

Evaluation of empathy among undergraduate nursing students: a three-year longitudinal study

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Abstract. *Background and aim:* An empathic approach is considered fundamental in order to ensure the identification of patient needs and to provide the appropriate care, although the studies on the development of empathic attitude during nursing course reported conflicting results. Different empathic tendencies have been observed in the two genders: many studies showed greater empathy in females. *Methods:* To assess empathy level of students enrolled in the academic year 2015/16 at an Italian University nursing course, the Balanced Emotional Empathy Scale (BEES) was administered at the start of Year 1 (n=118), at the mid-point of Year 2 (n=99) and at the end of Year 3 (n=67). Data were statistically analyzed. *Results:* Cronbach's values were satisfactory (0.87 at Year 1, 0.89 at Year 2, 0.79 at Year 3), confirming the good internal reliability of BEES. The nursing students obtained a total BEES mean \pm SD score of 37.0 ± 19.5 at Year 1, 33.5 ± 22.6 at Year 2 and 35.4 ± 16 at Year 3, without any statistically significant difference among the three years. The BEES mean scores reported by males were lower in comparison with females during the three years of the course, although, at the end of the third year, males showed a significant increase at the "Emotional spread responsiveness" dimension of the scale. *Conclusions:* The study suggests that empathy can be maintained at good levels during the nursing education especially if nursing teaching and internship are focused on this topic, acting up the innate aptitude of each student. (www.actabiomedica.it)

Key words: empathy, nursing education, undergraduate nursing students, balanced emotional empathy scale, gender differences

Introduction

In nursing field, an empathic approach is considered fundamental for the development of the therapeutic relationship (1, 2), to ensure the identification of patient needs and to provide appropriate care (3). High capacity for empathy is required to fully understand patients' feelings, opinions and conditions (4). Good empathetic capacity in nurses has been linked to greater patient well-being and satisfaction, better patient compliance and decreased errors, complications

and treatment period (5-12). A lack of empathy, on the other hand, may interfere negatively with diagnosis, treatment and care (13). Although empathic skill is a mutually beneficial element in the relationship between nurse and patient (6, 7), according to some researchers nursing students demonstrate low to moderate levels of empathy (7, 14-18).

However, despite the increasing recognition of the impact of empathy on patient outcomes, there is compelling research indicating that contemporary healthcare is characterized by a generalised lack of

empathy and patients frequently report the lack of empathy in nurse-patient relationship (19, 20). Many authors highlight that a lack of empathy in our health systems may have measurable detrimental effects on patient care, representing, at the same time, a risk for the health of professionals (21).

For example, a review of cases presented to the nurses' disciplinary tribunal in New South Wales (Australia) suggests that the majority of complaints against nurses in this jurisdiction are the result of callousness or lack of empathy (3). In addition, empathy is associated with lower levels of burnout among nurses and nursing students (17, 22, 23) and with a higher professional job satisfaction (13, 24).

The ability to empathize can be influenced by many factors, such as gender, age, job training and experience (17, 25, 26). Regarding gender differences in empathy, many studies showed that women demonstrate greater empathic tendencies in comparison to men (14, 27-29). An Italian longitudinal study, which assessed the efficacy of a specific training course for improving empathy skills in nursing students, highlighted that the training was more effective for the female students than for their male counterparts (30). Another Italian study revealed that the impact of gender on empathetic tendency increased during the nursing training process, as demonstrated by the higher Balanced Emotional Empathy Scale (BEES) scores of female students with respect to males (16). In opposition, another Italian research, which investigated the involvement of expert patients in developing innate capacity to empathize among nursing students, highlighted that all male students, who, at the baseline, presented significantly lower levels of empathy in comparison with females, increased their empathy tendency by the end of nursing program, as showed by BEES scores (31).

The development of empathic tendency during the nursing course has been studied by many researchers, who report conflicting results. For example, Australian cross-sectional studies (29, 32) recorded no statistically significant differences of empathy among students in different years of the course. Three transversal studies revealed a "decline" in empathy among students at the end of the nursing course compared with those at the beginning of study (28, 33, 34). Similarly, Ward et al. (35) observed a decrease in empathy, using the

Jefferson Scale of Empathy, within the same cohort of students at the end of the course in comparison with its start. Similar findings were recorded among medical students and students of other health professions (33, 36-39). A recent comparative cross-sectional study highlighted an increase in empathy among nursing students in their sixth semester in comparison with both students attending their second semester and master's nursing course, indicating a positive effect on empathy development induced by basic nursing education but not by post-graduate training (40).

