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Expression and Functional Use of Emotions as Predictors of Clinical Reasoning in Undergraduate Nursing Students: A Cross-Sectional Study

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Abstract **Background:** Clinical reasoning (CR) involves intertwined cognitive and affective processes, yet the specific contribution of emotional competence (EC) sub-dimensions to CR remains underexplored in undergraduate nursing education. Identifying which EC components matter can inform targeted, low-cost educational routines to support decision quality and patient safety. **Aim:** To examine the association between EC and CR and to determine, among PEC dimensions (intrapersonal, interpersonal) and the ten PEC sub-dimensions, which independently predict CR in undergraduate nursing students. **Methods:** A cross-sectional study was conducted in Morocco (Tanger-Tétouan-Al Hoceïma region, March-May 2025). Students completed the Profile of Emotional Competence (PEC, 50 items) and the Nurses' Clinical Reasoning Competence Scale (NCRCS). Analyses included descriptive statistics, Pearson/Spearman correlations and multiple linear regressions. **Results:** Clinical reasoning (CR) was positively associated with both intrapersonal emotional competence (EC) ($r = 0.23$, $p<0.01$) and interpersonal EC ($r = 0.19$, $p<0.01$). In the two-dimensional model, the regression was significant ($F(2, 308) = 11.27$, $p<0.001$, $R^2 = 0.07$), with independent contributions from intrapersonal EC ($\beta = 0.19$, $p = 0.002$) and interpersonal EC ($\beta = 0.13$, $p = 0.027$). In the ten-subdimension model, overall fit remained significant ($F(10, 300) = 3.56$, $p<0.001$, $R^2 = 0.106$, adjusted $R^2 = 0.076$). Two intrapersonal subdimensions, emotional expression ($\beta = 0.15$, $p = 0.013$) and task-oriented use of emotions ($\beta = 0.17$, $p = 0.005$), emerged as independent predictors of CR when modeled simultaneously. **Conclusion:** Two intrapersonal emotional micro-skills, expressing emotions and using them in a task-oriented way are priority targets to strengthen clinical reasoning. Embedding brief metacognitive prompts and structured debriefings (including simulation) may offer scalable, cost-effective ways to improve decision quality in undergraduate nursing.

Key Words Clinical Reasoning, Emotional competence, Nursing students, Nursing Education

INTRODUCTION

Clinical reasoning (CR) is a major determinant of care quality and patient safety. It integrates cue collection, hypothesis generation and appraisal, evidence evaluation and in-situ decision-making, engaging cognitive, metacognitive and affective processes whose integration conditions the reliability of judgment [1,2]. Emotions do not operate in the background; they guide attention, evidence appraisal and choices, with potential effects on bias and diagnostic error [3,4]. In nursing education, the development of CR increasingly relies on active and authentic approaches: simulation, virtual patients and problem-based learning, with documented effects on judgment and decision-making [5, 6].

Across health systems, strengthening non-technical skills: communication, emotion regulation, teamwork is central to patient-safety policies [7]. In Morocco, this objective is embedded in the recent health-system reform and aligned with the regional orientations of the World Health Organization's Eastern Mediterranean Regional Office [8]. Studies from hospital and primary care settings in Morocco suggest that a structured safety culture and professional capacity building contribute to better care [9].

Nursing education is therefore encouraged to align CR with non-technical skills, including emotional competence (EC), to support safer and context-sensitive decisions.

EC comprises five cross-cutting components, identification, understanding, expression, regulation and use of emotions, assessed at the intrapersonal (self) and interpersonal (others) levels [10]. The Profile of Emotional Competence (PEC; 50 items) provides a multi-level operationalization global score, two dimensions, ten sub-dimensions with established psychometric properties [10]. This granularity is pertinent to explore differential effects of emotional components on complex performances such as CR.

Among nursing students, several studies link EC with clinical performance, decision making and academic success [11,12]. However, most rely on global scores and do not test the unique effect of each sub-dimension when modeled simultaneously, which limits the identification of precise pedagogical targets and their curricular translation [12]. Alignment with contemporary learning environments enables brief, low-cost instructional routines, structured debriefings and short metacognitive prompts, that make the impact of affective states on reasoning steps visible and explicitly connect affect, cues and action choices [13,14]. These didactic principles are consistent with recommendations for teaching CR and making expert strategies explicit [15].

