Research question: Employ a scoping review to determine what is known about simulation-based learning methods of creating illness and care experiences for health professions and the impact on their empathic skills.

No.	Paper	Article details						Nature of illness and care that was simulated				Impact of simulation on the healthcare student/caregiver (student)					
		Study – where/ type	Year of publication	Country of the first author (alphab.)	Nursing or professional health care discipline	Sample size of participants (if applicable)	Aim of study (alphab.)	Sample of illness or care (alphab.)	Did it use Virtual Reality or other digital systems (yes/ no)	Did it use Haptic or other physical sensors (yes/ no)	Simulation length (if applicable)	Sample size before and after (if applicable)	Did it use a control group (yes/ no)	How was empathy defined and measured (if applicable)? (Instrument)	Pre/ post-experience debriefing, reflection, or discussion (yes/ no)	Summary of impact (Cite – what happened?)	Author conclusion (alphab.)	Reference
1	(Addison & Morley, 2018)	Qualitative study	2018	USA	Hospice and palliative care staff	101	To increase empathy levels in hospice and palliative care staff within the agency.	Palliative care	Partially	Partially	5 min	Immediate & after 18 months	Yes	Common feelings of desperation, fear, anxiety, panic, and exhaustion. Getting in touch with one's empathy translated to behavioral changes that participants planned to implement in their practice. Participants felt more connected to their patients and wrote (sample) on one side of the body: Participants were laid into a sensory deprivation cocooning chamber, covering entirely a table, pouring water into cups, and reading and signing a consent form During this time, the participant been bandaged nurses and students "staff" talking over and about them.	Post-experience debriefing, reflection, and discussion (yes/ no)	Increased personal empathy for patients and families in hospice and palliative care. After 18 months: direct positive correlation between increasing empathy levels after participating in the symptom simulation class.	Addison P, Morley C. Empathy Training: Impact of a hospice and palliative care simulation. *Am J Hosp Palliat Med* 2018; 36: 169–173.
2	(Anghinoni & Wetters, 2015)	Qualitative – longitudinal study	2015	USA	Medical students	3	Experiential learning, Health Professions Education, nursing homes, palliative care	Old age	No	No	2 weeks (2x/ 2h)	Immediate, daily for 17/20 days	No	Simple everyday tasks (going to the bathroom, washing up in the morning, dressing, undressing, eating, meals, and sleeping around the environment) were environmental, timeconsuming and bumbling tasks. Low independence for the participants. Asked to make too much work for the staff. Did not want to keep asking for things, not ring the assistance bell. Importance of taking medication on time.	Daily journals	Enchantment and anxiety while entering a nursing home, frustration, powerlessness, and fear of being a burden to others. Lack of skills, or experience of physical needs. Enhancement of communication by being at eye level regardless of where the person is in a bed, a wheelchair, or on a treatment table. (Communication with authenticity and sincerity that comes from bowlining comfortably with the patient, sitting down and talking to the patient, and being in the moment, thus merely treating the doctor-patient relationship and more beneficial nature of the relationship. Sensibility: and the role of family as caregivers. Sensibility: Sensitive to the needs of others and to other patients throughout bedtime procedures only after increasing with 25 yearold student.	Anghinoni and Wetters wrote, 3. Learning by Living: Life-Altering Medical Education Through Nursing Home Immersion. *Journal of Medical Education and Curriculum Development* 2015; 2: 59–65.
3	(Bharanyk et al., 2016)	Poly-pharmacy qualitative study	2016	USA	Third year pharmacy students	102 (146)	Determine the effectiveness of the IPSS to incubate student empathy for those managing multiple drug, multi-drug medication regimens.	Polypharmacy, comorbidities, empathy	Medication	Partially	7-days	Immediate	Yes	Increase in empathy (open-ended responses: reflected personal growth in many respondents).	Kiersten Chen Empathy Scale – Medical Student Version. Open-ended responses: was categorized as "empathy" or "no empathy" by each of the first authors.	Increase in empathy.	"Overall, the IPSS was a successful simulation exercise in increasing empathy in pharmacy school students, and the IPS implications of this exercise can be holistic for future research."
4	(Barnes, 2010)	Qualitative study	2010	USA	Introductory psychology course undergraduates	127	Examine the efficacy of a brief auditory simulation on mental illness stigma among two-listening conditions.	Stigma, education, simulations, hallucinations	Partially	No	10 min	Immediate?	Yes	Discussed self-reported willingness to help or interact with individuals with a mental illness, did not appear to engender greater effort to derive a basis stimuli, but rather facilitated social distance – the preference for greater personal distance and less interpersonal contact. Increase in attitudes regarding forced treatment for those individuals with mental illness was noted.	Attribution Questionnaire	Changes in mental illness stigma, as evidenced by changes on 2 of the 8 dimensions of attitudes towards individuals with mental illness.	Barnes AL. Implementing a brief hallucination simulation to reduce mental illness stigma. *Community Mental Health J* 2010; 46: 588–593.
5	(Barnes, 2008)	Systematic review	2008	USA	Introductory psychology course undergraduates	866	Hallucinations, simulations, emotions, schizophrenia	Old age	Partially	No	45/52 min	Immediate	Yes	Higher levels of negative affect and lower levels of positive affect during the simulation conditions.	The Positive and Negative Affect Schedule Expanded Form (PANAS) (pre and post)	The simulations increased negative affect and decreased positive affect. Participants felt more negative affect and less positive affect after the simulations with bowel-silent textural content.	Barnes AL. Simulated emotions to hallucinations: a meta-analysis. *J Psychopathol Behav Assess* 2008; 30: 507–514.
