

Impact of a Clinical Simulation Program on Communication Skills, Psychological Well-being and Self-Perception of Personality Traits in Nursing Students.

Impacto de un Programa de Simulación Clínica en Habilidades Comunicativas, Bienestar Psicológico y Auto percepción de Rasgos de Personalidad en Estudiantes de Enfermería.

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Summary

Introduction: Communication skills are essential in clinical practice. Clinical simulation has empirical support as a training strategy, but its impact on psychological well-being and personality traits in nursing students has been scarcely studied. This study analyzed the effect of a clinical simulation program on communication skills, emotional management, psychological well-being, and personality traits in nursing students. **Methodology:** A pre-post quasi-experimental study without a control group was conducted with 101 second-year nursing students (Pontifical University of Salamanca). Ad hoc measures of self-perception, the Health Professionals Communication Skills Scale (EHC-PS), the Ryff Scale, and the Big Five Personality Inventories in Spanish were administered. The intervention included 11 clinical simulation sessions within a required course. The Wilcoxon signed-rank test with Holm-Bonferroni correction was used for statistical analysis. **Results:** Self-perception of communication and emotional management improved significantly ($p < .001$). In the validated instruments, the following improved: total EHC-PS score ($r = .308$), Social Skills ($r = .275$), Self-Acceptance ($r = .374$), Total Psychological Well-being ($r = .317$), self-perceived Emotional Stability ($r = .496$), Agreeableness ($r = .449$), Extraversion ($r = .305$), and Conscientiousness ($r = .263$). Respect did not change. **Discussion:** The effects were greater in self-perception than in standardized instruments, suggesting more pronounced changes in confidence than in specific skills. The lack of a control group limits causal interpretation. **Conclusions:** Clinical simulation showed potential for improving communication skills, well-being, and self-perceived personality, although controlled studies are needed.

Keywords: clinical simulation, communication skills, nursing students, psychological well-being, personality, emotional management, nursing education.

Resumen

Introducción: Las habilidades de comunicación son esenciales en la práctica clínica. La simulación clínica cuenta con respaldo empírico como estrategia formativa, pero su impacto sobre el bienestar psicológico y los rasgos de personalidad en estudiantes de enfermería apenas ha sido estudiado. El presente estudio analizó el efecto de un programa de simulación clínica sobre las habilidades de comunicación, la gestión emocional, el bienestar psicológico y los rasgos de personalidad en estudiantes de enfermería. **Metodología:** Estudio cuasiexperimental pre-post sin grupo control con 101 estudiantes de segundo curso de Enfermería (Universidad Pontificia de Salamanca). Se administraron medidas ad hoc de autopercepción, la Escala de Habilidades de Comunicación en Profesionales de la Salud (EHC-PS), la Escala de Ryff y la Escala de los Cinco Grandes en español. La intervención incluyó 11 sesiones de simulación clínica dentro de una asignatura obligatoria. Se empleó la prueba de Wilcoxon con corrección de Holm-Bonferroni. **Resultados:** La autopercepción de comunicación y gestión emocional mejoró con efectos grandes ($p < .001$). En los instrumentos validados mejoraron el total de la EHC-PS ($r = .308$), Habilidades Sociales ($r = .275$), Autoaceptación ($r = .374$), Bienestar Psicológico total ($r = .317$), autopercepción de Estabilidad Emocional ($r = .496$), Agradabilidad ($r = .449$), Extroversión ($r = .305$) y Responsabilidad ($r = .263$). Respeto no cambió. **Discusión:** Los efectos fueron mayores en autopercepción que en instrumentos estandarizados, lo que sugiere cambios más marcados en la confianza que en habilidades específicas. La falta de grupo control limita la interpretación causal. **Conclusiones:** La simulación clínica mostró potencial para mejorar competencias comunicativas, bienestar y autopercepción de personalidad, aunque son necesarios estudios controlados.

Palabras clave: simulación clínica, habilidades de comunicación, estudiantes de enfermería, bienestar psicológico, personalidad, gestión emocional, educación en enfermería.

1. Introduction

Communication between healthcare professionals and patients is an essential component of clinical practice. Far from being a supplementary aspect, the quality of this interaction has been consistently linked to outcomes that affect patients, professionals, and the healthcare system itself. Several studies have associated effective clinical communication with greater patient satisfaction, improved treatment adherence, prevention of burnout, and improved indicators of quality of care (1). In fact, Leal-Costa et al. (2) found that healthcare professionals' communication skills act as a preventive factor against burnout syndrome, demonstrating that communicative competence transcends the purely relational sphere to become a protective resource for occupational health. However, despite this evidence, training in communication skills during undergraduate studies in health sciences continues to have shortcomings. Gutiérrez-Puertas et al. (3) conducted a systematic review of educational interventions aimed at developing communication skills with patients in nursing students. Of the 19 included studies, simulation was the most frequently used intervention (11 of 19), and 13 of the 19 studies found statistically significant differences in patient-centered communication skills. However, the authors cautioned that it has not yet been determined which of the different methodologies is most effective. Meanwhile, Kerr et al. (4), in the first systematic review of randomized controlled trials focused specifically on nurse-patient communication, identified only seven trials that met the inclusion criteria. While all showed at least one significant improvement, the authors emphasized the difficulty of directly measuring the impact of these interventions, largely due to the lack of standardized measurement instruments.

