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Geriatric simulation to increase empathy in nursing students: A pre–post-test study.

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Abstract:

Background: Nursing students who care for older adults sometimes do not understand or comprehend the way in which to understand the limitations of this population. The study objective was to evaluate the effectiveness of geriatric simulator in enhancing nursing students' emotional intelligence and empathy towards older adults.

Methods: A descriptive pre–post-test cross-sectional study using psychometric tools to measure empathy-related parameters and sociodemographic data about the simulator experience was conducted.

Results: Between pre- and post-test intervention scores, the sample reported significantly better post-intervention scores based on the Jefferson Scale of Empathy and Trait Meta Mood Scale/repair dimension.

Conclusion: Implementation of geriatric simulation caused an increase in empathy-related parameters in nursing students.

Keywords: Nursing students; empathy; emotional intelligence; simulation training

1. Introduction:

Health professionals, especially nurses, must be well-prepared to meet the needs of an increasingly aging adult population. However, students may have difficulty understanding and

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empathizing with older adults since the students may not have personally experienced aging-related problems, such as disabilities and illnesses (Chen, Kiersma, Yehle, & Plake, 2015).

Empathy and understanding are critical skills that must be present in these healthcare professionals because these skills influence the quality of care (Courtney, Tong, & Walsh, 2000; Eymard & Douglas, 2012). M. L. Hoffman (1987) defined empathy as 'an effective response more appropriate to someone else's situation than to one's own'. This author explained that empathy can be learned because as 'role-taking skills develop, the other-oriented distress increasingly becomes a form of true compassion for others.

Simulation practice sessions can be a valuable method for teaching abstract concepts, such as caring and empathetic attitudes. These simulation sessions allow students to actively participate in the learning process (Oudshoorn & Sinclair, 2015; Schmall, Grabinski, & Bowman, 2008). Experiential training development is effective at improving empathy in nursing students (Bas-Sarmiento, Fernández-Gutiérrez, Baena-Baños, & Romero-Sánchez, 2017). Another additional benefit for student learning is the opportunity to experience and react to situations in an environment and visualize an understanding of what happens to patients before they undergo clinical experiences (Kelly, Berragan, Husebø, & Orr, 2016; Schmall et al., 2008); thus, these simulation experiences provide students with the opportunity to develop empathy towards older people (Schmall, Grabinski, & Bowman, 2008). Gholamzadeh, Khastavaneh, Khademian, and Ghadakpour (2018) found that empathy is a teachable skill and they recommend that nursing schools incorporate empathy skills with respect to elderly patients into undergraduate nursing education curricula.

A recent study suggests that the use of simulation in preparation for health experiences involving older adults helps nursing students develop patient care skills. These simulation experiences should be integrated into nursing curriculum pedagogy in order to enhance students' preparation for better nursing care of older adults (Skinner, 2017).

2. Theoretical Framework

The theoretical framework for the current study is based on Jeffries (Jeffries & Rizzolo, 2006) and consists of five possible results of clinical simulation experiences: (a) increased knowledge or understanding; (b) enhanced skill performance; (c) greater learner satisfaction; (d) development of critical thinking abilities; and (e) increased student self-confidence.

Following the recommendations of various authors who advise further research on empathy in students (Kerasidou & Horn, 2016; Richter, 2018), we understand that it is very important to encourage and increase nursing student empathy towards the elderly population through pre-clinical simulation in order to provide better care and treatment. Therefore, the main goal of this study was to evaluate the effectiveness of a geriatric simulator in enhancing empathy in nursing students. We hypothesized that the students who experience physical states of older people through medical simulations will increase their empathy toward this population.

Materials and Methods:

A descriptive cross-sectional study was carried out between the months of September and December 2018 following the declaration and the verification list of the Strengthening of the Information of Observational Studies in Epidemiology (STROBE).

