The Application of Virtual Simulation to Promoting Empathy in Undergraduate Nursing Students

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Abstract

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Empathy is the foundation of caring in the nursing profession. It is critical to an effective patient-nurse relationship and impacts decision-making in nursing care. This study aimed to investigate the impact of virtual simulation on nursing students’ empathy and the relationships of empathy to their demographic characteristics. A randomized pretest and posttest control group design was employed in the study with 140 participants from twelve undergraduate nursing programs across Canada.

A virtual simulation scenario was created by the author regarding a patient with substance overuse in an acute care setting. Standardized patients were employed to portray the virtual characters to enhance realism and immersive experience. The participants in the control group reviewed a text-based case study, which consisted of an identical storyline of the virtual simulation scenario, while those in the intervention group experienced the virtual simulation activity. The Kiersma-Chen Empathy Scale-Revised (KCES-R), Substance Abuse Attitude Survey (SAAS), and a demographic survey consisting of age, gender, personal, family, and learning experiences related to substance overuse, were used in the study.

The results indicated empathy was significantly increased after the learning activities in both groups, but nonsignificantly different between the participants in the text-based case study and virtual simulation groups before and after the learning activities. Meanwhile, the participants’ attitudes toward substance overuse did not change significantly after their learning
activities. All demographic characteristics were nonsignificantly correlated to the participants’ empathy as well. However, the participants’ empathy toward the patients with substance overuse was significantly associated with their attitude toward substance overuse.

This study is one of the few studies that employed virtual simulation to promote nursing students’ empathy. Although the study did not demonstrate a significant difference between the text-based case study and virtual simulation groups after the learning activities, it supports that virtual simulation is effective for promoting empathy in nursing education as a text-based application. Future studies will be needed to explore different virtual simulation designs and to determine how individual characteristics influence the cognitive process of perspective-taking in promoting empathy.
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S.J.
Chapter I: Introduction to the Dissertation

Empathy is the foundation of caring in the nursing profession. It is critical to an effective patient-nurse relationship (Reynolds, 2017) and impacts decision-making in nursing care (Schorn, 2007). To cultivate empathy and further promote caring in nursing practice and education, nurse educators must understand what empathy is and the relevant factors associated with its development.

Empathy is illustrated as "putting ourselves into someone else's shoes" and is perceived as a positive characteristic. Hoffman (1987) first defined empathy as an "affective response more appropriate to someone else's situation than to one's own," (p. 48), which limited empathy to an emotional state. Davis (1994, 2018) further identified that empathy was multifaceted, including cognitive, affective, and behavioral responses.

The cognitive response is the ability of perspective-taking in empathy. Perspective-taking is crucial in empathy because both affective and behavioral responses act according to the perception of others’ feelings and needs. A purposeful effort and active attempt are needed in perspective-taking. Individuals need first to suppress their egos and connect their own experiences and knowledge to interpret the world of others, and then infer an accurate perception of others’ feelings and needs. Various teaching strategies, such as case study (Razavi et al., 2002), role play (Cunico et al., 2012), and simulation (Bas-Sarmiento et al., 2017), have been proposed in the nursing literature to promote empathy by enhancing perspective-taking. Through evolving technology, simulation now plays a significant role in promoting empathy in nursing education.

Simulation imitates real-world settings and provides immersive learning experiences. The immersive learning experience recreates the lives of others, and nursing students can “put
themselves into someone else's shoes” and further explore the perspectives of others. Simulation has been implemented in nursing education to promote empathy through different modalities, such as the simulated suit (Levett-Jones et al., 2017), standardized patient (Yang et al., 2014; Turk & Colbert, 2018), and high-fidelity manikin (Ayed et al., 2021), with positive outcomes. However, virtual simulation, which is a technology that recreates reality on a computer screen and allows users to gain a standardized immersive learning experience online or offline, has yet to be explored to promote empathy in nursing education.

Some evidence has been generated supporting the application of virtual simulation in the cognitive domains of learning in nursing education, such as knowledge acquisition (Weston & Zauche, 2020; Chang et al., 2021) and clinical judgment (Fogg et al., 2020). However, the impact of virtual simulation on the affective domains of learning, such as caring and empathy, is unclear. Meanwhile, studies also support the relationships between nursing students' characteristics, such as gender (Cunico et al., 2012), learning history (Schultze et al., 2019), personal experience (Christofides & Silo, 2005), and empathy. In addition, attitudes toward vulnerable populations, such as patients with substance overuse, might play a significant role in empathy (von Hippel et al., 2008). However, no direct evidence shows the relationship between individuals’ attitudes and level of empathy. Thus, this study aimed to examine the application of virtual simulation to promote empathy in nursing students and the relevant demographic characteristics associated with empathy.

**Specific Aims**

There were three specific aims of this dissertation:

1. To compare the effect of a text-based case study and a virtual simulation on nursing students' self-reported empathy and attitudes.
2. To explore the relationships of nursing students' demographic characteristics, including age and gender, personal experience, and learning experience related to substance overuse to self-reported empathy before the intervention.

3. To examine how nursing students' attitudes toward substance overuse correlates to self-reported empathy before the intervention.

The following hypotheses were generated according to the aims:

1. Nursing students who experience virtual simulation will self-report more empathy than those in the text-based case study group after the learning activities.

2. Nursing students who experience virtual simulation will self-report more positive attitudes toward substance overuse than those in the text-based case study group after the learning activities.

3. Nursing students' age, gender, own experience related to substance overuse, family or close friend’s experience related to substance overuse, and learning experience with substance overuse will be significantly correlated to self-reported empathy before the learning activities in both groups.

4. Nursing students' attitudes toward substance overuse will be significantly correlated to their self-reported empathy before the learning activities.

Changes Made Since Proposal

The Kiersma-Chen Empathy Scale (KCES, Kiersma & Chen, 2013) was initially proposed to measure participants’ empathy in the dissertation. However, the instrument was modified to Kiersma-Chen Empathy Scale-Revised (KCES-R) in 2022 (Aronson et al., 2022), and the KCES authors requested the dissertation author to employ KCES-R, instead of KCES, in this study.
In addition, there were five specific aims in the dissertation proposal. The fifth aim was to evaluate the relationships between engagement level in the intervention group and self-reported empathy, and the hypothesis was that the participants who demonstrated a higher level of engagement in the virtual simulation group would report a higher level of self-reported empathy after the intervention compared to those who demonstrated a lower level of engagement in the same group. The engagement level was measured by the learning behaviors, such as the total time spent in the virtual simulation scenario, recorded from the virtual simulation platform. Unfortunately, the recording function was unavailable from the virtual simulation platform during the data collection. Thus, the fifth aim was eliminated from the study.

**Organization of the Dissertation**

This dissertation has been organized into four chapters. This first chapter presents the introduction, including an overview of empathy, evidence generated to support the development of empathy in nursing education, gaps in the evidence, specific aims, modifications required since the dissertation proposal, and plans for dissemination of the findings. The second chapter is a systematic review of the simulation modalities that have been applied to promote empathy in nursing education. Although previous reviews have identified the effectiveness of empathy education for undergraduate nursing students (Levett-Jones et al., 2019), the impact of simulated suits (Coelho et al., 2017; Eost-Telling et al., 2021), and virtual reality simulation (Hirt & Beer, 2020) in promoting empathy in nursing education, no systematic review has been conducted to compare the outcomes of different simulation modalities in promoting empathy.

In addition, Chapter III addresses the three specific aims with the details of study design, sample characteristics, intervention, and results of applying virtual simulation to promote nursing students’ empathy. Finally, a general summary of the dissertation is provided in Chapter IV. The
Appendices include the instruments, text-based case study, script and design of the virtual simulation scenario, as well as supporting documents of the study.

**Dissemination Plan**

The dissertation author plans to submit the manuscripts consisting of the systematic review and the results of this dissertation to peer-reviewed journals for dissemination. The first manuscript will be based on the systematic review in Chapter II with the title "Application of Simulation to Promote Empathy in Nursing Education: A Systematic Review." This manuscript will be submitted to *Nurse Education Today*, which emphasizes nursing, midwifery, and interprofessional healthcare education related to evidence-based practice for educators. Meanwhile, the manuscript consisting of the main results from Chapter III will be submitted to *Simulation in Healthcare* or *Clinical Simulation in Nursing* with the title "The Impact of Virtual Simulation on Undergraduate Nursing Students’ Empathy." *Clinical Simulation in Nursing* is the official journal of the International Nursing Association for Clinical Simulation & Learning (INACSL), which develops and publishes best practices in clinical simulation: INACSL Standards of Best Practice (INACSL, 2021). In addition, the author plans to submit a paper detailing the experience of creating the virtual simulation scenario to *Nursing Education Perspectives* as an innovation.
References


Empathy is the foundation of caring in the nursing profession. It is critical to an effective patient-nurse relationship (Reynolds, 2017) and it impacts decision-making in nursing care (Schorn, 2007). Empathy is described as "putting oneself into someone else's shoes" and is perceived as a positive characteristic. Adam Smith (1759/1976) first argued that we might share similar emotions when observing the affective states of others. However, Hoffman (1987) distinguished the similar emotional reaction mimicked from others as sympathy, and maintained that empathy required an active attempt to understand others' emotions. In the case of empathy, the observer purposefully tries to understand the feelings of others. Moreover, Davis (1994, 2018) further identified that empathy is multifaceted, and includes cognitive, affective, and behavioral responses.

The cognitive response is the ability of perspective-taking in empathy, which is crucial because both affective and behavioral responses act according to the cognitive capacity of understanding the perspectives of others. A purposeful effort and active attempt are needed in perspective-taking. For instance, Parkin et al. (2014) found the dieticians with a greater level of empathy tended to acknowledge patients' concerns more frequently and agreed on shared decision-making in treatment planning, which led to higher patient satisfaction and treatment adherence. Several teaching strategies have been proposed in nursing education for empathy development. After Kalisch (1971) published the first study of the development of empathy in nursing education, various teaching strategies, including lecture (Kalisch, 1971), role modeling (Kalisch, 1971; Layton, 1979), and rehearsal (Layton, 1979), were proposed in early publications to promote empathy in this field. In later publications (Cunico et al., 2012; Chen et
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al., 2015; Ayed et al., 2021), experiential learning strategies, such as the use of case studies, role
play, and simulation, began to play a significant role in empathy development in nursing
education.

Simulation imitates real-world settings and provides safe and immersive learning
opportunities. Nursing students can deliberately apply knowledge and practice skills without the
risk of harming real patients. In addition, by recreating the lives of others in the simulation,
nursing students can “put themselves into someone else's shoes” and further explore the
perspectives of others. Perspective-taking is imperative in empathy (Davis, 1994, 2018), which is
centered on accurately perceiving the feelings and needs of others. Although the accuracy with
which nursing students identify the feelings and needs of patients increases with more nursing
experience (Kunst-Wilson et al., 1981), it is also evident (Ward et al., 2012; Wilson, Prescott &
Becket, 2012) that overall empathy among nursing students decline with exposure to clinical
practice.

Simulation has been implemented in nursing education to promote empathy through
different modalities, including the simulated suit (Levett-Jones et al., 2017; Mandegari-Bamakan
et al., 2021), standardized patient (Yang et al., 2014; Turk & Colbert, 2018), high-fidelity
manikin (Ayed et al., 2021), and virtual simulation (Yu et al., 2021). The simulated suit is a
wearable device that replicates the physical and sensory effects of a lived experience, such as the
experience of visual impairment and stiff joints in older people or auditory hallucinations in
patients with schizophrenia. The standardized patient (SP) is an actor who portrays a real patient
to simulate someone experiencing a disease or health problem. The high-fidelity manikin is an
advanced computerized manikin that displays various physiological functions, such as heartbeat
and breath sounds. Both the SP and high-fidelity manikin provide nursing students with
simultaneous responses while practicing skills. Virtual simulation is a technology that recreates reality on a computer screen and allows users to gain a standardized learning experience online or offline. Another virtual simulation is virtual reality (VR) simulation, which imitates three-dimensional reality, and allows users to gain a fully immersive learning experience through a headset. Although both computer screen-based and VR simulations are considered virtual simulation, computer screen-based simulation is referred to as virtual simulation and VR simulation with a headset as VR simulation in this study.

Previous reviews have identified the effectiveness of empathy education for undergraduate nursing students (Levett-Jones et al., 2019), the impacts of simulated suits (Coelho et al., 2017; Eost-Telling et al., 2021), and virtual reality simulation (Hirt & Beer, 2020) in promoting empathy in nursing education. However, no systematic review has been conducted to compare the outcomes of different simulation modalities in promoting empathy in this context. Thus, this review aims to address this gap by focusing on the simulation modalities applied to promote empathy in nursing education.

Methods

Design

A systematic review extracts existing data from publications and critically appraises the relevant evidence to answer a research question. The Preferred Reporting Items for Systematic Reviews and Meta-Analysis (PRISMA) was employed to search and report the findings. The quality of those findings was appraised by the Medical Education Research Study Quality Instrument (MERSQI), and the matrix method (Garrard, 2017) was used to display information.

Study Objective
This review aimed to identify findings published in peer-reviewed journals, and summarize and synthesize the evidence for the effectiveness of different simulation modalities in promoting empathy in nursing education.

**Eligibility Criteria**

**Types of Studies**

The review included papers published in peer-reviewed journals. There were no geographical limitations or predefined publication year range. Owing to the author’s language skills, only English language papers were reviewed. Only studies that used experimental or quasi-experimental designs were included in the review.

**Types of Participants**

The review consisted of studies of nursing students regardless of education level, gender, age, ethnicity, or country.

**Types of Interventions**

Studies that employed at least one simulation modality, including simulated suit, manikin, SP, virtual simulation, and VR simulation, as an intervention, including in control and intervention groups, were included. Any devices that replicated sensations, such as an eye cover to distort vision, were considered a simulated suit. The manikin-based simulation included all low-, medium-, and high-fidelity manikins. For SP-based simulation, a standardized script and pre-simulation training were required. In addition, a VR headset had to be worn in the simulation activity in order to meet the definition of VR simulation. Experiential learning activities, such as educational videos, case studies, and role play between students, were excluded from the review.

**Types of Outcome Measures**
The review included studies that implemented self-reported quantitative evaluation or behavioral observation using validated instruments related to empathy, caring, or attitude.

**Search Strategy**

A systematic search was performed on four electronic databases, including CINAHL Plus, ERIC, PubMed (Ovid Medline), and PsycINFO. The keywords “nursing education” (context), “nursing students” (population), “simulation” (intervention), and “empathy” (outcome) were employed in the search. Meanwhile, a text search of the same keywords was performed on Google Scholar to find more published papers.

**Critical Appraisal**

The quality of each study was appraised using MERSQI, which consists of 10 items and six domains, including study design, sampling, type of data, validity of evaluation instrument, data analysis, and outcomes, with scores ranging from 5–18. The reliability of MERSQI was reported in Reed et al.'s (2007) study of medical education with a Cronbach's alpha of .6 and Yucha et al.’s (2011) study of nursing education with a Cronbach's alpha of .547. Meanwhile, the criterion validity for MERSQI was demonstrated via a significant correlation between MERSQI scores and initial editorial decision for peer review, final manuscript acceptance (Reed et al., 2008), 3-year citation rate, and journal impact factor (Reed et al., 2007).

**Results Synthesis**

A data extraction sheet was created in table format. Author(s), purpose of study, study design, study sample, simulation design, outcome measure, reliability and validity of the measure, results, and MERSQI score were included in the table. The extracted data were synthesized in narrative form to compare the outcomes of different simulation modalities in promoting empathy in nursing education. Meanwhile, similarities and differences between study
sample, simulation design, and results were compared to inform the appropriate simulation design for promoting empathy in different contexts.

**Results**

**Study Selection**

The initial search produced 339 articles from the four electronic databases. An inclusion and exclusion process based on PRISMA (Figure 2.1) was conducted, after which 39 articles remained. After a full review of those 39 articles, 20 studies were included in the review.

**Characteristics of Included Studies**

The 20 studies included in the review were published between 2014 and 2022 (Table 2.1), and 10 were published between 2020 and 2022. Only one study (Yang et al., 2014) used a single-group post-test design. Nine studies employed a single-group pre-/post-test design, and the remaining 10 had a two-group pre-/post-test design. Of the ten two-group studies, six were true experimental designs. Although most of the studies were cross-sectional, three from the single group pre-/post-tests design and two from the two-group design were longitudinal studies of 1 to 4 months.

**Participant Characteristics**

Most of the studies recruited participants using convenience sampling of either students from a specific course or from the same university. The recruited participants included Bachelor of Science in Nursing (BSN, \( n = 2825 \)) students and nurse practitioner (NP, \( n = 26 \)) students. All years of the BSN program were represented by participants. Most participants were female; BSN students were mostly between the ages of 20 and 30 years, and nurse practitioner program participants were between 30 and 39 years.

**Simulation Design**
All five simulation modalities were represented in the studies, including SP (n = 8), simulated suit (n = 6), manikin (n = 3), virtual simulation (n = 2), and VR simulation (n = 1).