Clinical simulation has become established as a pedagogical strategy that allows for the creation of safe and controlled learning environments where students can practice clinical skills without risk to the patient. Chernikova et al. (5) conducted a meta-analysis on simulation-based learning in higher education that showed substantial effects on decision-making and problem-solving, and moderate

effects on non-technical skills, a category that includes communication skills. The authors emphasized that the use of active learning strategies is key to optimizing educational outcomes. In the healthcare field, Kaplonyi et al. (6), in their systematic review, concluded that simulated patient-based education is widely accepted as an effective means of teaching and practicing communication skills with immediate feedback, although they acknowledged that evidence on how this learning transfers to interaction with real patients is still limited. The most recent quantitative evidence provides data that support the effectiveness of simulation in improving specific skills. Gilligan et al. (7), in a Cochrane review that included 76 studies with 10,124 medical students, found that interpersonal communication programs produced improvements, generally with small effect sizes, in overall communication skills and empathy. The authors identified that programs incorporating personalized and specific feedback were more effective than those with general feedback or no feedback at all. Specifically regarding empathy, Cho and Kim (8) conducted a meta-analysis of 28 studies on simulation-based interventions to improve empathy in nursing students and obtained an overall Hedge's effect size of $g = .35$ (95% CI: 0.14–0.57; $p = .001$). Subgroup analyses revealed that studies published after 2019 had a larger effect size ($g = .52$), as did those employing quasi-experimental designs ($g = .51$). These results suggest that simulation can significantly improve the empathy of nursing students, although with a small to moderate effect size.

Alongside communication skills, the emotional dimension of simulation-based learning is receiving increasing attention in recent literature. Simulated experiences generate diverse emotions (anxiety, satisfaction, frustration, pride) that coexist and transform throughout the briefing, scenario, and debriefing phases, and which can both facilitate and hinder learning (9). Ahn et al. (10), in a scoping review of emotions and related constructs in simulation-based education research, noted that understanding and addressing students' emotions is necessary to establish learning environments that prepare professionals capable of meeting the challenges of clinical practice. Even so, most of the available research has focused on technical and communication skills as outcome variables, while students' ability to manage their own emotions in the simulated clinical context has been underexplored as an explicit outcome measure. Beyond communication and emotional skills, clinical simulation could also influence broader psychological variables in students. Oliveira Silva et al. (11), in a systematic review with meta-analysis of 62 studies and 4,570 nursing students, found that simulation produces a moderate effect on self-confidence ($d = .71$), as well as a positive relationship between self-confidence and learning. Although these findings do not directly assess psychological well-being, they do suggest that the experience of successfully navigating simulated clinical scenarios could impact dimensions that transcend the acquisition of technical skills. However, evidence on Psychological Well-being in a broad sense, for example, from Ryff's multidimensional model (12), remains scarce in clinical simulation programs with nursing students.

Something similar occurs with personality traits. The five dimensions of the Big Five model in Spanish (13)—Emotional Stability, Agreeableness, Conscientiousness, Extraversion, and Integrity—have been consistently associated with variables relevant to nursing practice. Shdaifat et al. (14), in a cross-sectional study with 411 nursing students, found that Extraversion, Agreeableness, Conscientiousness, and Neuroticism significantly predicted the students' level of well-being, and that Neuroticism was related to lower levels of happiness and less adaptive emotion regulation strategies. However, personality traits are understood as relatively stable dispositions over time. Abbiati et al. (15), in a six-year longitudinal study with medical students, found moderate to high temporal stability in the five dimensions (test-retest correlations $r > .50$), although they observed moderate changes in Agreeableness ($d = +.72$) and small changes in Neuroticism ($d = -.29$) and Conscientiousness ($d = -.25$), which the authors attributed to a combination of maturation and adaptation to the training environment. These data raise the possibility that intensive educational interventions, such as clinical simulation, may be associated with changes in the self-perception of personality traits, without necessarily implying a profound dispositional modification.

The rigorous assessment of communication skills requires instruments with proven psychometric properties. The Scale on Communication Skills in Health Professionals (EHC-PS), created by Leal-Costa et al. (16), was developed through a process that included the definition of the construct endorsed by 29 experts using the Delphi methodology, the development of specification tables for the scale and items, and its qualitative evaluation. The analysis of psychometric properties (17) was carried out in two independent samples of healthcare professionals ($n = 410$ in Murcia and $n = 517$ in Alicante), obtaining a factor structure of four oblique factors (Empathy, Informative Communication, Respect, and Social Skill) with good fit indices ($\chi^2/df = 2.05$; RMSEA = .051; CFI = .948; SRMR = .056) and high temporal stability (ICC between 0.82 and 0.88). Subsequently, Leal-Costa et al. (18) performed specific validation of the scale in 692 nursing professionals, confirming the internal structure through confirmatory factor analysis ($\chi^2/df = 1.67$; RMSEA = .053; CFI = .949) and obtaining an internal consistency of $\alpha = .88$ for the total scale and between 0.70 and 0.77 for the dimensions. To the best of our knowledge, the only published study that has used the EHC-PS to evaluate the effect of a clinical simulation program on communication skills is that of Fernández-Quiroga et al. (19). In a pre-post design with 27 medical students who participated in three simulation sessions, the authors found significant improvements in three of the four dimensions of the scale: Informative Communication ($p = .008$), Empathy ($p = .008$), and Social Skills ($p = .034$). The Respect dimension showed no significant changes ($p = .191$), a result the authors attributed to the fact that Respect is a fundamental characteristic of communication, constantly practiced, with already high baseline scores. However, this study was conducted with medical students, with a small sample size and only three simulation sessions, which leaves open the question of whether these results are generalizable to nursing students, with a more extensive program and complementary measures that also assess emotional management.

