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Self-compassion, positive mental health, and empathy in nursing students: A structural equation modelling approach

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ABSTRACT

Background: Empathy is central to humanised nursing but vulnerable to erosion in demanding academic and clinical settings. Positive mental health (PMH) encompassing emotional, psychological, and social well-being, may regulate how self-compassion is statistically linked to empathic engagement. However, evidence in nursing students remains limited.
Aim: To examine the statistical association of positive mental health in the relationship between self-compassion and empathy among undergraduate nursing students within a structural equation modelling (SEM) framework.
Design: Observational, analytical, cross-sectional study.
Methods: A total of 402 nursing students from a public university completed validated measures of self-compassion, empathy, and PMH. SEM with latent variables was conducted using diagonally weighted least squares (DWLS) to account for ordinal and non-normal data. Model fit was assessed using multiple indices, acknowledging the complexity of the latent structure.
Results: Self-compassion was positively associated with PMH ($\beta = 0.772$, $p < 0.001$), which related positively to empathy ($\beta = 0.689$, $p < 0.001$). The indirect effect via PMH was positive ($\beta = 0.532$, $p < 0.001$), while the direct effect of self-compassion on empathy was negative when controlling for PMH ($\beta = -0.553$, $p < 0.001$), indicating an inconsistent mediation pattern. The model explained 59.6% of the variance in positive mental health and 19.3% in empathy.
Conclusion: PMH appears to be a key correlate in the association between self-compassion and empathy. Findings suggest that emotional well-being may be an important foundation for relational competence, although the study's cross-sectional nature precludes causal inferences and the marginal model fit warrants a cautious interpretation.
Implications for nursing education: Fostering empathy may require more than interpersonal skills training. Nursing curricula could benefit from integrating positive mental health promotion, including training in self-compassion and emotional regulation, to support empathic and humanised nursing practice across educational and clinical contexts.

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1. Introduction

Empathy is a central relational competency in nursing, underpinning therapeutic alliances, effective communication, and improved patient outcomes (Hojat, 2016; Nembhard et al., 2023; Zhou et al., 2022; Sutil-Rodríguez et al., 2025). In clinical practice, this competency requires both cognitive accuracy in understanding the patient's perspective and affective attunement to their emotional experience. Together, these dimensions support ethically grounded, person-centred care (Hojat et al., 2001; Reynolds, 2017). Developing such a multidimensional skill during undergraduate training requires not only technical competence but also the cultivation of psycho-emotional resources that sustain compassionate engagement without compromising mental health (Foster et al., 2019; Gómez-Salgado et al., 2021).

The acquisition of empathy unfolds in emotionally demanding academic and clinical environments. Repeated exposure to patient suffering, without effective emotional regulation, can increase the risk of compassion fatigue, burnout, and disengagement (Duarte et al., 2016; Gómez-Urquiza et al., 2017; Díaz-Narváez et al., 2025). In this context, empathy cannot be reduced to a stable interpersonal trait. Rather, its expression depends on the student's capacity to regulate distress and remain emotionally available in situations of sustained demand. This perspective has led educators and researchers to investigate intrapersonal factors that may sustain empathic engagement while supporting psychological stability.

Self-compassion has emerged as one of these factors, defined as treating oneself with kindness and understanding in times of difficulty, recognising personal suffering as part of the shared human experience, and maintaining balanced emotional awareness (Neff, 2003a). It consists of three positive components (self-kindness, common humanity, and mindfulness) and three negative counterparts (self-judgement, isolation, and over-identification) (Neff, 2003b; Garcia-Campayo et al., 2014). Among nursing students, higher self-compassion is associated with lower stress, greater resilience, and enhanced empathic sensitivity (Wiklund Gustin and Wagner, 2013; Özparlak et al., 2025). While these findings indicate that self-compassion contributes to personal psychological adjustment, empathy involves an outward-oriented relational process that requires emotional availability to others' distress. The degree to which self-directed compassion is reflected in sustained empathic engagement remains open to empirical examination, particularly within the specific demands of nursing education.

The present study is grounded in Compassion-Based Models, particularly in Gilbert's Compassionate Mind Theory (2009, 2014), which conceptualises compassion as a dynamic regulatory process involving the interaction of threat, drive, and soothing systems. Within this framework, self-compassion is described in relation to affiliative regulatory processes associated with experiences of safety and connectedness (Matos et al., 2017; Gilbert, 2014). From this perspective, the capacity for empathic engagement may hinge on the degree to which individuals possess sufficient internal security to navigate others' distress without emotional dysregulation. Integrating this framework with broader models of psychological well-being offers a necessary conceptual lens for investigating whether the association between self-compassion and empathy operates directly or is better understood as mediated by general psychological well-being. While self-compassion is theorised to facilitate the emotional regulation required for empathy, the precise mechanisms remain to be elucidated.