6	(Barnes et al., 2010)	Mixed methods study	2010	USA	Introductory psychology course undergraduates	145	Examine the impact of two brief interventions towards altering individuals' attitudes toward those diagnosed with schizophrenia.	Stigma, education, contact, simulation	Partially	No	10 min	Immediate and 1 week after	Yes	Increased levels of social distance and negative emotion immediately following the intervention were observed, which persisted (but diminished) 1 week later. Simulations were helpful in understanding mental illness and bolstering empathy.	Stigma measure, Symptom Checklist-Revised Quality of life inventory, Social Distance Scale and Affect Scale (Pere and Allen)	The results from this study indicate that participants in the filmed contact and simulation intervention experienced changes in mental illness stigma, social distance, and negative affect immediately after the simulation. The simulation led to increases in stigma.	Barnes AL, Brown T, Bojanowski K, et al. Effectiveness of two brief interventions to decrease stigma toward people with schizophrenia: Filmed perspectives-taking versus simulation. *Community Ment Health J* 2010; 46: 484–490.
7	(Bates & Torpiano, 2009)	Qualitative study	2009	USA	Medical students	190	-	Old age	No	Partially	40min	Immediate	Yes	Increase in overall empathy score, easier to understand the behaviour of patients with mental illness.	The Jefferson Scale of Physician Empathy, Student Version (Pine and Pere)	Students' empathy score increased, with an average difference of 0.46.	These results suggest that empathy may increase when students are given a brief glimpse into the world of people with mental illness. Simulation may be a useful method to increase empathy for the mentally ill and lead to a better understanding of how empathy can improve patient care, enhance the doctor-patient relationship, and direct future educational strategies."
8	(Chaffin & Adams, 2015)	Mixed methods study	2015	USA	Senior baccalaureate nursing students	67	Teach psychiatric nursing students about the experience of auditory hallucinations, or "hearing voices."	Auditory hallucinations, empathy, hearing voices, consumers, psychiatric nursing students, education, schizophrenia	Auditory hallucinations	No	15/30 min + 5min	Immediate and after 6 weeks	Yes	Significant improvement in students' empathy after the simulation, and effective statements showed they were changed by the experience. As a result of the Hearing Voices simulation, students reported increased empathy for people who hear voices. Students felt they could empathize with the experience. Qualitative results indicated students' "future practice will be or has been influenced by the Hearing Voices simulation experience. It will motivate therapists accept the patient, believe that the patient says, and respond appropriately when the patient describes voices. Just say to do listen."	Experiential Liker type scale, open-ended questions	Students felt they could empathize with the experience. Qualitative results indicated students' future practice will be or has been influenced by the Hearing Voices simulation experience. It will motivate therapists accept the patient, believe that the patient says, and respond appropriately when the patient describes voices. Just say to do listen."	Chaffin AJ, Adams J. Creating Empathy Through Use of a Hearing Voices Simulation. *Clin Nurse Spec* 2015; 9: e201–e206.
9	(Chen et al., 2019a)	Quasi-experimental pretest-posttest design study	2019	USA	Sophomore level baccalaureate nursing students	88	Nursing student, empathy, geriatrics, attitude	Old age	Partially	No	5h	Immediate	Yes	Significant improvement in student empathy toward older adults and greater understanding of the healthcare system. Students reported increased empathy. Demonstrated improvement in empathy after completing the DMS.	Kiersten Chen Empathy Scale, Medical Student Version, Students' and Aging Attitudes Questionnaire, reflective discussion	Significant improvement in student empathy toward older adults and greater understanding of the healthcare system. Students reported increased empathy. Demonstrated improvement in empathy after completing the DMS.	"Simulation may be a useful method to increase empathy for the mentally ill and lead to a better understanding of how empathy can improve patient care, enhance the doctor-patient relationship, and direct future educational strategies."
10	(Chen et al., 2019b)	Quasi-experimental pretest-posttest design study	2019	USA	First year pharmacy students	196	Evaluate changes in empathy and perceptions as well as gain experiences among student pharmacists participating in an aging simulation game.	Empathy, attitudes, pharmacy students, geriatrics, games	Old age	Partially	5h	Immediate	Yes	Students become more cognizant of older adults' feelings and of the different treatment patients can receive based on their type of health insurance. Students experienced frustration when they were unable to complete a task timely. They became more aware of the challenges faced by older adults. Students reported increased empathy and perceptions of older adults' experiences in the health care system. Students planned to provide assistance to older adults in their future practice, and try to be patient with older adults. Qualitative results indicated students reported increased empathy and reduced ageism.	Kiersten Chen Empathy Scale, Jefferson Scale of Attitudes Toward Aging in Healthcare Students, and Aging Simulation Experience Survey, reflective discussion	Empathy using the KCES and JSE-HPS improved significantly. Of the 196 students, 150 (76.5%) had higher KCES scores, and 139 had significant increase in JSE-HPS. Of those, 66 (47.5%) had significant increases from pretest-to-posttest to posttest-to-follow-up (p<0.05). Agreement significantly increased that it is necessary for a healthcare provider to understand the lifestyle of a patient (p=0.0001). Students felt they could use empathy to understand patients' feelings. Students also recognized with higher agreement posttest-to-follow-up that they could provide better care to patients with different backgrounds (p=0.0001) and reduced consumer risk to patient harm (p=0.0001). Similar perceptions of older adults' experiences in the health care system and of the healthcare system improved significantly (ages and for Fee-for-Title II items on the Aging Simulation Experience Survey).	"Students who may not have time as a patient in the health care system may not understand the experiences of other adults. Incorporating simulations such as the DMS into the curriculum can be a noninvasive, realistic, student empathy, attitudes, and perceptions may help students better understand the challenges faced by older adults and improve their care of them. Students felt they could use empathy to understand patients' feelings. Students also recognized with higher agreement posttest-to-follow-up that they could provide better care to patients with different backgrounds. Simulations such as the DMS can be a useful method to increase empathy for those who are not exposed to the healthcare system and reduce consumer risk to patient harm."