The reviewed evidence converges on clinical simulation as a pedagogical strategy with growing empirical support for developing communicative and emotional competencies in healthcare training. However, several gaps remain that justify the present study: most pre-post studies have been conducted with small samples and short programs, which limits the robustness of the findings; few studies employ validated and specific instruments such as the EHC-PS in this context, and the only previous study (19) was conducted with medical students, not nursing students; emotional management as an explicit outcome variable has barely been studied in relation to clinical simulation programs; psychological well-being and personality traits have not been evaluated as outcome variables in this type of intervention with nursing students; and the available evidence comes mainly from Anglo-Saxon or Asian contexts.

The aim of this study is to determine the effect of a clinical simulation-based training program on the development and self-perception of communication and emotional management skills in second-year nursing students at the Pontifical University of Salamanca. To this end, the following hypotheses are proposed:

- (H1) Students will significantly improve their self-perception of their communication and emotional management skills after the intervention.
- (H2) The scores on the EHC-PS, both overall and in the dimensions of Empathy, Informative Communication and Social Skills, will increase significantly, with the possible exception of the Respect dimension (19).
- (H3) Psychological Wellbeing, as measured by the Ryff Scale, will improve after the intervention, especially in the Self-Acceptance dimension.

- (H4) Self-reported personality traits related to emotional regulation and prosocial behavior (Emotional Stability and Agreeableness) will show positive changes after the intervention .

2. Methods

2.1. Design

A single-group, pre-post quasi-experimental design was used. This type of design is based on measuring and comparing outcome variables before and after participants' exposure to the intervention (20). Data were collected from two academic cohorts: 2021–2022 and 2022–2023. The study was conducted at the Advanced Clinical Simulation Center of the Pontifical University of Salamanca (Spain).

2.2. Participants

The target population consisted of students enrolled in the second-year Nursing Degree course, *Communication Techniques in Psychosocial Care*, at the Pontifical University of Salamanca. A non-probability convenience sampling method was used, inviting all students who met the following inclusion criteria to participate: being enrolled in the second year at the time of the study, voluntarily agreeing to participate, and completing the pre- and post-intervention assessments. Students who did not attend all sessions of the program were excluded from the analysis to ensure full exposure to the intervention. No additional exclusion criteria were established beyond refusal to participate. The final sample comprised 101 students. The majority were women ($n = 86$; 85.1%), with a mean age of 20.11 years ($SD = 3.18$), a median age of 19 years, and an age range of 18 to 38 years. Regarding marital status, 62 participants were single (61.4%), 36 had a stable partner (35.6%), two were married (2.0%), and one indicated another situation (1.0%). Of the total sample, 61 students (60.4%) belonged to the 2021–2022 academic year cohort and 40 (39.6%) to the 2022–2023 academic year cohort.

2.3. Procedure

Students were informed about the study objectives and provided informed consent before the intervention began. Participation was voluntary and anonymous. Pre- and post-intervention questionnaires were administered by personnel external to the research team to minimize bias. Participants used a self-generated pseudonym for measurement matching. The pre-intervention assessment was conducted before the first session, and the post-intervention assessment after the program's completion. Completion time was approximately 30 minutes. The study was approved by the Ethics Committee of the Pontifical University of Salamanca. Data were anonymized, stored in an encrypted database, and processed in accordance with current data protection regulations. The study was conducted in accordance with the principles of the Declaration of Helsinki.

2.4. Intervention

The clinical simulation program was developed as part of a mandatory second-year course in the Bachelor of Science in Nursing. It comprised a total of 60 hours of training, divided into 34 hours of theory and 26 hours of practice, organized into 13 weekly two-hour sessions. Of these, 11 were dedicated to clinical simulation, one to the program presentation and administration of the pre-intervention questionnaire, and a final session to post-intervention data collection and program closure. The simulation sessions followed the standard three-phase structure: *briefing*, scenario development, and *debriefing*, in accordance with the recommendations of the International Nursing Association for Clinical Simulation and Learning (21). Students were organized into groups of 15 to 20 participants and received the clinical case one week in advance, along with the necessary information for their preparation. The scenarios recreated realistic clinical situations, with particular emphasis on patient communication and emotional management. The topics covered included verbal

and non-verbal communication, empathy, active listening, emotional management, informative communication, social skills, patient-centered communication, and communicating bad news.