Positive Mental Health (PMH) offers a complementary theoretical framework to examine this relationship. Defined as a multidimensional construct that includes emotional, psychological, and social well-being (Keyes, 2002; Ryff, 2014; WHO, 2022), PMH represents a conceptual shift from the absence of illness toward the promotion of optimal functioning. Specifically, the Positive Mental Health Model proposed by Lluch Canut (2003) and operationalised through the Positive Mental Health Questionnaire (PMHQ) (Roldán-Merino et al., 2017) conceptualises well-being as a dynamic balance between six dimensions: personal satisfaction, prosocial attitude, self-control, autonomy, problem-solving, and interpersonal relationship skills. Unlike other frameworks such as Ryff's Psychological Well-Being Model (2014), centred on individual self-actualisation, or resilience-based approaches focused on adaptive responses to adversity (Windle, 2011), Lluch Canut's model explicitly incorporates social and relational well-being. This makes it particularly relevant for nursing, as it provides a framework to examine whether the relationship between self-compassion and empathy is better explained by an integrated configuration of mental health resources rather than by self-compassion alone.

Taken together, Compassionate Mind Theory and the Positive Mental Health framework suggest that the regulatory processes associated with self-compassion may contribute to empathic engagement primarily when embedded within this broader psychological context. Empirical evidence indicates that higher PMH levels are associated with better emotional regulation and more adaptive interpersonal functioning among healthcare students (Sequeira et al., 2020). However, the theoretical necessity of exploring this triad lies in determining whether self-compassion, as a self-directed resource, requires the global stability provided by PMH to sustain outward-oriented empathy. Examining the role of PMH therefore provides a theoretically grounded way to clarify whether the association between self-compassion and empathy is observable at a direct level or is more closely related to this wider configuration of mental health resources.

Accordingly, this study examines whether positive mental health is statistically associated with the relationship between self-compassion and empathy among undergraduate nursing students. Specifically, within a correlational framework, it tests a mediation model in which positive mental health is hypothesised to be associated with self-compassion (H1) and with empathy (H2), and account for their observed association (H3). Grounded in established theoretical perspectives on compassion and psychological well-being, this approach seeks to clarify how these constructs may be interrelated in nursing education, without inferring causal direction.

2. Methodology

2.1. Participants, design and setting

This study employed an observational, analytical, cross-sectional study design, forming part of a larger research programme aimed at evaluating an integrated educational model for the humanisation of care in undergraduate nursing education. Participants were 402 undergraduate nursing students enrolled in a four-year Bachelor of Nursing programme (240 ECTS credits) at a public university in XXXX, XXXX. Recruitment was conducted via non-probability convenience sampling, based on classroom availability during scheduled teaching activities.

Eligibility criteria included: (1) active enrolment in any academic year of the programme, and (2) provision of written informed consent. Questionnaires with more than 10% missing data in the primary study variables were excluded.

The design and reporting of this observational study adhered to the STROBE guidelines for cross-sectional studies (Von Elm et al., 2007) to ensure methodological rigour and transparency. In addition, the mediation analyses were planned, conducted, and reported following the AGReMA Statement (Lee et al., 2021), thereby aligning the statistical reporting with current international standards for mediation research.

2.2. Measures

2.2.1. Self-compassion

Self-compassion was assessed using the 26-item long form of the Self-Compassion Scale (SCS) developed by Neff (2003b) and validated in Spanish by Garcia-Campayo et al. (2014). The SCS evaluates six subscales grouped into two overarching dimensions (positive and negative components). Responses are scored on a five-point Likert scale ranging

from 1 ("Almost never") to 5 ("Almost always"), with higher scores indicating greater self-compassion. Total scores range from 26 to 130. Internal consistency in the present sample was α = 0.896, ω = 0.890.

2.2.2. Empathy

Empathy was measured using the Jefferson Scale of Empathy - Health Professions Students version (JSE-HPS), culturally adapted and validated for Spanish-speaking populations (Díaz Valentín et al., 2019; Serrada-Tejeda et al., 2021). The JSE-HPS comprises 20 items rated on a seven-point Likert scale (1 = "Strongly disagree" to 7 = "Strongly agree"), with higher scores reflecting greater empathy. Total scores range from 20 to 140. Internal consistency in this study was α = 0.838, ω = 0.859. Permission and formal authorisation to use the instrument for this research were obtained from the Jefferson Institute, as required by the scale's copyright policy.

2.2.3. Positive mental health

Positive mental health was assessed using the Positive Mental Health Questionnaire (PMHQ), developed by Lluch Canut (2003) and validated for use in Spanish university populations (Roldán-Merino et al., 2017). The PMHQ contains 39 items covering six factors: Personal satisfaction, Prosocial attitude, Self-control, Autonomy, Problem-solving and self-actualisation, and Interpersonal relationship skills. Items are rated on a four-point Likert scale (1 = "Never" to 4 = "Always"), with total scores ranging from 39 to 156. Higher scores indicate greater positive mental health. Internal consistency in this study was α = 0.902, ω = 0.899.