11	(Chen et al., 2021)	Quasi-experimental pretest-posttest design study	2021	USA	First year pharmacy students	623	Attitudes, pharmacy education, geriatrics, assessment	Old age	Partially	No	5h	Immediate	Yes	Improved attitudes toward older adults, greater knowledge and understanding of patient experiences, increased willingness to provide assistance. Experienced physical frustration surrounding the healthcare system dealing with disabilities and being difficulties completing tasks.	Aging Simulation Experience Survey, reflective discussion	>75% of students indicated they experienced frustration because many were given disabilities, such as vision or dexterity loss. 89% of students felt more knowledgeable after the DMS. Students felt they had skills required to navigate both the healthcare system and daily life. Students felt they were more aware of older adults' feelings, better understanding their needs, and more willing to provide assistance to older adults. Students felt they could use their stereotypes or prejudices to better interact with people with disabilities. Nearly 88% of students agreed that their attitudes had improved after completing the DMS. Students felt they had more empathy for older adults. Students felt they had more knowledge of older adults' needs and challenges. Nearly 88% of students learned that they often had to wait multiple healthcare providers, such as physicians, nurse practitioners, and pharmacists, to resolve their health issues. A quarter of the students felt that the DMS was helpful in their future practice. Students felt the components for office visits, laboratory tests, and prescription medications. 19% of students felt there was a lack of new information learned. Students felt the components of transportation, longer wait times, unnecessary trips to a healthcare provider, and potential errors.	"Incorporating the Geriatric Medication Game into the pharmacy curriculum facilitates students' understanding of the challenges faced by our patients in future practice. The Geriatric Medication Game was incorporated into the PharmD curriculum to address the ACPE standards and to help students understand the challenges faced by older adults and their caregivers. Students felt they could use their stereotypes or prejudices to better interact with people with disabilities. Students felt they could use empathy to understand patients' feelings. Students felt they could provide better care to patients with different backgrounds."
12	(Cor et al., 2017)	Qualitative – interpretative phenomenological study	2017	UK (94)	Fourth year medical students	10	-	Melanoma	No	Partially	2 times at regular intervals (~ 2h) simulation, immediate interviews afterwards	23h	Broadened and deepened perspectives and understanding. Increased patient-centered attitudes towards the experience of having this important form of cancer. Explored a less paternalistic view of life and mortality. Reflected on what they wish for general in their practice. Increased desire to be able to be a better advocate for patients. "More alive, less numbing." really centred.	Audio diaries, face-to-face interviews	Learned a sense of empathy and sympathy for patients. Participants felt an enhanced desire to be a better advocate for patients. Participants felt deeplyrooted empathy and sympathy towards the experience of having this important form of cancer. Explored a less paternalistic view of life and mortality. Reflected on what they wish for general in their practice. "Describe the physical effects of the voice hearing experience." "Describe the physical effects of the voice hearing experience." "Describe the physical effects of the voice hearing." "Describe the physical effects of the voice hearing."	Cor M, Bendersen G, Haig N, et al. Living with melanoma: ... *Arch dermatol Res* 2017; 309: 775–778.
13	(Dambacher et al., 2009)	Qualitative study	2009	USA	Second-year pharmacy students	137	Diabetes, active listening techniques, practice laboratory	Diabetes	Partially	No	5h	Immediate	Yes	Improved confidence in providing care to diabetic patients, empathy for patients with diabetes, gaining a better understanding of what a patient with diabetes faces. Realized that more learning and practice was needed before becoming totally confident in providing diabetes management services.	Knowledge of diabetes evaluation, confidence in providing care to diabetic patients evaluation, a diabetes evaluation.	Significant decline in confidence after some care cases (14 cases). Participants felt more empathy for patients with diabetes. Participants felt more confident in providing care to diabetic patients. Participants felt deeplyrooted empathy and sympathy towards the experience of having this important form of cancer. Accreditation Council for Pharmacy Education's recommendations for patients with diabetes, (11) are a diabetes patient (6-8), (12) have been diagnosed for 3 years or more, (13) have disadvantages between fasting blood glucose ranges, and (14) can demonstrate a patient on how to self-monitor blood glucose levels.	Dambacher JS, Hunter RF, Smith CL. Active-learning laboratory session to teach the care of patients with diabetes. *Am J Pharm Educ* 2009; 73: 1–6.
