

Emotional Intelligence Training and Nursing Performance Across Time: A Randomized Controlled Trial in Madinah Hospitals

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ABSTRACT:

Background: Emotional intelligence (EI) is increasingly treated as a trainable professional competency, yet evidence connecting EI education to practicing nurses' performance in Saudi hospitals remains limited. **Objective:** To examine nursing performance within and between experimental and control groups at baseline, one week, and three weeks after an EI training program, and to characterize the group-by-time pattern. **Methods:** A two-group randomized controlled trial enrolled 120 registered nurses from Al Haram and Alsalam Hospitals in Madinah (60 per group). The experimental group completed a four-week, 11-module EI program using lectures, discussion, case studies, reflection, role-play, and simulation; controls received routine hospital education unrelated to EI. Nursing performance was measured with an adapted nine-item Nursing Performance Instrument (range 318-325). **Results:** Experimental-group scores increased from 34.50 ± 3.38 at baseline to 39.17 ± 2.66 at week 1 and 39.28 ± 2.65 at week 3. Control scores declined from 26.68 ± 4.57 to 22.62 ± 3.88 and 22.40 ± 3.68 . Between-group differences were significant at each assessment (all $p < .001$), and the reported within-group repeated-measures test was significant in the experimental group ($F = 220.955$, $p < .001$). Difference-in-differences estimates were 8.73 points at week 1 and 9.06 points at week 3. The archived output did not include the omnibus group-by-time F statistic, so the interaction should be formally re-estimated from participant-level data before submission. **Conclusion:** EI training was associated with rapid, sustained improvement in self-reported nursing performance, but baseline imbalance and incomplete interaction reporting warrant baseline-adjusted reanalysis and cautious causal interpretation. **Keywords:** emotional intelligence, nursing performance, professional development, randomized controlled trial, Saudi Arabia

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1. Introduction

Nursing performance is enacted in clinical environments that require technical accuracy, sustained attention, emotional regulation, and effective communication with patients, families,

and multidisciplinary teams. Emotional intelligence (EI) refers to abilities involved in perceiving, understanding, using, and regulating emotion to guide thought and action (Mayer et al., 2004; Salovey & Mayer, 1990). These abilities

are educationally relevant because they can be practiced through reflection, feedback, simulation, and structured interpersonal learning rather than treated only as stable personal traits.

Evidence in nursing links EI with performance, caring behavior, communication, and professional functioning. Emotional intelligence was associated with nursing performance among nursing students (Beauvais et al., 2011), while an integrative review found that EI in healthcare professionals may support caring behavior toward patients (Nightingale et al., 2018). For practicing nurses, a brief intervention increased EI (Kozlowski et al., 2018), and a randomized trial among intensive care nurses found benefits of EI education for general health (Sharif et al., 2013). More recent reviews conclude that EI programs generally improve EI and communication-related outcomes, although heterogeneity and methodological weaknesses may inflate effects (Kawashima et al., 2025; Powell et al., 2024; Saikia et al., 2024).

The Saudi hospital context provides a strong rationale for examining structured EI education among a culturally diverse workforce serving local residents and international visitors. Madinah hospitals operate under high patient turnover and emotionally demanding conditions, making emotional self-regulation, empathy, and communication directly relevant to safe practice. Nevertheless, intervention evidence from practicing nurses in Saudi Arabia remains limited, particularly evidence with repeated assessment after training.

The objective of this manuscript was to examine the effectiveness of a structured EI training program on nursing performance within and between experimental and control groups and to evaluate the pattern of change across baseline, week 1, and week 3. The primary hypothesis was that nursing performance would improve over time in the experimental group relative to the control group, producing a group-by-time interaction.

2. Methodology

Design and setting

A two-group randomized controlled trial was conducted between January and June 2026 at Al Haram Hospital and Alsalam Hospital in Madinah, Kingdom of Saudi Arabia. Reporting was structured with reference to CONSORT 2025 and the TIDieR framework for intervention description (Hoffmann et al., 2014; Hopewell et al., 2025). Assessments were completed at baseline (T0), one week after the intervention (T1), and three weeks after the intervention (T2).

Participants and sample size

The source population comprised 450 registered nurses in direct patient-care roles across the two hospitals. Eligible nurses were employed in either hospital, had at least six months of continuous clinical experience in their current role, worked in a direct-care unit, had sufficient English proficiency for the training and questionnaires, and could attend the intervention and follow-up assessments. Nurses on long-term leave, participating in another EI or psychosocial program, or working exclusively in administrative roles were excluded.

G*Power 3.1 was used for an a priori repeated-measures within-between interaction calculation (Faul et al., 2009), assuming a medium effect ($f = 0.25$), $\alpha = .05$, and 90% power. The calculated minimum was 92 participants; allowance for attrition increased the target, and 120 nurses were enrolled (60 per group). The source document reported complete outcome summaries for all 120 participants at the three assessment points.