2.3. Sample size

Sample size adequacy was determined using power analysis for mediation models with medium effect sizes ($f^2 = 0.15$), α = 0.05, and 80% statistical power (Fritz and MacKinnon, 2007). Calculations indicated that a minimum of 150 participants was required to detect significant indirect effects. The final sample of 402 exceeded this threshold, providing sufficient statistical power for the planned analyses.

2.4. Data collection

Data were collected between October 2024 and February 2025 using paper-based questionnaires administered in classroom settings. Collection was coordinated by the research team in collaboration with teaching staff. No incentives were offered. Procedures were standardised to ensure anonymity and minimise social desirability bias.

2.5. Data analysis

Analyses were conducted using IBM SPSS Statistics (version 30) and R (version 4.5.0), with the Lavaan package (version 0.6-19) for structural equation modelling (SEM). Preliminary screening addressed missing data patterns, outliers (via z-scores), and assumptions of normality (Kolmogorov–Smirnov, Shapiro–Wilk), homoscedasticity (Levene's test), and multicollinearity (VIF, tolerance). Descriptive statistics (mean, SD, skewness, kurtosis) and bivariate correlations (Pearson or Spearman, depending on distribution) were calculated.

Confirmatory factor analyses (CFAs) were performed for each scale. The SCS, showing approximate normality, was analysed using the maximum likelihood robust (MLR) estimator; the JSE-HPS and PMHQ, which exhibited non-normality, were analysed using the diagonally weighted least squares (DWLS) estimator. Model fit was evaluated using χ^2, CFI, TLI, RMSEA (with 95% CI), and SRMR. Confirmatory factor analytic approach was also conducted to examine potential common method bias (CMB), including the comparison between the theoretical three-factor model and a single-factor model, as well as the application of Harman's single-factor test.

The mediation analysis was conducted within a latent variable SEM framework that integrated the validated measurement models for self-compassion, positive mental health, and empathy. Self-compassion was specified as the independent latent variable, positive mental health as the mediating latent variable, and empathy as the dependent latent variable. Given the ordinal nature of the indicators and their non-normal distribution, the mediation model was estimated using the DWLS estimator. Direct, indirect, and total effects were examined using unstandardised estimates, standard errors, and 95% confidence intervals.

2.6. Ethical considerations

Ethical approval for the study was granted by the Ethics, Research and Knowledge Transfer Committee of the University of Lleida (reference CERT33, June 2024). All procedures complied with the Declaration of Helsinki. Written informed consent was obtained from all participants. Confidentiality and anonymity were ensured throughout. Authorisation for use of the JSE-HPS was obtained directly from the Jefferson Institute.

3. Results

3.1. Data quality and sample characteristics

A very low percentage of missing values was identified in the questionnaires included in the analysis: self-compassion (1.0%), empathy (0.5%), and positive mental health (0.5%). Little's MCAR test for the pattern of missing data yielded a non-significant result, $\chi^2(6) = 10.413$, $p = 0.108$, indicating that missing data could be considered completely random (MCAR). Consequently, listwise deletion was applied, resulting in a final sample of N = 402 for analysis.

The final sample comprised 402 undergraduate nursing students, with representation from all four academic years. The sample was predominantly female (83.1%), with a mean age of 21.5 years (SD = 3.36). Supplementary material Tables 1 and 2 summarise the age and sex distributions of the participants, providing essential contextual information for interpreting the subsequent analyses and assessing the representativeness of the sample.

Standardised scores (z) were examined to identify outliers. For self-compassion, five cases had $|z| > 2.5$, although none exceeded the critical threshold of $|z| > 3.0$. For empathy, five cases were found below $z = -3.0$. For positive mental health, two cases showed values $z < -3.3$. Upon individual inspection, all were deemed valid.

Univariate distribution was assessed using Kolmogorov-Smirnov (K-S) and Shapiro-Wilk (S-W) tests, as well as histograms and Q-Q plots. Only self-compassion exhibited a distribution compatible with normality (S-W = 0.996, p = 0.458; K-S = 0.043, p = 0.075), with skewness (0.021) and kurtosis (−0.090) values near zero. In contrast, empathy demonstrated a clearly non-normal distribution (S-W = 0.903, $p < 0.001$), with strong negative skewness (−1.34) and high kurtosis (2.51), while positive mental health showed moderate deviations (S-W = 0.986, $p < 0.001$), with moderate skewness (−0.428) and near-zero kurtosis (0.013). The histograms with the overlaid normal distribution curve are presented in the Supplementary material Figs. 1A, 1B and 1C.

Multivariate normality was assessed using Mardia's indices, which were significant for skewness (164, $p < 0.001$) and kurtosis (6.48, $p < 0.001$), indicating a lack of joint normality.

The assumption of homoscedasticity was confirmed through graphical inspection of residuals. A scatterplot of unstandardised residuals versus unstandardised predicted values revealed an approximately random and symmetrical distribution around the zero axis, with no evidence of systematic expansion or contraction pattern, supporting the assumption of constant error variance (see Fig. 2 Supplementary material).