2.5. Variables and instruments

- *Sociodemographic variables* . Age, sex and marital status were recorded using an ad hoc form included at the beginning of the evaluation booklet.
- *Perceived communication skills (ad hoc measure) (H1)*. Self-perception of communication skills was assessed using a dichotomous question ("Do you consider that you have communication skills to cope with the clinical situations that arise in nursing?"; Yes/No) and a numerical scale from 1 to 10 ("Rate your communication skills on a scale of 1 to 10"). Both questions were administered before and after the intervention.
- *Perceived emotional management (ad hoc measure) (H1)* . Self-perception of the ability to manage emotions was assessed using a numerical scale from 1 to 10 ("Rate your ability to manage emotions on a scale of 1 to 10"), administered before and after the intervention.
- *Communication skills (H2)*. Assessed using the Scale on Communication Skills in Health Professionals (EHC-PS; 16-17). The 18 items corresponding to the validated version were used for the analysis (empathy, informative communication, respect, and social skills). The internal consistency reported in the nursing population is adequate ($\alpha = .88$; Leal-Costa et al., 2019).
- *Psychological well-being (H3)*. Assessed using Ryff's Psychological Well-being Scale (12-22). Consisting of 39 items. Subdivided into 6 dimensions with the following reliability indices: Self-acceptance (.83), Positive relationships with others (.81), Autonomy (.73), Environmental mastery (.71), Purpose in life (.83) and Personal growth (.68).
- *Personality traits (H4)*. Assessed using the Big Five Scale in Spanish (13). It consists of 150 adjectives identified as personality descriptors. The subject had to rate the adjectives in relation to whether or not they were appropriate to describe their personality with 5 response options.

2.6. Statistical analysis

Categorical variables were described using frequencies and percentages, and continuous variables using mean and standard deviation or median and interquartile range, depending on their distribution. McNemar's test was used for the pre-post comparison of the dichotomous variable (perception of communication skills: Yes/No). For continuous variables, the normality of individual differences (post-pre) was assessed using the Shapiro-Wilk test and graphical inspection. Regardless of the normality test result, the Wilcoxon signed-rank test was used as the primary analysis in all blocks to ensure methodological consistency and robustness of the analysis in the face of the distributional heterogeneity observed among instruments. The paired-samples t-test was used for sensitivity analysis. These analyses did not alter the main inferential pattern and are therefore not presented in the main tables. The significance level was set at $\alpha = .05$ (two-tailed).

Since the Wilcoxon test was used as the main analysis in all blocks, the effect size was estimated using the coefficient r derived from this test ($r = |Z| / \sqrt{N}$), where N corresponds to the number of valid observations included in the analysis. This coefficient was interpreted according to conventional criteria for effect size (23): small ($r = 0.10$), medium ($r = 0.30$), and large ($r = 0.50$).

Due to the multiple pre-post comparisons, the Holm- Bonferroni sequential correction was applied to the p-values within each block of conceptually related variables (Ryff: $k = 7$; EHC-PS: $k = 5$; Personality: $k = 5$; ad hoc self-perception variables: $k = 3$) in order to control for the type I error rate per family (24). The Holm sequential procedure was chosen over the classical Bonferroni correction because it offers the same strict control of the error rate per family while being uniformly more powerful, a particularly relevant property when the comparisons within each block are conceptually related and partially correlated.

The ad hoc block ($k = 3$) included the dichotomous variable of perceived communication skills (analyzed using the McNemar test), as well as communication and emotional management scores. Both unadjusted and Holm-adjusted p -values are reported, with adjusted p -values $< .05$ considered statistically significant. The significance level was set at $\alpha = .05$ (two-tailed). All analyses were performed using IBM SPSS Statistics version 31.

Additionally, Spearman correlations were calculated between the total psychological well-being score (Ryff), the total communicative skills score (EHC-PS), and personality dimensions, both at baseline and at the change points (post-pre), to explore associations between the study variables. P -values were adjusted using the Holm-Bonferroni sequential correction.

The number of valid cases varied between analyses depending on the number of unanswered items in each instrument. Sample sizes ranged from $n = 101$ (ad hoc measures, with a full response rate) to $n = 83$ (total Ryff Scale score, which required complete data on all six subscales). No imputation of missing data was performed; analyses were conducted using complete cases for the variables included in each contrast.

3. Results

3.1. Self-perception of communication and emotional management skills

Before the intervention, 80 participants (79.2%) considered themselves to have sufficient communication skills to handle typical nursing clinical situations. After completing the program, this number rose to 100 participants (99.0%). McNemar's test indicated a statistically significant change ($\chi^2(1) = 20.00$; adjusted $p < .001$). Analysis of the 2×2 contingency table showed that 20 students changed from responding "No" to "Yes," with no reverse transitions observed.

The mean score for self-reported communication skills (scale 1–10) increased from 5.03 (SD = 1.46) to 7.89 (SD = 0.97), a mean difference of +2.86 points. Individual differences did not follow a normal distribution (Shapiro–Wilk: $p < 0.001$), so the Wilcoxon test was used as the main analysis, which was significant ($W = 0$; adjusted $p < 0.001$), with a very large effect size ($r = 0.863$). Similarly, the mean score for perceived emotional management increased from 5.19 (SD = 1.71) to 7.62 (SD = 1.38), a difference of +2.43 points. Again, the differences deviated from normality (Shapiro–Wilk: $p < .001$), and the Wilcoxon test was significant ($W = 0$; adjusted $p < .001$; $r = .818$). All three contrasts in this block remained significant after Holm-Bonferroni correction ($k = 3$). Notably, the W statistic of 0 on both numerical scales suggests that no decreases in scores were observed after the intervention.