14	(de Alvarez et al., 2017)	Qualitative study	2017	USA	Medical students, physician assistant students, pharmacy students, and psychiatry residents	49 (48 medical students, 1 physician assistant, 1?)	Geriatrics, education, medical students, cognitive dysfunction	Old age	Partially	No	20min	Pre/post (assumed immediate?)	Yes	Significant improvement in the Approaches to Dementia Questionnaire scores among participants indicating an increase in empathy and a decrease in negative attitudes towards people with dementia. Results indicate that the intervention increased the participants' empathy for people with dementia. Nearly 80% of students learned that they often had to wait multiple healthcare providers, such as physicians, nurse practitioners, and pharmacists, to resolve their health issues. A quarter of the students felt that the DMS was helpful in their future practice. Students felt the components for office visits, laboratory tests, and prescription medications. 19% of students felt there was a lack of new information learned. Students felt the components of transportation, longer wait times, unnecessary trips to a healthcare provider, and potential errors.	The Approaches to Dementia Questionnaire	Statistically significant improvement in the Approaches to Dementia Questionnaire scores among participants indicating an increase in empathy and a decrease in negative attitudes towards people with dementia. Results indicate that the intervention increased the participants' empathy for people with dementia. Nearly 80% of students learned that they often had to wait multiple healthcare providers, such as physicians, nurse practitioners, and pharmacists, to resolve their health issues.	de Alvarez RR, Shargo-Lindsey M, Anghinoni L, et al. Improving attitudes about aging and cognitive impairment: the potential to improve the care of older adults receive and deserve. One intervention provides a medical-to-interprofessional training that attempts to address the increasing need for the care of older adults. The exercise was incorporated into the geriatric psychiatry session anonymously for 30 learners."
15	(Deming & Steadman, 2009)	Qualitative – interpretative phenomenological study	2009	USA	Senior-year nursing students	28	Intellectual/empathy, novice nurses, therapeutic relationship, voice simulation	Auditory hallucinations	Partially	No	45 min	Immediate	Yes	Experienced heightened emotions in the category of intense feelings. As the simulation continued, feelings of anger, vulnerability, and fear became more overwhelming. The ability of the participants to maintain focus regarding negative feelings was overwhelmed by the experience of hearing voices. Participants felt the voices, which can be characterized as mocking, degrading, threatening, and/or otherwise and being physically abusive, and being physically abusive. Participants felt deeplyrooted empathy and sympathy towards the experience of having this important form of cancer. Participants felt deeplyrooted empathy and sympathy towards the experience of having this important form of cancer. Students felt they could empathize with the type of suffering. Assigned being able to change their thinking and attitudes to only focus on the development of therapeutic relationships.	Writing of a reflective account of the experience, "Describe the physical effects of the voice hearing experience." "Describe the physical effects of the voice hearing." "Describe the physical effects of the voice hearing."	Participants felt more empathy for patients with diabetes. Participants felt more confident in providing care to diabetic patients. Participants felt deeplyrooted empathy and sympathy towards the experience of having this important form of cancer. Participants felt deeplyrooted empathy and sympathy towards the experience of having this important form of cancer. Students felt they could empathize with the type of suffering. Assigned being able to change their thinking and attitudes to only focus on the development of therapeutic relationships.	Deming KH, Steadman S. Intensifying Therapeutic Relationships: Novice Nurses' Experiences of Voice Simulation. *Perspect Psychiatr Care* 2009; 45: 175–182.
16	(Deming & Steadman, 2008)	Mixed methods interpretative – phenomenological study	2008	USA	Nursing students	90 (32 – voice simulation; 32 – control)	-	Auditory hallucinations	Partially	No	45 min	Immediate	Yes	Expressed a desire to improve ability to interact with patients. The importance of good communication skills was prominent in nursing students' interactions with people with auditory hallucinations. Participants would suspend judgment, try to be more understanding, and be more patient with people who hear voices. Participants felt they could use their nursing skills (open-ended, empathy, and patience) and of listening patients as they talked about the voices they hear, the need to be proactive with patients, and to be more patient with people who hear voices. Participants felt they could use their communication with the consumer measured whether they were focusing on communication with the consumer measured whether they were focusing on communication and assistance with complicated symptoms. Reduced stigmatizing perceptions, increased empathy and evident ideals, and improved the development of the nurse-patient relationship.	Medical Condition Regard Scale (MCRS) and The 13-item Attitudes Toward Mental Illness Scale, open-ended	Nursing students demonstrated a change in attitudes, believing they could use their nursing skills (open-ended, empathy, and patience) and of listening patients as they talked about the voices they hear, the need to be proactive with patients, and to be more patient with people who hear voices. Participants felt they could use their communication with the consumer measured whether they were focusing on communication and assistance with complicated symptoms. Reduced stigmatizing perceptions, increased empathy and evident ideals, and improved the development of the nurse-patient relationship.	Deming KH, Steadman S. Challenging stereotyping and bias: A voice simulation study. *J Nurs Educ* 2008; 47: 99–102.
17	(Dinko et al., 2010)	Qualitative study	2010	USA	Third year pharmacy students	187 (77)	Determine the changes in students' attitudes about type 2 diabetes and impact on students' confidence in diabetes self-management services. Gain experiences in diabetes self-management services. Incorporate the interview of a living With Diabetes Week simulation into the curriculum.	Diabetes, attitudes, assessment, simulation	Diabetes	Partially	1 week	Immediate	Yes	The students were provided with a "diabetes diary" consisting of several logs to record when self-care tasks were performed. Participants performed diabetes self-management activities (blood glucose, blood pressure, foot care, medication, diet, and "snacks" (consumed between 2 to 3 times daily). Self-monitoring blood glucose (over all glucometers) check blood glucose levels 3 times daily, diet (monitor and record all meals/snacks drinks ingested: second item) (reflect on current self-diagnosis intake) and medical nutrition therapy (carbohydrate counting, calorie counting, and exchanges) (reflect on current self-diagnosis intake) (pseudo-diabetics first self-care), self-reflection (reflect on experience living as a patient with diabetes).	3H-Interviewer-survey	Increased confidence in diabetes self-management education skills. Increased confidence in diabetes self-management. Increased confidence in diabetes self-management education skills. Increased confidence in diabetes self-management education skills also increased.	"The living With Diabetes Week simulation was a valuable experiential learning activity. It is possible to afford medical students a similar but potentially important interaction to some of the lived experiences of a patient who has a diabetes. Beyond the biological issues from traditional teaching, the experience provides insights to patients' life worlds. Overall, the simulation modality could complement traditional dimensions by: teaching methods, providing a greater appreciation of the patient, and their lifeworlds, behind the substance this lecture."