3.2. Descriptive statistics, internal consistency, confirmatory factor analysis and assessment of common method bias

Descriptive measures and internal reliability (Cronbach's alpha and McDonald's omega) were calculated for the three scales.

All three instruments showed excellent reliability ($\alpha \geq 0.838$, $\omega \geq 0.859$). Although the empathy scale exhibited negative skewness and leptokurtosis, its internal consistency remained within the acceptable parameters. Descriptive statistics and reliability indices for the main study variables are presented in Supplementary material Table 3.

3.2.1. Confirmatory factor analysis (CFA)

3.2.1.1. Self-Compassion Scale (SCS). CFA was performed using the ML estimator, appropriate for normally distributed data. The six-factor model demonstrated acceptable fit: χ^2 (284) = 636.692, CFI = 0.905, TLI = 0.892, RMSEA = 0.056, SRMR = 0.064. All standardised loadings were significant (0.39–0.79) (see Table 4 Supplementary material). The original factor structure was preserved.

3.2.1.2. Empathy (JSE-HPS). Given the non-normal distribution of the items, the CFA was estimated using DWLS. The initial model, which included all items, showed good global fit ($\chi^2(167) = 307$, $p < 0.001$; CFI = 0.960; TLI = 0.954; SRMR = 0.060; RMSEA = 0.057). Standardised factor loadings ranged from 0.412 to 0.851. However, Item 18 displayed a negligible negative loading (−0.10, p = 0.048), suggesting it did not contribute meaningfully to the latent construct in this sample.

To evaluate the effect of this item on model performance, a revised CFA was conducted excluding item 18. The updated model yielded improved fit indices ($\chi^2(149) = 259$, $p < 0.001$; CFI = 0.965; TLI = 0.959; SRMR = 0.056; RMSEA = 0.057). In the revised solution, all standardised factor loadings remained within the expected range (0.412–0.851). Comparative analysis showed increases in CFI (+0.005) and TLI (+0.005), a reduction in SRMR (−0.004), and a stable RMSEA. Internal consistency also improved, with Cronbach's α increasing from 0.810 to 0.838 and McDonald's ω from 0.840 to 0.859 (see Table 4 Supplementary material).

Based on these empirical indicators, the model excluding item 18 was retained for all subsequent analyses, as it offers a more stable factor solution and improved psychometric properties without altering the theoretical structure of the scale.

3.2.1.3. PMHQ. Given ordinal data and non-normality, we employed the DWLS estimator (Li, 2016). The six-factor model (Roldán-Merino et al., 2017) demonstrated marginal fit: CFI = 0.881, TLI = 0.871, RMSEA = 0.058, SRMR = 0.087. CFI and TLI fall below the conventional 0.90 threshold and should be regarded as marginal. RMSEA = 0.058 indicated good fit. Factor loadings ranged from 0.342 to 0.858, all exceeding the 0.30 minimum (Hair et al., 2018). Items with moderate loadings (0.30–0.50) were retained for theoretical reasons: they capture unique conceptual facets essential to the six-dimensional structure of positive mental health (Jahoda, 1958; Lluch Canut, 2003) and removing them would compromise content validity (Clark and Watson, 2019). The model's complexity (39 items, 6 factors) may partly account for the marginal incremental fit indices (Marsh et al., 2004). Internal consistency was good (α = 0.838, ω = 0.859). Considering the marginal fit indices, acceptable factor loadings, and theoretical grounding, the 39-item model was retained for subsequent analyses.

Fit indices reported include χ^2, CFI, TLI, RMSEA (with 95% CI), SRMR, and the range of standardised factor loadings (see Table 4 Supplementary material).

Schematic diagrams of the confirmatory factor models for the three study scales are presented in Supplementary material Figs. 3A, 3B and 3C.

3.2.2. Assessment CMB

Given that all measures were self-reported, two complementary procedures were conducted to evaluate potential CMB (Podsakoff et al., 2012). Firstly, Harman's single-factor test showed that a forced one-factor solution accounted for 30.9% of the total variance, below the conventional 50% threshold. Secondly, a confirmatory factor analysis comparison was conducted using DWLS estimation (Li, 2016), contrasting the theoretical model with an alternative one-factor model representing common method variance. As detailed in Supplementary material Table 5, the theoretical model demonstrated a relatively better fit. While these results indicate that no single-method factor was clearly identified, it is important to note that both procedures have recognised limitations and cannot completely rule out the possibility of shared method variance. Accordingly, the observed associations are presented with this caveat in mind.

3.3. Zero-order correlation and partial correlation

Spearman and Pearson correlations were calculated due to partial non-normality. A moderate-to-high positive correlation was found between self-compassion and positive mental health ($\rho = 0.668$, $p < 0.001$), and a low correlation between positive mental health and empathy ($\rho = 0.241$, $p < 0.001$). No correlation was observed between self-compassion and empathy ($\rho = 0.003$, $p = 0.947$). The bivariate correlation matrix for the main study variables is presented in Supplementary material Table 6.