Study Design:

A pre- and post-test using psychometric tools for measuring empathy, emotional intelligence, and positive and negative effects of simulation training in addition to sociodemographic data was administered. The participants were recruited from the Faculty of Health Sciences and the Nursing Career of the Universidad Rey Juan Carlos- Spain. This Universitary teaching center provided the location for study participants to conduct their nursing studies and their pre-clinical practice, which were also done in the clinics in the University-affiliated hospitals.

Considering a correlation with an intraclass correlation coefficient (ICC) of 0.40 and a 95% confidence interval (CI) for a two-tailed test, error of 0.05, and a desired analysis power of 80% (error $\beta = 20\%$), a final size sample should have been no less than 53 participants.

Participants Study Participant Selection:

The study included all consecutive nursing students who fulfilled the inclusion criteria and voluntarily agreed to participate in the study. Male and female nursing students 18 years and older were recruited from the School of Health Sciences of the URJC. Exclusion criteria consisted of cognitive and/or motor disabilities, difficulties

following the questionnaire instructions, and refusal to sign the informed consent.

Instruments:

We performed pre- and post-testing using psychometric measurement tools, including the Jefferson Scale of Empathy validated for nursing students (coefficient alpha of 0.77), Trait Meta-Mood Scale-24 (TMMS-24) (coefficient alpha for Emotional Attention 0.90; for Emotional Clarity 0.90; for Emotional Repair 0.86) and the Positive and Negative Affect Schedule (PANAS) (coefficient alpha for the positive of 0.92 and 0.88 for negative affections).

The Jefferson Scale of Empathy is a 20-item questionnaire answered on a 7-point Likert-type scale (ranging from 1 = No Agreement to 7 = Total Agreement) (Ward et al., 2009). The TMMS-24 is used to measure emotional intelligence and consists of 24 items, and in each of them we find five options for different levels of conformity (ranging from 1 = Strongly Disagree to 5 = Strongly Agree). TMMS-24 contains three key dimensions of emotional intelligence with eight items: (a) Emotional Attention, when the individual is able to feel and express feelings in an appropriate way; (b) Emotional Clarity occurs when the individual understands their own emotional states well; and (c) Emotional Repair, when a person is able to correctly regulate their emotional states. It was validated for the Spanish population (coefficient alpha of 0.90) (Fernández-Berrocal, Extremera, & Ramos, 2004). The PANAS is a 20-item self-reported questionnaire with five options of answer in each item (ranging from 1 = Slightly or Almost Nothing to 5 = Extremely). It is one of the most frequently used measures of affection, and it has demonstrated excellent psychometric properties (Watson, Clark, & Tellegen, 1988). This test was also validated for the Spanish population (Cronbach alpha coefficient of 0.92 and 0.88 for the positive and negative affection subscales, respectively)(López-Gómez, Hervás, & Vázquez, 2015). We also requested sociodemographic data, such as age and gender, and finally we administered an open-ended question to the students at the end of the simulation experience in order to allow them to describe their experiences ('Briefly describe your experience with this age simulator.').

The pre-clinical practice performed by the students was conducted between completion of the pre- and post-testing sessions. The 1-hour practice per student consisted of wearing a geriatric simulator suit and performing daily life activities, such as going up and down stairs, sitting, rising up from a chair and putting shoes.

Figure 1. **Student Buckling Shoes.**

Age Simulation Suit (Gert): Simulation of Vision, Hearing, And Movement.

The age simulation suit, GERT (Produkt + Projekt, Niederstotzingen, Germany, http://www.agesimulationsuit.com/imprint.html), offers the opportunity for younger people to experience the limitations of older people. The age-related limitations that are experienced consisted of lens opacity in the eye, narrowing of the visual field, high-frequency hearing loss, restrictions in head mobility, joint stiffness, loss of strength, reduced gripping ability, and reduced coordination. Effects similar to alterations in sensorimotor skills during old age can be achieved, especially with respect to age-related walking and modified gripping ability, which are simulated very closely to real-life. The uncertainty and /instability in movement will be understandable when the GERT age simulation suit is worn. This suit consists of a set of separate components, including special glasses, ear protection, earplugs, cervical collar, weight vest, elbow patches, wrist and ankle cuffs, special gloves, and knee pads.