In the SP-based simulation intervention, three studies (Yang et al., 2014; Turk & Colbert, 2018; Sanko et al., 2021) employed the Community Action Poverty Simulation (CAPS) developed by the Missouri Community Action Network (2020), which aims to promote understanding of the day-to-day experiences of families living in poverty. CAPS consists of 15 community agencies, such as a bank, utility company, pawnbroker, grocery store, and school. SPs act as those community agents, and the participants, as family members in poverty, interact in certain tasks with the SPs in order to experience the challenges of being poor. The remaining studies consisted of one to four single SP-based simulation activities as interventions.

The simulated suit-based interventions consisted of various simulated suits, including a hemiparesis suit (Levett-Jones et al., 2017) for acquired brain injury (ABI) to replicate the experience of dysphasia, hemianopia, and hemiparesis, and an aging suit, used in two studies (Mandegari Bamakan, et al., 2021; Fernández-Gutiérrez et al., 2022), to mimic the impairments of older adults, including visual restrictions, joint stiffness from arthritis, and lower limb weakness from muscle atrophy. In addition, a pregnancy belly simulator (Thomas, 2020) and a voice simulator (Sideras et al., 2015) were worn by participants to experience daily life being pregnant and living with auditory hallucinations, respectively. Campbell et al. (2021) utilized the Virtual Dementia Tour® (VDT®) to improve nursing students’ attitudes and empathy toward patients with dementia. VDT® was created by Second Wind Dreams (2021) in 2001 to develop a better understanding of dementia. Although Campbell et al. (2021) indicated the intervention was a “virtual reality experience” (p. 1), no VR headset was used in the simulation activity. Instead, eyewear to distort vision and devices to alter the senses of touch and hearing were used to mimic
the experience of being a person with dementia. Therefore, the simulation modality of this study was coded as a simulated suit.

Simulation designs in manikin-based studies were diverse. Haley et al. (2017) chose one manikin-based simulation scenario from the National League for Nursing’s (NLN) Advancing Care Excellence for Seniors (ACES) simulation scenarios and examined participants’ empathy a month after the simulation activity. Ayed et al. (2021) used three ACES simulation scenarios and evaluated participants’ empathy immediately after completion of the third simulation activity. In Khalaila’s (2014) study, participants experienced two to three author-created manikin-based simulation scenarios within four months.

Menzel et al. (2014) were the first to apply a virtual simulation to promote empathy among nursing students. Unfortunately, the participating faculty members perceived the free virtual simulation platform, Second Life®, to be a “challenge” (Menzel et al., 2014, p. 44) due to difficulties with the technology and with interacting on the platform. Six years later, Yu et al. (2021) created a virtual simulation scenario based on a real patient with bowel cancer. The virtual simulation activity provided a simulated hospital environment where participants could explore the patient's experience with cancer treatment. With advancing technology, Yu et al.’s virtual simulation activity is accessible on mobile devices, such as smartphones, through Quick Response (QR) codes.

Everson et al. (2015) developed a three-dimensional (3D) video of an unfolding case scenario in a hospital, and participants experienced the 3D video through a headset. Although VR is the latest technology, this is the only paper in the review that used VR simulation to promote empathy among nursing students.

**Outcome Measures**
The studies included in the review used 10 instruments to measure empathy, caring, and attitudes toward poverty, older adults, dementia, and people with schizophrenia. All instruments were previously developed with acceptable reliability, and some authors (Khalaila, 2014; Levett-Jones et al., 2017; Patterson et al., 2020; Campbell et al., 2021; Sanko et al., 2021) also reported the reliability outcomes of their own studies. However, not all authors indicated the validity of the instrument used in their study.

**Empathy**

The most frequently used instrument, found in seven of the studies, was the Jefferson Scale of Empathy-Health Professions Students (JSE-HPS). This instrument measures empathy in the context of healthcare profession education. The scale consists of 20 7-point Likert-type items divided into three subscales: perspective-taking, compassionate care, and standing in the patient's shoes. The reliability of JSE-HPS was reported in several studies (Ward, 2016; Fernández-Gutiérrez et al., 2022) with Cronbach's alpha .77–.90. Meanwhile, psychometric data have supported the construct and criterion-related validity among healthcare providers (Ward et al., 2009).

The Kiersma-Chen Empathy Scale (KCES) was used in four studies. This instrument measures the cognitive and affective domains related to empathy in the context of healthcare education. The scale consists of 15 items and uses 7-point Likert-type scales. One study (Everson et al., 2015) used a Modified Kiersma-Chen Empathy Scale (MKES) with eight 7-point Likert-type items. The concurrent validity of KCES and JSE-HPS \( r = .594, p < .001; r = .770, p < .001 \) was established in Kiersma et al.’s study (2013) with good internal consistency of Cronbach's alpha .85–.89. In addition, the Comprehensive State Empathy Scale (CSES) was applied in two studies. The CSES comprises 30 items rated on a 5-point Likert-type scale,
divided into six subscales, including empathic concern, distress, shared affect, empathic imagination, helping motivation, and cognitive empathy. The Cronbach's alpha of CSES was .82–.94 indicating a good reliability but no validity was reported.

**Caring**

Both the Caring Ability Inventory (CAI) and the Caring Efficacy Scale (CES) were employed in Khalaila’s study (2014) to determine the relationship between anxiety and caring. The CAI measures the ability to care for others when involved in a relationship and consists of 37 7-point Likert-type items divided into three subscales: knowledge, courage, and patience. The CES assesses one’s confidence in developing caring relationships with clients or patients. It consists of 30 items rated on a 6-point Likert-type scale and has three subscales: attitudes, skills, and behaviors. The Cronbach's alpha of CAI was .70–.84 and a content validity index of 0.80. Meanwhile, Cronbach's alpha of CES was .84 but no validity was indicated in the study.

**Attitudes**

Five instruments were applied to measure various attitudes, including the Attitude Toward Poverty Scale (ATPS), Undergraduate Perceptions of Poverty Tracking Survey (UPPTS), Kogan’s Attitudes Toward Older People Scale (KAOPS), the Dementia Attitudes Scale (DAS), and the Attribution Questionnaire (AQ-20) concerning people with schizophrenia. All five instruments are Likert-type scales.

**Empathy Outcomes**

Fifteen studies, including all five simulation modalities, reported significant differences in measured outcomes after simulation activities had taken place. The six studies utilizing simulated suits and three employing manikin-based simulation activities led to significant increase in participants’ empathy or attitudes post-intervention. Meanwhile, one of the two
virtual simulation studies and four of the eight SP-based studies identified positive outcomes post-intervention. Although all three CAPS studies indicated a significant change in participants’ attitudes toward poverty, Sanko et al.’s (2021) study compared participants’ attitudes after CAPS or a table-top Monopoly-like board game simulation and found no group difference in overall change of attitude. In addition, the only VR simulation study (Everson et al., 2015) found a significant positive change in empathy after the immersive learning experience.

**Methodological Quality**

The MERSQI scores for the included studies ranged from 8.5 to 14 out of 18 points, with a mean of 10.95 ($SD = 1.62$). This result was considered acceptable with regard to methodological quality, compared to Yucha et al.’s (2011) review of 133 quantitative nursing education research articles with MERSQI scores ranging from 6.0 to 14.5, mean of 9.8, and SD of 2.2.

The primary reason for low MERSQI scores in this review was a lack of objective measures. MERSQI only scores one point for the use of a self-report survey, but three points if an objective approach is employed, such as a trained observer who rates behavior according to a rubric. Meanwhile, no patient or healthcare outcomes were measured as all the included studies used Likert-type instruments.

**Discussion**

Empathy is described as "putting ourselves into someone else's shoes" and has multiple facets, including cognitive, affective, and behavioral responses (Davis, 1994, 2018). The cognitive response is the ability of perspective-taking. This is crucial as both affective and behavioral responses rely on the accuracy of understanding the feelings and needs of others. While individual characteristics, such as gender (Christov-Moore & Iacoboni, 2019) and
personal experiences (Christofides & Silo, 2005), can affect the interpretation of the world of another, an immersive approach that replicates the experiences of others might enhance perspective-taking by putting participants into someone else's shoes.

Text-based case studies and role play between nursing students were the first immersive approaches applied to promote empathy in nursing education and were shown to be effective for decades (Kalisch, 1971; Cunico et al., 2012; Chen et al., 2015). SP-based simulation is a more rigorous immersive approach combining case study and role play. The SP, who is a professional actor portraying the characteristics of a real patient or client in order to simulate clinical symptoms or problems, undergoes pre-simulation training, and uses a standardized script when interacting with students. However, studies employing SP-based simulation to promote empathy have shown mixed results. Studies by Ward (2016), Patterson et al. (2020), and Turkelson et al. (2021) found no significant difference in empathy after SP-based simulation activities. On the contrary, the participants in Arrogante et al.'s (2022) study significantly improved their attitudes toward older people after SP-based simulation activity. In addition, all three CAPS studies (Yang et al., 2014; Turk & Colbert, 2018; Sanko et al., 2021) indicated a significant change in participants’ attitudes toward poverty. The relationship between attitude and empathy is unclear, as is whether the SP-based simulation activity is only effective in changing attitudes in a unique context but not general empathy.

In contrast, all three manikin-based simulation studies (Khalaila, 2014; Haley et al., 2017; Ayed et al., 2021) showed significant increase in participants’ empathy post-intervention. Khalaila (2014) and Haley et al. (2017) followed participants from 1 to 4 months, respectively, post-manikin-based simulation activities, and found that participants’ empathy had significantly increased at the end of data collection. Meanwhile, both Haley et al. (2017) and Ayed et al.
(2021) retrieved manikin-based simulation scenarios from ACES, which is a teaching resource that provides validated simulation scenarios and follows the International Nursing Association for Clinical Simulation & Learning (INACSL) Standards of Best Practice (INACSL, 2021). It is surprising that all three manikin-based simulation studies showed a significant increase in participants’ empathy while the SP-based studies did not. Theoretically, owing to its limited facial expressions and body language, the manikin is a less preferred simulation modality in the affective domain of learning, such as empathy. It is unclear whether some scenarios, such as the ACES simulation scenarios, are more empathy-provoking than author-developed scenarios.

A simulated suit offers a different approach to the immersive experience. Instead of interacting with an SP or manikin in a mimicked environment, the simulated suit aims to “turn the student into the patient.” For instance, participants in Thomas’ (2020) study wore an Empathy Belly Simulator in a maternal nursing course and performed some daily activities, including walking for short distances, putting on shoes, getting in and out of bed, and reaching into an upper cabinet for items. The Empathy Belly Simulator is a commercial product weighing 30 pounds that can simulate the symptoms and effects of pregnancy, such as fetal kicking, bladder pressure, and waddling. Not surprisingly, with the lived experience of being a patient, all six studies that applied a simulated suit as an intervention reported a significant increase in empathy or attitudes toward unique contexts, such as older people, mental illness, and pregnancy. In addition, both Sideras et al. (2015) and Fernández-Gutiérrez et al. (2022) investigated participant empathy and attitudes after experiencing simulated suits, and found not only a significant increase in empathy but more positive attitudes toward patients with schizophrenia and older patients.
Although nursing students can experience the real world of vulnerable populations through the physical and sensory effects of simulated suits, this tool cannot replicate the visceral feelings of a person’s life experience, such as poverty or discrimination. Considering the spaces required for 15 community agencies and the costs of SPs to implement the CAPS and the scheduling challenges for manikin-based simulation activity in simulation labs, Menzel et al. (2014) established a virtual community, Wald Island, in Second Life®, which is a free online platform allowing users to create places, objects, and avatars in an online virtual world. Avatars interact with each other and participate in activities developed by users. Menzel et al. (2014) recreated two families living in poverty and faculty members voiced the roles in Wald Island, such as pawnshop owner, day laborer and temp office manager, and banker. Taking on the role of family members in poverty, nursing students interacted with the avatars that faculty members voiced online and virtually experienced life in poverty. The users could manipulate the design of the environment and objects in Second Life® according to the learning outcomes and could standardize the scripts for avatars to ensure a consistent learning experience. However, advanced computer and graphic design skills were required to develop a virtual community in Second Life®, and faculty required significant professional development to operate the virtual simulation activity. It is unclear whether Menzel et al.'s (2014) nonsignificant result for participants’ attitudes toward poverty was due to the simulation modality or to technological difficulty.

Fortunately, with evolving advanced technology, the immersive approach to enhance perspective-taking has entered a new era in nursing education. Yu et al. (2021) recreated a simulated hospital and used the life story of a cancer patient in a virtual simulation intervention. The virtual simulation scenario was accessible via participants’ mobile devices, such as tablets
and smartphones, through quick response (QR) codes. The participants “became the patient” in the virtual simulation activity and explored the journey of being in the hospital for cancer treatments, including interactions with healthcare professionals and the impacts of the physical surroundings of the hospital. As expected, immediately after the virtual simulation activity, participants’ empathy was significantly higher than the empathy of those who did not have this experience. However, 3 months after the activity, the empathy of the control and intervention groups were not significantly different. The relationship between empathy retention and simulation modality is unclear because of the varied research designs. For instance, although both Khalaila’s (2014) and Haley et al.’s (2017) studies revealed a significant increase in participants’ empathy 1 to 4 months, respectively, after the manikin-based simulation activities, Khalaila (2014) employed a one-group pre-/posttests design that implemented two to three manikin-based simulation scenarios in 4 months, while Haley et al. (2017) used a two-group experimental design with one manikin-based simulation scenario as the intervention.

The VR simulation has the highest level of immersion in replicating the experiences of others. Using a headset, participants can move freely in the 3D environment of the VR simulation and interact with their surroundings, replacing the participants’ perceptual real world with a manipulated virtual environment. If the participants are willing to suppress their own ego and believe they “have become someone else,” they have the opportunity to deeply understand perspectives other than their own. Unfortunately, because of the complicated development and high cost, VR simulation has not yet come into common use in nursing education. However, Everson et al.’s (2015) study has shown that an unfolding VR simulation scenario has positive results in promoting the empathy of nursing students.

**Limitations of the Review**
Due to the author’s limited language ability, only articles written in English were included in the study. Studies conducted in languages other than English might generate valuable evidence supporting the use of simulation to promote empathy in nursing education. Meanwhile, the appraisal of MERSQI was coded by the author only. Thus, the reliability of the MERSQI score might require validation.

Gaps of the Studies Reviewed

The outcome measures in this review are limited to self-perceived responses, which only address one facet of empathy. Objective measurements, such as observed behaviors, are needed to determine the effectiveness of simulation modalities in empathy development. Meanwhile, most of the studies in the review had a cross-sectional design. The long-term effects of the different simulation modalities remain unclear and deliberate practice may be necessary. Further studies are needed to explore the impacts of different simulation modalities on empathic behaviors and long-term effects.