18	(Dorsey et al., 2013)	Qualitative study	2013	Australia	Second-year nursing students	286	-	Old age	No	Partially	5 min	Immediate	Yes	A conclusion was provided along with role-play during simulated auditory hallucinations, in a cohort of undergraduate nursing students. The recording was analysed for content using thematic analysis. Participants felt they could use empathy to understand patients' feelings. Participants felt they could use their nursing skills (open-ended, empathy, and patience) and of listening patients as they talked about the voices they hear, the need to be proactive with patients, and to be more patient with people who hear voices. Participants felt they could use their communication with the consumer measured whether they were focusing on communication and assistance with complicated symptoms. Participants felt they could use their communication with the consumer measured whether they were focusing on communication and assistance with complicated symptoms.	-	A greater understanding of the nature of auditory hallucinations, and empathy for people experiencing them. Reported increased confidence in the ability to offer to understand and more appropriately assist consumers experiencing auditory hallucinations.	Quasi-experimental pre-post-matched design questionnaire	Increased their overall understanding of auditory hallucinations. Increased their overall understanding of auditory hallucinations. Increased their overall understanding of auditory hallucinations. Increased their overall understanding of auditory hallucinations. Participants felt they could use their nursing skills (open-ended, empathy, and patience) and of listening patients as they talked about the voices they hear, the need to be proactive with patients, and to be more patient with people who hear voices. Participants felt they could use their communication with the consumer measured whether they were focusing on communication and assistance with complicated symptoms. Participants felt they could use their communication with the consumer measured whether they were focusing on communication and assistance with complicated symptoms.	Dorsey S, Wyborn G, Gallagher K, et al. Simulation to Nursing Students Hear Voices: Qualitative Analysis of Students' Perceptions. *Issues Ment Health Nurs* 2013; 34: 500–512.
19	(Dunn et al., 2005)	Qualitative study	2005	USA	Pharmacy students	102 (96)	Role play, geriatric patients, pharmacy education, medication	Old age	Partially	No	1, 1.5 h	Immediate	Yes	In a simulation, participants were given a brief glimpse into the world of people with mental illness. Students felt they could use their nursing skills (open-ended, empathy, and patience) and of listening patients as they talked about the voices they hear, the need to be proactive with patients, and to be more patient with people who hear voices. Participants felt they could use their communication with the consumer measured whether they were focusing on communication and assistance with complicated symptoms. Participants felt they could use their communication with the consumer measured whether they were focusing on communication and assistance with complicated symptoms.	Pretest and posttest questionnaire, reflection	"The Geriatric Medication Game serves as a resource for increasing pharmacy students' awareness of the perceptions and experiences of geriatric patients. The Geriatric Medication Game increased students' empathy and knowledge of geriatric patients, which may help demonstrate their responsibility for improving the delivery of pharmaceutical care to these patients. Central to this delivery are improved communication skills, which can be learned through role-playing and simulation games. Generally, the fact that simulation exercises may be started or practiced with no guidance or instruction, we offer physical challenges that may be encountered by the tester is concerning. The authors advise simulation not too should be troublesome with sections in health care settings, they propose that patient needs to be developed in conjunction with further research to explore the risks and mitigation of increasing unintended weight loss, will ensure that simulation tools in clinical practice and education."
20	(Dunn et al., 2003)	Qualitative study	2003	USA	Pharmacy students	102 (96)	Role play, geriatric patients, pharmacy education, medication	Old age	Partially	No	1, 1.5 h	Immediate	Yes	Increased understanding, awareness, and empathy towards geriatric patients. Increased perception that older patients have a different time taking their medications. Greater understanding of geriatric patients and increased empathy. Increase patients' ability to understand the challenges of medication management. Increased understanding of geriatric patients and increased empathy. Increased understanding of geriatric patients and increased empathy. Increased understanding of geriatric patients and increased empathy.	Pretest and posttest questionnaire, reflection	"The Geriatric Medication Game serves as a resource for increasing pharmacy students' awareness of the perceptions and experiences of geriatric patients. The Geriatric Medication Game increased students' empathy and knowledge of geriatric patients, which may help demonstrate their responsibility for improving the delivery of pharmaceutical care to these patients. Central to this delivery are improved communication skills, which can be learned through role-playing and simulation games. Generally, the fact that simulation exercises may be started or practiced with no guidance or instruction, we offer physical challenges that may be encountered by the tester is concerning. The authors advise simulation not too should be troublesome with sections in health care settings, they propose that patient needs to be developed in conjunction with further research to explore the risks and mitigation of increasing unintended weight loss, will ensure that simulation tools in clinical practice and education."
21	(Evertsen et al., 2010)	Qualitative study	2010	Australia	Second-year nursing students	440	-	Cultural empathy	No	Partially	10 min	Immediate	Yes	Increased empathy.	The Modified Kiersten Chen Empathy Scale (+ the Nursing Activities Empathy scale)	Enhanced empathy towards people undergoing the same or similar type of experience as the simulation participants, undergoing health care. Increased empathy.	"The immersive 3D simulation had a positive impact on nursing students' empathy levels in regards to people who hear voices. The immersive 3D simulation had a positive impact on nursing students' empathy levels in regards to people who hear voices. The results therefore imply, when it is the potential for immersive 3D cultural simulations to positively impact empathy levels in nursing students' and other health care students. The results therefore imply, when it is the potential for immersive 3D cultural simulations to positively impact empathy levels in nursing students."
