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