Conclusion

This review included 20 studies reporting on different simulation modalities to promote the empathy of nursing students. The five simulation modalities, including SP-based, simulated suit, manikin-based, virtual simulation, and VR simulation, were identified to significantly promote empathy in nursing education. The immersive approaches of the different simulation modalities allow nursing students to put themselves “into someone else's shoes” and gain insights into others’ worlds. Although the long-term outcome of empathy development is unclear, the studies demonstrated that empathy in nursing students was significantly higher immediately after the simulation activity. However, further research is needed to identify the objective outcome of empathy, such as observed empathic behavior. Overall, the results of this
review are encouraging and demonstrate that all five simulation modality types are effective
education strategies for promoting empathy in nursing students.
References


Second Wind Dreams. (2021). Virtual Dementia Tour®: a window into the world of dementia through the evidence-based dementia simulation training. https://www.secondwind.org/virtual-dementia-tourreg.html?gclid=Cj0KCQiA4aXiBRcRnl5sAMBZGz9eSWTZcZOU9zLIdQjfAKeT7VzdcVEllzR_svDrIskHT0d41bMj1saAgbBEALw_wCB


Methodological quality and scientific impact of quantitative nursing education research over 18 months. *Nursing Education Perspectives, 32*(6), 362-368.
Figure 2.1

*The Systematic Reviews and Meta-Analysis Flowchart*

- **Identification**
  - Records identified through databases searches (n=339)
  - Records identified through Google Scholar (n=6040)

- **Screening**
  - Records after duplicates removed (n=156)
  - Records excluded (n=118) (opinion, implementation process, qualitative, systematic review)

- **Eligibility**
  - Records screened (n=156)
  - Full-text articles excluded (n=19) (author-developed instrument without reliability and validity measurement, instrument irrelevant to empathy/caring/attitude, experiential learning activity as intervention not simulation)

- **Included**
  - Full-text articles assessed for eligibility (n=39)
  - Quantitative studies included in review (n=20)
Table 2.1

Characteristics of included studies

<table>
<thead>
<tr>
<th>Author</th>
<th>Purpose of study</th>
<th>Study design</th>
<th>Study sample</th>
<th>Simulation design</th>
<th>Outcome measure</th>
<th>Reliability and validity of measure</th>
<th>Results</th>
<th>Study quality (MERSQI score/18)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Khalaila (2014)</td>
<td>Investigate the effectiveness of simulations in promoting caring ability, and the predictors and mediators for caring efficacy</td>
<td>One group and pre-/post-tests, quasi-experiment and longitudinal (T0 and T1, 4 months apart)</td>
<td>$N = 61$, 2nd year BSN students in a university for the first clinical experience, 60% female, 88% between ages of 21-34 years</td>
<td>Manikin-based, 2-3 simulation scenarios in each simulation day for 2 days in 3 months</td>
<td>The Caring Ability Inventory (CAI), The Caring Efficacy Scale (CES)</td>
<td>CAI: internal consistency of 0.79-0.84, test-retest coefficient of 0.75, content validity index of 0.80 CES: Internal consistency of 0.84-0.88</td>
<td>Caring ability significantly increased after the simulations ($p = .001$). Caring efficacy was positively predicted by caring ability ($p = .05$)</td>
<td>10.5</td>
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<tr>
<td>Menzel et al. (2014)</td>
<td>Evaluate the impact of a virtual simulation activity on nursing students' attitudes toward poverty</td>
<td>Two groups and pre-/post-tests, true experiment</td>
<td>$N = 51$, BSN students in a university for a community health course, 77% between 20-29 years old</td>
<td>Virtual simulation: Second Life®</td>
<td>the Attitude toward Poverty Scale (ATPS)</td>
<td>ATPS: Cronbach’s alpha of 0.93 and a split-half (odd versus even) reliability of 0.87</td>
<td>No significant change in the total score pre- and post-tests within the control and intervention groups.</td>
<td>12.5</td>
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<tr>
<td>Yang et al. (2014)</td>
<td>Evaluate the effectiveness of</td>
<td>One group and post-</td>
<td>$N = 199$, three cohorts of senior</td>
<td>SP-based, Community</td>
<td>ATPS</td>
<td>Did not indicate</td>
<td>All three cohorts of students</td>
<td>9</td>
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<tr>
<td>Study</td>
<td>Methodology</td>
<td>Participants</td>
<td>Intervention</td>
<td>Measure</td>
<td>Results</td>
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<tr>
<td>Everson et al. (2015)</td>
<td>Measure the impact of a 3D simulation experience on nursing students' empathy</td>
<td>One group and pre-/post-tests, quasi-experiment</td>
<td>Virtual reality simulation: 10-minute 3D video of an unfolding scene in a hospital ward</td>
<td>Modified Kiersma-Chen Empathy Scale (MKES)</td>
<td>The empathy was significantly higher after the simulation activity ($p &lt; .001$)</td>
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<tr>
<td>Sideras et al. (2015)</td>
<td>Compare the impact of a simulation activity with a traditional didactic and clinical experience</td>
<td>Two groups and pre-/post-tests, quasi-experiment</td>
<td>Hearing voices simulation while performing tasks, and 3 SP-based simulation scenarios</td>
<td>Attribution Questionnaire (AQ-20), JSE-HPS</td>
<td>A significant difference between groups on the AQ-20 negative emotions subscale ($p = .04$), but no significant differences on the JSE ($p = .13$)</td>
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<tr>
<td>Mennenga et al. (2016)</td>
<td>Evaluate the impact of consistent exposure to a single patient through case study and simulation on empathy</td>
<td>Two groups and pre-/post-tests, true experiment</td>
<td>One SP-based simulation scenario: control group had different patients in the case studies and the</td>
<td>JSE-HPS</td>
<td>No significant differences within ($p = .76$) and between ($p = .58$) the control and intervention groups on HSE-HPS</td>
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</table>

Note: MKES: Cronbach’s $\alpha = 0.73$-$0.79$

AQ-20: Cronbach’s $\alpha = 0.79$-$0.93$

JSE-HPS: Cronbach’s $\alpha = 0.77$-$0.80$
<table>
<thead>
<tr>
<th>Study</th>
<th>Methodology</th>
<th>Participants</th>
<th>Measures</th>
<th>Results</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ward (2016)</td>
<td>Investigate nursing students’ empathy over time after experiencing SP-based simulation</td>
<td>One group and pre-/post-tests, quasi-experiment and longitudinal (T0 and T1, 2 semesters apart)</td>
<td>N = 146, senior BSN students in a university, mostly female and between 21-29 years old</td>
<td>Two SP-based simulation scenarios (one in each term)</td>
<td>JSE-HPS: Cronbach’s α = 0.78</td>
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<tr>
<td>Haley et al. (2017)</td>
<td>Evaluate nursing students’ empathy after experiencing a manikin-based simulation activity</td>
<td>Two groups and pre-/post-tests, true experiment and longitudinal (T0, T1 and T2, one month apart)</td>
<td>N = 53, BSN students in a university, 85% female, 50% were between 19-23 years old</td>
<td>One manikin-based simulation scenario from ACES NLN</td>
<td>KCES: Cronbach's α = 0.86-0.87</td>
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<tr>
<td>Study</td>
<td>Research Question</td>
<td>Participant Details</td>
<td>Method Details</td>
<td>Outcome Measures</td>
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<td>Levett-Jones et al. (2017)</td>
<td>Examine the impact of an immersive point-of-view simulation on nursing students' empathy</td>
<td>Two groups and pre-/post-tests, true experiment. N = 390, second year of BSN students from three campuses in a university, 90% female, mean age 28.8 years old</td>
<td>The hemiparesis suit for ABI: control group played the role of nurse and the intervention group played the role of ABI patient</td>
<td>CSES: Cronbach's α = 0.95. The mean scores of CSES between the two groups were significantly different (p &lt; .001). The control group had a higher mean of CSES compared to the intervention group, indicating the participants who played the role of nurse self-reported a higher level of empathy</td>
<td>6.87, p &lt; .001; CG t(23) = 2.106, p = .046</td>
</tr>
<tr>
<td>Turk &amp; Colbert (2018)</td>
<td>Examine the effects of a poverty simulation on the junior nursing students’ attitude toward poverty</td>
<td>One group and pre-/post-tests, quasi-experiment. N = 145, three cohorts of first-year BSN students in a university from 2015-2017, 61% self-reported having worked or volunteered with individuals living in poverty, 85% self-reported middle class or above</td>
<td>SP-based, Community Action Poverty Simulation (CAPS) Undergraduate Perceptions of Poverty Tracking Survey (UPPTS)</td>
<td>UPPTS: did not indicate. The mean scores of UPPTS after the intervention were significantly different (p &lt; .001) as well as the four subscales, indicating improvements in the students' attitudes toward poverty, empathy for those faced with poverty, and recognition of societal and structural barriers encountered by individuals living in poverty</td>
<td>8.5</td>
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<tr>
<td>Study</td>
<td>Title</td>
<td>Design</td>
<td>Sample</td>
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<td>Patterson et al. (2020)</td>
<td>Examine the effectiveness of simulation in enhancing the empathy of nursing students toward patients with alcohol use disorder (AUD)</td>
<td>One group and pre-/post-tests, quasi-experiment</td>
<td>$N = 56$, first-year of BSN students in a university, 80% female, 80% were 25-year-old and younger, 80% had personal experience with AUD, 30% had professional experience with AUD</td>
<td>One SP-based simulation scenario</td>
<td>CSES: Cronbach's $\alpha = 0.96$</td>
</tr>
<tr>
<td>Thomas (2020)</td>
<td>Evaluate the effectiveness of an Empathy Belly simulation exercise in increasing students’ empathy</td>
<td>2x3 mixed design: CG (pre-test, mid-test with simulator, post-test without simulator) and IG (pre-test, mid-test without simulator, post-test with simulator), quasi-experiment</td>
<td>$N = 158$, BSN students from a maternal health course in a university, 90% female, mean age 21.58 years old</td>
<td>Empathy Belly Simulator to experience the symptoms and effects of pregnancy</td>
<td>KCES: Cronbach's $\alpha = 0.66-0.81$</td>
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<tr>
<td>Study</td>
<td>Objective</td>
<td>Design</td>
<td>Participants</td>
<td>Measurement Tool(s)</td>
<td>Cronbach's α</td>
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<td>Ayed et al. (2021)</td>
<td>Evaluate the effect of high-fidelity simulation on students’ empathy</td>
<td>One group and pre-/post-tests, quasi-experiment</td>
<td>N = 83, BSN students from a pediatric nursing course in a university, 50% female, mean age 21.59 years old</td>
<td>Three manikin-based simulation scenarios from ACES NLN</td>
<td>KCES</td>
</tr>
<tr>
<td>Campbell et al. (2021)</td>
<td>Evaluate nursing students’ attitudes and empathy toward dementia patients after participating in a simulation activity</td>
<td>One group and pre-/post-tests, quasi-experiment</td>
<td>N = 163, BSN students in a university, no other characteristic provided</td>
<td>Simulated dementia experience: Virtual Dementia Tour (VDT)</td>
<td>DAS Cronbach's α = 0.83 – 0.85</td>
</tr>
<tr>
<td>Mandegari Bamakan, et al. (2021)</td>
<td>Determine the effect of an aging suit on nursing students’ attitudes toward older people</td>
<td>Two groups and pre-/post-tests, quasi-experiment</td>
<td>N = 84, BSN students from the 5th semester in a university, 50% female, mean age 21.25 years old</td>
<td>Aging suit Kogan’s attitudes toward older people scale (KAOPS)</td>
<td>KAOPS Cronbach's α = 0.87</td>
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<tr>
<td>Sanko et al. (2021)</td>
<td>Compare students’ attitudes toward poverty after participating in SP-based and tabletop simulation (Dwell™)</td>
<td>Two groups and pre-/post-tests, quasi-experiment</td>
<td>N = 292 (80 BSN students in SP group, 212 BSN and PT students in TTS group), 70% under the age of 25 years, 74% had personal</td>
<td>SP-based: CAPS, tabletop simulation (TTS): Dwell™</td>
<td>UPPTS Cronbach’s α = 0.60</td>
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<tr>
<td>Study</td>
<td>Aim</td>
<td>Methodology</td>
<td>Participants</td>
<td>Outcome</td>
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<td>Turkelson et al. (2021)</td>
<td>Evaluate empathy in nurse practitioner (NP) students through an SP-based simulation</td>
<td>One group and pre-/post-tests, quasi-experiment</td>
<td>N = 26, NP students from the rural health course in 2 universities, 90% female, 50% were between 30-39 years old</td>
<td>Three SP-based simulation scenarios, willingness to help (p = .008) and empathy toward those living in poverty (p = .039) in the subscale analyses</td>
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<tr>
<td>Yu et al. (2021)</td>
<td>Evaluate the effects of a virtual simulation on empathy.</td>
<td>Two groups and pre-/post-tests, true experiment and longitudinal (T0, T1, and T2, 3 months apart)</td>
<td>N = 238, second-year BSN students from the acute adult nursing course in a university, 90% female, 45% were between the ages of 21 and 30 years</td>
<td>Virtual simulation: Walking in Their Shoes (WITS), JSE-HPS, JSE-HPS: Cronbach's α = 0.81, significantly different (p &lt; .05) in the pre/post-JSE-HPS between T0 and T1, and the mean scores were significantly higher in IG (p = .012) in T1. However, no significant differences between the groups (p = .364) in T2</td>
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<tr>
<td>Arrogante et al. (2022)</td>
<td>Evaluate the effects of SP-based simulation on attitudes and empathy toward older people</td>
<td>One group and pre-/post-tests, quasi-experiment and longitudinal</td>
<td>N = 73, BSN students in a university, 90% female, mean age 20.67 years old, 50% lived</td>
<td>Four SP-based simulation scenarios, KAOPS, KAOPS: Cronbach's α = 0.82, significantly different (p &lt; .001) in the pre/post-KAOPS. The mean scores were significantly higher in the post-test</td>
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<tr>
<td>Study</td>
<td>Objective</td>
<td>Participants</td>
<td>Intervention</td>
<td>Outcome Measures</td>
<td>Results</td>
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<tr>
<td>Fernández-Gutiérrez et al. (2022)</td>
<td>Evaluate the influence of the simulation flow on the effectiveness in improving attitudes and empathy toward older adults</td>
<td>Two groups (CG: attended theory and seminar first, then interacted with the older adult and used aging suit, IG: attended theory and seminar first, and then used aging suit and interacted with older adult), and pre-/post-tests, true experiment</td>
<td>N = 70, third-year BSN students from the gerontology nursing course in a university, 80% female, mean age was 23.12 years old</td>
<td>Aging suit (GERonTologic simulator GERT)</td>
<td>Significant differences in empathy (p = .001) and attitudes (p = .001) scores in both groups. The mean scores were significantly higher in IG compared to CG.</td>
</tr>
</tbody>
</table>
Chapter III: The Impact of Virtual Simulation on Empathy in Undergraduate Nursing Students

Empathy is the foundation of caring in nursing and is essential to effective patient-nurse relationships (Reynolds, 2017) and decision-making in nursing care (Schorn, 2007). In past decades, nursing scholars and nurse educators have studied and implemented various teaching strategies to promote empathy, including case study and role-play. Factors relevant to the development of empathy have also been explored. For example, researchers have frequently observed that female nursing students display a higher level of empathy than their male counterparts (Juujärvi, 2006; Cunico et al., 2012). Given the evolving technology, simulation is now playing a significant role in promoting empathy in nursing education.

The concept of empathy has a long history. Adam Smith (1759, 1976) first argued that we might share similar emotions when observing others' feelings. Later, Hoffman (1987) distinguished the similar emotions shared based on observations of others as sympathy, which is a passive emotional reaction. In sympathy, the observer tended to mimic the same emotion from the observed affective state. By contrast, empathy involves an active, purposeful attempt to understand the feelings of others. Davis (1994) highlighted the cognitive processes and the capacity of a given individual to gain perspective while developing empathy and proposed an Organizational Model (1994, 2018) to elaborate on its multiple facets.

Theoretical Framework

Davis's Organizational Model (1994, 2018, Figure 3.1) served as the theoretical framework of this study. There are four constructs in this model, including antecedents, processes, intrapersonal outcomes, and interpersonal outcomes. Davis’s Organizational Model illustrates the development of empathy from childhood to adulthood and various behaviors
related to insufficient and excessive empathy. Because the context of this dissertation study is focused on promoting empathy in undergraduate nursing students, the proportion of empathy development in adulthood and helping behaviors in Davis's Organizational Model is applied in this dissertation.

**Antecedents**

The two components of antecedents are the person and the situation. The nursing literature focuses on several individual characteristics, including gender (Cunico et al., 2012), learning history (Schultze et al., 2019), and personal experience (Christofides & Silo, 2005), as being associated with nurses’ and nursing students’ levels of empathy. Environmental influences are also among the critical elements that contribute to empathy. For example, results reported by Choi et al. (2019), Kong et al. (2020), and Stavropoulou et al. (2020) all identified a significant negative relationship between self-perceived work-related stress and empathy in nursing practice. However, individual characteristics might have an impact on the perception of environmental influence. For example, von Hippel et al. (2008) reported that attitude might be an important mediator of self-perceived work-related stress. Unfortunately, the literature contains no direct evidence of a relationship between attitudes and empathy. Additional studies are needed to explore the relationships that link individual attitudes and perceived environmental influences with empathy in nursing practice.

**Processes**

The construct known as processes includes three components: noncognitive, simple cognitive, and advanced cognitive. Noncognitive processes do not apply in this study because primary circular reactions and motor mimicry require little to no cognitive activity and are known as simultaneous emotional responses in early childhood. An example of a noncognitive
process is a newborn infant starting to cry upon hearing other crying infants. By contrast, a simple cognitive process requires basic cognitive ability and includes classical conditioning, direct association, and labeling. In a simple cognitive process, an emotion is evoked when an individual encounters a situation that is similar to one experienced previously. For example, a nurse who has experienced, witnessed, or overheard aggressive behaviors from patients presenting with substance overuse might perceive stress if assigned to provide care for a patient diagnosed with a similar condition. Although this process connects personal experience and knowledge with a specific situation, it lacks a deeper connection, interpretation, and inference. In contrast, when using an advanced cognitive process, a nurse will actively attempt to imagine the patient’s world and experience. Although it is impossible to have a precise understanding of exactly how another person feels, this type of cognitive process requires a capacity for perspective-taking.

Perspective-taking is an essential component of empathy. This action requires a purposeful effort and an active attempt to understand the world as experienced by others. Individuals must use advanced cognitive processes to suppress their egos and imagine how others perceive a given situation. Advanced cognitive processes are needed to engage in perspective-taking as one attempts to connect and interpret personal experiences and knowledge and apply them to the world experienced by others, and then to infer an accurate perception of others’ feelings and needs. Although nursing students become more adept at identifying patients' needs as they gain experience (Kunst-Wilson et al., 1981), their overall empathy declines with ongoing exposure to clinical practice (Nunes et al., 2011; Ward et al., 2012). It is not clear why nursing students' empathy declines throughout the nursing programs. More studies are needed to explore the influence of the environment, for example, the role of student service and nursing
Intrapersonal and Interpersonal Outcomes

Davis's Organizational Model includes two outcome constructs. The affective responses are defined as intrapersonal outcomes, while interpersonal outcomes refer to behavioral responses, for example, helping behaviors. The affective responses that constitute the intrapersonal outcomes can be parallel or reactive. Parallel responses are more self-centered and describe duplicated emotions that are shared between the nurse and the patient. For example, a nurse might focus on own their feeling of pain when observing the patient withdrawing from a needle during injection. By contrast, reactive responses tend to be more other-oriented and result from more sophisticated cognitive processes. For example, a nurse might instead engage in a reactive response by recognizing the patient’s actions of withdrawing from a needle and using this information to apply an alternative strategy, such as distraction, when administering an injection.