The literature on empathy levels in nursing students is represented by cross-sectional research and small samples of participants with inconsistent results. Many authors suggest implementation of longitudinal studies in order to measure the development of empathy over the nursing course and analyse the effect of communication skills training on empathy among nursing students (17, 28).

Aims

- To longitudinally evaluate the impact of nursing education on self-reported emotional empathy among undergraduate students in a 3-year nursing course.
- To assess the gender difference of self-reported emotional empathy among students in the 3-year nursing course.

Method

Study design

This study is a longitudinal research, carried out among nursing students enrolled in the Modena Nursing Degree Programme at the University of Modena and Reggio Emilia, Italy.

Procedures

We scheduled three subsequent day-surveys to evaluate empathy level among students of the three years of the nursing course: at the start of Year 1, at the mid-point of Year 2 and at the end of Year 3.

Participants

Our convenience sample was composed of all students enrolled at the nursing course in the academic year 2015/16 (n=142): 118 students participated in the first evaluation (Year 1) and represented the initial sample; 99 of this initial sample participated in the second assessment (Year 2) and only 67 of the initial sample participated in the third assessment (Year 3).

Measures

The chosen instrument to assess empathy levels was the BEES, which has already been used in studies conducted on other samples of Italian nursing students (16, 17, 30). BEES is a self-report instrument, validated in Italian (41,42), which includes 30 items about which participants express their level of agreement/disagreement on a seven-point Likert scale. The scale is designed with negative and positive answers to avoid social desirability. The validation of BEES, Italian version, highlighted five dimensions that deal with the following areas of emotional empathy (43):

- D1 'Impermeability to the emotional feelings of others', 7 items referring to situations in which the respondent is unwilling to become emotionally involved in another person's feelings (e.g., "*I am not affected easily by the strong emotions of people around me*");
- D2 'Susceptibility to the emotional feelings of others', 6 items tapping the respondent's willingness to become involved in others' feelings and share their suffering (e.g., "*I get a strong urge to help when I see someone in distress*");
- D3 'Emotional spread responsiveness', 7 items referring to the respondent's tendency to identify with characters in films, plays, stories, etc. (e.g., "*I don't get caught up easily in the emotions generated by a crowd*");
- D4 'Susceptibility to emotional involvement with people nearby', 6 items tapping the respondent's feelings experienced in the presence of others who are suffering (e.g., "*It upsets me to see someone being mistreated*");
- D5 'Tendency to avoid emotional involvement with fragile people', 4 items reflecting the re-

spondent's tendency to avoid becoming emotionally involved with fragile or vulnerable people like children or the elderly (e.g., "*Helpless old people don't have much of an emotional effect on me*").

The Cronbach's α coefficient for all 30 items in the present study was 0.87 at Year 1, 0.89 at Year 2 and 0.79 at Year 3, similarly to previous research (42, 43). The total BEES score indicates high levels of empathy if it is greater than the mean value of 32 ± 18 (SD).

Another questionnaire for collecting student information (gender, age, course year attended and the date of BEES completion) was concomitantly administered. BEES and the questionnaire were distributed in the classroom at the end of a lesson, giving students the time necessary to complete them. Each student was asked to insert an identification code, that only he/she would recognise, in order to allow the matching of each student's data among the three surveys and, at the same time, the anonymity of all information collected.

The principal investigator explained to students the purpose and methods of this study. Participants' anonymity and confidentiality as well as students' decision to voluntarily participate or not participate in this study were respected. All students were assured that neither the information obtained through administration of the BEES nor a failure to participate in the study would have any impact on their course of study.

Data analysis

The statistical analysis was performed using the software Stata 14 (StataCorp, College Station, TX, USA). Continuous variables were reported as arithmetic mean and standard deviations (SD). A total BEES score (reflecting emotional empathy) and 5-dimension BEES scores were computed, in accordance with the indications of the authors who adapted and validated the BEES Italian version (41, 42). The ANOVA was applied for comparing the BEES mean scores of all students at Year 1, Year 2 and Year 3 and the gender scores of the three years of nursing course. The independent samples *t*-test was chosen to compare total score and 5-dimension BEES mean scores between the two genders. The statistical significance was attained if $p < 0.05$.