3.2. Psychological Well-being (Ryff Scale)

The reliability of the overall scale was high ($\alpha = .897$). At the subscale level, Self-Acceptance ($\alpha = .791$), Positive Relationships ($\alpha = .730$), Purpose in Life ($\alpha = .754$), Environmental Mastery ($\alpha = .703$), and Autonomy ($\alpha = .717$) showed adequate values. However, the Personal Growth subscale showed low internal consistency ($\alpha = 0.447$), so its results should be interpreted with caution. Individual differences did not follow a normal distribution in any of the subscales (Shapiro–Wilk: $p < .05$ in all cases), so the Wilcoxon test was used as the primary analysis. After Holm-Bonferroni correction ($k = 7$), only two comparisons reached statistical significance: Self-Acceptance ($W = 692.5$; adjusted $p = .002$; $r = .374$) and the total score ($W = 905.0$; adjusted $p = .023$; $r = .317$), with medium effect sizes in both cases. The Autonomy subscale, which was significant before correction ($p = .042$), did not remain significant after applying the Holm-Bonferroni adjustment (adjusted $p = .210$). The remaining subscales did not show statistically significant changes. The total score analysis was performed on the 83 participants with complete data in both measurements (11.9% missing data in the previous assessment). Table 1 presents the results.

Table 1. Pre-post comparison in psychological well-being (Ryff Scale).

Subscale	Pre M (DE)	Post M (DE)	n	W	p	pholm	r
Self-acceptance	14.94 (2.76)	15.76 (2.61)	96	692.5	,0003	,002	,374
Positive relationships	21.77 (3.10)	22.11 (2.83)	98	1010.5	,233	,934	,120
Autonomy	21,20 (4,21)	21.67 (4.08)	95	1103.5	,042	,210	,209
Environment mastery	19.98 (2.74)	20.08 (2.81)	98	1202.0	,526	1,000	,064
Personal growth*	16.99 (2.29)	17.24 (2.21)	98	1165.0	,301	,902	,105
Purpose in life	20.27 (3.06)	20.41 (3.00)	101	1384.5	,549	,549	0.060
Total	115.04 (12.85)	117.37 (13.20)	83	905.0	,004	,023	,317

Note. W = Wilcoxon statistic; p = uncorrected p-value; p_holm = p-value after Holm-Bonferroni correction (k = 7); r = Wilcoxon r coefficient. In bold: significant comparisons after correction. *Subscale with internal consistency below the recommended threshold ($\alpha < .70$).

3.3. Communication skills (EHC-PS)

The internal consistency of the total EHC-PS was higher ($\alpha = .856$), a value close to the 0.88 reported by Leal-Costa et al. (18) in nursing professionals. The Respect subscale showed adequate reliability ($\alpha = .812$), and the Empathy subscale showed acceptable internal consistency ($\alpha = .716$). Informative Communication showed reliability close to the recommended threshold ($\alpha = .709$), while the Social Skills subscale showed low internal consistency ($\alpha = .560$), lower than the values reported in both the original validation ($\alpha = .65$) (17) and the nursing validation ($\alpha = .70$) (18). The normality of the differences was heterogeneous among subscales: Empathy, Informative Communication, and the total score followed normal distributions (Shapiro–Wilk: $p > .05$), while Respect and Social Skills did not meet this assumption. The Wilcoxon signed-rank test was prioritized as the primary analysis for all subscales due to its greater robustness, with the t-test used for sensitivity analysis. After Holm-Bonferroni correction (k = 5), two comparisons reached statistical significance: Social Skills (W = 1241.5; adjusted p = .025; r = .275) and the total score (W = 1342.5; adjusted p = .015; r = .308), both with small to moderate effect sizes. The Empathy (adjusted p = .090) and Informative Communication (adjusted p = .090) subscales, which were significant before correction, did not retain significance. The Respect subscale was not significant in any case (adjusted p = .092). The results are presented in table 2.

Table 2. Pre-post comparison in communication skills (EHC-PS).

Subscale	Pre M (DE)	Post M (DE)	n	W	p	pholm	r
Empathy	20.84 (3.18)	21.41 (2.91)	98	1207.5	,032	,090	,217
I respect	13.18 (1.74)	13.45 (1.75)	98	594.5	,092	,092	,170
News Communication	25.59 (3.09)	26.35 (2.64)	98	1268.0	,030	,090	,219
Social Skills*	13.47 (2.34)	14.28 (2.79)	99	1241.5	,006	0.025	,275
Total	73.01 (8.28)	75.52 (8.20)	93	1342.5	,003	015	,308

Note. W = Wilcoxon statistic; p = uncorrected p-value; p_holm = p-value after Holm-Bonferroni correction (k = 5); r = Wilcoxon r coefficient. In bold: significant comparisons after correction. *Subscale with low internal consistency ($\alpha = .560$); results to be interpreted with caution.