Helping behavior is the overall outcome of empathy. However, few studies in the nursing literature provide direct measurements of empathic behavioral responses primarily due to the lack of a validated instrument. Razavi et al. (2002) first investigated empathic behaviors via recorded clinical interviews that were designed to determine whether more emotion-laden words and deeper communication at the emotional level were employed in practice after nurses participated in an empathy workshop. Meanwhile, Bas-Sarmiento et al. (2017) used the objective structured clinical examination (OSCE) in a simulation lab to evaluate nursing students’ empathic behaviors on a 0 to 5 rating scale after the completion of an empathy training program.
Although both studies revealed a significant increase in participants’ empathy after interventions, the validity and reliability of these measurements remain unclear.

Relevant evidence from the nursing practice and education literature has supported the components of each construct in Davis's Organizational Model (1994, 2018). In this model, processes are identified as critical constructs in empathy development. The principles of this organizational model suggest that it is possible to promote empathic feelings and behaviors in nursing students by manipulating the cognitive process. The learning strategies included in this model that emphasize perspective-taking, such as simulation, might have great potential to promote empathy. In addition, the four constructs in Davis's Organizational Model might interact with one another.

This study aimed to explore virtual simulation as a means to promote empathy and to identify the relevant demographic characteristics associated with empathy among nursing students. The four hypotheses were as follows:

1. Nursing students who experience virtual simulation will self-report more empathy than those in the text-based case study group after the learning activities.

2. Nursing students who experience virtual simulation will self-report more positive attitudes toward substance overuse than those in the text-based case study group after the learning activities.

3. Nursing students' age, gender, own experience related to substance overuse, family or close friend’s experience related to substance overuse, and learning experience with substance overuse will be significantly correlated to self-reported empathy before the learning activities in both groups.
4. Nursing students' attitudes toward substance overuse will be significantly correlated to their self-reported empathy before the learning activities.

Method

Design

This study employed a randomized pre-test and post-test control group design to explore the impact of virtual simulation on nursing students’ empathy and attitudes.

Participants

The sample consisted of nursing students from pre-licensure Bachelor of Science in Nursing (BSN) programs in Canada. A list of the accredited BSN programs was obtained from the Canadian Association of Schools of Nursing’s website (CASN, 2022). A research invitation recruiting participants was emailed to the contact person identified on the website of each BSN program. Because the learning activities in the study were in English, the Canadian BSN programs offered in French were excluded from the study.

Intervention

The Affinity Learning® platform was used to host the text-based case study and to develop the virtual simulation scenario. Affinity Learning® is a Canada-based virtual simulation platform that provides an interactive platform using basic artificial intelligence technology. The platform allows users to develop virtual simulation scenarios with minimal advanced graphic design and computer skills. Learners can engage with virtual characters through computer screen-based scenarios. The virtual simulation scenarios can be accessed by laptop and on mobile devices via a specific web link.

Nursing students in the control group reviewed a text-based case study (Appendix A) while those in the intervention group participated in a virtual simulation activity (Appendix B).
The storylines of the text-based case study and the virtual simulation scenario were identical; both focused on providing care for a patient with substance overuse in an acute care setting. The storyline was drafted by the author based on their own nursing experience with substance overuse patients in acute care settings. The content was validated by three subject matter experts who worked with the same patient population in the Greater Vancouver region in Canada. The storyline included information on the patient’s childhood, factors leading to substance overuse, and the progress of the social, physical, and mental status under the influence of this substance.

The simulation activity was designed based on the National League for Nursing (NLN) Jeffries Simulation Theory (Jeffries, 2021) to provide an experiential, interactive, and learner-centered experience. Standardized patients (SPs) were used to portray each character in a simulated acute care setting. An SP is an actor who is trained to portray a real patient to simulate someone experiencing a disease or health problem. In addition to the patient, SPs portrayed the social worker, the father, the mother and the voice of the nurse in the virtual simulation. The camera was secured on the forehead of the SP who voiced the nurse, while filming. When the participants experienced the virtual simulation, they were interacting with the virtual characters from “the eye of the nurse.” The purpose of this virtual simulation design was to further strengthen the immersive experience by replicating the realism through the first-person view. The text-based case study used the same SPs who were featured in the virtual simulation.

The storyline included six themes. The participants in the text-based case study control group were asked to read all six themes. For the virtual simulation activity, each theme (except for theme six) unfolded differently based on the participants’ selections at the decision-making points. The decision-making points were multiple-choice questions, each with two to four options. Nursing students who were assigned to the intervention group could select any option at
a decision-making point; the selected option led the participants to various outcomes. For instance, when confronted with a patient in pain, if the participant chose to withhold medication, the patient in the virtual simulation might respond by escalating to verbal violence. Similarly, if the participant chose to administer a high narcotic dose, the patient might experience an overdose. The participants could then re-select different options or return to a previous decision-making point, but could not return to a previous theme. The expected answer needed to be selected at each decision-making point to proceed to the next theme.

The six themes in the storyline started with a general healthcare background of the patient and the scenario unfolded with more information regarding the patient’s substance overuse from the perspectives of the patient, social worker, and family members. The first theme included a handover report from the night nurses with the patient’s past substance overuse history, current healthcare needs related to withdrawing, and aggressive behaviors toward other healthcare providers. There were three decision-making points in theme 1 to unfold the patient’s abnormal laboratory results, vital signs, and medication list. The second theme was the first encounter between participants and the patient. The signs and symptoms of substance withdrawing were revealed in theme 2 and participants needed to approach the three decision-making points with empathy in order to proceed to theme 3 in the virtual simulation activity. The social worker’s perspective to the patient’s substance overuse was indicated in the third theme, and participants could examine their perspective toward substance treatment through the two decision-making points.

Theme 4 was the second interaction between participants and the patient, which disclosed more details about the patient’s past and current uses of substances. The two decision-making points in this theme in the virtual simulation activity emphasized an empathic approach to the
patient’s use of substances and the virtual patient responded with a trusting attitude if participants selected the expected option in the decision-making points. Theme 5 disclosed the family dynamics with more information related to the patient’s substance overuse. The four decision-making points in theme 5 unfolded the cause and progress of the patient’s substance overuse, patient’s father’s perspective about substance treatment, and family support. Theme 6 was for self-reflection and did not have any decision-making points. In this final theme, the patient demonstrated signs and symptoms of withdrawing and participants were asked to reflect on what might be their responses to the patient’s behaviors.

**Measures**

The following measures were used to assess participants in this study.

**Demographic Questionnaire**

The demographic questionnaire included five questions that requested information on age and gender as well as personal experiences, a family member or close friend’s experiences, and previous learning experiences related to substance overuse. Ethnicity was not included in the demographic questionnaire because no study indicated a significant relationship between ethnicity and empathy or attitudes.

**The Kiersma-Chen Empathy Scale Revised (KCES-R)**

Kiersma and Chen (2013) developed an instrument that can be used to quantify empathy. The original Kiersma-Chen Empathy Scale (KCES) was based on Davis’s Interpersonal Reactivity Index (Davis, 1980; Davis, 1983) and was targeted to address students in healthcare-related fields. The instrument was recently modified to the Kiersma-Chen Empathy Scale-Revised (KCES-R) by Aronson et al. (2022) based on its evaluation in 47 studies. The KCES-R uses a 7-point Likert-type scale and features 14 items divided into two parallel subscales,
including Global Healthcare Professional Empathy Ratings (Items 1–7) and Self-Perceived Empathy Ratings (Items 8–14). Items 1 and 8 have parallel content and focus on comprehension of the patient’s experiences with substance overuse. Item 1 asks the respondent to assess how necessary it is for healthcare professionals to comprehend the experiences of a patient with substance overuse, while Item 8 asks respondents to provide a self-assessment of their own ability to comprehend the experiences of this patient cohort. The total score ranges from 14 to 98, with a higher score indicating a higher level of empathy. In a recent study by Blakely et al. (2022), the KCES-R was applied to measure empathy. In this study, the KCES-R was administered to 90 second-year pharmacy students with results that included inter-item correlations and item-scale correlations ranging from .72–.88, with Cronbach’s alpha at .936 for the global subscale and .938 for the personal subscale.

**The Substance Abuse Attitude Survey (SAAS)**

In 1985, Chappel, Veach, and Krug (1985) developed the Substance Abuse Attitude Survey (SAAS) to examine physicians’ and medical students’ attitudes toward alcohol and drug misuse. Since that time, the survey has been used widely to assess attitudes among nurses (Foster & Onyeukwu, 2003; Kelleher & Cotter, 2009) and nursing students (Quaye et al., 2020). The SAAS is scored using a 5-point Likert-type scale with 50 items divided into five factors, including permissiveness, treatment intervention, non-stereotypes, treatment optimism, and non-moralism. Each factor measures an attitude toward substance overuse. The items included under permissiveness explore attitudes focused on accepting substance use as normal human behavior. Treatment intervention examines perceptions of substance overuse in the context of treatment. The non-stereotypes category explores the social stereotypes associated with substance overuse. Treatment optimism evaluates factors that contribute to successful outcomes in substance
overuse treatment. Non-moralism evaluates the implicit moral perspectives associated with substance overuse. The survey includes 28 statements that reflect negative attitudes toward substance overuse and another 22 statements that reflect more neutral attitudes. The 28 negative statements were reverse-coded, and items were summed to generate a final score.

The validity and reliability of the SAAS have been reported in several studies. Chappel et al. (1985) validated subscale reliabilities with a Cronbach’s alpha of .63–.77. Likewise, Quaye et al. (2020) recruited 488 BSN students and used the SAAS to explore the impact of an educational intervention on their attitude toward substance overuse. In the current study, Cronbach’s alpha was .66 before the intervention and .86 after the intervention, indicating moderate and acceptable internal consistency.

The participants’ demographic characteristics, including age and gender as well as personal, family, and learning experiences related to substance overuse were surveyed before the interventions. The KCES-R was distributed to participants before and after the interventions to examine their impact on empathy.

**Sample Size**

Power analyses were conducted through G*Power 3.1 to determine the minimum sample size required to address each research question. First, an *a priori* power analysis was performed for an $F$-test with repeated measures, within-between interaction, a medium effect size of 0.25 (Cohen, 1992), 0.05 $\alpha$ error probability, and 0.8 power to test the effect of the intervention on empathy and attitude scores. This analysis yielded a sample size of 34 participants. Second, an *a priori* power analysis was conducted for a Pearson correlation, including two tails, a medium effect size of 0.3 (Cohen, 1992), 0.05 $\alpha$ error probability, and 0.8 power to test the relationship between the participants’ ages and their self-reported empathy. This analysis indicated a sample
size of 82 participants. Finally, an *a priori* power analysis was employed for a Chi-square test with a goodness-of-fit test, a medium effect size of 0.3 (Cohen, 1992), 0.05 $\alpha$ error probability, 0.8 power, and four degrees of freedom to test the relationship between the participants’ gender and personal, family, and learning experiences and their self-reported empathy. The power analysis indicated a sample size of 133. Thus, a sample size of 133 was targeted to reach the power levels described above.

**Procedure**

The research invitation provided an online link to the survey that included a research consent form, the demographic characteristics questions, the SAAS, and the KCES-R pre-test. Once the participants completed the survey, they were compensated with a $5 gift card sent to them via their institutional email addresses. Each participant was randomly assigned to either the control or intervention groups. The participants then received an individualized website link to either the text-based case study or virtual simulation activity. An online link to the KCES-R post-test was provided upon completion of the learning activities. Once the participants completed the KCES-R post-test, a $10 gift card and thank you note were delivered to their institutional email addresses.

**Statistical Analysis**

Descriptive statistical analyses, mixed analysis of variance (ANOVA), Pearson correlations, Chi-square, and $t$ test analyses were performed using SPSS version 29. A $p$-value of .01 ($0.05/5 = .01$) was used to indicate statistical significance using the Bonferroni correction to control for Type I error in the correlation analysis.

**Ethical Considerations**
Ethics approval was obtained from the Research Ethics Board of the University of British Columbia for multiple sites of research data collection in Canada and from the Teachers College Institutional Review Board. All participants were aware that they could withdraw from the study or revise their online surveys at any time during the data collection.

Results

Participant Recruitment

Thirty-eight English-language pre-licensure BSN programs were identified from the CASN-accredited BSN programs list, and emails were sent to the contact persons listed on the program websites. Representatives from 12 BSN programs replied and agreed to participate in the study. More than 1,500 completed pre-test surveys were received within one week after the first research invitation was distributed. However, most participants used a public domain email address, such as @gmail.com or @hotmail.com, and did not confirm the BSN program that they attended after a verification email was sent by the author. These surveys without a confirmation of the BSN program attended were not included in the analysis, as an institutional email address or confirmation of the BSN program attended were needed to verify the participant’s eligibility to participate in the study. The source of the large amount of completed pre-test surveys was unclear, and it might be due to survey bots (Griffin et al., 2021).

A final sample of 140 respondents (Figure 3.2) who confirmed the BSN program attended via an institutional email were randomly assigned to either the control or intervention group. Sixty-six participants in the control group and 61 in the intervention group completed the post-test. The attrition rate was 9.3 percent.

Participant Characteristics
The average age of all participants was 24.69 years \((SD = 4.88)\). The average ages of the participants in the control and intervention groups were 24.08 years \((SD = 4.34)\) and 25.54 years \((SD = 5.34)\), respectively. Eighty percent of the participants in both groups were between 21 to 30 years of age. Most of the participants (90%) were female which is consistent with the current demographics of the nurses’ population in Canada (Canadian Nurses Association, 2023). Although most participants did not have personal experience with substance overuse, almost half (47%) reported that they had family members or close friends with these concerns. Furthermore, 70 percent of the participants reported that they had received formal education related to substance overuse.

The participants in the control and intervention groups exhibited no significant differences with respect to the aforementioned five demographic characteristics (Table 3.1), indicating that sample characteristics between the two groups were similar to each other.

**Psychometric Analysis**

The Cronbach’s alpha for the two subscale scores of the KCES-R showed adequate internal consistency reliability, including \(\alpha = .74\) for the global subscale and \(\alpha = .86\) for the personal subscale. Aronson et al. (2022) reported \(\alpha = .84\) for the global subscale and \(\alpha = .77\) for the personal subscale.

Twenty-eight items in the SAAS are negative statements and were reverse-coded (Table 3.2). Item 34 was removed to increase the Cronbach’s alpha of factor 2 from .48 to .58. Item 50 was eliminated from consideration and the Cronbach’s alpha of factor 1 was increased from .62 to .72. The final Cronbach’s alpha that included 48 items in the SAAS exhibited adequate reliability over the five subscales. The values of .58–.80 in the study were similar to those reported by Chappel et al. (1985), which ranged from .56–.77 over the five subscales.
Outcomes

The results of pre-test KCES-R and the SAAS (Table 3.3) revealed statistically nonsignificant differences in KCES-R, $t(122) = 0.46, p = .32$, and SAAS total scores, $t(117) = 0.64, p = .26$, between control and intervention groups before the learning activities. Thus, the two subscales of the KCES-R and five factors of the SAAS that measured empathy and attitudes toward substance overuse in those assigned to the control and intervention groups were similar to one another before participating in the learning activities.

The results of the mixed ANOVA (Table 3.4 and Figure 3.3) also revealed statistically nonsignificant interactions between group and time for the KCES-R total score, $F(1, 120) = 0.005, p = .94$, the KCES-R Global Health Empathy Ratings subscale, $F(1, 120) = 0.04, p = .85$, and KCES-R Self-Perceived Empathy Ratings subscale scores, $F(1, 122) = 0.02, p = .89$. However, an evaluation of the time factors associated with the KCES-R total, $F(1, 120) = 31.40, p < .001$, and KCES-R Self-Perceived Empathy Ratings subscale, $F(1, 122) = 36.65, p < .001$, revealed significant differences between the pre-test and the post-test scores. These results suggest that empathy increased in both groups after participation in the learning activities with most of the effect contributed by the differences in Self-Perceived Empathy Ratings subscale scores.

The results of the mixed ANOVAs for the attitude subscales (Table 3.5 and Figure 3.4) also revealed statistically nonsignificant interactions between group and time for the SAAS total score, $F(1, 111) = 0.46, p = .50$ and all factors, including Factor 1: Permissiveness, $F(1, 123) = 0.019, p = .89$, Factor 2: Treatment intervention, $F(1, 123) = 0.17, p = .68$, Factor 3: Non-stereotypes, $F(1, 119) = 0.66, p = .42$, Factor 4: Treatment Optimism, $F(1, 123) = 0.004, p = .95$, and Factor 5: Non-moralism, $F(1, 120) = 1.09, p = .30$. However, an evaluation of the time
factors associated with the Factor 1: Permissiveness, $F(1, 123) = 3.99$, $p = .048$, and Factor 2: Treatment intervention, $F(1, 123) = 4.19$, $p = .048$, revealed significant differences between the pre-test and the post-test scores. These results suggest that attitudes improved in both groups after participation in the learning activities.