Randomization and masking

After written consent and baseline assessment, participants were randomized using a computer-generated list stratified by hospital and unit type (intensive care versus non-intensive care). Variable block sizes were used, and allocation was concealed in sequentially numbered, opaque, sealed envelopes prepared by a researcher not involved in recruitment or data collection. Participant and trainer masking was not feasible; outcome assessors and data analysts were described as blinded to allocation.

Intervention and comparison

The experimental group completed a four-week, 11-module EI training program delivered by facilitators with nursing education, psychology, and EI-training experience. Content covered the foundations of EI; emotional self-awareness; self-regulation; motivation; empathy; verbal and nonverbal communication; relationship and conflict management; mindfulness and stress management; teamwork; leadership; and

application to patient-care and counseling scenarios. Teaching strategies combined short lectures with discussion, case analysis, guided reflection, role-play, and simulation. Attendance was monitored, and participants received handouts and workbooks. The control group continued routine institutional education on topics such as infection control, patient safety, quality improvement, and continuing professional development, without explicit EI content.

Table 1. Core components of the emotional intelligence training program

Component	Content focus	Learning methods
Awareness	Recognizing emotions, triggers, and emotional cues in self and others	Mini-lectures, emotion compass exercises, reflection
Regulation	Managing stress, maintaining composure, and using emotion constructively	Mindfulness, coping practice, guided debriefing
Empathy and communication	Perspective-taking, active listening, nonverbal cues, and culturally sensitive communication	Case discussion, difficult-patient and bad-news role-play
Team and practice application	Conflict management, teamwork, leadership, and emotionally intelligent clinical decision-making	Simulation, peer feedback, emergency scenarios

Note. The source thesis described 11 modules delivered across four weeks; related modules are grouped here for concise reporting.

Outcome measure

Nursing performance was assessed with an adapted version of the nine-item Nursing Performance Instrument (NPI), originally developed to measure nursing performance as a distinct construct in registered nurses (Sagherian et al., 2018). Items addressed physical task capacity, adherence to medication and patient-handling procedures, fine-motor performance, monitoring and documentation, safe practice, communication, and maintaining standards under workload. The study used a five-point response scale and a total-score range of 318-325, with scores oriented so that higher values represented better performance. The instrument was pilot-tested with 22 nurses outside the main

trial; the source document reported Cronbach's alpha values of at least .70 across the study instruments, but did not provide an NPI-specific coefficient.

Data collection and ethics

Trained research assistants administered coded questionnaires using the same procedure at all three assessment points. Forms were checked for completeness; paper records were stored in locked cabinets and electronic data in a password-protected database. The source document states that ethical approval was obtained from Lincoln University College, the Madinah Health Cluster, and participating-hospital research ethics committees. All nurses provided written informed consent, participation was voluntary,

and controls were offered EI training after follow-up. Approval reference numbers and a trial-registration number were not reported in the supplied document.

Statistical analysis

Analyses were conducted in SPSS version 24. Continuous data were summarized using means and standard deviations; categorical characteristics were summarized using frequencies and percentages. Baseline group characteristics were compared using independent-samples t tests, chi-square tests, or Fisher's exact tests as appropriate. The planned primary model was repeated-measures analysis of variance with time (T0, T1, T2) as the within-subject factor and group (experimental, control) as the between-subject factor, including the time-by-group interaction. The source output also reported independent t tests at each time point and separate within-group repeated-measures F tests. Statistical significance was set at $p < .05$.

Because participant-level data and the omnibus interaction output were not supplied, difference-in-differences values were calculated descriptively from published means, but no interaction F statistic, confidence interval, or partial eta squared was reconstructed.

3. Results

Participant characteristics

The analysis included 120 nurses, with 60 in each group. Age, gender, nationality, education, and total nursing experience were not significantly different between groups. Most nurses were 318-325 years old (50.0% experimental; 51.7% control), female (55.0%; 58.3%), and bachelor's prepared (71.7%; 55.0%). Marital status, current job title, and working unit differed significantly between groups. The experimental group also began with substantially higher NPI scores than the control group, indicating an important baseline imbalance for interpretation.

Table 2. Selected baseline characteristics by group (N = 120)

Characteristic	Experimental n (%)	Control n (%)	p
Age 318-325 years	30 (50.0)	31 (51.7)	.347
Female	33 (55.0)	35 (58.3)	.713
Married	36 (60.0)	25 (41.7)	.017
Saudi nationality	43 (71.7)	34 (56.7)	.087
Bachelor's degree	43 (71.7)	33 (55.0)	.167
Staff nurse	43 (71.7)	27 (45.0)	.001
318-325 years' experience	22 (36.7)	30 (50.0)	.213
Working unit distribution	-	-	.020

Note. p values are from the source thesis. Marital status, job-title distribution, and working-unit distribution were imbalanced at baseline.