Objectives

The aim of this study was to assess the association between EC and CR among undergraduate nursing students and to identify among the two PEC dimensions (intrapersonal, interpersonal) and the ten sub-dimensions those that independently predict CR when modeled simultaneously.

METHODS

Study Design and Setting

A cross-sectional study was conducted and reported in accordance with STROBE [16]. Data were collected in Morocco at the Higher Institutes of Nursing and Health Techniques in the Tanger-Tétouan-Al Hoceïma region from March 3 to May 2, 2025.

Participants

The target population comprised second- and third-year undergraduate students in nursing and midwifery (N = 1,501; year 2 = 802; year 3 = 699). Stratified random sampling proportional to year was applied. Sample size was calculated with Cochran's formula with finite-population correction (required n = 306); a target of n = 360 was set to offset nonresponse. Complete cases included in analyses were n = 311. Inclusion criteria were enrollment in semester 3/5, presence on data-collection day and written informed consent; exclusion criterion was incomplete questionnaires.

Procedure

A pilot (n = 40) tested clarity and timing; pilot data were excluded from analyses. Questionnaires were paper-based, self-administered under standardized instructions and supervised on site.

Measures

- **Clinical reasoning (CR):** Nurses' Clinical Reasoning Competence Scale (NCRCS; 15 items, 1-5 Likert) [17]. The total score was the mean of items (higher = better CR); Cronbach's α = 0.75
- **Emotional competence (EC):** Profile of Emotional Competence (PEC; 50 items, 1- 5 Likert) [10]. We computed the global score, two dimensions (intrapersonal, interpersonal) and the ten sub-dimensions; Cronbach's α = 0.78
- Sociodemographic variables were collected but not modeled

Statistical Analysis

Analyses were conducted in IBM SPSS v27. Descriptive statistics summarized all variables. Primary associations were estimated with Spearman's rho; Pearson correlations were examined as sensitivity analyses. Two multiple linear regression models were fitted: (1) CR as a function of intrapersonal and interpersonal EC; and (2) CR as a function of the ten PEC sub-dimensions entered simultaneously. Statistical significance was set at two-sided α = 0.05. Model assumptions (normality, independence, homoscedasticity) were checked.

Ethics

The study complied with the Declaration of Helsinki and institutional standards. Authorization was obtained from the Regional Health Directorate of Tanger-Tétouan- Al Hoceïma (Ref. 3508). Participation was voluntary and anonymous; all students received study information and provided written informed consent.

RESULTS

Participants

We analyzed 311 complete cases. These came from a source population of 1,501 second- and third-year students (year 2 = 802; year 3 = 699). After the pilot (n = 40) and exclusions for incomplete questionnaires, the analytic sample was finalized.

Descriptives and Reliability

Overall levels were moderate and relatively homogeneous. The EC global mean was 3.04 (SD 0.27; range 2.28-4.20). The intrapersonal EC mean was 3.02 (SD 0.33), while the interpersonal EC mean was 3.06 (SD 0.34). In parallel, CR averaged 3.32 (SD 0.55; range 1.53-5.00). Internal consistency was acceptable for all scales: NCRCS α = 0.75, PEC global α = 0.78, intrapersonal α = 0.77 and interpersonal α = 0.73 (Table 1).

Table 1: Descriptive statistics and reliability (N = 311)

Variable	M	SD	Min-Max	α
Global EC	3.04	0.27	2.28-4.20	0.78
Intrapersonal EC	3.02	0.33	1.60-4.36	0.77
Interpersonal EC	3.06	0.34	2.28-5.00	0.73
Global CR	3.32	0.55	1.53-5.00	0.75

M: Mean, SD: Standard deviation, α: Cronbach's alpha, EC: Emotional competence, CR: Clinical reasoning

Table 2: Correlations between clinical reasoning (CR) and emotional competence (EC) (N = 311)

EC predictor	Coefficient	Value	p-value
Dimensions (Pearson)			
Intrapersonal EC	r	0.23	<0.001
Interpersonal EC	r	0.19	0.001
Sub-dimensions (Spearman)			
Identification (intra)	ρ	0.13	<0.05
Understanding (intra)	ρ	-0.06	n.s.
Expression (intra)	ρ	0.16	<0.01
Regulation (intra)	ρ	0.13	<0.05
Use (intra)	ρ	0.19	<0.001
Identification (inter)	ρ	0.08	n.s.
Understanding (inter)	ρ	0.07	n.s.
Expression (inter)	ρ	0.09	n.s.
Regulation (inter)	ρ	0.14	<0.05
Use (inter)	ρ	0.06	n.s.