The results of correlation and $t$ tests using the Bonferroni adjusted criterion with a $p$-value of .01 (Table 3.6) revealed statistically nonsignificant relationships between nursing students’ pre-test KCES-R scores and demographic characteristics, including age, ($r(125) = -.18$, $p = .04$), gender ($t(122) = 0.20$, $p = .84$), personal experience ($t(121) = 1.61$, $p = .10$), family experience ($t(122) = 1.35$, $p = .18$), and learning experience ($t(122) = 1.2$, $p = .24$). No significant correlations were identified between nursing students’ pre-test KCES-R scores (both those in the control and intervention groups) and their demographic characteristics.

The results of a Pearson correlation (Table 3.7) did reveal a significant relationship between the participants’ empathy and attitudes toward patients with substance overuse determined before the learning activities. The KCES-R total score was significantly negatively correlated to the SAAS total score ($r(115) = -.43$, $p < .001$). These results indicate that a more negative attitude toward substance overuse was associated with lower levels of empathy toward these patients. Although the relationship between the KCES-R Self-Perceived Empathy Ratings subscale and SAAS Factor 2: Treatment Intervention was nonsignificant ($r(124) = -.09$, $p = .34$), most of the relationships between the two subscales of the KCES-R and five factors of the SAAS were significantly ($ps = .03 – < .01$) negatively associated ($rs(115–123) = -.19 – -.54$) with one another.

**Discussion**
This study aimed to investigate the impact of virtual simulation on nursing students’ empathy and the relationships between their demographic characteristics, attitudes, and empathy. The intervention group participated in a virtual simulation scenario that tracked a nurse’s interaction with a patient with substance overuse in an acute care setting. The storyline included a description of the patient’s life from childhood to adulthood and factors that may have contributed to substance overuse and the progress of the patient’s life under the influence of this substance. To enhance the immersive experience, the camera angle in the virtual simulation scenario was from “the eye of the nurse,” which permitted the students to take on the role of a nurse while interacting with the virtual characters, including the patient, the patient’s family members, and the social worker. The findings from this study revealed that nursing students who participated in either the text-based case study or the virtual simulation self-reported significantly higher levels of empathy after the activity. Interestingly, self-reported post-study empathy was not significantly different when comparing those from the text-based case study to the virtual simulation groups. These results indicated that the text-based case study and virtual simulation learning activities were equally effective at increasing nursing students’ empathy.

The impact of text-based case studies was evaluated in the literature to promote empathy in nursing education (Razavi et al., 2002; Cunico et al., 2012; Bas-Sarmiento et al., 2017). The goal of the text-based case studies was to illustrate the patient’s perspective through texts or graphics and thereby enhance the understanding of others’ experiences. The results of this study were positive overall and suggested that text-based case study was effective in promoting empathy among nursing students. To augment this approach, advanced simulation technologies can now be used to provide a more immersive learning experience. A more immersive learning environment might permit students to suppress their egos more effectively
and be able to imagine how and why others might perceive the world differently than they do. The results of this study indicated that similar to text-based case studies, virtual simulation was also effective in promoting increased empathy among nursing students.

Although the Self-Perceived Empathy Ratings in KCES-R increased significantly in both the virtual simulation and text-based case study groups, there were no significant differences between the two groups after the completion of these activities. There are several reasons why this may have occurred. The virtual simulation scenario was designed to be from “the eye of the nurse.” This “nurse-centered” approach is frequently employed in virtual simulation activities aimed at promoting the cognitive domain of learning, such as knowledge acquisition and clinical judgment. However, this approach does not provide an immersive experience from the patient’s perspective. Perspective-taking is a critical element in Davis’s Organizational Model (1994, 2018). Ideally, the immersive experience should permit participants to “put themselves into someone else's shoes” and suppress their own egos while imagining how others perceive the world. Although this study employed video recordings of the SPs to portray the virtual characters, the storyline remains “nurse-centered.” This approach might not be sufficiently supportive of the critical element of perspective-taking. Instead, it might encourage the participants to interpret the world of the virtual patient and their families based on their own knowledge and experience alone. By contrast, the Community Action Poverty Simulation presented in studies published by Yang et al. (2014), Turk & Colbert (2018), and Sanko et al. (2021) not only replicated the real world of poverty but effectively turned the nursing students into the poor. Participation in this activity resulted in significantly more positive attitudes toward poverty in nursing students. While it is not yet clear whether in-person interactions are essential for the development of empathy, a patient-centered approach involving
perspective-taking might be more effective in promoting the affective domain of learning to achieve this result.

Herrera et al. (2018) created a virtual reality (VR) simulation activity regarding a homeless person. The participants in Herrera et al.’s study “became” the homeless person in the VR simulation activity, and experienced being evacuated from the apartment and looked for shelter at night. Although it is a VR simulation and the VR headset provides a higher level of immersive experience, the design of Herrera et al.’s homeless scenario might be an example of “patient-centered” approach. Instead of securing the camera on the SP’s forehead who voiced the nurse, the camera might be secure on the SP’s forehead who portrayed the patient, so participants "became" the patient and experienced the virtual simulation from the patient’s perspective. Meanwhile, the reason for using substance was revealed by the social worker and family members in the virtual simulation scenario in this dissertation study. It might be more patient-centered if one of the themes could bring participants back to the patient’s childhood and experienced the challenges encountered after the injuries from figure skating.

The KCES-R instrument used in this study might not be adequate to evaluate the constructs in Davis’s Organizational Model (1994, 2018). The perspective-taking component of processes is a critical element in Davis's Organizational Model. The virtual simulation used in this dissertation study was intended to enhance perspective-taking and thereby promote empathy. The original KCES instrument (Kiersma et al., 2013) was first proposed for this study. The KCES contains nine items related to perspective-taking and six items related to empathetic concern and personal distress. However, KCES was recently modified to KCES-R (Aronson et al., 2022). The authors of the first version asked the study investigator to use the revised version. The KCES-R, includes two parallel subscales, including Global Healthcare
Professional Empathy Ratings and Self-Perceived Empathy Ratings. The KCES-R subscales do not differentiate between perspective-taking and affective empathic responses, which were the critical measurements assessed in this study. Thus, a different instrument might be needed to examine the relationship between the cognitive capacity for perspective-taking and affective empathic responses with the individual characteristics of the participants in the study.

There is currently only one publication that used the KCES-R to assess empathy. Blakely et al. (2022) used the KCES-R to assess the empathy of second-year pharmacy students before and after participation in a simulation activity related to a homeless individual portrayed by an SP. Interestingly, the Global Healthcare Professional Empathy Ratings in the present study ($M = 43.25–44.37, SD = 5.35–7.4$) were similar to those reported by Blakely et al. ($M = 43.2–44.9, SD = 4.79–6.82$). However, the Self-Perceived Empathy Ratings presented in this study ($M = 33.02–37.98, SD = 7.61–10.12$) were much lower compared to the result from Blakely et al.’s ($M = 39.8–41.3, SD = 6.58–6.68$). It is unclear why nursing students in Canada perceived similar empathy as those of other healthcare providers but self-appraised with a lower capacity for personal empathy (Figure 3.2). More studies will be needed to improve our understanding of the implications of the KCES-R and how it might be applied to evaluate interdisciplinary healthcare providers and students.

Furthermore, Blakely et al. (2022) reported a significant increase in both KCES-R subscales after the in-person simulation activity portrayed by an SP. By contrast, changes recorded for the KCES-R Global Healthcare Professional Empathy Ratings subscale in this study were all nonsignificant (Table 3.4), i.e., the subscale scores did not increase significantly after the learning activities either between or within the control and intervention groups. It is not clear whether the modality of simulation, such as in-person versus virtual, might have an impact on
the beliefs and responses of healthcare professionals who are expected to demonstrate empathy. More studies will be needed to explore the relationship between the modality of simulation and individual differences, such as attitude, in relation to empathy.

The participants’ attitudes toward substance overuse were nonsignificantly different in both groups before and after their learning activities. It is unclear if the “nursing-centered” approach also led to this result as this is one of the few studies that examined nursing students’ attitudes after a virtual simulation activity. Meanwhile, the instrument measured participants’ attitudes toward substance overuse, Substance Abuse Attitude Survey (SAAS), was created in 1985. Although the validity and reliability of SAAS have been established by several studies on multiple healthcare professional disciplines, with evolving knowledge and available resources, the contemporary perception and interventions for substance overuse might differ from 40 years ago when SAAS was created. A more updated instrument is needed to reflect the current values and attitudes toward substance overuse.

Surprisingly, the participants’ empathy did not correlate significantly with any of the demographic characteristics, including age, gender, and learning and personal experiences. This result contradicts the findings reported in the literature. For example, results from longitudinal studies conducted by Juujärvi (2006) and Cunico et al. (2012) revealed that female nursing students demonstrated higher levels of empathy compared to male nursing students. Meanwhile, Christov-Moore and Iacoboni (2019) presented physical evidence from functional magnetic resonance imaging that suggested that females had greater empathy. Likewise, Schultze et al. (2019) and Christofides and Silo (2005) reported that learning and personal experience were significant factors associated with the development of empathy.
The findings presented in this study revealed that a more negative attitude toward substance overuse correlated with a lower level of empathy toward affected patients. This is one of the few studies in the literature that supports a relationship between attitude and empathy, thereby explaining how individual characteristics might also be associated with empathy. For example, Christofides and Silo (2005) reported that nurses who were most capable of identifying patients suffering from domestic violence (DV) were those whose friends and family had experienced DV rather than their own experiences or formal training associated with DV or years of nursing practice. Theoretically, accurate assessment of patient needs should increase as students acquire more knowledge and practice experience (Kunst-Wilson et al., 1981). Of note, Christofides and Silo (2005) reported that some nurses had never experienced a case of DV. However, given the high prevalence of DV in the regions studied, some cases were most likely missed. Although attitude toward DV was not measured in Christofides & Silo’s study, negative attitudes toward DV and/or lack of empathy might explain why formal training and practice experience were not associated with increased accuracy in identifying DV patients. This assumption might be supported by the results of a study reported by Schorn (2007) who found that the most frequent reasons for early discharge before the completion of postpartum care in a midwifery practice were “noncompliance,” “obnoxious or abusive behavior,” and “failure to keep appointments” (p. 469). By contrast, midwives with a higher level of empathy tended to discharge patients less frequently before the completion of postpartum care. Although the reasons for early discharge specifically by midwives with higher levels of empathy were not discussed in this study, these individuals might be more capable of perceiving noncompliance, obnoxious or abusive behavior, and failure to keep appointments through a client-centered lens and thus able to identify clients’ needs more accurately. Thus, the combination of evidence
generated by Christofides and Silo (2005) and Schorn (2007) suggests that attitudes toward vulnerable populations might be one of the critical elements leading to individual differences in empathy, rather than specific learning or personal experiences.

Overall, the findings presented in this work are limited to the participants’ self-reported empathy immediately after completion of the learning activities, while the impact of virtual simulation on long-term affective and behavioral responses remains unclear. The affective empathic response, measured by a self-report scale, may gradually decline after the intervention (Herrera et al., 2018); however, this is not the case for the behavioral empathic response. As described by Razavi et al. (2002), oncology nurses who participated in a workshop designed to increase professional empathy used more emotion-laden words in practice 3 and 6 months after the workshop compared to those who were on the waiting list. In addition, Bas-Sarmiento et al. (2017) evaluated the participants’ empathic behaviors after a training program using the objective structured clinical examination (OSCE) and found that the participants demonstrated significantly more empathic behaviors one month later as opposed to immediately after the intervention. Despite the association of the four constructs included in Davis’s Organizational Model (1994, 2018), more research will be needed to explore the relationship between the cognitive processes associated with empathy, long-term affective empathic responses, and behavioral empathic responses. Although behavioral empathic responses were not measured in this study, several studies have employed clinical observation and the OSCE in a simulation laboratory to determine how empathic behavior changes after intervention. This study would have been strengthened if measures of behavioral empathic responses had been included. However, it would be quite difficult to measure behavioral empathic responses with the online delivery platform.
This study explored the impact of virtual simulation on increasing nursing students’ empathy. Although the results of this study revealed nonsignificant interactions between group and time with respect to empathy scores, the time factor alone was associated with significant differences. This finding indicates that all participants’ empathy significantly increased after completion of either the text-based case or virtual simulation learning activities.

**Implications**

This study employed SPs to portray virtual characters. The realistic scenario generated by the SPs provided a strong immersive experience and insight into the worlds of one of the most vulnerable populations. The virtual simulation was hosted on an interactive simulation platform with scenarios that unfolded differently based on the participant actions taken at each decision-making point. The instant feedback from the decision-making points engaged nursing students in the learning process and encouraged them to consider new ideas by re-selecting different options and/or returning to a previous decision-making point. This platform allows nursing students to access virtual simulation through a web link. In addition, it allows nurse educators to create and revise virtual simulation scenarios without the need for advanced graphic design and computer skills. This format provides flexibility and accessibility for both students and educators engaged in teaching and learning. In addition, the 24/7 access to virtual simulation scenarios via the Internet might decrease the high costs typically associated with in-person simulation activities and scheduling challenges when using a simulation lab.

While virtual simulation has been applied broadly in nursing education, nurse educators must be mindful when aligning the design of these activities with the domains of learning. The evidence supporting the application of virtual simulation in nursing education mostly emphasizes knowledge acquisition (Weston & Zauche, 2020; Chang et al., 2021) and the development of
clinical judgment (Fogg et al., 2020). When considering the cognitive domain of learning, a nurse-centered approach might be most effective with respect to connecting learners’ knowledge, interpreting patient data, and inferring the best clinical decision-making. However, if the desired outcome is more closely related to the affective domain of learning, a patient-centered approach might be more appropriate for suppressing learners’ egos, as well as for interpreting, inferring, and creating connections between their own knowledge and the world as experienced by others.

**Limitations**

Perspective-taking is a critical element of empathy. Unfortunately, the KCES-R does not have a subscale to measure perspective-taking. Thus, it is unclear if the significantly higher level of empathy after the learning activities was due to perspective-taking from the case study and virtual simulation or if virtual simulation could further enhance perspective-taking. Meanwhile, because of the technology glitch from the virtual simulation platform, the learning behaviors, such as time spent in the case study and virtual simulation, were not recorded. Therefore, the relationship between engagement level and self-reported empathy is unclear.

**Future Research**

The outcome measure in the study addressed changes in nursing students’ affective empathic responses immediately after an intervention. A longitudinal design might provide a greater understanding of empathy retention as part of the overall affective response. Likewise, a behavioral empathic response is also a critical component of the nursing profession. Thus, methods to evaluate behavioral outcomes either in the simulation lab or clinical practice will be needed to determine the full impact of virtual simulation in practice. In addition, qualitative data
from a focus group might enhance the understanding of how nursing students perceive substance overuse and user experience related to virtual simulation.

Conclusion

Empathy is critical in the nursing profession. Thus, evidence-based learning strategies are needed to cultivate empathy in nursing practice and education. With evolving technology, immersive teaching approaches, for example, simulations, are available to enhance not only the cognitive domain of learning but also the affective domain, such as empathy, specifically in nursing education. Although the virtual simulation learning strategy employed and evaluated in this study resulted in no significant differences in promoting empathy compared to the more traditional text-based case study, this remains one of the very few studies that have employed virtual simulation in promoting empathy in nursing education. Future studies will be needed to explore different virtual simulation designs and to determine how individual characteristics influence the cognitive process of perspective-taking in promoting empathy.
References


Figure 3.1

Davis's Organizational Model
Figure 3.2

Participant Flow

Enrollment

- Accessed for eligibility ($N = 1562$
- Excluded ($n = 1422$
  - Not meeting inclusion criteria ($n = 1420$
  - Declined to participate ($n = 2$

Randomized ($n = 140$

Allocation

- Allocated to the control group ($n = 70$
- Allocated to the intervention group ($n = 70$

Follow Up

- Lost to follow-up ($n = 4$
  (did not complete the post-test 3 weeks after the intervention)
- Lost to follow-up ($n = 9$
  (did not complete the post-test 3 weeks after the intervention)

Analysis

- Analyzed ($n = 66$
- Analyzed ($n = 61$
Figure 3.3

Means of Empathy Scores in the Study Groups

Note. Empathy was measured by the Kiersma-Chen Empathy Scale-Revised (KCES-R), which consists of two subscales, Global Healthcare Professional Empathy Ratings and Self-Perceived Empathy Ratings. CG = Control Group who reviewed the text-based case study; IG = Interventional Group who experienced the virtual simulation activity.
Figure 3.4

Means of Attitudes Scores in the Study Groups

Note. Attitudes was measured by the Substance Abuse Attitude Survey (SAAS) Total scores, which consists of the sum of five factors, Permissiveness, Treatment Intervention, Non-stereotypes, Treatment Optimism, and Non-moralism.