Results

The initial sample was represented by 118 students (males=25 and females=93), who agreed to participate in this study and completed the BEES at Year 1. They represented 83% of all students enrolled in the first year of the nursing course (n=142 students). The imbalance between males and females reflected the gender distribution of all nursing students (21% males and 79% females). The mean age of students at Year 1 was 20.2 ± 2.6 (SD) years. From the initial sample, 99 students (25% males and 75% females), who had previously completed the questionnaire, participated in the second BEES administration at Year 2. The mean age of students at Year 2 was 21.2 ± 2.8 (SD) years. In the final survey, only 67 students (19% males and 81% females), who had previously completed the questionnaire at both Year 1 and Year 2, agreed to participate. The mean age of students at Year 3 was 22.1 ± 2.2 (SD) years.

Cronbach's α values were satisfactory (respectively 0.87 at Year 1, 0.89 at Year 2 and 0.79 at Year 3), confirming the good internal reliability of BEES.

The empathic tendency

The nursing students obtained a total BEES mean score of 37.0 ± 19.5 SD at Year 1, 33.5 ± 22.6 SD at Year 2 and 35.4 ± 16 SD at Year 3, without any statistically significant difference among the three years, as shown in Table 1. The mean scores of BEES dimensions, as reported in Table 1, showed a statistically significant difference only at D3 "Emotional spread responsiveness" among the three years ($F=4.66$; $p < 0.01$).

The gender score difference

As show in Figure 1, the total BEES mean scores reported by male students were lower in comparison with females in all three surveys: 17.4 vs 42.7 ($t=6.40$; $p < 0.0001$) at Year 1 (Table 2), 15 vs 40 ($t=5.48$; $p < 0.0001$) at Year 2 (Table 3); 26 vs 37.6 ($t=2.43$; $p < 0.05$) at Year 3 (Table 4). In BEES dimensions, male students obtained statistically significantly lower scores in comparison with females at Year 1 (Table 2) and Year 2 (Table 3), but not at Year 3, when male students obtained scores not statistically significantly

Table 1. Dimensions and total scores of BEES at the 3 surveys

BEES dimension	Year 1	Year 2	Year 3	Statistical test
	Mean (SD)	Mean (SD)	Mean (SD)	ANOVA p-value
D1: Impermeability to the emotional feelings of others	-7.5 (6.0)	-6.0 (7.0)	-7.5 (6.0)	F = 1.81 p = 0.17
D2: Susceptibility to the emotional feelings of others	10.7 (4.0)	10.6 (4.7)	11.2 (4.1)	F = 0.45 p = 0.64
D3: Emotional spread responsiveness	-0.60 (5.3)	-1.5 (8.9)	-2.6 (5.3)	F = 4.66 p < 0.01
D4: Susceptibility to emotional involvement with people nearby	10.9 (4.9)	10.9 (4.9)	11.2 (4.7)	F = 0.08 p = 0.92
D5: Tendency to avoid emotional involvement with fragile people	-3.3 (2.6)	-2.4 (3.0)	-2.9 (3.8)	F = 2.15 p = 0.12
Total score	37.0 (19.5)	33.5 (22.6)	35.4 (16.0)	F = 0.86 p = 0.42

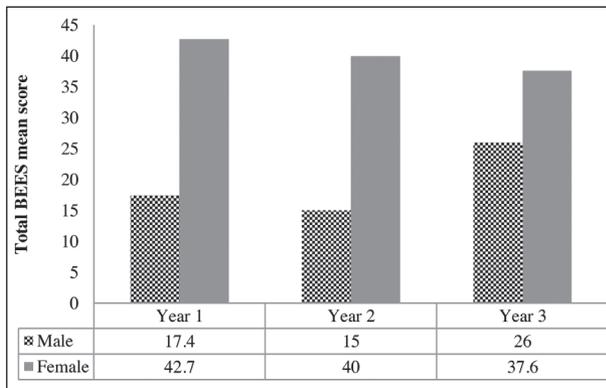


Figure 1. Total BEES mean scores in male and female students at the 3 surveys

different from females at the dimensions ‘Emotional spread responsiveness’, ‘Susceptibility to emotional involvement with people nearby’, and ‘Tendency to avoid emotional involvement with fragile people’ (Table 4).