The partial correlation between self-compassion and empathy, controlling for positive mental health, revealed a substantially different pattern: $\rho = -0.219$ ($p < 0.001$).

3.4. Multiple linear regression analysis

A multiple linear regression was conducted with empathy JSE-HPS (revised) as the dependent variable, and self-compassion and positive mental health as predictors. The model was statistically significant, F (2, 399) = 28.8, $p < 0.001$, with an $R^2 = 0.126$ and adjusted $R^2 = 0.122$. Both predictors were statistically significant: positive mental health was positively related ($\beta = 0.476$, $p < 0.001$), while self-compassion was negatively related with empathy ($\beta = -0.308$, $p < 0.001$). Collinearity diagnostics were satisfactory (VIF = 1.80), and residuals met assumptions of normality and homoscedasticity. The coefficients of the multiple linear regression model are presented in Supplementary material Table 7.

Partial regression plots were generated to visualise the individual relationships between each predictor and the dependent variable (see Supplementary material Figs. 4A, 4B).

3.5. Mediation model: the role of positive mental health between self-compassion and empathy

To examine whether positive mental health mediates the relationship between self-compassion and empathy, we estimated a latent variable structural equation model incorporating the validated measurement structures from the confirmatory factor analyses. Given the ordinal nature of item-level data, we employed the DWLS estimator with robust standard errors, appropriate for categorical indicators (Li, 2016; Rhemtulla et al., 2012). Prior to testing the structural model, we conducted preliminary analyses to characterize the bivariate associations and assess potential threats to validity.

3.5.1. Zero-order correlations, partial correlations, and multicollinearity

To clarify the pattern of associations underlying the mediation model, zero-order and partial correlations were examined. Zero-order results showed no direct association between SCS and empathy; however, after controlling for PMHQ, the association became significantly negative (Spearman $\rho = -0.219$, $p < 0.001$; Pearson $r = -0.238$, $p <$

0.001), consistent with a pattern of suppression. To rule out that the negative partial association reflects statistical artifacts due to excessive shared variance between self-compassion and positive mental health, we examined collinearity diagnostics. Variance inflation factors (VIF = 1.80 for both predictors) and tolerance values (0.555 for both) were well within acceptable limits (VIF < 5, Tolerance > 0.20); (Hair et al., 2018), confirming that multicollinearity does not threaten the stability or interpretability of the regression coefficients. The negative direct effect thus reflects a genuine relationship rather than a statistical artifact.

3.5.2. Mediation model

The structural estimates and fit indices for the mediation model are presented in Table 8. SCS was positively associated with PMHQ (path a), which in turn was positively related to empathy (path b). When controlling for positive mental health, the direct path from self-compassion to empathy (path c') was significantly negative. This configuration, where the indirect and direct effects have opposing signs, constitute an inconsistent mediation pattern (also termed competitive mediation; Zhao et al., 2010), statistically characterised as a form of suppression.

Regarding model adequacy, the fit indices indicate a borderline to marginal fit. While the CFI (0.887) and TLI (0.884) fall slightly below conventional thresholds, the RMSEA (0.083; 95% CI [0.082, 0.085]) and SRMR (0.101) suggest potential model misspecification. Although complex latent structures estimated via DWLS can often yield lower incremental fit indices, these methodological factors do not fully account for the observed values. Consequently, it must be acknowledged that some degree of misspecification may be present, and the structural conclusions should be interpreted with appropriate caution (Hu and Bentler, 1999; Kline, 2016). Despite these limitations, the model captured a substantial proportion of the observed covariance, accounting for 59.6% of the variance in positive mental health ($R^2 = 0.596$) and 19.3% in empathy ($R^2 = 0.193$). The final model is illustrated in Fig. 1.

4. Discussion

The present study contributes to the understanding of empathy in nursing students by situating self-compassion and empathy within a broader framework of psychological well-being. Rather than supporting a simple direct association, the findings point to a more complex pattern in which positive mental health is statistically associated with the relationship between these constructs. This perspective aligns with contemporary models that view empathy not merely as an interpersonal skill, but as a relational capacity that may be grounded in internal psychological conditions (Ryff, 2014; Zessin et al., 2015).

Consistent with Compassionate Mind Theory, self-compassion showed a strong and positive association with Positive Mental Health, supporting its role as a potential internal resource for emotional regulation, balance between threat and soothing systems, and psychological resilience (Gilbert, 2009, 2014). This finding is in line with previous research linking self-compassion to improved emotional regulation, reduced stress reactivity, and enhanced psychological functioning (MacBeth and Gumley, 2012; Neff and Germer, 2018; Suazo Galdames et al., 2024). Importantly, the present study extends existing evidence by applying Lluch Canut's PMH Model, which shifts the focus from symptom reduction toward a more functional understanding of well-being. This is particularly relevant in nursing education, where maintaining a multidimensional configuration of mental health resources is essential for navigating emotionally demanding environments.