CG = Control Group who reviewed the text-based case study; IG = Interventional Group who experienced the virtual simulation activity.
Table 3.1

Comparison of Demographic Characteristics of the Study Groups

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>Control Group n (%)</th>
<th>Intervention Group n (%)</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n (%)</td>
<td>n (%)</td>
<td></td>
</tr>
<tr>
<td>Age</td>
<td></td>
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</tr>
<tr>
<td>Gender</td>
<td></td>
<td></td>
<td>.30^b</td>
</tr>
<tr>
<td>Female</td>
<td>61 (92.4%)</td>
<td>53 (86.9%)</td>
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</tr>
<tr>
<td>Male</td>
<td>5 (7.6%)</td>
<td>8 (13.1%)</td>
<td></td>
</tr>
<tr>
<td>Have you ever recovered from substance overuse?</td>
<td></td>
<td></td>
<td>.54^b</td>
</tr>
<tr>
<td>Yes</td>
<td>6 (9.2%)</td>
<td>4 (6.6%)</td>
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<tr>
<td>No</td>
<td>59 (90.8%)</td>
<td>57 (93.4%)</td>
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<td>Do you have any family or close friends who have (had) substance overuse?</td>
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<tr>
<td>Yes</td>
<td>31 (47%)</td>
<td>29 (47.5%)</td>
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<td>No</td>
<td>35 (53%)</td>
<td>32 (52.5%)</td>
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</tr>
<tr>
<td>Have you had any training in relation to substance overuse?</td>
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<td>18 (29.5%)</td>
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Note. ^a Independent sample t test, ^b Chi-Square Test
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<tr>
<th>Factor</th>
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<th>This Study</th>
<th>Chappel et al. (1985)</th>
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<td></td>
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<tr>
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<td></td>
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<tr>
<td>Item 41</td>
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<td>Item 46 (reverse coded)</td>
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<td></td>
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<td>Item 50 (reverse coded)</td>
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<td>Item 34</td>
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<tr>
<td>Item 38</td>
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<tr>
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<td>Item 49 (reverse coded)</td>
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<td>.56—.63</td>
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<tr>
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<td>.76—.81</td>
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<td>.64—.67</td>
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<td>Items 35, 40, 48 (reverse coded)</td>
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78
<table>
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<th>Cronbach’s alpha</th>
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<th>Chappel et al. (1985)</th>
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<td>.63–.67</td>
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Table 3.3

Results of Group Comparisons on Pre-Tests of Empathy Total Score and Substance Abuse Attitudes Total Score and Subscales

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<thead>
<tr>
<th>Scale</th>
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<th>t</th>
<th>p-value</th>
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<td>KCES-R Total</td>
<td>64</td>
<td>58</td>
<td>0.46</td>
<td>.32</td>
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<tr>
<td>Global Healthcare Professional Empathy Ratings</td>
<td>64</td>
<td>59</td>
<td>0.19</td>
<td>.43</td>
</tr>
<tr>
<td>Self-Perceived Empathy Ratings</td>
<td>66</td>
<td>58</td>
<td>0.62</td>
<td>.27</td>
</tr>
<tr>
<td>SAAS Total</td>
<td>63</td>
<td>50</td>
<td>0.64</td>
<td>.26</td>
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<tr>
<td>Factor 1: Permissiveness</td>
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<td>59</td>
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<td>.46</td>
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<tr>
<td>Factor 2: Treatment Intervention</td>
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<td>59</td>
<td>0.55</td>
<td>.29</td>
</tr>
<tr>
<td>Factor 3: Non-stereotypes</td>
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<td>57</td>
<td>0.57</td>
<td>.29</td>
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<td>57</td>
<td>-1.4</td>
<td>.08</td>
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</table>

Note. Empathy was measured by the Kiersma-Chen Empathy Scale-Revised (KCES-R), which consists of two subscales. Attitudes were measured by the Substance Abuse Attitude Survey (SAAS), which contains five factors.
Table 3.4

Mixed ANOVA of Pre- and Post-Tests with Empathy Total Scores and Subscales for Study Groups

<table>
<thead>
<tr>
<th>Variable</th>
<th>Control Group $(n = 64)$</th>
<th>Intervention Group $(n = 58)$</th>
<th>ANOVA</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>$M$</td>
<td>$SD$</td>
<td>$M$</td>
</tr>
<tr>
<td>KCES-R Total</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pre-test</td>
<td>77.38</td>
<td>15.10</td>
<td>76.17</td>
</tr>
<tr>
<td>Post-test</td>
<td>80.75</td>
<td>15.02</td>
<td>82.28</td>
</tr>
<tr>
<td>KCES-R Global Health Empathy Ratings</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pre-test</td>
<td>43.33</td>
<td>6.84</td>
<td>43.25</td>
</tr>
<tr>
<td>Post-test</td>
<td>43.89</td>
<td>7.4</td>
<td>44.37</td>
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<tr>
<td>KCES-R Self-Perceived Empathy Ratings</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pre-test</td>
<td>34.32</td>
<td>10.12</td>
<td>33.02</td>
</tr>
<tr>
<td>Post-test</td>
<td>37.09</td>
<td>9.24</td>
<td>37.98</td>
</tr>
</tbody>
</table>

*Note.* Empathy was measured by the Kiersma-Chen Empathy Scale-Revised (KCES-R), which consists of two subscales.

* $p$-value < .05
Table 3.5

Mixed ANOVA of Pre- and Post-Tests with Substance Abuse Attitudes Total Score and Subscales for Study Groups

<table>
<thead>
<tr>
<th>Variable</th>
<th>Control Group (n = 63)</th>
<th>Intervention Group (n = 50)</th>
<th>ANOVA</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>M</td>
<td>SD</td>
<td>M</td>
</tr>
<tr>
<td>SAAS Total</td>
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<td>.46</td>
<td>1, 111</td>
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<tr>
<td>Pretest</td>
<td>120.52</td>
<td>15.91</td>
<td>118.58</td>
</tr>
<tr>
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<td>119.79</td>
<td>14.32</td>
<td>117.92</td>
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<tr>
<td>SAAS Factor 1: Permissiveness</td>
<td>Interaction</td>
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<td>1, 123</td>
</tr>
<tr>
<td>Pretest</td>
<td>26.58</td>
<td>4.69</td>
<td>26.63</td>
</tr>
<tr>
<td>Posttest</td>
<td>27</td>
<td>4.24</td>
<td>27.19</td>
</tr>
<tr>
<td>SAAS Factor 2: Treatment and Intervention</td>
<td>Interaction</td>
<td>.170</td>
<td>1, 123</td>
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<tr>
<td>Pretest</td>
<td>15.47</td>
<td>3.13</td>
<td>15.10</td>
</tr>
<tr>
<td>Posttest</td>
<td>14.82</td>
<td>3.19</td>
<td>14.78</td>
</tr>
<tr>
<td>SAAS Factor 3: Non-stereotypes</td>
<td>Interaction</td>
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<td>1, 119</td>
</tr>
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<td>Pretest</td>
<td>22.8</td>
<td>5.46</td>
<td>22.19</td>
</tr>
<tr>
<td>Posttest</td>
<td>22.5</td>
<td>5.32</td>
<td>21.58</td>
</tr>
<tr>
<td>SAAS Factor 4: Treatment Optimism</td>
<td>Interaction</td>
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<td>1, 123</td>
</tr>
<tr>
<td>Pretest</td>
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<td>3.14</td>
<td>9.25</td>
</tr>
<tr>
<td>Posttest</td>
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<td>3.08</td>
<td>9.15</td>
</tr>
<tr>
<td>SAAS Factor 5: Non-moralism</td>
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<td>1, 120</td>
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<tr>
<td>Pretest</td>
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<tr>
<td>Posttest</td>
<td>25.58</td>
<td>4.38</td>
<td>26.07</td>
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</table>

Note. Attitudes were measured by the Substance Abuse Attitude Survey (SAAS), which contains five factors.

* p-value < .05
## Table 3.6

*Frequencies and Correlations Related to Pre-Test Empathy Scores and Demographic Characteristics of the Study Groups*

<table>
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<th>KCES-R Total</th>
<th>Value</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
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<td></td>
<td>n</td>
<td>%</td>
<td></td>
</tr>
<tr>
<td>Age</td>
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</tr>
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<td>.04a</td>
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<tr>
<td>Intervention Group</td>
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<tr>
<td>Gender</td>
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<tr>
<td>Total</td>
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<tr>
<td>Control Group</td>
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<tr>
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<td>48</td>
<td>1.52</td>
</tr>
<tr>
<td>Male</td>
<td>5</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>Intervention Group</td>
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<tr>
<td>Female</td>
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<td>-1.08</td>
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<tr>
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<tr>
<td>Total</td>
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<td>Control Group</td>
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<td>6</td>
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<tr>
<td>Intervention Group</td>
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</tr>
<tr>
<td>Yes</td>
<td>4</td>
<td>3</td>
<td>1.32</td>
</tr>
<tr>
<td>No</td>
<td>55</td>
<td>45</td>
<td></td>
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<tr>
<td>Do you have any family or close friends who have (had) substance overuse?</td>
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<td></td>
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<tr>
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Empathy was measured by the Kiersma-Chen Empathy Scale-Revised (KCES-R).

<table>
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<tr>
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<td>13</td>
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Note. Empathy was measured by the Kiersma-Chen Empathy Scale-Revised (KCES-R).

<sup>a</sup>Pearson Correlation, <sup>b</sup>t test
### Table 3.7

_Pearson Correlation Results of Empathy and Attitudes_

<table>
<thead>
<tr>
<th></th>
<th>KCES-R Total</th>
<th></th>
<th>Global Healthcare Professional Empathy Ratings</th>
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<th>Self-Perceived Empathy Ratings</th>
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<td></td>
<td><em>r</em></td>
<td><em>p</em></td>
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<td>SAAS Total</td>
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<tr>
<td>Permissiveness</td>
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<td>&lt;.001*</td>
<td>-.19</td>
<td>.03*</td>
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<td>.11</td>
<td>-.20</td>
<td>.03*</td>
<td>-.09</td>
<td>.34</td>
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<tr>
<td>Non-stereotypes</td>
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<td>&lt;.001*</td>
<td>-.43</td>
<td>&lt;.001*</td>
<td>-.25</td>
<td>.006*</td>
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<td>Treatment Optimism</td>
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<td>.001*</td>
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<td>.002*</td>
<td>-.27</td>
<td>.002*</td>
<td>-.21</td>
<td>.02*</td>
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*Note.* Empathy was measured by the Kiersma-Chen Empathy Scale-Revised (KCES-R), which consists of two subscales. Attitudes were measured by the Substance Abuse Attitude Survey (SAAS), which contains five factors.

*p < .05*
Chapter IV: Summary

This study aimed to investigate the impact of virtual simulation on nursing students’ empathy and attitudes, and the relationships of empathy to demographic characteristics and attitudes. Davis’s Organizational Model (1994, 2018) was applied in the study as a theoretical framework, and the design of the virtual simulation scenario was aimed to enhance perspective-taking from the advanced cognitive processes in Davis’s model. The instruments used in the study included the Kiersma-Chen Empathy Scale-Revised (KCES-R), Substance Abuse Attitude Survey (SAAS), and a demographic survey assessing age; gender; and personal, family, and learning experiences related to substance overuse. A randomized pretest-posttest control group design was employed in the study with 140 participants from 12 BSN programs across Canada.

Chapter II reported the systematic review of 20 quantitative studies from peer-reviewed journals to compare the outcomes of different simulation modalities in promoting empathy in nursing education. All five simulation modalities were represented in the review, including manikins, standardized patients (SPs), simulated suits, screen-based virtual simulation, and virtual reality (VR) simulation. Ten instruments were employed to measure empathy, caring, and attitudes toward vulnerable populations. Fifteen studies found a significant increase in nursing students’ empathy or attitudes after the simulation activity. A similarity among those studies is the focus on perspective-taking in the simulation design. Six of the 15 studies utilized simulated suits to mimic the physical and sensory experience of vulnerable populations and “turned nursing students into patients.” Meanwhile, the four studies that applied the Community Action Poverty Simulation (CAPS) also “turned nursing students into poor people” who interacted with the SPs to simulate the day-to-day experience of poverty. In addition, one virtual study recreated a
Simulated oncology hospital environment and “turned nursing students into cancer patients” to 
explore the experience of being a patient in the acute care setting. Surprisingly, the three studies 
that employed manikins also revealed a positive outcome after their interventions, although the 
use of manikins is often a less preferable simulation modality for the affective domain of 
learning outcomes because of limited facial expression and body language.

In addition, the Medical Education Research Study Quality Instrument (MERSQI) was 
employed in the systematic review to appraise the quality of those 20 studies. One study (Yang 
et al., 2014) used a single-group post-test design, and nine studies applied a single-group pre- 
/post-test design. The remaining 10 studies had a two-group pre-/post-test design and six were 
true experimental designs. Most of the studies \((n = 15)\) recruited participants using convenience 
sampling from one educational institute. Meanwhile, no behavior, patient or healthcare outcomes 
were measured as all the included studies used Likert-type self-report instruments. However, six 
studies out of the nine with single-group pre-/post-test design demonstrated significant results, 
and six out of the 10 two-group pre-/post-test design reported a significant increase in 
participants’ empathy after the intervention. Overall, the results of this review support that all 
five simulation modalities are effective in promoting nursing students’ empathy.

Chapter III discussed the results of applying virtual simulation to promote empathy and 
attitudes in nursing students and the relevant demographic characteristics associated with 
empathy. The virtual simulation scenario involved a patient with substance overuse in an acute 
care setting. The storyline included the patient’s childhood life, the cause of his substance 
overuse, and the current progress of his social, physical, and mental statuses under the influence 
of the substance. The SPs were employed in the virtual simulation scenario to portray the virtual 
characters. The purpose of the virtual simulation was to enhance perspective-taking through
realism and immersive experience, and further promote empathy. The “eye of the nurse”
approach in this virtual simulation design might be problematic in promoting empathy because it
is nurse-centered not patient-centered. A patient-centered immersive experience from the
patient’s perspective might be critical to enhancing perspective-taking as it might better suppress
participants’ egos, as well as for interpreting, inferring, and creating connections between
their own knowledge and the world as experienced by the patient. A nurse-centered approach
might encourage the participants to interpret the world of the virtual patient based on their own
knowledge and experience. Although the empathy was significantly increased after the learning
activities in both groups, the results showed no significant difference between the participants in
the text-based case study and virtual simulation groups before and after the learning activities.
Meanwhile, the participants’ attitudes toward substance overuse were not significantly
different in both groups before and after their learning activities.

The results supported the significant relationship between the participants’ empathy and
attitudes that a more negative attitude toward substance overuse was associated with a lower
level of empathy toward the patients with substance overuse. This is one of the few studies in the
nursing literature that disclosed the relationship between attitude and empathy, which might
explain the mixed results (Christofides & Silo, 2005; Cunico et al., 2012; Schultze et al., 2019)
regarding the relationships between individual characteristics and empathy. The attitudes toward
vulnerable populations might be the key element in individual differences related to empathy,
instead of more general demographic characteristics, such as age, gender, personal, family, and
learning experiences.

Although this study supports that virtual simulation is an effective learning tool for
promoting empathy in nursing education, it did not demonstrate a significant difference between
the text-based case study and virtual simulation. Future studies will be needed to explore different virtual simulation designs and to determine how individual characteristics influence the cognitive process of perspective-taking in promoting empathy.
References


APPENDICES
Appendix A: Text-Based Case Study

You are assigned to Charles Whitterman as his nurse this morning.

It Is The Report From The Night Shift Nurse.

Charles, 32 yo, male, who was admitted to our medicine ward yesterday evening around 8 pm from the emergency department (ED). Charles has complained low fever, chill, loss of appetite, and “doesn’t feel well” in the past 2 weeks.

His both lower legs are redness, warm, swollen, and oozing with serosanguinous fluid. He indicated his legs “have been like this forever.”

Wound culture has been sent in the ED. Both lower legs are wrapped with abdominal pads. The ED RN reported Charles doesn’t like anyone to touch his leg dressing. “He threatened to kick the ED doc when he wanted to assess his legs,” the ED RN said. But the RN ED palpated

both pedal pulses were 2(+) when applying the abdominal pads.

The lab results from the ED yesterday evening are below. Charles yelled at the lab technician this morning and refused his blood work.

<table>
<thead>
<tr>
<th></th>
<th>Result</th>
<th>Normal Range</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>CBC</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>White Blood Cell</td>
<td>16</td>
<td>4.5 to 11.0 × 10⁹/L</td>
</tr>
<tr>
<td>Red Blood Cell</td>
<td>3.4</td>
<td>4.6–6.2 × 10¹²/L</td>
</tr>
<tr>
<td>Hemoglobin</td>
<td>92</td>
<td>120–160 g/L</td>
</tr>
<tr>
<td><strong>Renal Profile</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sodium</td>
<td>133</td>
<td>135-145 mEq/L</td>
</tr>
<tr>
<td>Potassium</td>
<td>4.5</td>
<td>3.6-5.2 mmol/L</td>
</tr>
<tr>
<td>Magnesium</td>
<td>0.82</td>
<td>0.85 to 1.10 mmol/L</td>
</tr>
<tr>
<td>Calcium</td>
<td>2.1</td>
<td>2.2–2.6 mmol/L</td>
</tr>
<tr>
<td>Urea</td>
<td>9.4</td>
<td>3.6–7.1 mmol/L</td>
</tr>
<tr>
<td>Creatinine</td>
<td>148</td>
<td>52-92 mmol/L</td>
</tr>
<tr>
<td>C-Reactive Protein</td>
<td>28</td>
<td>&lt; 3.0 mg/L</td>
</tr>
<tr>
<td>Serum Iron</td>
<td>48</td>
<td>60 to 170 mcg/dL</td>
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</tbody>
</table>
Those are his last set of vital signs in the ED, and he let me check his vital sign last night after I made him a peanut butter sandwich. He also asked for 2 cans of milk, 3 cans of apple juice, and he ate all our ice cream in the fridge. He seemed very hungry last night. I didn’t check his vital sign this morning because he yelled at the lab technician. The lab technician said Charles told him to fuck off and get out of his room. When the lab technician told Charles again he needed to do some bloodwork, Charles sat up and was going to punch him. I’ve put a violent sign outside his room.