3.4. Self-perception of personality traits (Big Five Scale in Spanish)

Reliability was adequate for four of the five dimensions: Emotional Stability ($\alpha = .866$), Conscientiousness ($\alpha = .841$), Extraversion ($\alpha = .752$), and Agreeableness ($\alpha = .778$). The Integrity/Credibility dimension showed low internal consistency ($\alpha = .611$), which limits the interpretation of the results associated with this subscale. The differences in four dimensions followed a normal distribution (Shapiro–Wilk: $p > .05$), while Extraversion deviated from this assumption. The Wilcoxon test was used as the primary analysis for all dimensions to maintain methodological consistency and the robustness of the analysis, and the Student's t-test was used for sensitivity analysis. After Holm-Bonferroni correction ($k = 5$), four dimensions showed significant changes in a positive direction: Emotional Stability ($W = 745.0$; adjusted $p < .001$; $r = .496$) and Agreeableness ($W = 765.5$; adjusted $p < .001$; $r = 0.449$), with moderate effect sizes; Extraversion ($W = 1152.0$; adjusted $p = .009$; $r = .305$) and Conscientiousness ($W = 1216.0$; adjusted $p = .021$; $r = .263$), with small to moderate effect sizes. The Integrity/Credibility dimension did not reach statistical significance (adjusted $p = .059$), and given its low internal consistency, these results should be interpreted with caution. Table 3 presents the details of these analyses.

3.5. Correlations between study variables

As a complementary analysis, Spearman correlations were estimated between the total EHC-PS score, the total Ryff Psychological Well-being Scale score, and personality dimensions, with Holm-Bonferroni correction. At baseline, the highest correlation was observed between Psychological Well-being and Emotional Stability ($p = .662$; adjusted $p < .001$), suggesting that students with higher perceived well-being also tended to exhibit greater emotional stability. Significant associations were also found after correction between Agreeableness and Conscientiousness ($p = .434$), between Emotional Stability and Extraversion ($p = .402$), and between the total Psychological Well-being score and Extraversion ($p = .337$). Regarding the changes, the only correlation that remained significant after correction was that observed between the total Ryff Psychological Well-being score and Emotional Stability ($p = .358$; adjusted $p = .023$), suggesting that students who experienced greater improvement in Psychological Well-being also tended to show greater increases in Emotional Stability. Table 4 summarizes the significant correlations.

Table 3. Pre-post comparison in personality traits.

Dimension	Pre M (DE)	Post M (DE)	n	W	p	pholm	r
Emotional stability	35.02 (6.23)	36.75 (6.42)	92	745.0	<.001	<.001	.496
Pleasantness	35.56 (5.74)	37.17 (5.79)	89	765.5	<.001	<.001	.449
Extroversion	38.34 (5.77)	39.82 (4.87)	95	1152.0	.003	.009	.305
Responsibility	40.27 (4.91)	40.99 (5.32)	94	1216.0	.011	.021	.263
Integrity*	41.46 (3.05)	41.98 (3.60)	89	1229.0	.059	.059	.200

Note. W = Wilcoxon statistic; p = uncorrected p-value; p_holm = p-value after Holm-Bonferroni correction ($k = 5$); r = Wilcoxon r coefficient. In bold: significant comparisons after correction. *Subscale with low internal consistency ($\alpha = .611$). Scores reflect self-reported personality descriptors; for interpretation, see section 4.4

Table 4. Significant Spearman correlations after Holm-Bonferroni correction.

Moment	Relationship	n	q	p	pholm
Basal (pre)	Ryff Total - Emotional Stabilization	84	.662	<.001	<.001
Basal (pre)	Agreeableness - Responsibility	91	.434	<.001	<.001
Basal (pre)	Emotional Stability - Extroversion	95	.402	<.001	.001

Basal (pre)	Ryff Total - Extroversion	88	,337	,001	,016
Δ (post-pre)	Δ Ryff Total - Δ Stab. Emotional	76	,358	,002	,023

Note. p = Spearman's correlation coefficient.

3.6. Summary of results

In conclusion, the largest effect sizes were observed in the ad hoc self-perception measures, with high magnitudes ($r = .818-.863$). Among the validated instruments, the largest effects were found in the personality dimensions, where Emotional Stability ($r = .496$) and Agreeableness ($r = .449$) showed moderate magnitudes, followed by Self-Acceptance ($r = .374$) and the total score on the Psychological Well-being scale ($r = .317$). In the EHC-PS, only the total score ($r = .308$) and the Social Skills subscale ($r = .275$) remained significant after correction, with small to moderate effect sizes.

4. Discussion

This study examined the changes associated with a training program in communication skills and emotional management in nursing students, observing consistent improvements after the intervention. Overall, the results show a clear pattern: the greatest changes occurred in self-perception measures, while validated instruments reflected more moderate and specific improvements.

4.1. Self-perception of communication and emotional management skills

The ad hoc measures showed the most significant changes in the study. The proportion of students who considered themselves to have sufficient communication skills increased from 79.2% to 99.0%, and scores on the numerical scales increased by almost three points in both communication ($r = .863$) and emotional management ($r = .818$), with no participants experiencing a decline. The complete absence of impairment ($W = 0$ on both scales) establishes a pattern that, while compatible with a genuine intervention effect, could also reflect a demand bias characteristic of single-item measures. These results are consistent with previous literature. Alrashidi et al. (25), in a systematic review of 15 studies, concluded that simulation improves perceived self-confidence even in short programs. Jallad (26), in a pre-post design with 112 first-year students, reported high satisfaction (91.1%) with the simulated experience. In a more methodologically rigorous context, Hsu et al. (27), through a randomized controlled trial with 116 nurses, demonstrated that scenario-based training produced significant improvements in communicative competence and perceived self-efficacy compared to traditional teaching. Azizi et al. (28) obtained similar results in nursing students. However, the effect sizes observed in the present study are higher than those usually reported in the literature, which probably reflects more the sensitivity of the measures used than an exceptionally high effectiveness of the program. The discrepancy between the ad hoc measures and the EHC-PS warrants specific consideration. While direct questions yielded large effects ($r = .818-.863$), the validated instrument placed the changes in a small to moderate range ($r = .275-.308$). This divergence suggests that global questions primarily capture an increase in the student's overall confidence, while standardized instruments detect more subtle changes in specific communicative behaviors. Both approaches provide complementary information, and using them together is more informative than using either one separately.