PMH, in turn, was positively and significantly associated with empathy. This result supports the notion that empathic engagement may depend not only on cognitive perspective-taking skills but also on sufficient emotional resources to sustain openness and sensitivity to others' suffering (Shen et al., 2024). Within nursing education, where students face frequent exposure to challenging clinical situations, positive mental health appears to be a relevant condition associated with the capacity to remain empathically engaged while mitigating the risk of emotional exhaustion (Durkin et al., 2016).

Importantly, these findings suggest that self-compassion is associated with empathic functioning primarily through indirect regulatory pathways rather than through a uniform direct association. Supporting this view, Tang et al. (2024) observed that self-compassion operates within a broader network of psychological regulation in nursing students. This is consistent with the perspective that self-compassion may be linked to empathic engagement through its association with emotional regulation and vulnerability, rather than through a direct enhancement of empathy.

One of the most theoretically informative findings of this study is the identification of opposing patterns in the association between self-compassion and empathy. While the estimated indirect effect of self-compassion on empathy via positive mental health was positive and

Table 8
Mediation model results: structural paths, indirect effects, and fit indices (DWLS estimation) structural path estimates.

Effect	Path	B	SE	95% CI	β	95% CI	p
a	Self-Compassion Scale (SCS) → Positive Mental Health (PMHQ)	0.939	0.0247	[0.891, 0.988]	0.772	[0.759, 0.785]	<0.001
b	Positive Mental Health (PMHQ) → Empathy (JSE-HPS)*	0.514	0.0305	[0.455, 0.574]	0.689	[0.632, 0.747]	<0.001
c′ (direct)	Self-Compassion Scale (SCS) → Empathy (JSE-HPS)*	−0.502	0.0346	[−0.570, −0.434]	−0.553	[0.612, −0.494]	<0.001
Indirect (a × b)	Self-Compassion Scale (SCS) → Positive Mental Health (PMHQ) → Empathy (JSE-HPS)*	0.483	0.0315	[0.422, 0.544]	0.532	[0.482, 0.583]	<0.001
Total effect	Self-Compassion Scale (SCS) → Empathy (JSE-HPS)*	−0.019	0.007	[−0.033, −0.005]	−0.021	[−0.036, −0.006]	0.006

Index	Value	Acceptability criteria
χ^2 (3399)	12,830	Non-significant desirable but unrealistic in large models
CFI	0.887	≥0.90 acceptable; ≥0.95 good
TLI	0.884	≥0.90 acceptable; ≥0.95 good
RMSEA	0.083	≤0.06 good; 0.06–0.08 acceptable; ≥0.10 poor
RMSEA 95% CI	[0.082, 0.085]	Should include ≤0.08 for acceptable fit
SRMR	0.101	≤0.08 good; ≤0.10 borderline acceptable

Note. Structural equation modelling (SEM) was conducted using latent variables and the Diagonally Weighted Least Squares (DWLS) estimator, incorporating the validated measurement models of the Self-Compassion Scale (SCS), the Positive Mental Health Questionnaire (PMHQ), and the Jefferson Scale of Empathy – Health Professions Students version (JSE-HPS). Unstandardised coefficients (B), standard errors (SE), and 95% confidence intervals (CI) reflect the model-implied asymptotic covariance matrix. Standardised coefficients (β) are provided for interpretability. Model fit evaluation follows conventional SEM criteria: CFI/TLI ≥ 0.90 indicate acceptable fit; RMSEA ≤ 0.08 indicates acceptable fit; and SRMR ≤ 0.10 denotes borderline-to-acceptable residual levels (Hu and Bentler, 1999; Kline, 2016). All indirect effects were computed as the product of structural paths (a × b).

* For the JSE-HPS, item 18 was excluded following confirmatory factor analysis due to consistently low factor loadings. Accordingly, the theoretical score range was revised from 20–140 to 19–133. All descriptive statistics and subsequent analyses are based on the revised 19-item version.

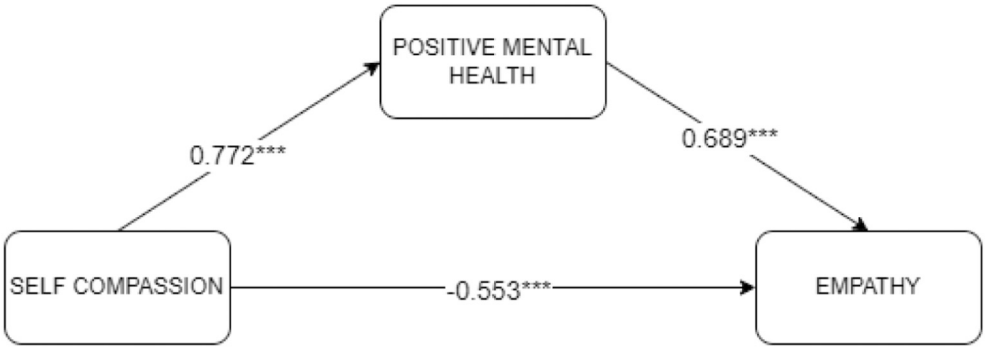

Fig. 1. Mediation model.