22	(Eymard et al., 2010)	Qualitative study	2010	USA	Second-year nursing students	42	-	Old age	No	Partially	30 min	Immediate	Yes	Increasing empathy and compassion. Increased empathy and compassion. Increased empathy and compassion. Increased empathy and compassion. Increased empathy and compassion.	Informal conversations with students and examination of their journals	Students recognized empathy within themselves and in the participants.	"Student participants expressed an increase in empathy and knowledge with regard to older adults."
23	(Fitzgerald, 2007)	Qualitative study	2007	UK	Second & third year nursing students	48	-	Old age	No	Partially	5 min	Immediate	Yes	Increased understanding of the lived experiences of patients with IBD. Statistically significant increases on collateral disease understanding, collateral disease understanding, collateral disease understanding,

28	(Han et al., 2019)	Qualitative study	2019	South Korea	Caregivers	Explore experiences of caregivers of people with dementia who participated in a Korean dementia simulation program.	29 (12 female)	Alzheimer's, dementia, caregivers, dementia, empathy, simulation training	Dementia	Headphones with MP3 players playing noises and sounds from televisions and radios are used to conduct participants by offering their attention level of hearing. Gloves are used to distract their attention from touch and feel. Glasses are used to distort their sense of touch and their motor skills. A different container of Tracks are used, so one of the participants is given the Tracks in a bag, and the other is given the Tracks in a box. Participants are shown and putting it on the table taking Tuesday, moving left and turning the otherwise into the tray. The experience moves co-op with needed items and unneeded items. Social complexities (Participants "behaviors are being observed by a trained observer who takes notes on the observation form of the behaviors of the participants. Observer takes notes on the observation form asking the helper, following, following, someone else and doing what he or she does), gathering (holding onto co-collecting things), giving up (shaking down, not participating in the activity), and refusing (refusing to do the assignment, managing, talking to self, and, crying.	7min	-2 weeks after	More empathy toward people with dementia, positively affected strategies, and increased awareness in psychic changes due to aging and the risk of dementia.	Individual interviews	More empathy, affected care strategies positively leading to emotional and social benefits on the care-dyads, and increased awareness of psychic changes due to aging and the risk of dementia. Reported better understanding about the difficulties in daily life of people with dementia, and realization that living with dementia is not a disease but a natural process. Participants felt more confident to live people with dementia would live in their day to day lives. The more commonly mentioned emotions were frustration, embarrassment, confusion, fear, the process necessary to do anything and overall mental distress. Better understanding of the social difficulties people with dementia face in their day to day life, realize, establish new care strategies, or promote the use of them, a was to complete simple tasks during the simulation experience. Improved communication between people with dementia and caregivers.	"The present study was the first study that explored experiences of caregivers of people with dementia to participate in a dementia simulation program. Results showed that it was a valuable experience, in and potential benefits, of a Korean dementia simulation program to caregivers of people with dementia. The present study also demonstrated that a programme developed in USA could be modified and adapted to a different culture and still be effective. Future research should explore the dissemination in South Korea. Caregivers in the other Asian countries may also benefit from participation in dementia simulation programs and modifying existing programs developed in Western countries by considering their own cultures, can be cost-easy and medicinal."	Han, A., Kim, T., Hong, H. Experiences of caregivers of people with dementia in a dementia simulation program: A qualitative study. *Dementia*. 2019, 0, 1–20.
29	(Harris et al., 2018)	Qualitative study	2018	USA	Pharmacy students	Determine the experiential activity rescribed in increased empathy for patients with diabetes, comfort in counseling these patients on nutrition, and knowledge of diabetes dietary recommendations.	140 (93)	Empathy, nutrition, patient counseling, diabetes, experiential	Diabetes	In the first week, students were asked to rank their typical diet over three days, eating calories and carbohydrate intake. In the second week, they were asked to designe a three day meal plan for a patient with diabetes that fit specific parameters (1500 calories, 45 g carbohydrates, 30 g fat, 30 g carbohydrates/meal). These parameters were selected as they would be consistent with a patient who would be prescribed insulin. Students then completed a medication history include food, prescription, and, and, and

49	(Meyer et al., 2020)	Qualitative study	2020	USA	Healthcare students, including family nurse practitioner, therapy, and speech language pathology disciplines	Dementia has a simulation training program may prepare healthcare trainees to treat individuals living with dementia.	8	Simulation, transformational learning, dementia, healthcare students, empathy	Dementia	The Virtual Dementia Tour simulation experience involved "putting" participants in boots to replicate the sensory experiences of those living with a cognitive impairment and other comorbidities, often experienced by individuals living with dementia. Participants were given a pair of boots and instructed to walk a predetermined path while listening to a tape, which lasted for 15 minutes. Participants were then given a set of simple tasks to complete in a designated simulation space five times period	15h	interviews - within 6-8 weeks after participants finished the program within 1 week	Elicited a sense of cognitive, physical, and emotional experiences which contributed to a stronger sense of empathy for those living with dementia. Articulated specific actions to take in the future practice. Described wanting to educate other clinicians and caregivers about the dementia experience. Described wanting to "slow down" in order to help determine underlying causes your practices are required (e.g., patience) Helped to realize why individuals living with dementia and related comorbidities may exhibit certain behaviors	In-depth, semi-structured one-on-one interviews, reflection papers	Enhanced student learning by allowing students what it is like to live with dementia and common co-morbidities ("Lived" moment) Greater empathy for those living with dementia. Greater empathy for those with cognitively impaired recreational rapport, gave way to allow about how to apply new knowledge about the experiences of living with dementia. Increased knowledge about dementia, including the effects of medication and common co-morbidities. Showed how much more time it takes to do everyday tasks when living with conditions that other can't comes, as well as more time needed to process information such as verbal instructions. Described difficulty remembering the sequence of steps, which made it difficult to complete tasks in the simulation. Gave the language needed to explain to family members what people living with dementia experience so they could better understand. Helped to understand the importance of "slow down" and "see where the dignity of individuals living with dementia is respected at a central level.	"Simulation learning provides healthcare trainees an opportunity to experience what it may be like to live with dementia and comorbidities. It provides a valuable transformative experience that allows students to put into practice lessons learned so they may provide optimal care. Students' deepened sense of empathy for those living with dementia and related comorbidities, and their ability to relate to patients, strongly influenced their psychological perspectives of dementia. As such, simulations may be an important and under-used tool to prepare future healthcare providers to serve a growing number of persons living with dementia."	Meyer K, Isaacs D, Annenga B, et al. Simulation learning to train healthcare students to care for persons with dementia. *Gerontol Geriatr Educ* 2020; 0: 1–10.