The total BEES mean scores among male students increased from the first to the third year and the BEES dimension “Emotional spread responsiveness” reported a statistically significant difference over the three year course (Table 5).

Differently, among female students, the total BEES mean scores slightly decreased over the three year course (Table 6).

Table 2. Dimensions and total scores of BEES at Year 1, divided by gender

BEES dimension	Year 1 Students n=118		p-value
	Male (n=25) Mean (SD)	Female (n=93) Mean (SD)	
D1: Impermeability to the emotional feelings of others	-3.0 (5.3)	-8.7 (5.5)	p<0.001
D2: Susceptibility to the emotional feelings of others	7.4 (3.6)	11.6 (3.7)	p<0.001
D3: Emotional spread responsiveness	3.2 (4.5)	-1.7 (5.0)	p<0.001
D4: Susceptibility to emotional involvement with people nearby	8.0 (5.5)	11.8 (4.6)	p<0.01
D5: Tendency to avoid emotional involvement with fragile people	-1.9 (2.7)	-3.7 (2.4)	p<0.01
Total score	17.4 (17.5)	42.7 (15.9)	p<0.0001

Table 3. Dimensions and total scores of BEES at Year 2, divided by gender

BEES dimension	Year 2 Students n=99		p-value
	Male (n=25) Mean (SD)	Female (n=74) Mean (SD)	
D1: Impermeability to the emotional feelings of others	-2.3 (6.4)	-7.2 (6.8)	p<0.01
D2: Susceptibility to the emotional feelings of others	7.6 (5.8)	11.6 (3.8)	p<0.01
D3: Emotional spread responsiveness	3.1 (5.5)	-1.2 (5.9)	p<0.01
D4: Susceptibility to emotional involvement with people nearby	8.3 (4.2)	11.8 (4.8)	p<0.01
D5: Tendency to avoid emotional involvement with fragile people	-1.5 (3.7)	-2.7 (2.6)	p<0.01
Total score	15.0 (20.3)	40.0 (20.0)	p<0.0001

Table 4. Dimensions and total scores of BEES at Year 3, divided by gender

BEES dimension	Year 3 Students n=67		p-value
	Male (n=13) Mean (SD)	Female (n=54) Mean (SD)	
D1: Impermeability to the emotional feelings of others	-3.9 (5.9)	-8.4 (5.7)	p<0.05
D2: Susceptibility to the emotional feelings of others	8.4 (4.3)	11.9 (3.8)	p<0.01
D3: Emotional spread responsiveness	-1.2 (4.8)	-2.9 (5.4)	p = 0.29
D4: Susceptibility to emotional involvement with people nearby	9.8 (5.2)	11.6 (4.5)	p = 0.22
D5: Tendency to avoid emotional involvement with fragile people	-2.9 (3.2)	-2.9 (3.9)	p = 0.98
Total score	26.0 (11.9)	37.6 (16.2)	p<0.05

Table 5. Dimensions and total scores of BEES at the 3 surveys, among males

BEES dimension	Year 1	Year 2	Year 3	Statistical test ANOVA p-value
	Mean (SD)	Mean (SD)	Mean (SD)	
D1: Impermeability to the emotional feelings of others	-3.0 (5.3)	-2.3 (6.4)	-3.9 (5.9)	F = 0.32 p = 0.73
D2: Susceptibility to the emotional feelings of others	7.4 (3.6)	7.6 (5.8)	8.4 (4.3)	F = 0.19 p = 0.83
D3: Emotional spread responsiveness	3.2 (4.5)	3.1 (5.5)	-1.2 (4.8)	F = 3.80 p<0.05
D4: Susceptibility to emotional involvement with people nearby	8.0 (5.5)	8.3 (4.2)	9.8 (5.2)	F = 0.61 p = 0.55
D5: Tendency to avoid emotional involvement with fragile people	-1.9 (2.7)	-1.5 (3.7)	-2.9 (3.2)	F = 0.80 p = 0.46
Total score	17.4 (17.5)	15.0 (20.3)	26.0 (11.9)	F = 1.69 p = 0.19

Discussion

This research, focused on empathy among nursing students, highlights a high empathy aptitude level at the start of the nursing course, which remains unchanged during the course, as evidenced by the stability of BEES scores during the 3 years.