substantial, the direct effect of self-compassion on empathy became negative when controlling for positive mental health. From a compassion-based perspective, this pattern may be interpreted in light of Gilbert's distinction between affiliative–soothing regulation and defensive self-protective responses (Gilbert, 2009, 2014). When self-compassion is not embedded within a broader context of psychological integration, it may be associated with a prioritisation of self-soothing and emotional protection over interpersonal engagement, rather than facilitating it.

In nursing students, exposed to sustained emotional demands this could reflect an adaptive coping strategy aimed at preventing emotional overload, involving relational costs. This is consistent with ~~prior~~ research suggesting that certain forms of self-focused coping, when not integrated with relational regulation, may be associated with emotional distancing (Inwood and Ferrari, 2018; Duarte et al., 2016). Crucially, the strong positive indirect effect observed here indicates that self-compassion associated with higher positive mental health (reflecting a more integrated psychological profile) is, in turn, related to enhanced empathic capacity. This dual-pathway pattern helps to clarify inconsistencies in the literature regarding the direct relationship between these constructs.

From a methodological perspective, the refinement of the empathy measurement model further supports the robustness of the findings. The removal of Item 18, which has shown instability in previous studies (Paro et al., 2012; Montanari et al., 2015; Díaz Valentín et al., 2019), improved model fit without compromising theoretical coherence. This minimises the likelihood that the observed effects are measurement artifacts and supports the validity of the scale in this population.

The potential educational implications of these findings are noteworthy. Instead of focusing exclusively on empathic skills training, the present results suggest the value of considering students' mental health and emotional regulation capacities. Integrating self-compassion training and positive mental health promotion into nursing curricula could foster a more sustainable form of empathy, grounded in psychological resilience rather than emotional depletion. From a pedagogical perspective, these findings point to the importance of supporting nurse educators in recognising and modelling emotional regulation and self-compassion within both classroom and clinical learning environments (Wang et al., 2025). Exploring how to embed these principles into teaching strategies and supervision practices may help mitigate empathic erosion and promote emotionally sustainable professional development. Evidence from compassion - and mindfulness-based interventions further supports their effectiveness in enhancing well-being and empathy among healthcare students (Kirby et al., 2017; Luberto et al., 2018; Teskereci et al., 2020).

Overall, this study contributes to refining the conceptualisation of empathy as a relational capacity that may be anchored in internal psychological conditions. PMH emerges as a key correlate through which self-compassion is statistically linked to empathic engagement, offering an integrative framework that links intrapersonal regulation with interpersonal functioning (Ryff, 2014; Hall et al., 2016). While these findings provide a theoretical basis for considering curriculum design and student support initiatives, further research is needed to determine the practical impact of such interventions on humanised and ethically grounded nursing care.

5. Limitations and prospects

Despite its contributions, several limitations warrant cautious consideration in this study. First, the cross-sectional design precludes causal inference, and recruitment from a single institution may limit the generalisability of the findings. Second, the mediation model demonstrated a borderline to marginal fit. Specifically, the CFI (0.887) and TLI (0.884) fell below the conventional 0.90 threshold, while the RMSEA (0.083) and SRMR (0.101) reached values that suggest potential model misspecification. Although complex latent structures estimated via DWLS can yield lower incremental fit indices, these methodological factors do not fully account for the observed values. Similarly, the measurement model for the PMHQ demonstrated a marginal incremental fit, with CFI and TLI values (0.881 and 0.871, respectively) below the 0.90 threshold. While these indices are consistent with the complexity of a 39-item scale, they necessitate a more measured interpretation of the construct's structural adequacy in this sample. Consequently, the structural conclusions should be interpreted as providing indicative evidence of the proposed associations rather than definitive parameters, as a certain degree of misspecification cannot be entirely ruled out.

Another limitation concerns the refinement of the empathy measurement model. The removal of Item 18 from the JSE-HPS, while improving internal consistency and model stability, may limit direct comparability with studies using the full original scale. Future research should therefore exercise caution when comparing effect sizes across different versions of the instrument. Furthermore, regarding the assessment of CMB, although no dominant single-method factor was clearly identified through CFA comparisons, these procedures cannot entirely rule out the presence of shared method variance.

Notwithstanding these constraints, the study has methodological strengths, including the use of validated instruments and the application of a latent variable SEM framework with the DWLS estimator, which is appropriate for the ordinal and non-normal nature of the data. These procedures enhance the statistical robustness of the observed correlations within this specific sample.