Nursing performance over time

At baseline, the experimental group had a higher mean NPI score than the control group (34.50 ± 3.38 vs. 26.68 ± 4.57 ; $t = 10.653$, $p < .001$). At

week 1, the experimental mean increased to 39.17 ± 2.66 , whereas the control mean declined to 22.62 ± 3.88 ($t = 27.263$, $p < .001$). At week 3, the experimental gain was sustained ($39.28 \pm$

2.65) while the control group remained lower than baseline (22.40 ± 3.68 ; $t = 28.847$, $p < .001$). Percentage scores changed from 70.83% to 83.80% and 84.12% in the experimental group and from 49.12% to 37.82% and 37.22% in controls.

The reported within-group repeated-measures test was significant for the experimental group ($F = 220.955$, $p < .001$) and non-significant for controls ($F = 0.327$, $p = .611$). Based on the published means, the experimental-group change

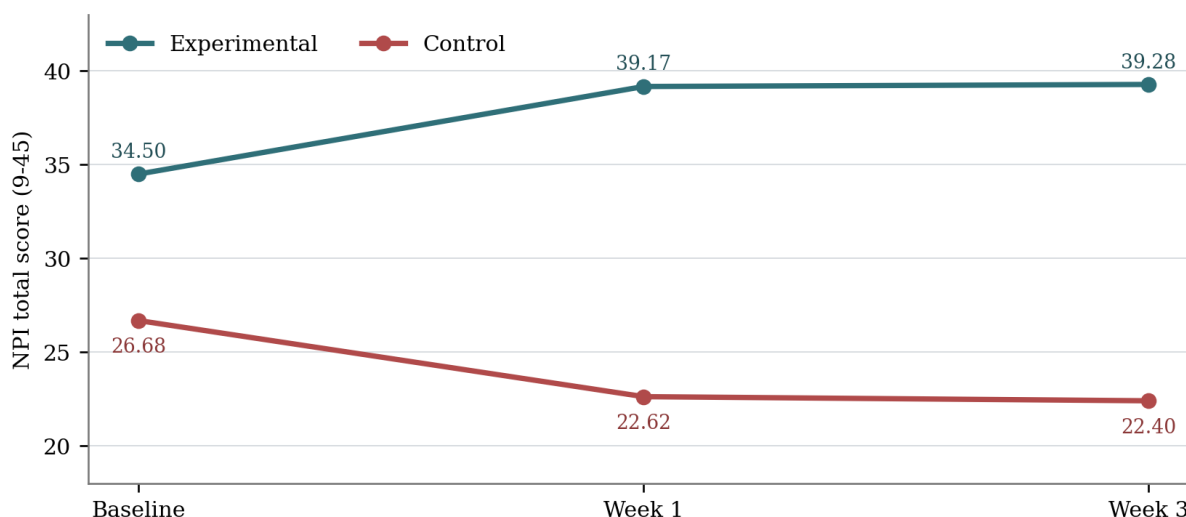
was +4.67 points at week 1 and +4.78 points at week 3; corresponding control changes were -4.06 and -4.28 points. The resulting difference-in-differences estimates were 8.73 points at week 1 and 9.06 points at week 3, showing a pronounced descriptive group-by-time divergence. The source table did not contain the planned omnibus time-by-group F statistic or partial eta squared; therefore, statistical significance of the interaction itself cannot be independently reported from the supplied summary output.

Table 3. Nursing Performance Instrument scores across the three assessment points

Assessment	Experimental mean $\pm$ SD	Control mean $\pm$ SD	Between-group t	Experimental change	Control change
Baseline	34.50 $\pm$ 3.38	26.68 $\pm$ 4.57	10.653***	Reference	Reference
Week 1	39.17 $\pm$ 2.66	22.62 $\pm$ 3.88	27.263***	+4.67	-4.06
Week 3	39.28 $\pm$ 2.65	22.40 $\pm$ 3.68	28.847***	+4.78	-4.28

Note. NPI range = 318-325; higher scores indicate better performance. *** $p < .001$. Reported within-group repeated-measures tests: experimental $F = 220.955$, $p < .001$; control $F = 0.327$, $p = .611$. The omnibus group-by-time statistic was not available in the supplied output.

Figure 1. Mean nursing performance scores by group and assessment point



Note. Values are unadjusted group means reported in the source thesis. The lines show the descriptive trajectory and do not substitute for the missing omnibus interaction test.

4. Discussion

This study examined nursing performance within and between experimental and control groups at baseline, week 1, and week 3 after a structured EI

training program. The experimental group demonstrated a rapid improvement of approximately 4.7 points on the 45-point NPI by week 1, and that gain was maintained at week 3.