Our result indicates a higher level of empathy if

compared to other recent Italian studies conducted among nursing students (16, 30). In this regard, the literature put in evidence that the undergraduate nursing students generally show a significantly higher mean score of empathy than the students attending other undergraduate courses (12, 33, 44). According to Petrucci et al. (12), this could be explained by the fact that students who choose to attend the nursing course

Table 6. Dimensions and total scores of BEES at the 3 surveys, among females

BEES dimension	Year 1	Year 2	Year 3	Statistical test ANOVA p-value
	Mean (SD)	Mean (SD)	Mean (SD)	
D1: Impermeability to the emotional feelings of others	-8.7 (5.5)	-7.2 (6.8)	-8.4 (5.7)	F = 1.05 p = 0.35
D2: Susceptibility to the emotional feelings of others	11.6 (3.7)	11.6 (3.8)	11.9 (3.8)	F = 0.16 p = 0.85
D3: Emotional spread responsiveness	-1.7 (5.0)	-1.2 (5.9)	-2.9 (5.4)	F = 1.97 p = 0.14
D4: Susceptibility to emotional involvement with people nearby	11.8 (4.6)	11.8 (4.8)	11.6 (4.5)	F = 0.08 p = 0.93
D5: Tendency to avoid emotional involvement with fragile people	-3.7 (2.4)	-2.7 (2.6)	-2.9 (3.9)	F = 2.15 p = 0.12
Total score	42.7 (15.9)	40.0 (20.0)	37.6 (16.2)	F = 1.08 p = 0.34

probably have a particular aptitude or motivation for helping relationships, which represents a key aspect of the nursing profession (45, 46).

As stated by Artioli et al. (47), some specific skills (e.g. To know the basics of effective communication, To use communication facilitation strategies, To know how to put in place the active listening to the patient and his point of view and understanding of 'being' in a difficult relationship, using empathy and reflective thinking) can help nurses deeply understand what patients feel and live, favouring personalized adaptation processes (47). Therefore, educational nursing care programs should improve students' ability to empathically communicate both with the patient and the inter-professional team (48).

The comparison of our results with others can be difficult due to the limited availability of longitudinal research on empathy in nursing students. At the same time, the comparison can be unreliable due to the difference in educational contexts where the few studies have been conducted.

Although the preliminary results of this research suggest a slight decline in empathic tendency among nursing students between the beginning and the mid-point of their undergraduate education (49),

the present study does show any change in empathic tendency with the progress of nursing education. This result overlaps the observations of unchanged empathy reported by Williams et al. (29, 44) and McKenna et al. (32) in Australian nursing schools, but it is different from other study findings (28, 33, 35, 50). In fact, in many different health-science disciplines, students show a decrease in empathy scores from the beginning to the end of school due to their probable defence mechanism against close engagement in patient suffering (36, 38).

The present study suggests a gender difference in empathy aptitude and tendency, showing that female students report statistically significant higher mean BEES scores in comparison with males. This gender difference was also found in the standard samples of the scale (42).

This result is in line with most studies which highlight gender difference in empathy. In particular, some studies report that such sex differences in humans can be driven by biological roots, which humans share with other animals (51), especially primates and rodents, whose offspring depend on the mother for a prolonged postnatal period (52). The empathic ability is not only confined within the mother-infant relation-

ship, but it fosters to create complex social networks, sustained and maintained by capacity of each individual to emotionally respond to signals of others in various contexts. The result of this study overlaps the difference in empathy reported by many studies between the two genders: females, compared to men, show higher emotional empathy, with mirroring responses to others' pain, as well as better emotion recognition abilities, whereas males show greater recruitment of areas involved in cognitive control and cognition (51).