50	(McGuire et al., 2016)	Mixed-methods study	2016	USA	Third-year pharmacy students	Evaluate and measure the impact of traditional large classroom lecture on pharmacy student empathy compared to a smaller elective course which utilized content based education, media, and an auditory hallucination simulation	14	Students, pharmacy, empathy, psychiatry	Auditory hallucinations	While listening to the hallucinations, the students completed multiple exercises, including a word find with negative words, and a word search of neutral terms (sunshine) which was conducted by one of the course faculty. The students utilized personal hallucinations of relapsed the volume to a comfortable level	-	Immediate	Increased empathy scores. Positively impacted pharmacy student attitudes, social distance, and stigma regarding patients with mental illness.	The Jefferson Scale of Empathy Health Professions Student Version (HP-JSPE) with demography	Mean empathy scores increased to 120.00 post-elective.	"Simulation learning provides healthcare trainees an opportunity to experience what it may be like to live with dementia and comorbidities. It provides a valuable transformative experience that allows students to put into practice lessons learned so they may provide optimal care. Students' deepened sense of empathy for those living with dementia and related comorbidities, and their ability to relate to patients, strongly influenced their psychological perspectives of dementia. As such, simulations may be an important and under-used tool to prepare future healthcare providers to serve a growing number of persons living with dementia."	McGuire DB, Bynum LA, Wright S. The effects of an elective pharmacy course on pharmacy student empathy. *Curr Pharm Teach Learn* 2016; 8: 368–371.
51	(Yazici-Bodurtad et al., 2017)	Mixed-methods study	2017	USA	Undergraduate psychology students	Investigate the impact of disability simulations on moral, self-ascribed disability stereotypes, attitudes about interacting with disabled individuals, and behavioral intentions for improving campus accessibility, and to see if there were two experiences, consisting the cognitive, emotional, and behavioral consequences of simulating both single and multiple disabilities in college student samples	40 + 80	Ableism, disability awareness, disability simulations, perspective taking	Disabilities (dyslexia, hearing or mobility impairments, low vision)	In experiment 1 participants were assigned to sixteen simulating either dyslexia, hearing or mobility impairments. In experiment 2 participants completed low vision, hearing impairment, and dyslexia simulations. Hearing impairment was simulated by placing a pair of ear plugs and a pair of ear muffs. Low vision was simulated by placing a pair of goggles covered in a layer of petroleum jelly that had such total impairment. Mobility impairment was simulated by using a hospital wheelchair to get meals.	-	Immediate	Increased negative emotions and self-ascribed disability stereotypes while beginning feelings of empathetic concern towards individual given a group. Same BS more confused, anxious, embarrassed, helpless, and more vulnerable to becoming disabled themselves. Negative emotions (mostly) toward disability simulations. Participants felt more helpless than those who used wheelchairs or blindfolds. Participants felt more vulnerable to disability than those who used wheelchairs or blindfolds. Participants felt more helpless (mostly) toward multiple disabilities. Participants felt more vulnerable to disability than those who used wheelchairs or blindfolds. Participants felt more helpless than those who used wheelchairs or blindfolds

72	(Whitley, 2012)	Qualitative study	2012	USA	Pharmacy students	Develop and integrate an active learning diabetes simulation into an advanced pharmacy practice experience to improve pharmacy students' ability to provide patient-centered care. Integrate a new program curriculum to provide patient-centered diabetes management services, which may likely enhance the provision of clinical/pharmacy services for other disease states as well.	39	Diabetes, mellitus, advanced pharmacy practice experience, active learning, simulation, public health, empathy	Diabetes	Students simulated the experience of having diabetes mellitus by conducting activities commonly prescribed to those with this disease over the 7 days. Each student was provided a "diabetic kit" consisting of a glucometer, carbohydrate counting book, a demonstration device, and a phenolic insulin pen and a standardized documentation log was also provided for each student. Students were instructed to perform activities that they would expected to begin incorporating which first daily life consultation, consultation, and integrity; initiate an exercise routine consistent with the American Diabetes Association recommendations; quantify the number of carbohydrates eaten at each meal or snack; and self-monitor blood glucose levels three times per day (before breakfast, before lunch, and before dinner) twice per SMBG. For, certain an elevated blood glucose value (students utilized 180 mg/dL to each self-monitored blood glucose value recorded. Based on an elevated blood glucose value, students were instructed to administer a bolus insulin dose. Using the placebo insulin pen, students administered the calculated number of units into the demonstration device before eating 2 meals daily and postprandially, as necessary.	1 week	within 5 days	Development of empathy. More consideration and realistic views when providing self care recommendations to patients and more understanding and compassion when patients did not adhere to all aspects of the prescribed therapeutic plan. Improved ability and comfort level with performing exchanges related tasks. Challenging experience with ability to identify hindrances associated with maintaining self management efforts. Increase knowledge of what is most likely inability to do so for longer periods of time.	