r: Pearson correlation (dimensions); ρ: Spearman correlation (sub-dimensions); two-sided p. Only Expression (intra) and Use (intra) remain significant, Abbreviations: EC: Emotional competence; CR: Clinical reasoning; PEC: Profile of Emotional Competence; n.s.: Not significant

Table 3: Two-dimensional regression model (N = 311)

Predictor	B	SE	Beta	p-value
Intrapersonal EC	0.32	0.10	0.19	0.002
Interpersonal EC	0.21	0.10	0.13	0.027

Model statistics: F(2, 308): 11.27, R^2: 0.07, Adjusted R^2: 0.06, Durbin-Watson: 1.96, Abbreviations: EC: Emotional competence, CR: Clinical reasoning, B: Unstandardized coefficient, SE: Standard error, Beta: standardized coefficient, two-sided

Table 4: Ten-sub-dimensional regression model (N = 311)

PEC sub-dimension	B	SE	Beta	T	p-value
Identification (intrapersonal)	0.06	0.06	0.06	1.03	0.302
Understanding (intrapersonal)	-0.08	0.06	-0.09	-1.47	0.144
Expression (intrapersonal)	0.14	0.06	0.15	2.50	0.013
Regulation (intrapersonal)	0.05	0.05	0.05	0.84	0.404
Use (intrapersonal)	0.15	0.05	0.17	2.81	0.005
Identification (interpersonal)	0.02	0.05	0.03	0.46	0.645
Understanding (interpersonal)	0.05	0.06	0.05	0.80	0.423
Expression (interpersonal)	0.04	0.04	0.05	0.87	0.385
Regulation (interpersonal)	0.05	0.06	0.06	0.93	0.351
Use (interpersonal)	0.01	0.05	0.02	0.30	0.763

Two-sided p-values, significance set at 0.05. Abbreviations: PEC: Profile of Emotional Competence, B: Unstandardized coefficient, SE: Standard error, Beta: Standardized coefficient, t: t statistic

Associations between CR and EC

The CR was correlated positively with both EC dimensions. The intrapersonal correlation was r = 0.23 (p<0.001) and the interpersonal correlation was r = 0.19 (p = 0.001). At the sub-dimension level, two intrapersonal components remained significant: Expression (ρ = 0.16, p<0.01) and Use (ρ = 0.19, p<0.001). The other sub-dimensions did not retain significance (Table 2).

Two-Dimensional Regression Model

We next examined unique contributions of the two EC dimensions. The model was significant (F (2,308) = 11.27, p<0.001) and explained 7% of the variance in CR (R^2 = 0.07). Intrapersonal EC showed an independent association (β = 0.19, p = 0.002). Interpersonal EC also contributed (β = 0.13, p = 0.027) (Table 3).

Ten Sub-Dimensional Regression Model

To refine targets, we entered the ten PEC sub-dimensions simultaneously. The model was significant (F(10,300) = 3.56, p<0.001) with R^2 = 0.106 and adjusted R^2 = 0.076. Two intrapersonal predictors were independently associated with CR: Emotional Expression (β = 0.15, p = 0.013) and Use of Emotions (β = 0.17, p = 0.005). No interpersonal sub-dimension remained significant at α = 0.05 when modeled simultaneously (Table 4).

DISCUSSION

In our sample, emotional competence (EC) and clinical reasoning (CR) showed moderate, relatively homogeneous levels. Beyond the positive associations between CR and EC (intra- and interpersonal dimensions), the simultaneous analysis of the ten sub- dimensions highlighted two intrapersonal targets, emotional expression and task- oriented use of emotions, as independent predictors of CR. These findings suggest that explicitly training both the mobilization of emotion for task goals and its accurate verbalization may strengthen CR in undergraduate nursing students.

These results align with recent nursing literature linking EC to clinical performance, decision making and academic outcomes in students [11,12]. They also fit contemporary decision-making accounts in which emotions guide attention, evidence appraisal and hypothesis prioritization, with implications for bias and diagnostic error [3,4], as well as foundational descriptions of CR processes in health-professions education [1,2]. In addition, updated syntheses outline how CR is taught across programs [18].