In this study, the gender difference, pronounced at the start, showed a tendency to decrease at the end of the nursing course, when male students improved in their empathy capacities, reporting significantly higher scores in one BEES dimension, "Emotional spread responsiveness". The improved empathic capacities reported by our students at the end of nursing course confirm previous data obtained in the same educational context (31), indicating a consistent positive impact of training on empathic attitudes. Moreover, this results suggests that the empathic dimension of "Emotional spread responsiveness" can be taught and learned through the reinforcement of the tendency to identify oneself with characters in films, plays, stories, etc (53). In fact, films and narrative workshops were included in our nursing programs during our students' attendance period. In accordance with most study result (14, 16, 17, 27-30, 44), females consistently recorded higher empathy scores, probably due to greater emotional resonance to others' feelings and more sensitivity to interpersonal stimuli, maybe due to biological and social conditioning. According to Williams et al. (29), the traditional role of women as caregivers may also explain the variation in empathy level between the two genders.

Another study, conducted in the same University course in 2015 (17), highlighted that both male and female students attending the third year of the nursing course showed lower mean BEES scores compared to students of this second study. This different result can be justified by a recent modification of the education program in the nursing course, represented by the introduction of training films followed by reflective debriefing sessions focused on empathy in care.

Limits and advantages

This study has some limits. It was conducted in only one Italian University, so its results cannot be generalised. The BEES is a self-reported measure of empathy and its use is restricted to few studies, although it is easy and quick to administer. Nevertheless, this study is one of few longitudinal studies, and certainly is the only Italian study on student empathy. Our findings provide important information that could help to better understand the potential of students to develop and maintain an empathic attitude towards patients during the nursing course.

Conclusions

This study suggests that empathy can be enhanced during the nursing education, especially if nursing teaching and internship are focused on this topic, acting up the innate aptitude of each individual. In fact, the students of our sample, especially males, showed an improvement and not a decline of their empathic capacities at the end of the nursing course. Further longitudinal and multicentre research is needed to confirm the efficacy of nursing education in improving empathy in students.

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Ethical considerations: The study was authorized by the Director of the Nursing Degree Programme and was conducted in accordance with the Ethical Principles for Medical Research Involving Human Subjects-the Declaration of Helsinki.

Conflict of interest: Each author declares that he or she has no commercial associations (e.g. consultancies, stock ownership, equity interest, patent/licensing arrangement etc.) that might pose a conflict of interest in connection with the submitted article

References

1. Reynolds WJ, Scott B, Jessiman WC. Empathy has not been measured in clients' terms or effectively taught: a review of the literature. *J Adv Nurs* 1999; 30: 1177-85.