Standardized diabetes log and narrative reflection	90% developed empathy, 97% found the experience beneficial, and 100% felt it was a valuable learning experience. Students noted 90% found difficulty adhering to the regimen, 69% decided to modify their personal habits to become healthier developed empathy, found it a valuable learning experience, 100% felt it was a valuable learning, change personal lifestyle, expressed difficulty with regimen adherence, and identified helpful methods tools for improving adherence. Improved ability to counsel/ relate to patients. Found helpful carbohydrate counting book or electronic application, meal repetition, and cutting numbers down.	"Inclusion of the 7-day active learning exercise greatly impacted student pharmacists' self-reported empathy toward and ability to relate to patients with diabetes mellitus. Completion of this experience may result in long lasting personal behavior modifications. Implementation of this 7-day experience provided students with a valuable learning experience that improved their understanding of patients' lifestyles, improved ability to relate to patients, increased comfort level with patient interactions, and heightened awareness toward and balanced behavioral modifications related to personal health habits. The experience may be altered in the future to enhance adherence measures and to compare medical students' responses to those of student pharmacists."	Whitley HP. Active learning diabetes simulation: a novel approach to integrating pharmacy practice experience to develop patient empathy. *Am J Pharm Educ* 2012; 76: 1. 7.
73	(Wieland et al., 2014)	Qualitative study	2014	USA	Bachelor nursing students	Investigate the experiences of baccalaureate nursing students with the clinical simulation of hearing distressful voices and derive themes based on their written reflective responses.	74	-	Auditory hallucinations	The first moderation, the "cognitive center," consisted of tonal and number dial tones, and was accompanied in Tennessee, for the second moderation, students were interviewed by a "psychiatrist" (role played by a member of the research team) who asked the students to "describe what you hear" and to "Tell me what the person/s/ 'Bill' states was doing" states, "ar "If you were lost within so many in a large city, what would you do?" At the third moderation, the "cognitive center," consisted of tonal and number dial tones, a complex job application within a 20-25 min time frame. Auditory stimuli played with headsets were purchased, and the VSR was downloaded. Students were requested to keep their eyes closed while actively engaged in the experiment. They were instructed to verbalize what they were thinking for those involved in the simulation experience.	1h	Immediate	Increased learning and understanding of individuals experiencing auditory hallucinations, feeling threatened, uncomfortable, and having a difficult time concentrating on other tasks. Felt it was a valuable learning experience, felt it was overall a necessary experience, feeling relieved, discomfort, and feeling a lack of understanding how distressing and, at times, disruptive the voices can be. Participants proposed speaking more slowly to patients and giving themselves to respond within at the same time, being certain the patient understood what the source was saying, providing calm reassurance, and attempt to counter the negative distressing voices.	Reflective evaluation	Attempted to problemsolve, but feeling on 4/Easy could not concentrate on focus, or overburdened by the experience, as the voices competed with the activities and people in the environment who attempted to talk to them. Felt overwhelmed, confused, and frustrated. Most the students were described as unnerving and irritating. Influenced bodily symptoms (e.g., headaches, anxiety, light headedness). Described how they perceived hearing distressing voices to affect activities of daily living. Learned to develop more patience with people who hear voices, felt more empathetic, increased understanding, compassion and understanding of what clients who have distressing voices experience on a daily basis.	"The clinical simulation of hearing distressing voices is an exceptional learning experience for BSN students because it increases active learning and provides students with the experience of hearing distressing voices and the ability to reflect on the experience. Although the sample size was small, the students were described as unnerving and irritating. Influenced bodily symptoms (e.g., headaches, anxiety, light headedness). Described how they perceived hearing distressing voices to affect activities of daily living. Learned to develop more patience with people who hear voices, felt more empathetic, increased understanding, compassion and understanding of what clients who have distressing voices experience on a daily basis.	Wieland D, Levine C, Smith C. Hearing distressing voices clinical simulation: Life Changing! Experiences of Psychiatric Mental Health Nursing Students. *J Psychiatric Ment Health Nurs* 2014; 42: 42. 51.
74	(Wilson et al., 2009)	Mixed methods longitudinal study	2009	UK, NZ	Healthcare professions within an interprofessional interdisciplinary team	Evaluate the impact of training on reflective clinical practice.	78	Simulation, exercises, senior rehabilitation, brain injury	Neurodisability	The exercises took place across 7 'stations', each of which provided experience of a different neurodisability presentation. Visual impairment: Sensory impairment: Cognitive impairment: Motor impairment: Multiple related/nonsensical simulating spectacles, frosted scissoffs wearing blurred vision spectacles, milk an ultraside course with tunnel vision spectacles under controlled light conditions. Sensory impairment: cardigans were asked to identify the following using their non dominant hand while wearing a thick cardigan: a pen, a piece of paper, a coin, a key, a toothbrush, a toothpaste, and were asked to identify the following activity with touch: a soft toy, glove, soft sponge, shoulder, crumb, toy car, toothbrush, fish, key, pen, more (with safety pin attached) Cognitive: Motor: Motor: Motor