Our findings are compatible with instructional designs that make reasoning visible, explicit strategy talk, authentic and progressively challenging tasks and timely feedback, consistent with recent guidance on CR teaching [18]. Consolidated evidence base supports technology-enhanced simulation to develop clinical and decision-making skills [19] and virtual simulation/virtual patients enable concise metacognitive prompts followed by debriefings that connect affect, cues and action choices [20]. Furthermore, structured debriefings can scaffold guide reflection and self-regulation [21]. Assessment approaches such as the objective structured clinical examination complement these strategies and help capture behavioral indicators of performance [22,23].

Alignment with our prior work in the same population further strengthens the overall picture: self-efficacy emerged as a major predictor of CR, perceived stress was not predictive and selected features of the clinical learning environment remained correlated with CR [24]. The present study complements that picture by identifying two intrapersonal emotional levers. Taken together, these results point to complementary pathways, motivational-cognitive (self-efficacy) and emotional (expression and use), that can be trained jointly within reasoning activities without disproportionate curricular burden. Consistently, recent Moroccan data indicate that development of emergency- care competencies among new graduates remains sensitive to training quality and learning environments [25], reinforcing the value of targeted emotional micro- competencies closely coupled to reasoning tasks. Finally, emerging technology enhanced strategies suggest additional, scalable avenues to support CR.

CONCLUSIONS

Our results identify two intrapersonal levers to improve clinical reasoning in nursing students: emotional expression and task-oriented use of emotions, which support cue gathering, hypothesis prioritization and decision making. Aligned with judgment models and current pedagogy, these targets lend themselves to brief, integrable and evaluable interventions.

Limitations

This study has several limitations. First, the use of self-reported measures may introduce social desirability bias. Second, it was conducted in a regional context, which constrains generalizability. Finally, the explained variance is moderate, as is typical for multifactorial competencies in health-professions education [18,19]. In practice, these points call for intervention studies in authentic settings with behavioral indicators (simulation, OSCE) and, ideally, longitudinal follow-up [22,23].

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Ethical Statement

All student participants provided written informed consent for participation.

REFERENCES

[1] Simmons, B. "Clinical reasoning: concept analysis." *Journal of Advanced Nursing*, vol. 66, no. 5, 2010, pp. 1151-1158. https://doi.org/10.1111/j.1365-2648.2010.05262.x.

[2] Croskerry, P. "A universal model of diagnostic reasoning." *Academic Medicine*, vol. 84, no. 8, 2009, pp. 1022-1028. https://doi.org/10.1097/ACM.0b013e3181ace703.

[3] Lerner, J.S. *et al.* "Emotion and decision making." *Annual Review of Psychology*, vol. 66, 2015, pp. 799-823. https://doi.org/10.1146/annurev-psych-010213-115043.

[4] Croskerry, P. "From mindless to mindful practice—cognitive bias and clinical decision making." *The New England Journal of Medicine*, vol. 368, no. 26, 2013, pp. 2445-2448. https://doi.org/10.1056/NEJMp1303712.

[5] Delavari, S. *et al.* "Teaching and learning clinical reasoning skill in undergraduate medical education: a scoping review." *PLoS One*, vol. 19, no. 8, 2024, e0309606. https://doi.org/10.1371/journal.pone.0309606.

[6] Giuffrida, S. *et al.* "Teaching strategies of clinical reasoning in advanced nursing clinical practice: a scoping review." *Nurse Education in Practice*, vol. 67, 2023, 103548. https://doi.org/10.1016/j.nepr.2023.103548.

[7] World Health Organization. *Quality and Patient Safety*. World Health Organization, 2023. Accessed December 2025. https://www.who.int/teams/integrated-health-services/quality-health-services.

[8] Harfaoui, W. *et al.* "The new reform of the national health system in Morocco: an opportunity to meet the challenges and improve the practice of anesthesiology." *Cureus*, vol. 16, no. 4, 2024, e57841. https://doi.org/10.7759/cureus.57841.

[9] Fassi, C.F. *et al.* "Assessment of patient safety culture in Moroccan primary health care: a multicentric cross-sectional study." *BMC Nursing*, vol. 23, 2024, p. 189. https://doi.org/10.1186/s12912-024-01864-6.