In contrast, the control mean was approximately four points below baseline at both post-intervention assessments. The descriptive difference-in-differences values of 8.73 and 9.06 points indicate a substantial divergence in trajectories consistent with the hypothesized group-by-time pattern.

The findings are consistent with a growing literature suggesting that emotional competencies can be developed through education. Brief EI intervention work among nurses has shown measurable improvement (Kozłowski et al., 2018), and earlier randomized work with intensive-care nurses demonstrated sustained benefits for general health (Sharif et al., 2013). Reviews focused on nurses and the broader healthcare workforce similarly report positive EI-training effects, while cautioning that intervention heterogeneity, small samples, self-report outcomes, and incomplete reporting can overestimate effects (Kawashima et al., 2025; Powell et al., 2024; Saikia et al., 2024). The current pattern extends that literature by focusing on self-reported nursing performance rather than EI alone.

The program's experiential components provide a plausible educational mechanism. Self-awareness and emotion-regulation practice may help nurses recognize when fatigue, frustration, or anxiety threatens attention and judgment. Role-play and simulation allow participants to rehearse difficult conversations, conflict management, and emotionally charged clinical decisions in a psychologically safer environment. Reflection and peer feedback may then support transfer from conceptual EI knowledge to behavior. This interpretation is compatible with evidence linking EI to nursing performance and caring behavior (Beauvais et al., 2011; Nightingale et al., 2018).

Implications for nursing education and practice

EI development should be considered a component of continuing professional education rather than a one-time wellness activity. Hospitals could embed short EI modules within orientation, patient-safety education, preceptor

development, and leadership preparation. Priority methods include scenario-based practice, guided reflection, structured feedback, and opportunities to apply skills between sessions. Implementation should include fidelity monitoring, facilitator preparation, protected learning time, and outcome measurement extending beyond immediate post-training assessment.

The NPI domains represented in this study include safety-relevant behaviors such as medication administration, patient handling, monitoring, documentation, communication, and maintaining standards under pressure. If replicated with objective and observer-rated outcomes, EI education may complement technical training by strengthening the emotional and interpersonal conditions under which safe nursing performance is sustained.

Limitations and statistical reporting considerations

Several limitations require cautious interpretation. First, the groups were already substantially different in NPI scores at baseline, and marital status, job title, and working unit were also imbalanced. Randomization therefore did not produce full observed equivalence, and unadjusted post-test comparisons may exaggerate the intervention effect. The participant-level data should be reanalyzed using a linear mixed model or baseline-adjusted analysis that includes group, time, group-by-time, baseline NPI, hospital, unit, and other prespecified covariates, with an intention-to-treat principle and appropriate handling of missingness.

Second, the supplied results table reported separate within-group F tests and time-specific independent t tests but omitted the prespecified omnibus group-by-time statistic, degrees of freedom, confidence intervals, and partial eta squared. Moreover, the reported non-significant within-control F test should be verified against the visible decline in control means. These omissions cannot be repaired from group-level means and standard deviations because the repeated-measures covariance structure is unknown. Formal interaction results must

therefore be regenerated from participant-level data before journal submission.

Third, the NPI was self-reported and adapted to a five-point format, potentially introducing response and measurement bias. Future trials should report adaptation procedures, reverse scoring, language validation, and an NPI-specific reliability coefficient, and should add supervisor ratings, audit indicators, medication-safety events, or patient-experience measures. Fourth, participants and trainers could not be blinded, follow-up lasted only three weeks, and the two-hospital setting limits generalizability. Finally, the supplied study document did not provide a CONSORT participant-flow diagram with losses, protocol registration details, exact ethics approval numbers, intervention fidelity results, or adverse-event reporting. These items should be completed before submission (Hopewell et al., 2025).

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5. Conclusion

A structured four-week EI training program was associated with rapid and sustained improvement in self-reported nursing performance among nurses in two Madinah hospitals. Experimental-group scores improved by week 1 and remained high at week 3, while control-group scores were lower than baseline, producing a strong descriptive group-by-time divergence. The findings support EI as a potentially valuable focus for continuing nursing education. However, baseline imbalance and incomplete interaction reporting prevent definitive causal claims from the supplied summary output. Before submission and implementation at scale, the participant-level dataset should be reanalyzed with an explicit group-by-time model, baseline adjustment, complete effect-size reporting, and longer-term, multi-method outcome assessment.

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Author Declaration

Originality: The author confirms that this manuscript is original and has not been published or submitted simultaneously elsewhere.

Conflict of interest: The author declares no conflict of interest.

Funding: No external funding was reported for this study.

Ethics and consent: Ethical approval was reported from Lincoln University College, the Madinah Health Cluster, and participating-hospital research ethics committees. Written informed consent was obtained from all participants.

Trial registration: No trial-registration number was reported in the supplied study document.

Data availability: Data requests should be directed to the corresponding author, subject to ethical and institutional approvals.