Ethical Aspects:

The study was approved by the Ethics and Research Committee of the San Carlos Clinical University Hospital in Madrid-Spain with number 18/339-E (July 18, 2018). Each participant in the study was given an informed consent that contained detailed information written in comprehensive language about the procedures, the consequences of study participation, possible complications, and the option to withdraw from the study at any time.

3. Data Analysis:

All variables were examined to determine the normality of the distribution using the Kolmogorov–Smirnov test, and the data were considered normally distributed if P > 0.05. For parametric variables, paired t-test was used, and for non-parametric variables the Wilcoxon signed-rank test was used to determine whether there were statistically significant differences in the pre- and post-test findings in the same group of participants. An independent Student's t-test was used to determine statistically significant differences between groups for parametric variables, and the U Mann–Whitney test was used for non-parametric variables. Pearson's p analysis was used to evaluate relationships between quantitative variables. Statistical significance was set at P < 0.05. We performed the analyses with SPSS 20.0 (Chicago, IL).

The open-ended questions were analyzed using the ATLAS. Ti versión 8 to illustrate the findings and interpretations on a digital mind map (Friese, 2019). A content analysis was performed following a series of steps: selection of the keywords in the texts of the open responses, these keywords were grouped together, first following a morphological criterion, categories and subcategories were built based on the previous semantic grouping and finally the word clouds were generated (with Atlas.Ti 8), which represents the iconographic frequency of how often each subcategory appears. These clouds follow a spiral arrangement, that is, the more repeated terms appear larger and more centered.

4. Results

Sample

The final sample consisted of 54 nursing students with 41 females (77.3%) and 13 males (22.7%). The mean age of the student sample was 21 ± 1.42 years old. All participants completed the pre- and post-tests and also the 1-hour session with the geriatric simulator suit.

For the total population, all variables showed a normal distribution (P > 0.05), except for age, PANAS-20 (negative subscale), and post-TMMS-24/attention dimension (P < 0.05). Table 1 represents the demographic characteristics of the sample. When population was divided into two groups by sex, all variables showed a normal distribution (P > 0.05), except for both the TMMS-24/attention dimension and PANAS-20 (positive dimension) for post-test males and PANAS-20/negative dimension pre-test for females.

Table 1. **Demographic Data of Study Participants (N=54)**

Variables (Units)	Total (N=54) Mean±SD (95%CI)	Female (n=41) Mean±SD (95%CI)	Male (n=13) Mean±SD (95%CI)	p-value
Age (years)	21.00 ± 1.42 (20.61–21.38)	21.19 ± 1.38 (20.77–21.61)	20.38 ± 1.44 (19.59–21.17)	0.074*
Height (cm)	169.27±7.10 (167.65-171.16)	167.65±6.19 (165.76–169.55)	176.00 ± 6.13 (172.66–179.33)	<0.001*
Weight (kg)	65.31±10.53 (62.50–68.12)	61.95 ± 7.96 (59.51–64.39)	77.92 ± 8.26 (73.43–82.41)	<0.001*
BMI (kgr/cm²)	22.45 ± 3.80 (21.44–23.46)	21.88 ± 2.02 (21.26–22.49)	24.74 ± 7.03 (20.92–28.57)	<0.001*

Abbreviations: M, mean; SD, standard deviation; BMI: body mass index; * P values were obtained from an independent t-test. A p value < 0.05 was considered statistically significant with a 95% confidence interval (CI).

Pre- and post-test differences in empathy and positive and negative affect.

Regarding the Jefferson Scale of Empathy, TMMS-24 (all dimensions), and PANAS, both positive and negative dimensions, and pre-and post-intervention scores, the sample reported significant better scores on the Jefferson Scale of Empathy from 86.59 ± 6.31 to 90.11 ± 6.83 (P < 0.003) and TMMS-24/repair dimension from 26.77 ± 6.33 to 28.51 ± 6.62 (P < 0.014) from pre- to post-test scores. In the case of PANAS-20/negative dimension, the score showed a significant decrease from 22.44 ± 6.38 to 20.88 ± 7.00 (Table 2).