VS from ED

Temp: 38.2 °C
Pulse: 128 bpm
Respiration: 28
BP: 88/52 mmHg
O2 Sat: 94% room air

VS. Last Night in the Ward

Temp: 37.6 °C
Pulse: 112 bpm
Respiration: 20
BP: 98/62 mmHg
O2 Sat: 95% room air
Charles had a liter of fluid bolus in ED and received his first dose of IV antibiotics. Unfortunately, the IV went interstitial and ED nurse couldn’t put another IV cause he has very challenging venous access. He is now on oral antibiotics.

It’s his MAR.

Kadian 500mg po daily at 0600

Cephalexin 500mg PO BID at 0900 and 2100

Hydromorphone 5-10mg IV/IM Q2H PRN

Methadone 50-100mg po Q8H PRN

Tylenol 500-1000mg po Q4H PRN (Maximum 4000mg per 24 hrs)

I haven’t given Charles his Kadian yet. He was sleeping and seemed comfortable. I didn’t want to wake him up for his pain killer. Would you please give him his Kadian and Cephalexin together when the breakfast tray arrives? He let me check his vital sign after I gave him a sandwich last night. I think he responds well with food.

Otherwise, he is independent and he voided several times in the washroom. Have a good shift.
The room is dark. Charles has his whole body covered by a blanket. There is some leftover food on the bedside table.

You walk quietly toward Charles but several meters away from him, and ask with a soft voice, “Hi Charles, I am your nurse today. Are you feeling ok?” Charles moves his upper body a bit but doesn’t respond to your question. You continue with a soft voice, “Let me know if you need anything. You can find me in the nursing station.” When you are about to leave, Charles sits up.
He is rubbing his face with heavy breathing. He then turns his head toward one side and looks at the window. 5 seconds later, he mumbles “fuck off” and “get out”, and then buries his face in his both hands.

You ask, “Charles, do you want me to leave?”

Charles shakes his head and says, “I don’t mean you.”

You then ask, “Is it ok if I turn on the night light so I can see. It’s quite dark here.”

Charles says, “It’s fine.”

You see a skinny man with fluffy hair in bed. He is constantly moving his shoulders, arms, and both legs. Looks like he can’t find a comfortable spot in bed. He takes the blanket off but puts it back again. When he turns his head toward you, you see he is sweating on his forehead.
You ask, “Are you in pain?”

Charles looks at you for several seconds, and asks, “Do you have Methadone or Hydromorphone?”

You answer, “Yes, your doctor has prescribed Kadian, Methadone, and Hydromorphone for you. But can I do a quick assessment so I am sure it’s safe to give you those medications?”

Charles mumbles, “Kadian is too slow.” Then he looks at you and speaks with a louder voice, “What assessment do you need to do?”

You walk closer to his bed and ask, “Can I turn on the overhead light? It might be bright to you.”

Charles looks down to the floor, “You are the only one who asks if it’s ok to turn on the lights. Others just turn it on. What the fuck they think they are doing?! I was sleeping.”
You turn on the overhead light, and ask, “Are you withdrawing?”

Charles answers, “I start to feel it.”

“Let me check your blood pressure and heart beat, and I will be right back with your medications.”

The following vital signs are obtained.

Temp: 36.8 °C
Pulse: 104 bpm
Respiration: 22
BP: 102/68 mmHg
O2 Sat: 95% room air

The following medications are administered.

Kadian 500mg po at 0800
Hydromorphone 10mg IM x1 at 0800

Charles goes back to sleep after medication administration. All lights are off.

5 minutes later, you re-assess Charles’ respiration rate, which is 12.
Social Worker Approaches You.

The social worker introduces himself to you and brings you Charles’ medical record.

“I heard Charles had some aggressive behaviors this morning.” Social worker indicates.

You reply, “I think he was withdrawing. I’ve given him his medications, and he is resting now. Do you know him well?”

“Yes, I’ve been his social worker in the past 6 years. He is in-and-out of hospital for cellulitis and overdose. I’ve placed him in detoxing programs several times but he relapsed. Charles always says his legs hurt. He fell and broke his patella and torn both patellar tendons in a national figure skating competition. The injury was very bad, but the ortho team believes his constant legs pain is more psychosocial related.” The social worker says.

“Any family or friends? Supportive system?”

You ask.
“His parents are quite supportive. They attended the detoxing programs with Charles, but Charles doesn’t have a good relationship with his dad. His dad is kind of my way or no way, and the poor mom is in the middle between them.” The social worker says.

“It must be hard for them.” You say.

“Is it ok to you if his parents come to visit?” The social worker asks.

“I haven’t had a chance to do a thorough assessment on Charles. Let me talk to him first, and I will get back to you.” You say.

“Sounds good. Let me know if Charles is ok if his parents come to visit.” The social worker leaves.
Breakfast Tray Has Arrived and You Walk Into Charles’ Room

The room is brighter with sunlight coming in from the window. Charles is lying in bed with blanket covered from his feet to his chest. He is awake and staring at the ceiling. Both his hands are outside the blanket.

You knock on the door, and ask “Hi Charles, I am your nurse. Can I come in?”

Charles turns his head toward you and sits up, “I remember you. You gave me Hydromorphone. Come in.”

You walk to his bed with 2 meter away, “How do you feel now?”

Charles replies, “I feel much better, but I am hungry. Is breakfast here yet?”
You answer, “Yes, breakfast is here. Can I ask several questions first and then bring you the breakfast? It won’t take long, but those questions will help me to decide the medications you need.”

Charles says, “Ok. What do you wanna know?”

You ask, “Were you actively using any drug before coming to hospital yesterday?”

Charles hesitates for a second and says, “Yes, I’ve been using.”

You continue, “When was the last time you used before coming to the hospital yesterday?”

Charles answers without hesitation, “The day before I came to hospital. My friend gave me some meth and I mixed it with heroin. I guess I passed out. When I woke up, my legs were swollen and painful so I asked the building manager to call 911.”

You ask, “Did you take Kadian every day in the community? 500mg didn’t work?”

Charles suddenly makes a fist on his hands and speaks with a louder voice, “I am not a fucking druggie. I want my breakfast.”
A couple of seconds silence.

You reply with a calm voice, “I don’t mean you are a druggie. I just need to know if the medications meet your needs. Let me bring your breakfast. Also, your social worker came earlier. He wanted to know if it’s ok to let your parents know you are here. Your parents might wanna come to visit you.”

Charles lets his fists go and answers with a calmer voice, “Yes, let my parents know.”

Charles lies down and turns his back to you, “I mix meth and heroin for my knees and ankles pain. Kadian helps nothing to my pain. No one can help.”
Charles’ Parents Come to Visit

You hear loud argument coming from Charles’ room.

Charles sits in bed.
He crosses both arms on
his chest without any
facial expression, and
stares at bed.

An old woman sits with
Charles in bed.
She puts one arm around
Charles’ shoulder.

An old man stands at the end of the bed and is shouting at Charles.

“I came to this country with a luggage and 20 bucks.”
“I worked like a dog to raise Gabriel, Emma, and you.”
“When you said you wanna take figure skating class, I took an extra job so you could have
private lessons with the best skating teacher.”
“Did I say anything when you first broke your knees?”
“No, I told you to rest until fully recovered.”
“I told you legs were very important to figure skater and I even hired a physio to help you.”

“Who paid for all of these?”

“You think government paid for any of these? You think our money fell off from the sky?”

“No, I worked 14 hours a day and 6 days a week to pay for all of these.”

“What do I want from you?”

“I want you to live like other people, like your brother, like your sister. Find a job, get married, and have kids.”

“That’s all I want. That’s all I want.”

“I didn’t work so hard to raise a druggie like you.”

Charles’ is silent.

The old woman notices you, and say, “Arthur, the nurse is here.”
The old man turns to you and takes a deep breathe.

He tries to smile and walks to you.

You say, “Hi, I am Charles’ nurse.”

The old man says, “I am Charles’ father. His social worker called us and said we could come and visit.”

You reply, “Yes, Charles said it’s ok for both of you to visit.”

You turn toward Charles, “Charles, you feel ok? Do you need anything?”

Charles doesn’t look at you but keeps staring at bed, “I am fine.”

Charles’ father asks, “Can I talk to you or Charles’ doctor? How is he doing now?”

You look at Charles’ and ask, “Charles, are you ok if I share your information with your dad?”

Charles lies down and covers his head with blanket, but holds his mother’s hand, “Of course, who else you can talk to?! He knows everything and he knows what’s the best for everybody.”
Charles’ father sighs, shakes his head, and walks out.

Charles’ father and you walk to nursing station.

“The social worker told me Charles yelled at the lab technician this morning and refused his bloodwork. He now has agreed to the bloodwork. Can you call the lab technician back? I will apologize. He needs his blood work done.” Charles’ father says.

You reply, “He might be withdrawing in the morning. You don’t need to apologize. I will call the lab to re-arrange his bloodwork”

“Charles said you are different. You are nice to him.” Charles’ father seems more relax.

“Anything you’d like to know about Charles?” You ask.

Charles’ father is silent for several seconds and cross both arms on his chest, “The social worker said he has infection on his legs again. How bad is the infection this time?”
You answer, “I haven’t had a chance to check his legs yet. But his legs don’t look good from the report we received from emergency department.”

“But I don’t see he has an IV on his arm or neck. Doctor usually gives him antibiotics by IV when the infection is bad.” Charles’ father asks.

You answer, “Charles had a dose of IV antibiotics in emergency department, but the IV came out. We didn’t put another IV back because we couldn’t find any vein on him. He now is taking oral antibiotics.”

Charles’ father asks, “If he doesn’t need IV antibiotics, I wanna take him home. I don’t want him to go back to shelter.”

You reply, “Charles’ doctor hasn’t seen him yet. Give us some time to make sure if he is ready to be discharged, and then Charles can decide where he would like to go.”

Charles’ father continues, “The doctors increase Charles’ Kadian each time he comes to hospital. Kadian does nothing but makes him more addicted. Now he uses all kinds of drug for his knees and ankles pain. He can’t find any vein on his arms so inject drug to his knees and ankles directly. And it’s how he gets infection on his legs.”

You ask, “What happened to his knees and ankles?”

Charles’ father answers, “He twisted his ankles several times and broke his knee bones”.

110
You ask, “From figure skating?”

Charles’ father sighs, “Yes, from figure skating. I should just let him stay with hockey.”

A smile is on Charles’ father’s face, “He was so fast on ice. I enrolled Charles to hockey when he was 4 because Gabriel played hockey too. But no one, even from Gabriel’s team, could catch up with Charles. Even the coaches said Charles was one of the fastest player they ever saw. But all the sudden he said he wanna try figure skating. I know why. When they were older, some kids teased at Gabriel said he wasn’t fast enough, said he wasn’t as good as his little brother. Charles is like my wife, very gentle and soft. Have a good heart, and always thinks about others first.”

You ask, “Charles asked for figure skating to make his brother felt better?”

The father continues, “Yes, Gabriel was going to quit hockey. But then Charles said he didn’t wanna play hockey anymore. He wanna try figure skating. I was like, great, problem solved, everyone was happy.

If I insisted Charles kept playing hockey and Gabriel could do something else, none of these would happen.”
You ask, “When did Charles twist his ankles and break his knee bones?”

The father continues, “He twisted his ankles several times but didn’t tell anyone. One time his skating coach asked him to take a week off because his ankles were swollen like a dough. But Charles asked Gabriel take him to the ice rink. A friend told me those kids gave Charles half of the ice at their puck time so Charles could practice on his spins.”

Tears in Charles’ father’s eyes, “Charles fell on his knees in one of the competitions and needed a surgery. I took his skates away this time. I knew he was angry at me, but he didn’t yell or curse. He just lied in his bed quietly.”
Charles’ father wipes off the tears, “He went back to ice after the surgery but it’s all different. Charles started to have a lot of pain on his knees and ankles, and it was surgery after surgery.”

The father continues, “He also took a lot of different painkillers, but pain was getting worse. One of Emma’s friends had cancer and used marijuana for her pain. My wife and I thought to give it a try.”

The father sighs, “It’s all my fault. I bought marijuana from a friend, but Charles smoked more and more. I freaked out. I really freaked out. I was so scared Charles would become a drug addict so I cut off his marijuana.”

Tears in Charles’ father’s eyes, “Not until a year later, I found out Charles had been buying marijuana and all kinds of drug online. Gabriel took extra shifts from his part-time job and paid for Charles. I was angry, really angry. I told Charles either he quit or got out of my house. He left home several months later.”
Charles’ father wipes off his tears, “Charles has been in-and-out the rehab programs, hospitals, and shelters since. One time my wife and I took him home. He stole all my wife’s jewelry and my watch. We didn’t see him several months later in the ICU. He was so beautiful on ice. I never think he’d end up like this.”

You pass Charles’ father a box of tissue paper and he starts to below his nose.

You reply, “It’s no one’s fault. You mentioned earlier you wanna take Charles home?”

The father answers, “Yes, my wife and I are prepared this time. Gabriel and Emma’s husband will come to help. Charles’ addiction gets worse every time he comes to hospital. He started Kadian at 100mg and it’s 500mg now.”

The father’s voice slightly elevates, “A doctor told me they were thinking to give Charles heroin. How can you give him heroin? It’s a drug!”

You reply, “I believe the doctor must have a reason for this. Let me contact the lab for Charles’ bloodwork.”
Several Hours Later, Charles Rings the Call Bell and You Come to His Room

You ask, “Charles, you doing ok? Do you need anything?”

Charles answers, “I don’t feel good. Can you give me something?”

What would be your response?
# Appendix B: Virtual Simulation Scenario

**Synopsis:**

The scenario is a 32-yo substance over user who is admitted to a medicine ward due to both legs cellulitis from injecting drug to legs. The night shift nurse reports an aggressive behavior from the patient. Meanwhile, the social worker and family also share their perspectives regarding the patient’s history of substance overuse. Learner needs to identify the patient’s needs according to the information.

**References:**


**Target Learners:** Nursing Students  
**Level of Learners:** Senior Level  
**Intended Use:** Formative  
**Learning Objectives:**

1. Identify the patient’s history of substance overuse through multiple resources  
2. Explore the patient’s psychosocial history related to substance overuse from multiple resources  
3. Analyze the supports required by the patient and family.

**Architecture:** Branching  
**Technical Platform:** Affinity  
**Primary Character Profile:**

Name: Charles Whitterman  
Age: 32 years old  
Gender: Male  
Height: Not Needed  
Weight: Not Needed  
Language: English  
Ethnic Background: Caucasian  
General appearance, behavior, affect: looks much older than 32 yo, skinny, fluffy hair, dark circle around eyes, wearing patient gown  
Psychosocial background: Heavy substance over user  
History of present illness: Substance overuse  
Current medications: Kadian 500mg po daily at 0600
<table>
<thead>
<tr>
<th>Character</th>
<th>Name</th>
<th>Age</th>
<th>Gender</th>
<th>Height</th>
<th>Weight</th>
<th>Language</th>
<th>Ethnic Background</th>
<th>General appearance, behavior, affect</th>
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<td>Female</td>
<td>Not Needed</td>
<td>Not Needed</td>
<td>English</td>
<td>Any ethnic background would work</td>
<td>Wearing hospital scrubs with name tag, exhausted, just finished night shift</td>
<td>Not Needed</td>
<td>NA</td>
<td>NA</td>
<td>Not Needed</td>
<td></td>
</tr>
<tr>
<td>Social Worker</td>
<td>Peter, MSW</td>
<td>Not Needed</td>
<td>Male</td>
<td>Not Needed</td>
<td>Not Needed</td>
<td>English</td>
<td>Any ethnic background would work</td>
<td>Wearing white coat with name tag.</td>
<td>Not Needed</td>
<td>NA</td>
<td>NA</td>
<td>Not Needed</td>
<td></td>
</tr>
<tr>
<td>Father</td>
<td>Arthur</td>
<td>70 years old</td>
<td>Male</td>
<td>Not Needed</td>
<td>Not Needed</td>
<td>English with accent</td>
<td>Caucasian</td>
<td>Looks serious and tough, polite, neat hair, short shirt and long pant</td>
<td>Not Needed</td>
<td>NA</td>
<td>NA</td>
<td>Not Needed</td>
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<tr>
<td><strong>Psychosocial background:</strong></td>
<td>Hardworking, high expectation on self and kids.</td>
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<tr>
<td><strong>History of present illness:</strong></td>
<td>NA</td>
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<td><strong>Current medications:</strong></td>
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<tr>
<td><strong>Allergy:</strong></td>
<td>NA</td>
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<td><strong>Baseline:</strong></td>
<td>NA</td>
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<table>
<thead>
<tr>
<th><strong>Other Characters: Mother</strong></th>
<th>Name: Not Needed</th>
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<tbody>
<tr>
<td></td>
<td>Age: 60ish years old</td>
</tr>
<tr>
<td></td>
<td>Gender: Female</td>
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<tr>
<td></td>
<td><strong>Height:</strong> Not Needed</td>
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<tr>
<td></td>
<td><strong>Weight:</strong> Not Needed</td>
</tr>
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<td></td>
<td><strong>Language:</strong> Not Needed</td>
</tr>
<tr>
<td></td>
<td><strong>Ethnic Background:</strong> Caucasian</td>
</tr>
<tr>
<td></td>
<td><strong>General appearance, behavior, affect:</strong> Looks caring, wearing long shirt</td>
</tr>
<tr>
<td><strong>Psychosocial background:</strong></td>
<td>NA</td>
</tr>
<tr>
<td><strong>History of present illness:</strong></td>
<td>NA</td>
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<tr>
<td><strong>Current medications:</strong></td>
<td>NA</td>
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<tr>
<td><strong>Allergy:</strong></td>
<td>NA</td>
</tr>
<tr>
<td><strong>Baseline:</strong></td>
<td>NA</td>
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</table>

| **Setting:**                  | Hospital acute medicine ward, single room      |
| **Pre-Briefing**              | An introduction video will be provided before the simulation started regarding how to use the platform. |
| **Debriefing**                | No debriefing provided in this scenario         |
Scenario Flow:

**Theme 1: It is the Report from the Night Shift Nurse**

You check the assignment board and Molly approaches you for report.