2. McCabe C. Nurse-patient communication: an exploration of patients' experiences. *J Clin Nurs* 2004; 13: 41-9.
3. Doyle K, Hungerford C, Cruickshank M. Reviewing tribunal cases and nurse behaviour: putting empathy back into nurse education with Bloom's taxonomy. *Nurse Educ Today* 2014; 34: 1069-73.
4. Hemsley B, Sigafos J, Balandin S, et al. Nursing the patient with severe communication impairment. *J Adv Nurs* 2001; 35: 827-35.
5. La Monica EL, Wolf RM, Madea AR, Oberst MT. Empathy and nursing care outcomes. *Sch Inq Nurs Pract* 1987; 1: 197-213.
6. Alligood MR. Empathy: the importance of recognizing two types. *J Psychosoc Nurs Ment Health Serv* 1992; 30: 14-7.
7. Reynolds WJ, Scott B. Do nurses and other professional helpers normally display much empathy? *J Adv Nurs* 2000; 31: 226-34.
8. Yu J, Kirk M. Measurement of empathy in nursing research: systematic review. *J Adv Nurs* 2008; 64: 440-54.
9. Del Canale S, Louis DZ, Maio V, et al. The relationship between physician empathy and disease complications: an empirical study of primary care physicians and their diabetic patients in Parma, Italy. *Acad Med* 2012; 87: 1243-9.
10. Gleichgerricht E, Decety J. Empathy in clinical practice: how individual dispositions, gender, and experience moderate empathic concern, burnout, and emotional distress in physicians. *PLoS One* 2013; 8: e61526.
11. Hojat M. Empathy in patient care: antecedents, development, measurement, and outcomes. New York: Springer; 2016.
12. Petrucci C, La Cerra C, Aloisio F, Montanari P, Lancia L. Empathy in health professional students: a comparative cross-sectional study. *Nurse Educ Today* 2016; 41: 1-5.
13. Ozcan CT, Oflaz F, Sutcu Cicek H. Empathy: the effects of undergraduate nursing education in Turkey. *Int Nurs Rev* 2010; 57: 493-9.
14. Fields SK, Mahan P, Tillman P, Harris J, Maxwell K, Hojat M. Measuring empathy in healthcare profession students using the Jefferson Scale of Physician Empathy: health provider - student version. *J Interprof Care* 2011; 25: 287-93.
15. Ouzouni C, Nakakis K. An exploratory study of student nurses' empathy. *J Health Sci* 2012; 6: 534-52.
16. Bidone S, Beneventi M, Larghero E, Di Pietrantonio C. La tendenza empatica negli studenti del corso di laurea in infermieristica: risultati di uno studio osservazionale. [Empathic tendency in nursing students: results of an observational study]. *Riv Inf* 2014; 51: e8-e13.
17. Ferri P, Guerra E, Marcheselli L, Cunico L, Di Lorenzo R. Empathy and burnout: an analytic cross-sectional study among nurses and nursing students. *Acta Biomed* 2015; 86 (Suppl 2): 104-15.
18. Kahrman I, Nural N, Arslan U, Topbas M, Can G, Kasim S. The effect of empathy training on the empathic skills of nurses. *Iran Red Crescent Med J* 2016; 18: e24847.
19. Williams J, Stickley T. Empathy and nurse education. *Nurse Educ Today* 2010; 30: 752-5.
20. Lown BA, Rosen J, Marttila J. An agenda for improving compassionate care: a survey shows about half of patients say such care is missing. *Health Aff (Millwood)* 2011; 30: 1772-8.
21. Trzeciak S, Roberts BW, Mazzarelli AJ. Compassionomics: hypothesis and experimental approach. *Med Hypotheses* 2017; 107: 92-7.
22. Aström S, Nilsson M, Norberg A, Winblad B. Empathy, experience of burnout and attitudes towards demented patients among nursing staff in geriatric care. *J Adv Nurs* 1990; 15: 1236-44.
23. Wilczek-Rużyczka E. Empathy vs. professional burnout in health care professionals. *J US China Med Sci* 2011; 8: 526-32.
24. Norfolk T, Birdi K, Walsh D. The role of empathy in establishing rapport in the consultation: a new model. *Med Educ* 2007; 41: 690-7.
25. Adriaansen M, Van Achterberg T, Borm G. The usefulness of the Staff-Patient Interaction Response Scale for palliative care nursing for measuring the empathetic capacity of nursing students. *J Prof Nurs* 2008; 24: 315-23.
26. Di Lorenzo R, Venturelli G, Spiga G, Ferri P. Emotional intelligence, empathy and alexithymia: a cross-sectional survey on emotional competence in a group of nursing students. *Acta Biomed* 2019; 90 (Suppl 4): 32-43.
27. Jolliffe D, Farrington DP. Examining the relationship between low empathy and bullying. *Aggressive Behav* 2006; 32: 540-50.
28. Galán González-Serna JM, Romero Serrano R, Morillo Martín MS, Alarcón Fernández JM. Descenso de empatía en estudiantes de enfermería y análisis de posibles factores implicados. *Rev Psicol Educ* 2014; 20: 53-60.
29. Williams B, Brown T, McKenna L, et al. Empathy levels among health professional students: a cross-sectional study at two universities in Australia. *Adv Med Educ Pract* 2014; 5: 107-13.
30. Cunico L, Sartori R, Marognoli O, Meneghini AM. Developing empathy in nursing students: a cohort longitudinal study. *J Clin Nurs* 2012; 21: 2016-25.
31. Ferri P, Rovesti S, Padula MS, D'Amico R, Di Lorenzo R. Effect of expert-patient teaching on empathy in nursing students: a randomized controlled trial. *Psychol Res Behav Manag* 2019; 12: 457-67.
32. McKenna L, Boyle M, Brown T, et al. Levels of empathy in undergraduate nursing students. *Int J Nurs Pract* 2012; 18: 246-51.
33. Nunes P, Williams S, Sa B, Stevenson K. A study of empathy decline in students from five health disciplines during their first year of training. *Int J Med Educ* 2011; 2: 12-17.
34. Wilson SE, Prescott J, Becket G. Empathy levels in first- and third-year students in health and non-health disciplines. *Am J Pharm Educ* 2012; 76 (Article 24).
35. Ward J, Cody J, Schaal M, Hojat M. The empathy enigma: an empirical study of decline in empathy among undergraduate nursing students. *J Prof Nurs* 2012; 28: 34-40.
36. Sherman JJ, Cramer A. Measurement of changes in empathy during dental school. *J Dent Educ* 2005; 69: 338-45.