Table 2: **Pre-and Post-Intervention Score Differences in The Three Questionnaires in The Total Population.**

TEST NAME AND DIMENSION	Pre-test Mean ± SD (95%CI)	Post-test Mean ± SD (95%CI)	P-value
Jefferson Scale of Empathy	86.59 ± 6.31 (84.86–88.31)	90.11 ± 6.83 (88.24–91.97)	0.003**
TMMS-24: Attention Dimension	27.81 ± 6.19 (26.12 –29.50)	28.46 ± 6.10 (26.79–30.12)	0.264*
TMMS -24: Clarity Dimension	26.70 ± 5.73 (25.13–28.26)	27.59 ± 6.04 (25.94–29.24)	0.139**
TMMS -24: Repair Dimension	26.77 ± 6.33 (25.04–28.50)	28.51 ± 6.62 (26.71–30.32)	0.014**
PANAS-20: Positive Dimension	34.74 ± 6.79 (32.88–36.54)	36.90 ± 5.78 (35.32–38.48)	0.016**
PANAS-20: Negative Dimension	22.44 ± 6.38 (20.70–24.18)	20.88 ± 7.00 (18.97–22.79)	0.030*

Abbreviations: M, mean; SD, standard deviation; TMMS, Trait Meta-Mood Scale-24; PANAS-20, Positive and Negative Affect Schedule. * P values were obtained from a Wilcoxon signed-rank test; ** P values were obtained from a paired t-test. A p value < 0.05 was considered as statistically significant with a 95% confidence interval (CI).

Differences Between Sex in The Three Questionnaires

In females, there were significant pre- and post-intervention differences in all questionnaires, except the TMMS-24/repair dimension and PANAS-20/positive dimension with higher post-intervention scores (P < 0.05).

In males, there were no pre- and post-intervention differences in any questionnaire, except the Jefferson Scale of Empathy showing pre- and post-intervention scores of 86.76 ± 5.87 and 93.53 ± 6.74, respectively (P = 0.011), for PANAS-20/positive dimension showing higher scores, and for PANAS-20/negative dimension showing lower scores after both interventions (P < 0.05).

When differences between sex pre-and post-intervention were compared, we found that there were no differences based on sex pre-intervention (P > 0.05), indicating homogeneity. After intervention, we did not find any statistical differences between sex, except for female and male post-test scores on the Jefferson Scale of Empathy (89.02 ± 6.57 and 93.53 ± 6.74, respectively), showing higher empathy scores in males than in females as shown in Table 3.

Table 3: **Score Differences Between Sex of Three Questionnaires Pre- and Post-Intervention**

TEST NAME DIMENSION	FEMALE (n=41)			MALE (n=13)			P Value	
	PRETEST Mean ± SD (95%CI)	POSTTEST Mean ± SD (95%CI)	P value	PRETEST Mean ± SD (95%CI)	POSTTEST Mean ± SD (95%CI)	P value	PRETEST Female Vs Male	POSTTEST Female Vs Male
Jefferson Scale of Empathy	86.53 ± 6.51 (84.54–88.53)	89.02 ± 6.57 (87.01 91.03)	0.072**	86.76 ± 5.87 (83.57-9.96)	93.53 ± 6.74 (89.87-97.20)	<0.001**	0.950****	0.036****
TMMS-24: Attention Dimension	28.19 ± 6.99 (26.35–30.03)	28.58 ± 5.85 (26.79–30.37)	0.619**	26.61 ± 6.88 (22.88-30.34)	28.07 ± 7.07 (24.23–1.92)	0.163***	0.428*	0.927*
TMMS -24: Clarity Dimension	26.68 ± 5.87 (24.88–28.48)	27.60 ± 6.25 (25.69–29.52)	0.166**	26.76 ± 5.47 (23.79–29.74)	27.53 ± 5.56 (24.51–0.56)	0.584**	0.962****	0.970****
TMMS -24: Repair Dimension	25.85 ± 6.44 (23.88–27.82)	27.58 ± 6.38 (25.63–28.53)	0.017**	29.69 ± 5.17 (26.88–32.50)	31.46 ± 6.75 (27.79–35.13)	0.364**	0.056****	0.065****
PANAS-20: Positive Dimension	34.17 ± 7.14 (31.88–36.35)	36.60 ± 6.15 (34.72–38.49)0	0.033**	36.53 ± 5.37 (33.61–39.46)	37.84 ± 4.48 (35.40–40.28)	0.026***	0.277****	0.446*
PANAS-20: Negative Dimension	22.07 ± 6.42 (20.10–24.04)	21.21 ± 7.16 (19.02–23.41)	0.378***	23.61 ± 6.35 (20.15–27.07)	19.84 ± 6.63 (16.24–23.45)	0.031**	0.440*	0.542*