Lab results provided
- Renal Profile
- Serum Iron
- C-Reactive protein
- CBC

Vital Signs
- VS from ED
- VS last night in the ward

Molly didn’t administer Kadian
- Can you administer it before you leave?
- He is sleeping. Let him rest. Otherwise we might trigger his aggressive behavior.

Theme 2
Theme 1 Screenshots from the Virtual Simulation Scenario

No worry. I will administer it. You go home and have a good rest.

He is sleeping. Let him rest. Otherwise, we might trigger his aggressive behavior.

Can you administer Kadian before you leave?

Kadian is for his addiction. Let me check on him first.
Theme 2: When You Walk into Charles’ Room For Safety Check

You walk into Charles’s room

- Turn on the light because it’s too dark
- Charles yells at you and tells you to fuck off
- You greet Charles and ask permission for safety check
- You try your best to perform as many as safety check in dark and quietly.

He is still sleeping. You will come back and check on him later.

Charles demonstrates S/S of withdrawing

- You indicate verbal abuse is not tolerated in hospital
- You indicate you will call security if he behaves inappropriately
- You will come back later
- Charles ignores you, and goes back to sleep
- You ask Charles if he wants you to leave the room
- You indicate you are here to help him.

Charles demonstrates S/S of withdrawing

- Charles rolls his eyes and says, “I don’t need your help.”
- You ask Charles’ permission to do an assessment.
- You administer Hydromorphone and Methadone pm
- Turn on the light because it’s too dark
- Charles yells at you and tells you to fuck off.

Charles ignores you, and goes back to sleep.

Charles admits he is withdrawing.

- You urge the physician to assess Charles because he is withdrawing
- You encourage Charles to utilize relaxation techniques
- You urge the physician to assess Charles because he is withdrawing
- You assess Charles’ vital signs
- Charles ignores you, and goes back to sleep.

Theme 3
Theme 2 Screenshots from the Virtual Simulation Scenario

1. It's a priority to administer Hydromorphone and Methadone prn.
2. I need to assess Charles' vital signs first.
3. I need to phone the physician first because Charles is withdrawing.
4. I encourage Charles to utilize relaxation techniques.

Press Esc to exit full screen.
Theme 3 Screenshots from the Virtual Simulation Scenario

What would you suggest we do about his aggressive behaviors? *

We feel uncomfortable working with him because of his aggressive behaviors. *

I admire your passion for working with substance overuse patients. *

I think he was withdrawing. I've given him his medications, and he is resting now. *

Replay
Theme 4: Breakfast Tray Has Arrived and You Walk Into Charles’ Room

You walk into Charles's room

- Turn on the light because Charles already knows you.
- Charles ignores you, and goes back to sleep.
- You ask permission to come in.
- You ask Charles how does he feel after the prn meds.
- You inform Charles his parents are coming.

Charles asks for breakfast

- You leave to pick up his breakfast.
- You indicate you need to conduct an assessment before he can eat.
- You inform Charles he needs to do the bloodwork first before he can eat.
- Charles ignores you, and goes back to sleep.

Charles feels intimidated by the question

- You apologize to upset him.
- You re-enforce he is a substance over user.
- Charles yells at you and tells you to fuck off.
- You re-enforce zero tolerance on verbal or physical abuses.
- You clarify the intention of the question.

Theme 5
Theme 4 Screenshots from the Virtual Simulation Scenario

I will leave to pick up his breakfast.
I ask Charles' permission to do an assessment before breakfast.
I need to do an assessment before he can eat.
Charles needs to have the bloodwork done before he can eat.
Theme 5 Screenshots from the Virtual Simulation Scenario

We have zero tolerance for verbal and physical abuse in the hospital.

He might be withdrawing in the morning. You don’t need to apologize.

I will re-arrange his bloodwork. Can you stay until the lab technician arrives?

Charles scares all of us. His aggressive behaviors make all the nurses frustrated.
Theme 6: Several Hours Later, Charles Rings the Call Bell and You Come to His Room

You walk into Charles's room

No branch in this theme

Theme 6 Screenshots from the Virtual Simulation Scenario
Appendix C: Demographic Characteristics

To which gender identity do you most identify?

A. Female
B. Male
C. Non-binary
D. Prefer not to answer
E. Other: Please indicate ________________

What is your age? _______(Please enter your age)

Have you ever recovered from substance overuse?

A. Yes
B. No

Do you have any family or close friend who has (or had) substance overuse?

A. Yes
B. No

Have you had any training in relation to substance overuse? Please select all that apply.

A. No
B. Yes
Appendix D: The Substance Abuse Attitude Survey (SAAS)

Indicate your degree of disagreement or agreement by circling the appropriate choice to the right of each statement. There are no right or wrong answers.

<table>
<thead>
<tr>
<th></th>
<th>Strongly Disagree</th>
<th>Disagree</th>
<th>Uncertain</th>
<th>Agree</th>
<th>Strongly Agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Alcohol is an effective social relaxant.</td>
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<tr>
<td>2. Marijuana should be legalized.</td>
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<tr>
<td>3. Any drug can be safely used by a person who is mentally healthy.</td>
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<td>4. Almost anyone would turn to drugs if their problems were great enough.</td>
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<tr>
<td>5. Alcohol is a food, not drug.</td>
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<tr>
<td>6. Physicians are an important source of drugs for most users.</td>
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<tr>
<td>7. Marijuana use leads to mental illness.</td>
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<td>8. Heroin is so addicting that no one can really recover once he/she becomes an addict.</td>
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<td>9. Smoking leads to marijuana use, which in turn leads to hard drugs.</td>
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<td>10. Clergymen should not drink in public.</td>
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<td>11. Alcoholism is associated with a weak will.</td>
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<tr>
<td>12. All heroin use leads to addiction.</td>
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</tbody>
</table>
13. Daily use of one marijuana cigarette is not necessarily harmful.
14. Physicians should not smoke tobacco in front of their patients.
15. People who use marijuana usually do not respect authority.
16. The laws governing the use of marijuana and heroin should be the same.
17. Angry confrontation is necessary in the treatment of alcoholic or drug addiction.
19. Tobacco should not be smoked in the rooms where non-smokers are present.
20. Weekends users of drugs will progress to drug abuse.
21. Tobacco smoking should be allowed in high schools.
22. Anyone who is clean-shaven with short hair probably doesn’t use illegal drugs.
23. Family involvement is a very important part of the treatment of alcoholism or drug addiction.
24. Alcohol is so dangerous that it could destroy the youth of our country if it wasn’t controlled by law.
25. A physician who has been addicted to narcotics should not be allowed to practice medicine again.
27. Lifelong abstinence is a necessary goal in the treatment of alcoholism.
28. Drug addiction is a treatable illness.
29. Alcoholism is a treatable illness.
30. Street pushers are the initial source of drugs for young people.
31. Personal use of drugs should be legal in the confines of one’s own home.
32. People who dress in hippie-style clothing usually use psychedelic drugs.
33. A hospital is the best place to treat an alcoholic or drug addict.
34. Group therapy is very important in the treatment of alcoholism or drug addiction.
35. Most alcohol and drug dependent persons are unpleasant to work with as patients.
36. It can be normal for a teenager to experiment with drugs.
37. Once a person becomes drug-free through treatment, he can never become a social user.
38. Paraprofessional counselors can provide effective treatment for drug and alcohol abusers.
39. Long-term outpatient treatment is necessary for the treatment of drug addiction.
40. An alcohol or drug dependent person who has relapsed several times probably cannot be treated.
41. Marijuana use among teenagers can be a healthy experiment.
42. Urine drug screening can be an important part of drug abuse treatment.
43. Physicians who diagnose alcoholism early improve the chance of treatment success.
<p>| | | | | |</p>
<table>
<thead>
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</thead>
<tbody>
<tr>
<td>44.</td>
<td>Alcohol and drug abusers should only be treated by specialists in that field.</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>45.</td>
<td>The best way for a physician to treat an alcohol or drug dependent patient is to refer them to a good treatment program.</td>
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<tr>
<td>46.</td>
<td>Persons convicted of sale of illicit drugs should not be eligible for parole.</td>
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<tr>
<td>47.</td>
<td>Chronic alcoholic who refuse treatment should be legally committed to long-term treatment.</td>
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<tr>
<td>48.</td>
<td>An alcohol or drug dependent person cannot be helped until he/she has hit rock bottom</td>
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<tr>
<td>49.</td>
<td>Once an alcohol or drug dependent patient is abstinent and off all medications, no further contact with a physician is necessary.</td>
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<tr>
<td>50.</td>
<td>Patient should teach their children how to use alcohol.</td>
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</tbody>
</table>
Appendix E: Permission to Use The Substance Abuse Attitude Survey (SAAS)

Sadly, Drs. John Chappel and Tracy each have passed away, and Dr. Ronald Krug has retired from the University of Oklahoma City. However, the survey is indicated to be used freely by professionals according to Alcohol & Drug Abuse Institute in University of Washington. Screenshot from the Institute below.
1. Substance Abuse Attitude Survey (SAAS)

**Year:** 1985

**Developers:**
Chappell, John N.; Veach, Tracy L.; Krug, Ronald S.

**Description:**
The Substance Abuse Attitude Survey was developed to measure medical student and physician/clinician attitudes towards various aspects of alcohol and drug misuse. It assesses five factors: Permissiveness, Treatment Intervention, Nonstereotypes, Treatment Optimism, and Normalism) using about 50 items. Items include such statements as: "Marijuana should be legalized" (permissiveness), "Physicians who diagnose alcoholism early improve the chance of treatment success" (treatment intervention), "Anybody who is clean shown with short hair probably doesn't use illegal drugs" (nonstereotypes), "Drug addiction is a treatable illness" (treatment optimism), and "Alcoholism is associated with a weak will" (normalism). Each statement is rated on a five-point Likert scale ranging from "strongly agree" to "strongly disagree."

The SAAS has been used most extensively in undergraduate medical education to measure changes in attitudes following different educational experiences. It was developed in cooperation with career teachers and AMERSA.

**Instrument Use & Availability**
Copyright information unavailable. The items in the SAAS are available, broken down by the five factors, in both the source reference and in Ollansky et al., 1988. The SAAS is offered freely for use by professionals. However, the costs of preprinted forms and additional scoring services cannot be provided by the authors. Costs and services available can be found at the end of the pdf copy of the instrument.

**Contact:**
John N. Chappell, MD
Professor Emeritus of Psychiatry,
University of Nevada
School of Medicine
401 W. Second St.
Reno, NV 89503-5397
Tel: 775-784-4927
jchappel1@med.unr.edu

**Permanent URL for this page:**
Instrument Details:

<table>
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<tbody>
<tr>
<td>Population studied</td>
<td>Clinicians; College students; Adults</td>
</tr>
<tr>
<td>Instrument Type</td>
<td>Assessment; Self-administered questionnaire</td>
</tr>
<tr>
<td>Validity/Reliability</td>
<td>The factor structure of the SAAS has been found to be internally consistent over repeated administrations.</td>
</tr>
</tbody>
</table>

Supporting References:

- Cilansky JM; Schoener EP. Use of the SAAS to examine age, gender, and ethnic differences in attitudes toward substance use in a nonmedical college sample. Substance Abuse 1988; 9(4):194-204.
Appendix F: The Kiersma-Chen Empathy Scale Revised (KCES-R)

The following questions pertain to your attitudes and feelings toward substance overuse patient. Please mark the circle on the scale below that best represents your response.

**Section 1. How necessary is it for healthcare professionals to be able to**

<table>
<thead>
<tr>
<th></th>
<th>Unnecessary</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>Extremely Necessary</th>
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<tbody>
<tr>
<td>2. Express an understanding of substance overuse patient’s feelings.</td>
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<td>3. Value substance overuse patient’s point of view.</td>
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<td>4. Consider substance overuse patient’s feelings to provide patient-centered care.</td>
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<td>5. Be caring in order to build a strong relationship with substance overuse patient.</td>
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<td>6. Identify with substance overuse patient’s feelings.</td>
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<td>7. View the world from substance overuse patient’s perspective.</td>
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## Section 2. I am able to

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<tr>
<th></th>
<th>Does not describe me</th>
<th>2</th>
<th>3</th>
<th>Describes me moderately well</th>
<th>5</th>
<th>6</th>
<th>Describes me extremely well</th>
</tr>
</thead>
<tbody>
<tr>
<td>9.</td>
<td>Express an understanding of substance overuse patient’s feelings.</td>
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<td>10.</td>
<td>Value substance overuse patient’s point of view.</td>
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<tr>
<td>11.</td>
<td>Consider substance overuse patient’s feelings to provide patient-centered care.</td>
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<tr>
<td>12.</td>
<td>Be caring in order to build a strong relationship with substance overuse patient.</td>
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<td>13.</td>
<td>Identify with substance overuse patient’s feelings.</td>
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<td>14.</td>
<td>View the world from substance overuse patient’s perspective.</td>
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</table>
Appendix G: Permission to Use the Kiersma-Chen Empathy Scale Revised (KCES-R)

Re: Permission to Use Kiersma-Chen Empathy Scale (KCES)
2 messages

Chen, Aleda M <amchen@cedarville.edu>
To: Samantha Juan <sj2906@tc.columbia.edu>
Cc: Mary Kiersma <mkiersma@acpe-accredit.org>

Samantha,

Thank you so much for your interest and for sharing the information about your project! It sounds really interesting.

The KCES was recently modified to the KCES-R. We are happy to share the KCES-R with you! I have attached a copy of the KCES-R (modifiable for your specific target patient population) and scoring instructions.

We do not charge for use of the scale; however, we do ask that you share the KCES-R data (de-identified) for further scale validation (if possible) as well as cite us in any manuscript or publication. Everything you outlined regarding use is acceptable.

Please let me know if you have any questions.

Aleda

On Wed, Nov 3, 2021 at 1:24 PM Samantha Juan <sj2906@tc.columbia.edu> wrote:

NOTE: This message was sent from a Cedarville University web-based contact form.
Neither the sender's name or email address has been validated.

Hello Dr. Chen, I am a doctoral student in Teachers College, Columbia University, and writing to seek your permission to use the Kiersma-Chen Empathy Scale (KCES) in my dissertation. My dissertation is to investigate the effectiveness of virtual simulation on nursing students' empathy. The design is to have the participants in the control group view a text-based case study and those in the intervention group will experience a virtual simulation activity, which is developed based on the text-based case study. The participants' empathy level will be measured by the KCES before, immediately following, and eight weeks after the interventions. Meanwhile, a correlation and regression analysis will also be conducted to explore the relationships between the participants' characteristics, attitudes toward substance use (the scenario is about a patient with substance overuse), and the empathy levels among both groups. Please feel free to contact me if you have any questions and I also plan to share the results with you and Dr. Kiersma once my study is concluded. Regards, Samantha Juan, EdD(c), MSN, RN, CORN, CHSE, CNE

-sj2906@tc.columbia.edu

IP: 142.232.219.244
SOURCE: https://www.cedarville.edu/why- Cedarville/contact-form/?part1=amchen&toname=Aleda+Chen
REFERRER: https://www.cedarville.edu/why- Cedarville/contact-form/?part1=amchen&toname=Aleda+Chen

2 attachments

[KCES-R Modifiable Scale (1).docx: 49K]

[KCES-R Scoring (2).pdf: 113K]