37. Hojat M, Vergare MJ, Maxwell K, et al. The devil is in the third year: a longitudinal study of erosion of empathy in medical school. *Acad Med* 2009; 84: 1182-91.
38. Neumann M, Edelhäuser F, Tauschel D, et al. Empathy decline and its reasons: a systematic review of studies with medical students and residents. *Acad Med* 2011; 86: 996-1009.
39. Papageorgiou A, Miles S, Fromage M. Does medical students' empathy change during their 5-year MBBS degree? *Educ Health (Abingdon)* 2018; 31: 142-7.
40. Håkansson Eklund J, Holmström IK, Ollén Lindqvist A, Sundler AJ, Hochwälder J, Marmstål Hammar L. Empathy levels among nursing students: a comparative cross-sectional study. *Nurs Open* 2019; 6: 983-9.
41. Meneghini AM, Sartori R, Cunico L. Adattamento italiano della Balanced Emotional Empathy Scale (BEES) di Albert Mehrabian. [Italian adaptation of the Balanced Emotional Empathy Scale (BEES) by Albert Mehrabian]. Firenze: Giunti Organizzazioni Speciali; 2016.
42. Meneghini AM, Sartori R, Cunico L. Adattamento e validazione su campione italiano della Balanced Emotional Empathy Scale di A. Mehrabian. [Adaptation and validation on an Italian sample of the Balanced Emotional Empathy Scale by A. Mehrabian]. *Ric Psicol* 2006; 29: 123-52.
43. Meneghini AM, Romaioli D, Nencini A, et al. Validity and reliability of the Caregiving System Scale in the Italian context. *Swiss J Psychol* 2015; 74: 129-39.
44. Williams B, Brown T, Boyle M, et al. Levels of empathy in undergraduate emergency health, nursing, and midwifery students: a longitudinal study. *Adv Med Educ Pract* 2014; 5: 299-306.
45. Ferri P, Laffi P, Rovesti S, Artioli G, Di Lorenzo R, Magnani D. Motivational factors for choosing the degree course in nursing: a focus group study with nursing students. *Acta Biomed* 2016; 87 (Suppl 2): 19-27.
46. Magnani D, Di Lorenzo R, Bari A, Pozzi S, Del Giovane C, Ferri P. The undergraduate nursing student evaluation of clinical learning environment: an Italian survey. *Prof Inferm* 2014; 67: 55-61.
47. Artioli G, Cosentino C, Taffurelli C, Ferri P, Foà C. The narrative interview for the assessment of the assisted person: structure, method and data analysis. *Acta Biomed* 2019; 90 (Suppl 6): 7-16.
48. Artioli G, Cosentino C, Foà C, Sarli L. Inter-Professionalism in Health Care Post-graduate specialization: an innovative Laboratory. *Acta Biomed* 2019; 90 (Suppl 4): 8-16.
49. Ferri P, Rovesti S, Panzera N, Marcheselli L, Bari A, Di Lorenzo R. Empathic attitudes among nursing students: a preliminary study. *Acta Biomed* 2017; 88 (Suppl 3): 22-30.
50. Ozcan CT, Öksüz E, Oflaz F. Improving empathy in nursing students: a comparative longitudinal study of two curricula. *J Korean Acad Nurs* 2018; 48: 497-505.
51. Christov-Moore L, Simpson EA, Coudé G, Grigaityte K, Iacoboni M, Ferrari PF. Empathy: gender effects in brain and behavior. *Neurosci Biobehav Rev* 2014; 46: 604-27.
52. Preston SD, de Waal FB. Empathy: its ultimate and proximate bases. *Behav Brain Sci* 2002; 25:1-20.
53. Hojat M, Axelrod D, Spandorfer J, Mangione S. Enhancing and sustaining empathy in medical students. *Med Teach* 2013; 35: 996-1001.

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