4.2. Communication skills assessed with the EHC-PS

After Holm-Bonferroni correction, the total EHC-PS score ($r = .308$) and the Social Skills subscale ($r = .275$) reached statistical significance, with small to moderate effect sizes. The Empathy and Informative Communication subscales showed trends in the expected direction that did not persist after adjustment, while Respect remained unchanged. This pattern is remarkably consistent with the results of Fernández-Quiroga et al. (19), the only previous study to use the EHC-PS in a simulation setting. In a sample of 27 medical students, after three sessions, these authors found significant effects

on Informative Communication ($p = .008$), Empathy ($p = .008$), and Social Skills ($p = .034$), but not on Respect ($p = .191$). In the present study, the pattern is partially replicated: Respect remains unchanged, and Social Skills improves in both studies. The main difference, three significant dimensions versus two, can be explained by a methodological factor, since Fernández-Quiroga et al. (19) did not apply a correction for multiple comparisons, which could have increased the probability of detecting significant effects. However, it is necessary to point out that the reliability of the Social Skills subscale was low ($\alpha = .560$), lower than the values reported in the original validation ($\alpha = 0.65$) (17) and in nursing professionals (α between $.70$ and $.77$) (18).

The stability of the Respect dimension can be directly explained: the baseline score ($M = 13.18$ out of a maximum of 15) represented 87.9% of the scale's ceiling, leaving very little room for improvement. Fernández-Quiroga et al. (19) attributed this result to the fact that Respect is a fundamental aspect of communication, practiced continuously and with already high initial levels. Overall, these data suggest that simulation is particularly effective for training skills that require specific practice, such as assertiveness or managing complex communication situations, while attitudes already consolidated at high levels at the start of the program show less room for change.

Regarding the overall magnitude of change, the effect observed in the EHC-PS ($r = .308$) is consistent with the values that the literature considers expected in simulation-based communication interventions. Cho and Kim (8) reported a Hedge's effect size of $g = .35$ in their meta-analysis on empathy, and Gilligan et al. (7) described generally small effects in interpersonal communication in their Cochrane review. In this context, the present results are consistent with the available evidence: communication skills, when assessed using standardized instruments, tend to change gradually, and longer programs or reinforcement strategies are likely necessary to achieve larger changes.

4.3. Psychological Well-being

Of Ryff's six subscales, only Self-Acceptance ($r = .374$) and the total Psychological Well-being score ($r = .317$) reached significance after correction for multiple comparisons, with moderate effect sizes. The Autonomy subscale, which was significant before adjustment, did not maintain that significance after applying the Holm-Bonferroni correction (adjusted $p = .210$), while the remaining dimensions did not show statistically significant changes. The fact that Self-Acceptance is the dimension most sensitive to change is consistent with the nature of the training experience. Over eleven sessions, students faced demanding clinical scenarios, received systematic feedback on their performance, and participated in debriefing processes focused on reflecting on strengths and areas for improvement. This process is directly related to Ryff's (12) conceptualization of Self-Acceptance, understood as the positive evaluation of oneself and one's life trajectory. In this sense, it is plausible that experiential learning, by providing direct evidence of one's own abilities in an environment that does not penalize mistakes, contributes to a more positive self-assessment. On the other hand, the Personal Growth subscale showed an internal consistency of less than 0.70, which limits the interpretation of the results associated with this dimension and discourages drawing firm conclusions from it.

4.4. Self-perception of personality traits

It is important to note beforehand that these results should be interpreted as changes in self-reported or self-perceived personality descriptors, not as evidence of dispositional change; the rationale for this interpretation is explained below. Emotional Stability ($r = .496$) and Agreeableness ($r = .449$) showed the largest effect sizes among the validated instruments, even surpassing the Ryff and EHC-PS subscales. Improvements were also observed in Extraversion and Conscientiousness, with small to moderate effect sizes. The fact that four of the five dimensions of the Big Five model showed significant changes over an eleven-week period is a finding that requires cautious interpretation, given the relative stability of personality traits.

Two explanations, not mutually exclusive, can account for these results. First, the observed changes could reflect modifications in the student's self-image after successfully completing a demanding training experience, rather than structural personality transformations. Simulation places participants in scenarios that demand emotional management, cooperation, and decision-making under pressure; having successfully navigated these situations could lead students to perceive themselves as more emotionally stable and more prosocial. Along these lines, Chernikova et al. (5) noted that simulation fosters the development of socio-emotional skills in addition to technical competencies, which could be reflected in the self-assessment of dispositional traits.