Looking ahead, future research should adopt longitudinal or experimental designs to examine temporal ordering and explore directional pathways among self-compassion, PMH, and empathy. Multi-institutional studies would further enhance external validity, while multi-method approaches combining self-report with behavioural or qualitative data could provide a more nuanced understanding of these interrelations in clinical settings. Such extensions will be essential to further clarify the role of psychological well-being in fostering

sustainable empathy in nursing education.

6. Conclusion

This study suggests that empathy in nursing students may be facilitated when supported by intrapersonal resources such as self-compassion and psychological well-being. Specifically, the findings point to positive mental health as a key correlate in the association between self-compassion and empathy, rather than a direct mechanistic bridge. The observed dual-pathway pattern indicates that self-compassion is related to empathic capacity primarily when associated with higher levels of positive mental health, reflecting a more integrated psychological profile. Conversely, in the absence of such well-being, self-compassion may be associated with self-protective processes that do not necessarily correspond to greater interpersonal engagement.

From an educational perspective, these results highlight the potential value of considering psychological well-being within nursing curricula. Rather than focusing exclusively on empathic skills training, nursing education could benefit from exploring the cultivation of PMH and emotional regulation as supportive conditions for relational engagement. While interventions such as mindfulness-based training, or reflective practice has shown promise in other contexts, further research is required to determine their long-term impact on the empathic competence of nursing students.

In clinical and organisational settings, the results are consistent with the view that prioritising the emotional well-being of future professionals may be associated with more sustainable therapeutic relationships. Within the limits of this cross-sectional study, the findings suggest that promoting positive mental health across educational trajectories could contribute to an environment conducive to humanised care. However, these implications should be interpreted with caution, and multi-institutional longitudinal studies are needed to confirm the practical applicability of these associations.

CRediT authorship contribution statement

Montserrat Sanromà-Ortiz: Writing – review & editing, Writing – original draft, Methodology, Formal analysis, Data curation, Conceptualization. **Judith Roca:** Writing – review & editing, Writing – original draft, Formal analysis. **Alba Torné-Ruiz:** Writing – review & editing, Methodology, Formal analysis, Data curation, Conceptualization. **Daniel Medel:** Writing – review & editing, Writing – original draft, Formal analysis. **Gloria Tort-Nasarre:** Writing – review & editing, Writing – original draft. **Aida Bonet:** Writing – review & editing, Writing – original draft, Supervision, Methodology, Formal analysis, Data curation, Conceptualization.

Ethics statement

The study received approval from the Ethics, Research, and Knowledge Transfer Committee of the University of Lleida, Spain (reference CERT33, June 2024) and was conducted in full accordance with the principles outlined in the Declaration of Helsinki.

Declaration of Generative AI and AI-assisted technologies in the writing process

During the preparation of this work, the author(s) used ChatGPT by OpenAI to improve the readability and language of the manuscript. After using this tool, the author(s) carefully reviewed and edited the content as needed and take(s) full responsibility for the content of the published article.

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Declaration of competing interest

All authors declare there is no conflict of interest.

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Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.nedt.2026.107137.

Data availability

The dataset generated and analysed during the current study forms part of a broader ongoing research project. In accordance with ethical considerations and institutional agreements, including those with the Jefferson College of Health Professions, only limited data can be made publicly available at this stage. Access to anonymised datasets may be granted upon reasonable request to the corresponding author, subject to the approval of the relevant institutional bodies. The data used in this manuscript have not been reported in any other publications, nor are they under review elsewhere.

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Glossary

AGReMA: a guideline for reporting mediation analyses
α (Cronbach's alpha): measure of internal consistency reliability of a scale
β (Beta coefficient): standardised regression coefficient indicating the strength and direction of the relationship between variables
CFA: confirmatory factor analysis
CFI: comparative fit index, a measure of model fit in structural equation modelling
CMB: common method bias; assessment of variance attributable to measurement method rather than constructs of interest
DWLS: diagonally weighted least squares, an estimation method for non-normal data in structural equation modelling
K–S: Kolmogorov–Smirnov test, a statistical test for normality
MCAR: missing completely at random, a pattern of missing data that is random and unrelated to any variable
ML: maximum likelihood, an estimation method in statistical modelling
MLR: maximum likelihood with robust standard errors, a variant of maximum likelihood estimation that is robust to non-normality
PMHQ: Positive Mental Health Questionnaire
Q–Q plot: Quantile–Quantile plot, a graphical method to assess whether data follow a given distribution
RMSEA: root mean square error of approximation; a measure of model fit in structural equation modelling
SCS: Self-Compassion Scale
SEM: structural equation modelling
SRMR: standardised root mean square residual; a measure of model fit in structural equation modelling
STROBE: strengthening the reporting of observational studies in epidemiology
S–W: Shapiro–Wilk test, a statistical test for normality
TLI: Tucker–Lewis Index, a measure of model fit in structural equation modelling
VIF: variance inflation factor, a measure of multicollinearity in regression analysis