Abbreviations: M, mean; SD, standard deviation; TMMS, Trait Meta-Mood Scale-24; PANAS-20, Positive and Negative Affect Schedule. * P values are from U Mann-Whitney test; ** P values were obtained from a paired t-test; *** P values were obtained from the Wilcoxon signed-rank test; **** P values were obtained from an independent t-test. A p value < 0.05 was considered as statistically significant with a 95% CI.

Correlations Between Three Questionnaires and Age

The Pearson's product moment correlation analysis indicates no significant positive association or correlation between age and scores from the three questionnaires scores as shown in Table 4.

Table 4: **Association or Correlations Between the Three Questionnaires and Age.**

VARIABLES r Pearson (P value)	Age	Jefferson Scale of Empathy	TMMS-24: Attention Dimension	TMMS -24: Clarity Dimension	TMMS -24: Repair Dimension	PANAS-20: Positive Dimension	PANAS-20: Negative Dimension
Age	1						
Jefferson Scale of Empathy	-0.077 (0.578)	1					
TMMS-24: Attention Dimension	–0.229 (0.095)	–0.151 (0.275)	1				
TMMS -24: Clarity Dimension	0.247 (0.072)	0.029 (0.835)	0.109 (0.435)	1			
TMMS -24: Repair Dimension	–0.066 (0.636)	0.222 (0.107)	–0.222 (0.107)	0.414 (0.002)	1		
PANAS-20: Positive Dimension	-0.062 (0.658)	0.203 (0.142)	0.071 (0.611)	0.166 (0.229)	0.353 (0.009)	1	
PANAS-20: Negative Dimension	0.038 (0.786)	–0.062 (0.656)	0.375 (0.005)	–0.142 (0.304)	–0.037 (0.788)	0.024 (0.866)	1

Abbreviations: TMMS, Trait Meta-Mood Scale-24; PANAS-20, Positive and Negative Affect Schedule. * P values are from u Mann-Whitney test; ** P values were obtained from a paired t-test. A p value < 0.05 was considered statistically significant with a 95% CI.

The Pearson's product moment correlation analysis indicates a significant positive correlation between scores on the TMMS-24/repair dimension and TMMS-24/clarity dimension (r = 0.414; p = 0.002). This correlation analysis also showed a significant and positive correlation with PANAS-20/positive dimension and TMMS-24/repair dimension (r = 0.353; p = 0.009). Finally, we found a positive correlation between the PANAS-20/negative dimension and TMMS-24/attention dimension (r = 0.375; p = 0.005).

Analysis of The Contents of The Open-Ended Questions

After analyzing the content of student responses using the ATLAS. Ti system, we discovered common emotions and experiences. The main sentiment was the sense of feeling of being in the shoes of an elderly person (empathy) followed by a feeling of reward and discovery in the face of this vital experience. Students also manifested an experience of many sensory motor difficulties and limitations that led them to feelings of isolation. With respect to their experiences, they stated that all nursing students and registered nurses should undergo this enriching experience (Figure 2).

Figure 2**. digital mind map derived from the open-Ended Study Questions and Used to Illustrate Simulation-Based Feelings and Experiences.**

5. Discussion

The results of this manuscript confirmed that using a geriatric simulator can increase the level of empathy of nursing students. In addition, nursing students also experienced increases in some dimensions of emotional intelligence, reductions in levels of negative effects, and experienced positive effects based on the simulation experience.