Secondly, the nature of the instrument used could contribute to the magnitude of the observed changes. The Big Five Scale in Spanish (13) is based on the assessment of descriptive personality adjectives, so its scores should be interpreted as indicators of self-perceived personality. From this perspective, some of the observed differences could reflect changes in how students describe themselves after the training experience, without necessarily implying a profound dispositional change. Distinguishing between these two mechanisms is not possible with the available data.

The correlation between changes in Emotional Stability and Psychological Well-being ($\rho = .358$; adjusted $p = .023$) provides additional information about possible shared mechanisms. Students who experienced greater improvements in well-being also tended to show greater increases in their perception of Emotional Stability. This association is consistent with the theoretical relationship described between Neuroticism and Psychological Well-being (12). While the magnitude of the correlation is moderate and does not allow for establishing causal relationships, it suggests a possible link between improvements in well-being and the perception of greater emotional regulation, which should be explored in future research.

4.5. Strengths and limitations

This study has several strengths that distinguish it from previous literature. First, it is one of the few studies that uses the EHC-PS in simulation contexts with nursing students, responding to the need for specific and validated instruments noted by Kerr et al. (4). Furthermore, the training program, consisting of 11 two-hour sessions, is longer than most published interventions; for example, Fernández-Quiroga et al. (19) only conducted three sessions.

From a methodological standpoint, the application of the Holm-Bonferroni block correction procedure to control for Type I errors, which is uncommon in this field, strengthens the inferential rigor of the results. Furthermore, the combination of ad hoc measures with validated instruments allows for a complementary approach that enriches the interpretation of the findings.

However, the study has significant limitations that affect the scope of its conclusions. The main limitation is the absence of a control group, which prevents unequivocally attributing the observed changes to the intervention. Factors such as academic development throughout the semester, concurrent clinical experiences, or the effect of repeated assessment could have contributed to the improvements recorded. Along these lines, Cook et al. (29) noted in their meta-analysis that many studies with positive results compared simulation with no intervention, highlighting the need for designs with active controls to establish the specificity of the effects.

Furthermore, the exclusive use of self-report measures introduces a potential social desirability bias and limits the assessment of the transfer of learning to actual clinical practice, a deficiency previously noted by Kaplonyi et al. (6). Finally, convenience sampling at a single university restricts the generalizability of the results. Additionally, some subscales showed reduced internal consistency. This was the case for Social Skills in the EHC-PS ($\alpha = 0.560$) and Personal Growth in the Ryff Scale ($\alpha =$

0.447). Consequently, the results for these dimensions should be interpreted with caution, and the conclusions drawn from them should be considered provisional.

Finally, the lack of medium or long-term follow-up prevents us from assessing the stability of the observed changes, a limitation widely noted in the literature in this field (8).

4.6. Practical implications and future directions

Despite the limitations described, the results suggest that clinical simulation, implemented systematically through a briefing, scenario, and debriefing structure, can contribute to the development of competencies that transcend the purely technical. In particular, the improvements observed in perceived communicative competence, psychological well-being, and personality dimensions related to emotional regulation support the integration of these experiences into nursing curricula, in line with the recommendations of Chernikova et al. (5) and the INACSL Standards Committee (21).

However, consolidating this line of research requires moving towards methodologically more robust designs. In this regard, future studies should incorporate control groups, preferably active controls such as structured psychoeducation, which would allow for ruling out alternative explanations for the observed changes.

The complementarity between self-report measures and objective assessments, such as evaluations by external observers, OSCE-type tests (Objective Structured Clinical Examinations), or the analysis of recorded interactions, would allow for the examination of the transfer of learning to real clinical practice. Along these lines, Cannity et al. (30) incorporated measures of behavioral empathy into the Comskil program, an approach that could enrich the evaluation of this type of intervention.

5. Conclusions

- The clinical simulation program was associated with improvements in self-perception of communication and emotional management skills in nursing students, as well as with increases in Self-Acceptance, overall Psychological Wellbeing, the total EHC-PS score and several self-reported personality dimensions linked to emotional regulation.
- However, the magnitude of the effects varied depending on the type of measure used. While self-perception variables showed large changes, standardized instruments reflected more moderate and specific improvements, consistent with previous evidence. This pattern suggests that clinical simulation is more strongly associated with perceived confidence and self-efficacy than with changes in communication skills assessed objectively or in a structured manner.
- In the case of communication skills, the results partially replicate previous findings, confirming the stability of the Respect dimension and improvements in dimensions more susceptible to specific training, such as social skills. Regarding Psychological Well-being, Self-Acceptance emerged as the dimension most sensitive to change, which could be related to the reflective and experiential nature of simulation-based learning.
- The changes observed in personality traits should be interpreted with caution, as they probably reflect modifications in the student's self-perception after a significant formative experience, rather than stable dispositional transformations.
- In summary, these findings support the value of clinical simulation as a pedagogical strategy for developing communicative and emotional competencies in nursing education. However, the absence of a control group, the exclusive use of self-report measures, and the low internal

consistency of some subscales, particularly Personal Growth (Ryff) and Social Skills (EHC-PS), prevent the establishment of firm causal conclusions.

- Future studies should incorporate controlled designs, observational measures, and longitudinal follow-ups to assess the stability of the effects and their transfer to real clinical practice.

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