[10] Brasseur, S. *et al.* "The Profile of Emotional Competence (PEC): development and validation." *PLoS One*, vol. 8, no. 5, 2013, e62635. https://doi.org/10.1371/journal.pone.0062635.

[11] Meyer, H.M. "Understanding emotional intelligence and its relationship to clinical reasoning in senior nursing students: a mixed methods study." *Journal of Professional Nursing*, vol. 46, 2023, pp. 187-196. https://doi.org/10.1016/j.profnurs.2023.03.010.

[12] Sutil-Rodríguez, E. *et al.* "Emotional intelligence, health and performance in nursing students: a systematic review." *Journal of Nursing Education*, vol. 63, no. 10, 2024, pp. 686-692. https://doi.org/10.3928/01484834-20240614-03.

[13] Posel, N. *et al.* "Twelve tips to support the development of clinical reasoning skills using virtual patient cases." *Medical Teacher*, vol. 37, no. 9, 2015, pp. 813-818. https://doi.org/10.3109/0142159X.2014.993951.

[14] Kononowicz, A.A. *et al.* "Virtual patients—what are we talking about? A framework to classify the meanings of the term in healthcare education." *BMC Medical Education*, vol. 15, 2015, p. 11. https://doi.org/10.1186/s12909-015-0296-3.

[15] Rencic, J. "Twelve tips for teaching expertise in clinical reasoning." *Medical Teacher*, vol. 33, no. 11, 2011, pp. 887-892. https://doi.org/10.3109/0142159X.2011.558142.

[16] von Elm, E. *et al.* "The Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) statement: guidelines for reporting observational studies." *The Lancet*, vol. 370, no. 9596, 2007, pp. 1453-1457. https://doi.org/10.1016/S0140-6736(07)61602-X.

[17] Liou, S.R. *et al.* "The development and psychometric testing of a theory-based instrument to evaluate nurses' perception of clinical reasoning competence." *Journal of Advanced Nursing*, vol. 72, no. 3, 2016, pp. 707-717. https://doi.org/10.1111/jan.12831.

[18] Elvén, M. *et al.* "Clinical reasoning curricula in health professions education: a scoping review." *Journal of Medical Education and Curricular Development*, vol. 10, 2023, 23821205231209093. https://doi.org/10.1177/23821205231209093.

[19] Su, W. *et al.* "Effectiveness of high-fidelity simulation in nursing education: an umbrella review." *Nurse Education in Practice*, vol. 45, 2020, 102818. https://doi.org/10.1016/j.nepr.2020.102818.

[20] Alsharari, A.F. *et al.* "Effectiveness of virtual clinical learning in nursing education: a systematic review." *BMC Nursing*, vol. 24, no. 1, 2025, p. 432. https://doi.org/10.1186/s12912-025-03076-y.

[21] Duff, J.P. *et al.* "Debriefing methods for simulation in healthcare: a systematic review." *Simulation in Healthcare*, vol. 19, no. 1 Suppl., 2024, pp. S112-S121. https://doi.org/10.1097/SIH.0000000000000765.

[22] Harden, R.M. "Revisiting 'Assessment of clinical competence using an objective structured clinical examination (OSCE)'." *Medical Education*, vol. 50, no. 4, 2016, pp. 376-379. https://doi.org/10.1111/medu.12801.

[23] Dewan, P. *et al.* "Objective structured clinical examination for teaching and assessment: evidence-based critique." *Clinical Epidemiology and Global Health*, vol. 25, 2024, 101477. https://doi.org/10.1016/j.cegh.2023.101477.

[24] Arhoun, S. *et al.* "Factors influencing clinical reasoning in Moroccan nursing students: the role of self-efficacy, stress and the clinical learning environment." *International Journal of Environmental Science*, vol. 11, no. 7, 2025, pp. 677-684. https://doi.org/10.64252/ewmgez27.

[25] Mramel, M. *et al.* "Predictors and levels of high-risk/emergency management competence among newly qualified midwives in Morocco: a cross-sectional study." *Pacific Rim International Journal of Nursing Research*, vol. 29, no. 1, 2025, pp. 108-121. https://doi.org/10.60099/prijnr.2025.270039.