These results support the need to implement this type of geriatric-related simulation experience in nursing curriculum. Based on their training, these nursing students should achieve higher levels of empathy than students in other disciplines (Petrucci, La Cerra, Aloisio, Montanari, & Lancia, 2016), but previous research has also shown that empathy levels decreased during their training period at the University (Ferri et al., 2017; Ward, Cody, Schaal, & Hojat, 2012). Therefore, it is critical to encourage nursing students to maintain or increase their empathy for the geriatric population during their nursing education.

Empathy is very closely related to emotional intelligence since it facilitates interpersonal relationships. Empathy allows an individual to be aware of emotions, understand them, manage them in oneself and others, and use them to facilitate better reasoning. Data that supports emotional intelligence as a reliable predictor of positive social relationships are available. People who score higher in emotional intelligence are better able to empathize with others, are more likely to help, cooperate more, and establish more satisfactory interpersonal relationships (Diaz, 2019; Ferri et al., 2017; Hurley, 2008). The relationship between empathy and the explicitness of affections is close (Karaoglu, Pekcan, & Yilmaz, 2013). Empathic affections are associated with moral principles in such a way that empathic affection can guide moral judgments, decision making processes, and individual actions (M. Hoffman, 1991; M. L. Hoffman, 1984).

Our data show lower baseline empathy levels, this data is according withother studies with nursing students (Hajibabaee, Farahani, Ameri, Salehi, & Hosseini, 2018) ; however, after the simulation experience, student empathy levels increased significantly in the TMMS-24/repair dimension and PANAS-20/positive dimension. The significant decrease of PANAS-20/negative dimension in total population is also noteworthy, especially in males.

When we studied the results that were grouped by sex, we found that empathy and the PANAS-20/negative dimension were shown to be significantly better in males than females. The TMMS-24 repair dimension was higher in females than in males, and the PANAS-20/positive dimension increased in both, females and males. The data concerning males were opposite to results from a study by Cunico, Sartori, Marognolli, and Meneghini (2012). These authors implemented a course to improve empathy in nursing students of the third year as done in our study. This study showed that this course was more effective for females (Cunico et al., 2012). These differences may originate from the use of another empathy measurement scale, and the type of experience that was not evaluated using a simulator model, only videos and seminars.

Previous research that examined the empathy of nursing students towards geriatric patients has found results consistent with the current study. For example, using an aging simulation game, Chen et al. (2015) found that nursing students experienced increased basal levels of empathy. Furthermore, additional research supports the use of simulation experiences to improve empathy towards older adults in healthcare students (Bearman, Palermo, Allen, & Williams, 2015; Kennedy, Fanning, & Thornton, 2004).

In our study, we also explored the experience from a more intimate point of view through the use of open-ended questions. In this case, the responses were all positive regarding the experience of “feeling of being in the shoes” of an older adult. There are not many rigorous qualitative studies that explore these types of simulation experiences in geriatric patients, but the existing ones conclude that through these simulation experiences, students can become more familiar with the way in which an older adult can feel and increases student understanding and empathy as using a simulator is a unique and recommendable experience (Dearing & Steadman, 2008; Henry, Ozier, & Johnson, 2011). These results are consistent with those that are found in the current study.

Despite maintaining the internal consistency of the study, some limitations arose.

First, it was a consecutive sample, and future randomized controlled trials studies should be conducted. It would also be useful, in view of a greater data solidity, to conduct an experimental and a qualitative study with methodological rigor. Also, the open-ended questions were not rigorously designed for qualitative research. Future research should use a rigorous qualitative approach to further probe how simulations could be used to increase and maintain empathy for geriatric patients among nursing students.

6.Conclusion.

The implementation of geriatric simulation activities and experiences can increase nursing students' empathy, emotional intelligence, and affect. These findings support the need to implement these types of experiences in nursing training programs.

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